The International Society of Feline Medicine (ISFM) is the veterinary arm of International Cat Care (icatcare.org), a UK based charity, first established in 1958 as the Feline Advisory Bureau (FAB). The ISFM works with the veterinary profession across the world to provide cutting edge information for the veterinary care of cats, and is a partner of the CVE in the Feline Medicine Distant Education course.

The International Society of Feline Medicine (ISFM) and the American Association of Feline Practitioners (AAFP) publish the Journal of Feline Medicine and Surgery.
Occurrence of extended spectrum beta-lactamase-producing Enterobacteriaceae among pet dogs and cats: an emerging public health threat outside health care facilities.


Abdel-Moein, K. A., and A. Samir

We aimed to investigate the potential role of pet dogs and cats in the epidemiology of extended spectrum beta-lactamase-producing Enterobacteriaceae. Twenty bacterial isolates were recovered from rectal swabs obtained from 110 dogs and cats. The occurrence of extended spectrum beta-lactamase-producing Enterobacteriaceae in pets spotlights the emergence of a significant public health threat.

Feline patent Toxoplasma-like coccidiosis among feral cats (Felis catus) in Doha city, Qatar and its immediate surroundings.


Abu-Madi, M. A., and J. M. Behnke

Doha city has a high feral cat population and studies of hospital records in Doha have shown that human toxoplasmosis also occurs. Clearly, there is a need to understand the role of cats as vectors of human toxoplasmosis in the city and as a first step we assessed the extent of patent Toxoplasma-like coccidial infections among feral cats. Oocysts in cat faeces were detected between June 2008 and April 2010, from a range of locations radiating out of the city centre in concentric semi circular/elliptic rings and by north, west and south divisions within each of the rings. In total 4,652 cats were sampled and overall prevalence of oocysts was 9.1%. Prevalence was 10.1% in the first summer, and then dropped to 8.4% in the following winter and further to 6.8% in the next summer before rising to 10.6% in the final winter of the study; this interaction between annual period and season was significant. There were also significant changes in prevalence across each of the consecutive months of the study, but no clear pattern was evident. Prevalence did not vary significantly by city sector and there was no difference in prevalence between the host sexes. We conclude therefore, that despite minor and significant perturbations, the prevalence of patent Toxoplasma-like coccidial infections among cats in Doha is remarkably stable throughout the year, across years and spatially within the city’s districts.

Pharmacological appetite stimulation: rational choices in the inappetent cat.


Agnew, W., and R. Korman

PRACTICAL RELEVANCE: Inappetence is a commonly encountered problem in feline medicine. Primary goals in managing the inappetent or anorectic cat are to diagnose and treat the underlying disease and reinstate adequate nutrition. RATIONALE: As cats are intolerant of prolonged periods of inadequate nutritional intake, especially given their propensity to develop hepatic lipidosis, their increased requirements for amino acids, and inability to slow their rate of gluconeogenesis, symptomatic therapy and nutritional support is often required during diagnostic investigations. CLINICAL CHALLENGES: Most cats presenting with reduced food intake will be suffering from an underlying systemic disease, and so the mechanism of action, pharmacokinetics and contraindications of appetite-stimulating medications will need to be considered in each case to ensure rational use of these agents. Pharmacological appetite stimulation should never replace monitoring and ensuring
adequate caloric intake, and may not be appropriate in some cases, such as critically ill or severely malnourished patients. EVIDENCE BASE: While there are no medications approved specifically for the treatment of anorexia in cats, some drugs have proven efficacious in the clinical field. Although several agents have been used historically for appetite stimulation, due to potential side effects and/or lack of efficacy or predictability only cyproheptadine and mirtazapine can currently be recommended for use.

Ganglion cyst arising from the composite occipito-atlanto-axial joint cavity in a cat.


Aikawa, T., S. Sadahiro, M. Nishimura, Y. Miyazaki, and M. Shibata

A four-year-old, female spayed Domestic Longhaired cat was referred for evaluation with a two month history of initial inability to jump progressing to ambulatory tetraparesis. Magnetic resonance imaging studies demonstrated a cystic lesion arising from the composite occipito-atlanto-axial joint cavity and extending to the region of the occipital bone and the axis. The lesion surrounded the spinal canal, causing moderate dorsal spinal cord compression at the atlanto-occipital joint. A dynamic myelographic study demonstrated attenuation of the dorsal contrast column at the atlanto-occipital joint when the cervical spine was positioned in extension. Partial excision of the cyst capsule by a ventral approach resulted in long-term (64 months) resolution of clinical signs. Histological evaluation was consistent with a ganglion cyst. An intra-spinal ganglion cyst arising from the composite occipito-atlanto-axial joint cavity may be considered as an uncommon differential diagnosis for cats with cervical myelopathy.

Electrophysiologic confirmation of heterogenous motor polyneuropathy in young cats.


Aleman, M., P. J. Dickinson, D. C. Williams, B. K. Sturges, R. A. LeCouteur, K. M. Vernau, and G. D. Shelton

BACKGROUND: Reports of motor polyneuropathies in young cats are scarce. Further, in-depth electrophysiologic evaluation to confirm a motor polyneuropathy in young cats of various breeds other than 2 Bengal cats is lacking. HYPOTHESIS/OBJECTIVES: To confirm a motor polyneuropathy in young cats of various breeds. ANIMALS: Five young cats with heterogenous chronic or relapsing episodes of weakness. METHODS: Retrospective case series. Cats were presented for evaluation of generalized neuromuscular disease and underwent electrophysiologic examination including electromyography, nerve conduction, and repetitive nerve stimulation. Minimum database and muscle and nerve biopsy analyses were carried out. Descriptive statistics were performed. RESULTS: Disease onset was at 3 months to 1 year of age and in 5 breeds. The most common clinical sign (5 of 5 cats) was weakness. Additional neurologic deficits consisted of palmigrade and plantigrade posture (4/4), low carriage of the head and tail (4/4), and variable segmental reflex deficits (5/5). Motor nerve conduction studies were abnormal for the ulnar (4/4), peroneal (5/5), and tibial (2/2) nerves (increased latencies, reduced amplitudes, slow velocities). A marked decrement was observed on repetitive nerve stimulation of the peroneal nerve in 3 cats for which autoimmune myasthenia gravis was ruled out. All sensory nerve conduction studies were normal. Histologic evaluation of muscle and nerve biopsies supported heterogenous alterations consistent with motor polyneuropathy with distal nerve fiber loss.
CONCLUSIONS AND CLINICAL IMPORTANCE: Heterogenous motor polineuropathies should be considered in young cats of any breed and sex that are presented with relapsing or progressive generalized neuromuscular disease.

**Genome-wide association and linkage analyses localize a progressive retinal atrophy locus in Persian cats.**


Hereditary eye diseases of animals serve as excellent models of human ocular disorders and assist in the development of gene and drug therapies for inherited forms of blindness. Several primary hereditary eye conditions affecting various ocular tissues and having different rates of progression have been documented in domestic cats. Gene therapy for canine retinopathies has been successful, thus the cat could be a gene therapy candidate for other forms of retinal degenerations. The current study investigates a hereditary, autosomal recessive, retinal degeneration specific to Persian cats. A multi-generational pedigree segregating for this progressive retinal atrophy was genotyped using a 63 K SNP array and analyzed via genome-wide linkage and association methods. A multi-point parametric linkage analysis localized the blindness phenotype to a ~1.75 Mb region with significant LOD scores (Z approximately 14, theta = 0.00) on cat chromosome E1. Genome-wide TDT, sib-TDT, and case-control analyses also consistently supported significant association within the same region on chromosome E1, which is homologous to human chromosome 17. Using haplotype analysis, a ~1.3 Mb region was identified as highly associated for progressive retinal atrophy in Persian cats. Several candidate genes within the region are reasonable candidates as a potential causative gene and should be considered for molecular analyses.

**High prevalence of Toxoplasma gondii antibodies in dogs in Veracruz, Mexico.**


Alvarado-Esquível, C., D. Romero-Salas, A. Cruz-Romero, Z. García-Vazquez, A. Peniche-Cárdenas, N. Ibarra-Priego, C. Ahuja-Aguirre, A. A. Perez-de-León, and J. P. Dubey

BACKGROUND: Little is known concerning the prevalence of Toxoplasma gondii infection in dogs in Mexico. Here, we investigated antibodies to T. gondii and associated risk factors in 101 dogs from an animal shelter in Veracruz State, Mexico. Canine sera were assayed for T. gondii IgG antibodies by using the modified agglutination test (MAT, cut off 1:25). RESULTS: Sixty eight (67.3%) of 101 dogs were seropositive with titers of 1:25 in 16, 1:50 in 8, 1:100 in 9, 1:200 in 10, 1:400 in 10, 1:800 in 10, 1:1600 in 3, and 1:3200 or higher in 2. None of the dogs’ characteristics studied including age, sex, breed, and history of deworming, rabies vaccination and contact with cats was associated with seroprevalence of T. gondii infection. CONCLUSION: Using the dogs as sentinel animals, the results indicate high contamination with T. gondii of the environment in Veracruz, Mexico. Results have public health implications, and further studies in Veracruz should be conducted to establish the sources of environmental contamination with T. gondii and to determine optimal preventive measures against T. gondii infection in humans.
Pathological and parasitological traits in experimentally infected cats with Gnathostoma binucleatum (Spirurida: Gnathostomatidae).


Alvarez-Guerrero, C., M. A. Munoz-Guzman, and F. Alba-Hurtado

This study aims to describe some of the unknown pathological and parasitological traits of experimental feline gnathostomosis. Thirteen female cats were orally inoculated with 30 advanced third-stage Gnathostoma binucleatum larvae and were euthanized at various post-infection (p.i.) periods. Clinically, the cats presented with nausea, vomiting, abdominal pain and other nonspecific signs. None of the cats shed eggs in their fecal matter. One cat, euthanized at 6 months p.i., developed a fibrous vascular nodule 2-3 cm in diameter within its gastric wall. The nodule contained caverns filled with mucous and bloody fluid as well as a juvenile worm. The histological characteristics of the nodule were observed, and the morphology of the juvenile worm was revealed using scanning electron microscopy. Another cat, euthanized at 10 months p.i., was found to have a larva within its diaphragm. Infected cats developed increased antibody titers against antigens of G. binucleatum adults and larvae beginning in the first month p.i., and these titers were maintained until the end of the experiment, suggesting the presence of undetected migrating larvae. The low number of cats with parasites and poor development of the parasites found suggest that cats have a low susceptibility to infection by G. binucleatum and cast doubt on the importance of domestic cats in maintaining the biological cycle of this parasite in nature.

Pharmacokinetics and pharmacodynamics of a constant rate infusion of fentanyl (5 mug/kg/h) in awake cats.


Ambros, B., J. Alcorn, T. Duke-Novakovski, A. Livingston, and P. M. Dowling

OBJECTIVE: To evaluate the pharmacokinetics and thermal and mechanical antinociceptive effects of a fentanyl constant rate infusion (CRI) in conscious cats. ANIMALS: 8 healthy adult cats. PROCEDURES: At a >/= 14-day interval, 7 cats received a loading dose (LD) of fentanyl (5 mug/kg, IV [administered at 0 hours]) followed by fentanyl infusion (5 mug/kg/h, IV) for 2 hours or similar administrations of equivalent volumes of 0.9% saline (NaCl) solution. One cat received only the fentanyl treatment. For both treatments, sedation and adverse events were evaluated and mechanical threshold (MT) and thermal threshold (TT) testing was performed prior to (baseline) and at predetermined times up to 26 hours after LD administration; plasma fentanyl concentrations were determined at similar times when the cats received fentanyl. RESULTS: Fentanyl induced mild sedation during the infusion. The only adverse effect associated with fentanyl LD administration was profuse salivation (1 cat). Saline solution administration did not significantly change MT or TT over time. For the duration of the CRI, MT and TT differed significantly between treatments, except for TT 1 hour after LD administration. For the fentanyl treatment, MT and TT were significantly higher than baseline at 0.25 to 0.75 hours and at 0.25 to 1 hour, respectively. During the fentanyl CRI, mean +/- SD plasma fentanyl concentration decreased from 4.41 +/- 1.86 ng/mL to 2.99 +/- 1.28 ng/mL and was correlated with antinociception; plasma concentrations < 1.33 +/- 0.30 ng/mL were not associated with antinociception. CONCLUSIONS AND CLINICAL RELEVANCE: Fentanyl CRI (5 mug/kg/h) induced mechanical and thermal antinociception in cats.
Arthropod-borne pathogens circulating in free-roaming domestic cats in a zoo environment in Brazil.

Ticks Tick Borne Dis (2014) 5:545-551.

Recently, tick and flea-borne pathogens have been detected in wild carnivores maintained in captivity in Brazilian zoos. Since free-roaming cats are frequently found in Brazilian zoos, they could act as reservoirs for arthropod-borne pathogens, which could be transmitted to endangered wild carnivores maintained in captivity in these institutions. On the other hand, stray cats in zoos may play a role as sentinels to pathogens that circulate among wild animals in captivity. The present work aimed to detect the presence of Anaplasmataceae agents, hemoplasmas, Bartonella species, piroplasmas, and Hepatozoon sp. DNA in blood samples of 37 free-roaming cats in a Brazilian zoo. Three (8%) cats were positive for Anaplasma spp. closed related to Anaplasma phagocytophilum; 12 (32%) cats were positive for hemoplasmas [two (5%) for Mycoplasma haemofelis, five (13.5%) for Candidatus Mycoplasma haemominutum, and five (13.5%) for Candidatus Mycoplasma turicensis]; 11 (30%) were positive for Bartonella spp., six (16%) were positive Babesia vogeli and one (3%) for Theileria sp. Coinfection with multiple arthropod-borne agents was observed in sampled cats. None of sampled cats were positive for Ehrlichia spp., Cytauxzoon spp., or Hepatozoon spp. in PCR. This is the first molecular detection of Babesia vogeli and Theileria sp. in domestic cats in Brazil. The control of the population of free-roaming cats in these conservation institutions is much needed aiming to prevent the potential transmission to endangered wild animals maintained in captivity, such as wild neotropical wild felids, as well as to human beings visiting zoos.

Effect of small interfering RNAs on in vitro replication and gene expression of feline coronavirus.


OBJECTIVE: To evaluate the ability of small interfering RNAs (siRNAs) to inhibit in vitro viral replication and gene expression of feline coronavirus (FCoV). SAMPLE: Cell cultures of Crandell-Rees feline kidney cells. PROCEDURES: 5 synthetic siRNAs that each targeted a different region of the FCoV genome were tested individually and in various combinations for their antiviral effects against 2 strains of FCoV (feline infectious peritonitis virus WSU 79-1146 and feline enteric coronavirus WSU 79-1683) in cell cultures. Tested combinations targeted the FCoV leader and 3’ untranslated region, FCoV leader region and nucleocapsid gene, and FCoV leader region, 3’ untranslated region, and nucleocapsid gene. For each test condition, assessments included relative quantification of the inhibition of intracellular viral genomic RNA synthesis by means of real-time, reverse-transcription PCR analysis; flow cytometric evaluation of the reduction of viral protein expression in infected cells; and assessment of virus replication inhibition via titration of extracellular virus with a TCID(50) infectivity assay. RESULTS: The 5 siRNAs had variable inhibitory effects on FCoV when used singly. Combinations of siRNAs that targeted different regions of the viral genome resulted in more effective viral inhibition than did individual siRNAs that targeted a single gene. The tested siRNA combinations resulted in approximately 95% reduction in viral replication (based on virus titration results), compared with findings in negative control, nontargeting siRNA-treated, FCoV-
infected cells. CONCLUSIONS AND CLINICAL RELEVANCE: In vitro replication of FCoV was specifically inhibited by siRNAs that targeted coding and noncoding regions of the viral genome, suggesting a potential therapeutic application of RNA interference in treatment of feline infectious peritonitis.

**Comparison of two techniques for ultrasound-guided axillary brachial plexus blockade in cats.**


Axillary blockade of the brachial plexus (BP) is advocated in humans and dogs for surgical procedures carried out on the foot, carpus and elbow as it provides complete analgesia distally from above the elbow joint. The aim of this study was to develop an ultrasound (US)-guided approach to block the BP in cats. Two groups of 12 feline cadavers each were used to compare two different techniques to block the BP at the axillary level. The reliability of the techniques was assessed by anatomical and computed tomography (CT) studies. Cadavers of the first group were positioned in dorsal recumbency with the forelimb to be blocked adducted (thoracic limbs flexed and orientated caudally) (FAD technique). The second group was positioned in dorsal recumbency with the forelimb abducted 90 degrees (FAB technique). The accuracy of the techniques was determined by US after injecting 1 ml blue ink along the BP nerves, and by CT after injecting 1 ml of an iodinated contrast medium. The anatomical and CT studies confirmed the accuracy of the US location of the BP nerves. Staining of the axillaris, musculocutaneous, radialis, medianus and ulnaris nerves was observed in 100% of cats using the FAB technique and in 66% of the cats using the FAD technique. Rate of complications was higher in the FAD technique. In conclusion, a US-guided axillary approach to the BP by the use of a FAB technique is a safe and feasible procedure to block the BP in the cat. Further studies are needed to ascertain whether the technique can be applied in a clinical setting.

**Owner experiences in treating dogs and cats diagnosed with diabetes mellitus in the United States.**


The objective of this study was to report owner experiences and satisfaction in treating a pet with diabetes mellitus using a descriptive report from an Internet-based survey. Descriptive analysis of results was performed, chi(2) tests were used to detect differences in responses between dog and cat owners, and correlations were assessed using the nonparametric Spearman rank correlation. A total of 834 owners participated in the survey. More diabetic dogs (97%) than cats (82%) were treated with insulin injections. Insulin was administered twice daily in 87% of dogs and 73% of cats. Porcine lente and neutral protamine Hagedorn were the most commonly administered insulins in dogs. In cats, glargine and protamine zinc insulin were the most commonly used insulins. Most pets were not fed a prescribed diabetes diet. More cat (66%) than dog (50%) owners were satisfied with the diabetic control achieved. Cat owners were more likely to use home blood glucose monitoring. Treatment was considered expensive by the majority of owners. Few published reports follow diabetic pets after diagnosis or report owner satisfaction. The results of this study provide useful information that may
help veterinarians better educate owners and set expectations regarding diabetes treatment and quality of life for diabetic pets.

**A questionnaire on survival of kittens depending on the blood groups of the parents.**


*Axner, E.*

Cats more than 2 months of age have alloantibodies against the blood type antigen that they do not possess. Maternal antibodies, including alloantibodies against blood groups, are transferred to the kittens’ systemic circulation when they suckle colostrum during the first 12-16 h after birth. If kittens with blood group A or AB nurse from a mother with blood group B they may develop neonatal isoerythrolysis (NI). Breeders can prevent kittens at risk of NI from nursing during the first 16-24 h; after this period it is safe to let them nurse. Kittens depend, however, on the passive transfer of antibodies from the colostrum for early protection against infections. Although it is known that kittens deprived of colostrum will also be deprived of passive systemic immunity, it is not known if this will affect their health. Therefore, the aim of this study was to evaluate kitten mortality in litters with B-mothers and A-fathers compared to litters with A-mothers. In addition, the aim was to evaluate the effects of colostrum deprivation on the health of the mothers, and the breeders’ opinions and experiences of these combinations of breedings. A web-based questionnaire was constructed and distributed to breeders. The results indicate that there is no difference in mortality between planned litters that have mothers with blood group A and litters with mothers that have blood group B and fathers that have blood group A. When managing blood group incompatibility in cat all factors affecting the health of the cats, including genetic variation, should be considered.

**Facilitation of ipsilateral actions of corticospinal tract neurons on feline motoneurons by transcranial direct current stimulation.**


*Baczyk, M., L. G. Pettersson, and E. Jankowska*

Ipsilateral actions of pyramidal tract (PT) neurons are weak but may, if strengthened, compensate for deficient crossed PT actions following brain damage. The purpose of the present study was to examine whether transcranial direct current stimulation (tDCS) can strengthen ipsilateral PT (iPT) actions; in particular, those relayed by reticulospinal neurons co-excited by axon collaterals of fibres descending in the iPT and contralateral PT (coPT) and of reticulospinal neurons descending in the medial longitudinal fascicle (MLF). The effects of tDCS were assessed in acute experiments on deeply anaesthetized cats by comparing postsynaptic potentials evoked in hindlimb motoneurons and discharges recorded from their axons in a ventral root, before, during and after tDCS. tDCS was consistently found to facilitate joint actions of the iPT and coPT, especially when they were stimulated together with the MLF. Both excitatory postsynaptic potentials and inhibitory postsynaptic potentials evoked in motoneurons and the ensuing ventral root discharges were facilitated, even though the facilitatory effects of tDCS were not sufficient for activation of motoneurons by iPT neurons alone. Facilitation outlasted single tDCS periods by at least a few minutes, and the effects evoked by repeated tDCS by up to 2 h. The results of this study thus indicate that tDCS may increase the contribution of
iPT actions to the recovery of motor functions after injuries to coPT neurons, and thereby assist rehabilitation, provided that corticoreticular and reticulospinal connections are preserved.

**Mutations of 3c and spike protein genes correlate with the occurrence of feline infectious peritonitis.**


The genes encoding accessory proteins 3a, 3b, 3c, 7a and 7b, the S2 domain of the spike (S) protein gene and the membrane (M) protein gene of feline infectious peritonitis virus (FIPV) and feline enteric coronavirus (FECV) samples were amplified, cloned and sequenced. For this faeces and/or ascites samples from 19 cats suffering from feline infectious peritonitis (FIP) as well as from 20 FECV-infected healthy cats were used. Sequence comparisons revealed that 3c genes of animals with FIP were heavily affected by nucleotide deletions and point mutations compared to animals infected with FECV; these alterations resulted either in early termination or destruction of the translation initiation codon. Two ascites-derived samples of cats with FIP which displayed no alterations of ORF3c harboured mutations in the S2 domain of the S protein gene which resulted in amino acid exchanges or deletions. Moreover, changes in 3c were often accompanied by mutations in S2. In contrast, in samples obtained from faeces of healthy cats, the ORF3c was never affected by such mutations. Similarly ORF3c from faecal samples of the cats with FIP was mostly intact and showed only in a few cases the same mutations found in the respective ascites samples. The genes encoding 3a, 3b, 7a and 7b displayed no mutations linked to the feline coronavirus (FCoV) biotype. The M protein gene was found to be conserved between FECV and FIPV samples. Our findings suggest that mutations of 3c and spike protein genes correlate with the occurrence of FIP.

**Assessments of feline plasma biochemistry reference intervals for three in-house analysers and a commercial laboratory analyser.**


*Baral, R. M., N. K. Dhand, M. B. Krockenberger, and M. Govendir*

For each species, the manufacturers of in-house analysers (and commercial laboratories) provide standard reference intervals (RIs) that do not account for any differences such as geographical population differences and do not overtly state the potential for variation between results obtained from serum or plasma. Additionally, biases have been demonstrated for in-house analysers which result in different RIs for each different type of analyser. The objective of this study was to calculate RIs (with 90% confidence intervals [CIs]) for 13 biochemistry analytes when tested on three commonly used in-house veterinary analysers, as well as a commercial laboratory analyser. The calculated RIs were then compared with those provided by the in-house analyser manufacturers and the commercial laboratory. Plasma samples were collected from 53 clinically normal cats. After centrifugation, plasma was divided into four aliquots; one aliquot was sent to the commercial laboratory and the remaining three were tested using the in-house biochemistry analysers. The distribution of results was used to choose the appropriate statistical technique for each analyte from each analyser to calculate RIs. Provided reference limits were deemed appropriate if they fell within the 90% CIs of the calculated reference limits. Transference validation was performed on provided and calculated RIs. Twenty-nine of a
possible 102 provided reference limits (28%) were within the calculated 90% CIs. To ensure proper interpretation of laboratory results, practitioners should determine RIs for their practice populations and/or use reference change values when assessing their patients’ clinical chemistry results.

**Bias in feline plasma biochemistry results between three in-house analysers and a commercial laboratory analyser: results should not be directly compared.**


In-house analysers are commonplace in small animal practices but cannot be calibrated by the operator; therefore, any bias in the generated plasma analyte values cannot be corrected. Guidelines such as grading of renal disease and published reference intervals (RIs) in veterinary textbooks assume plasma biochemistry values generated by different analysers are equivalent. This study evaluated the degree of bias, as well as if bias was constant or proportional, for feline plasma biochemical analytes assessed by three in-house biochemistry analysers compared with a commercial laboratory analyser. Blood samples were collected on 101 occasions from 94 cats and, after centrifugation, plasma was divided into four aliquots. One aliquot was sent to the commercial laboratory and the remaining three were tested using the in-house biochemistry analysers. Results from each analyser were compared with the commercial laboratory results by difference plots and analyses, and by comparing percentages of results within provided RIs. Substantial bias was evident relative to the results of the commercial analyser for at least half of the analytes tested for each machine. In most cases, bias was proportional, meaning that the difference between the methods varied with the concentration of the analyte. The results demonstrate that values obtained from these analysers should not be directly compared and that RIs are not transferable between these analysers. Potential effects of bias on clinical decision making may be overcome by use of appropriately generated RIs, or reference change values which, for most biochemistry analytes, are more appropriate than subject-based RIs.

**Computed tomographic features of feline sino-nasal and sino-orbital aspergillosis.**


Feline upper respiratory tract aspergillosis (URTA) occurs as two distinct anatomical forms, namely, sino-nasal aspergillosis (SNA) and sino-orbital aspergillosis (SOA). An emerging pathogen, Aspergillus felis, is frequently involved. The pathogenesis of URTA, in particular the relationship between the infecting isolate and outcome, is poorly understood. In this study, computed tomography was used to investigate the route of fungal infection and extension in 16 cases (SNA n = 7, SOA n = 9) where the infecting isolate had been identified by molecular testing. All cases had nasal cavity involvement except for one cat with SNA that had unilateral frontal sinus changes. There was a strong association between the infecting species and anatomic form (P = 0.005). A. fumigatus infections remained within the sino-nasal cavity, while cryptic species infections were associated with orbital and paranasal soft-tissue involvement and with orbital lysis. Cryptic species were further associated with a mass in the nasal cavity, paranasal sinuses or nasopharynx. Orbital masses showed heterogeneous contrast enhancement, with central coalescing hypoattenuating foci and peripheral rim enhancement.
Severe, cavitated turbinate lysis, typical of canine SNA, was present only in cats with SNA. These findings support the hypothesis that the nasal cavity is the portal of entry for fungal spores in feline URTA and that the route of extension to involve the orbit is via direct naso-orbital communication from bone lysis. Additionally, a pathogenic role for A. wyomingensis and a sinolith in a cat with A. udagawae infection are reported for the first time.

**Benzalkonium chloride exposure in cats: a retrospective analysis of 245 cases reported to the Veterinary Poisons Information Service (VPIS).**

*Vet Rec (2014)*

*Bates, N., and N. Edwards*

Benzalkonium chloride is commonly found in household products. This retrospective study examined 245 cases of feline exposure to benzalkonium chloride-containing products reported to the Veterinary Poisons Information Service (VPIS). A single route of exposure was reported in 188 cats (ingestion 126, skin 58, buccal 4); 57 cats had multiple routes. The common products involved were household antibacterial cleaners (43.6 per cent), household disinfectants (22.3 per cent) and patio cleaners (17.5 per cent). The most common signs were hypersalivation/drooling (53.9 per cent), tongue ulceration (40.4 per cent), hyperthermia (40.4 per cent) and oral ulceration (22.9 per cent). The mean time recorded for onset of the first clinical sign was 6.4 hours (range five minutes to 48 hours, median 4.5 hours, n=60), however, the VPIS was not contacted until 14.0+/−13.2 hours after exposure (n=120). This figure also reflects the time of presentation. The most common treatments given were antibiotics (82.0 per cent), fluids (50.2 per cent), analgesia (45.3 per cent), gastroprotectants (31.0 per cent), dermal decontamination (24.1 per cent) and steroids (22.7 per cent). 13 cats (5.3 per cent) received syringe or nasogastric feeding. Of 245 cats, 12 (4.9 per cent) remained asymptomatic, 230 (93.9 per cent) recovered and three died (1.2 per cent). The time to recovery ranged from 1 to 360 hours (n=67) with a mean of 100.4+/−82.0 hours (4.2+/−3.4 days, median 72 hours).

**Felis catus gammaherpesvirus 1; a widely endemic potential pathogen of domestic cats.**


Felis catus gammaherpesvirus 1 (FcaGHV1), recently discovered in the USA, was detected in domestic cats in Australia (11.4%, 95% confidence interval 5.9-19.1, n=110) and Singapore (9.6%, 95% confidence interval 5.9-14.6, n=176) using qPCR. FcaGHV1 qPCR positive cats were 2.8 times more likely to be sick than healthy. Risk factors for FcaGHV1 detection included being male, increasing age and coinfection with pathogenic retroviruses, feline immunodeficiency virus (FIV) or feline leukaemia virus. FcaGHV1 DNA was detected in multiple tissues from infected cats with consistently high virus loads in the small intestine. FcaGHV1 viral load was significantly higher in FIV-infected cats compared with matched controls, mimicking increased Epstein-Barr virus loads in human immunodeficiency virus-infected humans. FcaGHV1 is endemic in distant geographic regions and is associated with being sick and with coinfections. Horizontal transmission of FcaGHV1 is supported, with biting being a plausible route. A pathogenic role for FcaGHV1 in domestic cats is supported.
Presumed primary intraocular chondrosarcoma in cats.


Beckwith-Cohen, B., L. B. Teixeira, and R. R. Dubielzig

Following unilateral enucleation, 4 Domestic Shorthair cats with an average age of 12.5 years (range: 9-16 years) were histologically diagnosed with a presumed primary intraocular chondrosarcoma at the Comparative Ocular Pathology Laboratory of Wisconsin (Madison, Wisconsin). Medical records and follow-up were available for 3 of the 4 cats. Clinically, only 1 eye was affected in each cat; a mass lesion was noted in 2 cats, and a neoplasm was suspected in the other 2 cats. Grossly, 3 tumors presented as coalescing, poorly demarcated, white, friable masses filling the vitreous and intraocular chambers; 1 tumor presented as a solitary, well-demarcated, tan mass involving the iris and ciliary body. Histologically, all 4 neoplasms were composed of haphazardly arranged plump neoplastic spindle cells surrounded by irregular islands and thick trabeculae of abundant, variably basophilic, and Alcian blue-positive chondromatous matrix. None of the cats presented histologically or clinically with signs suggestive of feline posttraumatic ocular sarcoma. Two cats are still alive and healthy 6 months and 3 years following enucleation. One cat died 6 months following enucleation; however, this cat suffered from poorly controlled diabetes mellitus, and the cause of death is undetermined. No other tumors or skeletal lesions were identified that could suggest a metastatic tumor to the eye. The origin of primary intraocular chondrosarcoma is unclear, but is presumed to be ocular multipotent mesenchymal stem cells. Four cases of intraocular chondrosarcoma in cats not associated with the posttraumatic sarcoma complex of intraocular tumors are described.

Faecal microbiota of cats with insulin-treated diabetes mellitus.


Microorganisms within the gastrointestinal tract significantly influence metabolic processes within their mammalian host, and recently several groups have sought to characterise the gastrointestinal microbiota of individuals affected by metabolic disease. Differences in the composition of the gastrointestinal microbiota have been reported in mouse models of type 2 diabetes mellitus, as well as in human patients. Diabetes mellitus in cats has many similarities to type 2 diabetes in humans. No studies of the gastrointestinal microbiota of diabetic cats have been previously published. The objectives of this study were to compare the composition of the faecal microbiota of diabetic and non-diabetic cats, and secondarily to determine if host signalment and dietary factors influence the composition of the faecal microbiota in cats. Faecal samples were collected from insulin-treated diabetic and non-diabetic cats, and Illumina sequencing of the 16S rRNA gene and quantitative PCR were performed on each sample. ANOSIM based on the unweighted UniFrac distance metric identified no difference in the composition of the faecal microbiota between diabetic and non-diabetic cats, and no significant differences in the proportions of dominant bacteria by phylum, class, order, family or genus as determined by 16S rRNA gene sequencing were identified between diabetic and non-diabetic cats. qPCR identified a decrease in Faecalibacterium spp. in cats aged over ten years. Cat breed or gender, dietary carbohydrate, protein or fat content, and dietary formulation (wet versus dry food) did not affect the composition of the faecal microbiota. In conclusion, the composition of the faecal microbiota was not altered by the presence of diabetes mellitus in cats. Additional studies that compare the functional products of the microbiota in diabetic and non-diabetic cats are warranted to further
investigate the potential impact of the gastrointestinal microbiota on metabolic diseases such as diabetes mellitus in cats.

**Behavioral frequency discrimination ability of partially deafened cats using cochlear implants.**


**Benovitski, Y. B., P. J. Blamey, G. D. Rathbone, and J. B. Fallon**

The aim of this study was to determine the effects of cochlear implant (CI) use on behavioral frequency discrimination ability in partially deafened cats. We hypothesized that the additional information provided by the CI would allow subjects to perform better on a frequency discrimination task. Four cats with a high frequency hearing loss induced by ototoxic drugs were first trained on a go/no-go, positive reinforcement, frequency discrimination task and reached asymptotic performance (measured by d’ - detection theory). Reference frequencies (1, 4, and 7 kHz) were systematically rotated (Block design) every 9-11 days to cover the hearing range of the cats while avoiding bias arising from the order of testing. Animals were then implanted with an intracochlear electrode array connected to a CI and speech processor. They then underwent 6 months of continuous performance measurement with the CI turned on, except for one month when the stimulator was turned off. Overall, subjects performed the frequency discrimination task significantly better with their CI turned on than in the CI-off condition (3-way ANOVA, p < 0.001). The analysis showed no dependence on subject (3-way ANOVA, subject x on-off condition, p > 0.5); however, the CI only significantly improved performance for two (1 and 7 kHz) of the three reference frequencies. In this study we were able to show, for the first time, that cats can utilize information provided by a CI in performing a behavioral frequency discrimination task.

**Accuracy of cytology in distinguishing adrenocortical tumors from pheochromocytoma in companion animals.**


BACKGROUND: The distinction between adrenocortical tumors and pheochromocytoma can be challenging using clinical findings, diagnostic imaging and laboratory tests. Cytology might be a simple, minimally invasive method to reach a correct diagnosis. OBJECTIVES: The purpose of this study was to assess the accuracy of cytology in differentiating cortical from medullary tumors of the adrenal glands in dogs and cats. METHODS: Cytologic key features of adrenocortical tumors and pheochromocytoma were defined by one reference author. Cytologic specimens from primary adrenal tumors were submitted to 4 cytopathologists who were asked to classify the tumors based on the previously defined key features without knowledge of previous classification. RESULTS: Twenty specimens from histologically confirmed adrenal tumors (Group 1) and 4 specimens from adrenal tumors causing adrenal-dependent Cushing’s syndrome (Group 2) were evaluated by the 4 cytopathologists. Accuracy in differentiating cortical from medullary origin ranged from 90% to 100%, with a Kappa coefficient of agreement between cytopathologists of 0.95. CONCLUSIONS: The origin of an adrenal tumor can be easily determined by cytology alone in many cases. However, cytology was not reliable in distinguishing benign from malignant neoplasia. Additional studies are needed to assess possible risks and complications associated with fine-needle biopsy of adrenal tumors in dogs and cats.
Primary immune-mediated thrombocytopenia and immune-mediated neutropenia suspected in a 21-week-old Maine Coon cat.


*Best, M. P., and D. R. Fry*

CASE REPORT: A 21-week-old Maine Coon cat presented with an acute-onset coagulopathy. Severe concurrent thrombocytopenia and neutropenia were identified on peripheral blood smears and bone marrow cytology supported a peripheral consumptive process. Other than mild superficial haemorrhage, the cat was clinically well and screening for retroviral diseases, abdominal ultrasound examination, thoracic radiography, haematology and biochemistry panels did not identify an underlying disease. There was no historical pharmaceutical or toxicological trigger noted and the cat was from an area without endemic Ehrlichia spp. There was a rapid resolution of both cytopenias following treatment with immunosuppressive doses of prednisolone, though a mild relapse occurred during gradual prednisolone withdrawal and was responsive to a dose increase. CONCLUSIONS: This report describes this combination of diseases for the first time in a cat and presents a younger patient than previously described with feline primary immune-mediated haematological disease.

Clinical evaluation of alfaxalone to induce and maintain anaesthesia in cats undergoing neutering procedures.


*Beths, T., G. Touzot-Jourde, G. Musk, and K. Pasloske*

This study looked at the use and efficacy of alfaxalone for total intravenous anaesthesia (TIVA) in cats. Following intramuscular medetomidine (20 μg/kg) and morphine (0.3 mg/kg) premedication, anaesthesia was induced and maintained with intravenous alfaxalone. Patients were breathing 100% oxygen. Heart rate (HR), respiratory rate (RR), end-tidal carbon dioxide, oxygen saturation of haemoglobin and indirect arterial blood pressure via Doppler (DAP) were recorded every 5 mins. Thirty-four cats (10 males and 24 females), between the age of 6 and 18 months, and weighing between 1.8 and 5.3 kg, and undergoing neutering procedures were included in this study. The results are presented as median (min, max) values. The time to first spontaneous movement (TS) was >30 mins in 19 cats, of which 12 received atipamezole for reversal of the effects of medetomidine. The TS was 53 (43, 130) mins in these 12 cats and 50 (40, 72) mins in the other seven cats. The body temperature in those 19 cats was significantly lower than the other cats (P = 0.05). The alfaxalone induction dose and maintenance infusion rate were 1.7 (0.7, 3.0) mg/kg and 0.18 (0.06, 0.25) mg/kg/min, respectively. The HR, RR and DAP were 145 (68, 235) beats/min, 17 (5, 40) breaths/min and 110 (58, 210) mmHg, respectively. Apnoea was not observed in any cat. In conclusion, alfaxalone TIVA in combination with medetomidine and morphine premedication was effective in feral and domestic cats for the performance of neutering surgery; low body temperature might have resulted in longer recoveries in some cats.

Occurrence of Dipylidium caninum in fleas from client-owned cats and dogs in Europe using a new PCR detection assay.
Ctenocephalides fleas are not only the most prevalent ectoparasites of dogs and cats but also the intermediate host of the cestode Dipylidium caninum. Due to the poor sensitivity of coproscopy to diagnose cat and dog infestation by Dipylidium, few epidemiological data are available on its prevalence among pet populations. A new PCR method was developed to specifically identify D. caninum rDNA inside single fleas. The PCR test was then applied to 5529 fleas of Ctenocephalides genus, 2701 Ctenocephalides felis fleas (1969 collected on 435 cats and 732 on 178 dogs) and 2828 Ctenocephalides canis fleas collected from 396 dogs. Precisely, 4.37% of cats were infested by a flea population infected with D. caninum. Out of the 1969 C. felis from cats, 2.23% were found to be infected with Dipylidium. From the 396 dogs infested with C. canis, 9.11% were infected with the Dipylidium infected fleas, which is significantly higher than the observation made in cats (p=0.03). Moreover, 3.1% of the C. canis fleas were found to be infected with Dipylidium, which is not significantly different than in C. felis. Looking at the number of infected fleas in the positive samples (at least one PCR positive flea in a sample), the infestation rate in samples was varied from 3 to 100% with an average of 19.7% which is in favour of easy and regular Dipylidium reinfections of both cats and dogs in households. For the first time, the spread of D. caninum between fleas and dogs and cats is confirmed throughout Europe.

Preventive efficacy of a topical combination of fipronil--(S)-methoprene--eprinomectin--praziquantel against ear mite (Otodectes cynotis) infestation of cats through a natural infestation model.


A study based on naturally infested cats was designed to evaluate the effectiveness of a single treatment with a topical formulation containing fipronil, (S)-methoprene, eprinomectin and praziquantel, for the prevention of Otodectes cynotis infestation in cats. Six treated cats and six untreated cats were housed with three chronically Otodectes cynotis-infested cats, respectively. The cats of each group were kept together in a 20-m(2) room for 1 month. Both clinical examination and ear mite counts were conducted on Day 28. All donor cats were confirmed to be chronically infested with Otodectes cynotis on Day -1 and Day 28. From untreated control cats, 129 live mites were recovered on Day 28 and all cats were found to be infested. In the treated group, three cats were found to be infested, with a total of five live mites recovered, the difference between the two groups being significant (p = 0.003). One treatment corresponded to 96% preventive efficacy at Day 28 based on ear mite counts. With regard to cerumen, the clinical score increased significantly for untreated cats between Day -1 and Day 28 (p = 0.00026) and not for treated cats (p = 0.30). The difference in cerumen abundance was significant between untreated and treated cats on Day 28 (p = 0.0035). Concerning the pruritic reflex in at least one ear, all cats were negative at inclusion. All six untreated cats became positive and showed a reflex on Day 28, whereas no treated cat showed ear pruritus (p = 0.00026).

Metronomic chemotherapy in veterinary patients with cancer: rethinking the targets and strategies of chemotherapy.
Cancer chemotherapy in dogs and cats has traditionally involved administration of chemotherapy agents at the maximum tolerated dose. Cytotoxic chemotherapy has an acceptably low risk of serious toxicity, but an obligatory rest period must be included to allow for recovery of drug-sensitive normal cell populations. This rest period can also allow significant recovery of tumor cells. Metronomic chemotherapy is characterized by more frequent administration of lower doses of oral drugs and appears to halt or slow tumor progression through multiple mechanisms. This approach may be at least as effective as conventional chemotherapy with a lower risk of toxicity.

Characterization of kidney injury molecule-1 in cats.
Bland, S. K., O. Cote, M. E. Clark, J. DeLay, and D. Bienzle

BACKGROUND: Kidney disease (KD) is common in older cats and presumed to arise from subclinical kidney injuries throughout life. Sensitive markers for detecting kidney injury are lacking. Kidney injury molecule 1 (KIM-1) is a useful biomarker of kidney injury in humans and rodents. HYPOTHESIS/OBJECTIVES: Feline KIM-1 is conserved across species, expressed in kidney, and shed into urine of cats with acute kidney injury (AKI). The objectives were to characterize the feline KIM-1 gene and protein, assess available immunoassays for detecting KIM-1 in urine of cats, and identify KIM-1 expression in kidney sections. ANIMALS: Samples from 36 hospitalized and 7 clinically healthy cats were evaluated. Hospitalized cats were divided into 2 groups based on absence (n = 20) or presence (n = 16) of historical KD. METHODS: Feline KIM-1 genomic and complementary DNA sequences were amplified, sequenced and analyzed to determine the presence of isoforms, exon-intron organization and similarity with orthologous sequences. Presence in urine was evaluated by immunoassay and expression in kidney by immunohistochemistry. RESULTS: Three expressed feline KIM-1 transcript variants comprising 894, 810, and 705 bp were identified in renal tissue. KIM-1 immunoassays yielded positive results in urine of cats with conditions associated with AKI, but not chronic KD. Immunohistochemistry of kidney sections identified KIM-1 in proximal tubular cells of cats with positive urine immunoassay results. CONCLUSIONS AND CLINICAL IMPORTANCE: Kidney injury molecule 1 was expressed in specific segments of the nephron and detected in urine of cats at risk of AKI. Urine KIM-1 immunoassay may be a useful indicator of tubular injury.

A survey of owners’ perceptions and experiences of radioiodine treatment of feline hyperthyroidism in the UK.
Boland, L. A., J. K. Murray, C. P. Bovens, and A. Hibbert

The efficacy of radioiodine treatment of feline hyperthyroidism is well established; however, limited information is known about owners’ perceptions or experiences of radioiodine. This study aimed to examine factors that influence owner treatment choices and their opinions following radioiodine. Surveys were sent to owners of cats referred for radioiodine treatment between 2002 and 2011 (radioiodine group; 264 cats) and owners of non-radioiodine-treated hyperthyroid cats seen at first-
opinion practices (control group; 199 cats). The response rate was 67.0% (310 returned: 175 radioiodine, 135 control). Of 135 controls, 72 (53.3%) were unaware of radioiodine as a treatment option. Owners of cats 15 years old and uninsured cats were less likely to pursue radioiodine. Cost of treatment, travel distance, potential human or animal health risks and waiting periods for radioiodine had a low impact on owners’ treatment choice. Owners reported a moderate level of concern about treatment hospitalisation length, which included (158 respondents) the possibility of the cat being unhappy 130 (82.3%), owner missing the cat 102 (64.6%), inappetence 50 (31.6%), other pets missing the cat 32 (20.3%), development of co-morbid disease 28 (17.7%) and side effects 25 (15.8%). Owners assessed their cat’s quality of life on a scale of 1 (very poor) to 10 (excellent), as 4 (4) (median [interquartile range]) pre-radioiodine (134 respondents) and 9 (2) post-radioiodine (131 respondents). Of 132 respondents, 121 (91.7%) were happy with their decision to choose radioiodine. The results of this questionnaire may assist veterinarians in addressing common owner concerns when discussing radioiodine as a treatment option for hyperthyroidism.

**Plasma cardiac troponin I concentration and cardiac death in cats with hypertrophic cardiomyopathy.**


*Borgeat, K., K. Sherwood, J. R. Payne, V. Luis Fuentes, and D. J. Connolly*

BACKGROUND: The use of cardiac biomarkers to assist in the diagnosis of occult and symptomatic hypertrophic cardiomyopathy (HCM) in cats has been established. There is limited data describing their prognostic utility in cats with HCM. HYPOTHESIS: Circulating concentrations of N-terminal B-type natriuretic peptide (NTproBNP) and cardiac troponin I (cTnI) predict cardiac death in cats with HCM. ANIMALS: Forty-one cats diagnosed with HCM at a veterinary teaching hospital, between February 2010 and May 2011. METHODS: Prospective investigational study. Plasma samples were collected from cats diagnosed with HCM and concentrations of NTproBNP and cTnI were analyzed at a commercial laboratory. Echocardiographic measurements from the day of blood sampling were recorded. Long-term outcome data were obtained. Associations with time to cardiac death were analyzed using Cox proportional hazards models. RESULTS: When controlling for the presence/absence of heart failure and echocardiographic measures of left atrial size and function, cTnI > 0.7 ng/mL was independently associated with time to cardiac death. In univariable analysis, NTproBNP > 250 pmol/L was associated with cardiac death (P =.023), but this did not remain significant (P =.951) when controlling for the effect of clinical signs or left atrial size/function. CONCLUSIONS AND CLINICAL IMPORTANCE: Plasma concentration of cTnI (cutoff >0.7 ng/mL) is a predictor of cardiac death in cats with HCM that is independent of the presence of heart failure or left atrial dilatation.

**Alpha-mannosidosis - a review of genetic, clinical findings and options of treatment.**


*Borgwardt, L., A. M. Lund, and C. I. Dali*

Alpha-mannosidosis (OMIM 248500) is a rare, autosomal recessive, multisystemic, progressive lysosomal storage disorder caused by a deficiency of alpha-mannosidase. It has been described in humans, cattle, domestic cats, mice and guinea pigs. In humans, alpha-mannosidosis results in
progressive facial- and skeletal abnormalities, motor impairment, hearing impairment, intellectual disability, recurrent infections and immune deficiency. This review provides detailed information regarding the variability of manifestations and a description of current treatment and treatment under investigation for alpha-mannosidosis. The pathology, genetics and clinical pictures, including impairments in the activity of daily living are discussed.

**Mutations in the 3c and 7b genes of feline coronavirus in spontaneously affected FIP cats.**


*Borschensky, C. M., and M. Reinacher*

Feline infectious peritonitis (FIP) is the most frequent lethal infectious disease in cats. However, understanding of FIP pathogenesis is still incomplete. Mutations in the ORF 3c/ORF 7b genes are proposed to play a role in the occurrence of the fatal FIPV biotype. Here, we investigated 282 tissue specimens from 28 cats that succumbed to FIP. Within one cat, viral sequences from different organs were similar or identical, whereas greater discrepancies were found comparing sequences from various cats. Eleven of the cats exhibited deletions in the 3c gene, resulting in truncated amino acid sequences. The 7b gene was affected by deletions only in one cat. In three of the FIP cats, coronavirus isolates with both intact 3c genes as well as 7b genes of full length could also be detected. Thus, deletions or stop codons in the 3c sequence seem to be a frequent but not compelling feature of FIPVs.

**Correlation of gross urine color with diagnostic findings in male cats with naturally occurring urethral obstruction.**


*Brabson, T. L., C. P. Bloch, and J. A. Johnson*

Seventy-five male cats with urethral obstruction were prospectively enrolled to evaluate gross urine color at urinary catheter placement for correlation with diagnostic findings. Cats with darker red urine were more likely to be azotemic (serum creatinine concentration >2.0 mg/dl [177 micromol/l]), and urine color correlated well with serum creatinine and serum potassium concentrations. Darker urine color was negatively correlated with urine specific gravity. Urine color was not associated with the presence or absence of lower urinary tract stones on radiographs or ultrasound. Cats with darker red urine at the time of urinary catheter placement are likely to have more significant metabolic derangements and may require more aggressive supportive care.

**Relationship between Serum Symmetric Dimethylarginine Concentration and Glomerular Filtration Rate in Cats.**


*Braff, J., E. Obare, M. Yerramilli, J. Elliott, and M. Yerramilli*

BACKGROUND: Direct measurement of glomerular filtration rate (GFR) is the preferred method to assess renal function in cats, but it is not widely used in the diagnosis of chronic kidney disease (CKD). In cats with CKD, symmetric dimethylarginine (SDMA) has been shown to increase and to correlate with plasma creatinine concentrations. HYPOTHESIS: In cats, reduced GFR corresponds with
increased serum SDMA concentration. ANIMALS: The study group consisted of ten client-owned cats whose GFR had been measured previously. Cats ranged in age from 11.1 to 16.9 years; both azotemic and nonazotemic animals were included. METHODS: Glomerular filtration rate was determined for each cat by plasma iohexol clearance using the three sample slope-intercept method, and serum SDMA concentration was measured by liquid chromatography-mass spectrometry. RESULTS: A linear relationship was observed between GFR and the reciprocal of serum SDMA concentration ($R^2 = 0.82$, $P < .001$). A similar relationship was found between GFR and the reciprocal of plasma creatinine concentration ($R^2 = 0.81$, $P < .001$). CONCLUSIONS AND CLINICAL IMPORTANCE: Increased serum SDMA concentrations were observed in cats with reduced renal function as determined by direct measurement of GFR. This finding indicates that SDMA could have clinical applications in the diagnosis of CKD in cats.

**Detection of Ehrlichia canis in domestic cats in the central-western region of Brazil.**


*Braga, I. A., L. G. dos Santos, D. G. de Souza Ramos, A. L. Melo, G. L. da Cruz Mestre, and D. M. de Aguiar*

Ehrlichiosis is a worldwide distributed disease caused by different bacteria of the Ehrlichia genus that are transmitted by arthropod vectors. Its occurrence in dogs is considered endemic in several regions of Brazil. Regarding cats, however, few studies have been done and, consequently, there is not enough data available. In order to detect Ehrlichia spp. in cats from the central-western region of Brazil, blood and serum samples were collected from a regional population of 212 individuals originated from the cities of Cuiaba and Varzea Grande. These animals were tested by the Immunofluorescence Assay (IFA) and the Polymerase Chain Reaction (PCR) designed to amplify a 409 bp fragment of the dsb gene. The results obtained show that 88 (41.5%) cats were seropositive by IFA and 20 (9.4%) cats were positive by PCR. The partial DNA sequence obtained from PCR products yielded twenty samples that were found to match perfectly the Ehrlichia canis sequences deposited on GenBank. The natural transmission of Ehrlichia in cats has not been fully established. Furthermore, tick infestation was not observed in the evaluated cats and was not observed any association between age, gender and positivity of cats in both tests. The present study reports the first serological and molecular detection of E. canis in domestic cats located in the endemic area previously mentioned.

**The association between landscape and climate and reported tick paralysis cases in dogs and cats in Australia.**


*Brazier, I., M. Kelman, and M. P. Ward*

The aim of this study was to describe the association between landscape and climate factors and the occurrence of tick paralysis cases in dogs and cats reported by veterinarians in Australia. Data were collated based on postcode of residence of the animal and the corresponding landscape (landcover and elevation) and climate (precipitation, temperature) information was derived. During the study period (October 2010-December 2012), a total of 5560 cases (4235 [76%] canine and 1325 [24%] feline cases) were reported from 341 postcodes, mostly along the eastern seaboard of Australia and from the states of New South Wales and Queensland. Significantly more cases were reported from postcodes
which contained areas of broadleaved, evergreen tree coverage (P=0.0019); broadleaved, deciduous open tree coverage (P=0.0416); and water bodies (P=0.0394). Significantly fewer tick paralysis cases were reported from postcodes which contained areas of sparse herbaceous or sparse shrub coverage (P=0.0297) and areas that were cultivated and managed (P=0.0005). No significant (P=0.6998) correlation between number of tick paralysis cases reported per postcode and elevation was found. Strong positive correlations were found between number of cases reported per postcode and the annual minimum (rSP=0.9552, P<0.0001) and maximum (rSP=0.9075; P=0.0001) precipitation. Correlations between reported tick paralysis cases and temperature variables were much weaker than for precipitation, rSP<0.23. For maximum temperature, the strongest correlation between cases was found in winter (rSP=0.1877; P=0.0005) and for minimum temperature in autumn (rSP=0.2289; P<0.0001). Study findings suggest that tick paralysis cases are more likely to occur and be reported in certain eco-climatic zones, such as those with higher rainfall and containing tree cover and areas of water. Veterinarians and pet owners in these zones should be particularly alert for tick paralysis cases to maximize the benefits of early treatment, and to be vigilant to use chemical prophylaxis to reduce the risk of tick parasitism.

Feline lungworm Oslerus rostratus (Strongylida: Filaridae) in Italy: first case report and histopathological findings.


Oslerus rostratus syn. Anafilaroides rostratus (Strongylida: Filaroididae) is a metastrongyloid transmitted by snails, which localizes in peri-bronchial tissues and in the lung parenchyma of wild as well as domestic cats. In Europe, this nematode has been reported only on two occasions, being diagnosed in cats from Majorca Island and in northern Spain. Here, we describe a case of O. rostratus infection in a necropsied 4-year-old cat in Sicily (southern Italy). At the inspection of lungs, slender and greyish nematodes (four females and two males) were found embedded in the peri-bronchial tissues and in the bronchial walls. Parasites were morphological and molecularly identified as O. rostratus, with their 18S sequences being identical among them and showing a high homology (99%) with those available in public databases. At the histology, nematodes were encapsulated in a pseudocystic formation surrounded by an interstitial inflammatory process and fibrous tissue. Lung lesions were mainly represented by peri-luminal fibrosis, hyperplasia and hypertrophy of the bronchial mucosa and glands, respectively. This first record of O. rostratus infection from Italy indicates that this parasite should be included in the differential diagnosis of feline of lungworm infection.

Age, Breed Designation, Coat Color, and Coat Pattern Influenced the Length of Stay of Cats at a No-Kill Shelter.

J Appl Anim Welf Sci (2014) 1-12.

Brown, W. P., and K. T. Morgan

Adoption records from the Tompkins County Society for the Prevention of Cruelty to Animals, an open-admission, no-kill shelter in New York State, were examined to determine if various physical attributes influenced the length of stay (LOS) of cats and kittens. Similar reports from other no-kill
shelters have not been published. LOS averaged 61.2 days for cats and kittens combined and ranged from less than 1 day to 730 days. Based on mixed models that accounted for lack of independence among attributes, younger, lighter-colored cats were generally adopted more quickly than older, more darkly colored cats, but yellow-colored cats had the greatest LOS. Coat color did not influence LOS for kittens. Coat patterning and breed designation influenced LOS in both cats and kittens. Male cats and kittens had a shorter LOS than female cats and kittens, respectively. Studies from traditional shelters also demonstrated the importance of physical characteristics to adopters. Given adopter preferences for companion animals with certain characteristics, methods to reduce the LOS for cats with the longest potential residences at the shelter require continued development.

Assessing risks to non-target species during poison baiting programs for feral cats.
Buckmaster, T., C. R. Dickman, and M. J. Johnston

Poison baiting is used frequently to reduce the impacts of pest species of mammals on agricultural and biodiversity interests. However, baiting may not be appropriate if non-target species are at risk of poisoning. Here we use a desktop decision tree approach to assess the risks to non-target vertebrate species in Australia that arise from using poison baits developed to control feral house cats (Felis catus). These baits are presented in the form of sausages with toxicant implanted in the bait medium within an acid-soluble polymer capsule (hard shell delivery vehicle, or HSDV) that disintegrates after ingestion. Using criteria based on body size, diet and feeding behaviour, we assessed 221 of Australia’s 3,769 native vertebrate species as likely to consume cat-baits, with 47 of these likely to ingest implanted HSDVs too. Carnivorous marsupials were judged most likely to consume both the baits and HSDVs, with some large-bodied and ground-active birds and reptiles also consuming them. If criteria were relaxed, a further 269 species were assessed as possibly able to consume baits and 343 as possibly able to consume HSDVs; most of these consumers were birds. One threatened species, the Tasmanian devil (Sarcophilus harrisii) was judged as definitely able to consume baits with implanted HSDVs, whereas five threatened species of birds and 21 species of threatened mammals were rated as possible consumers. Amphibia were not considered to be at risk. We conclude that most species of native Australian vertebrates would not consume surface-laid baits during feral cat control programs, and that significantly fewer would be exposed to poisoning if HSDVs were employed. However, risks to susceptible species should be quantified in field or pen trials prior to the implementation of a control program, and minimized further by applying baits at times and in places where non-target species have little access.

Natural pet food: a review of natural diets and their impact on canine and feline physiology.
Buff, P. R., R. A. Carter, J. E. Bauer, and J. H. Kersey

The purpose of this review is to clarify the definition of “natural” as it pertains to commercial pet food and to summarize the scientific findings related to natural ingredients in pet foods and natural diets on the impact of pet health and physiology. The term “natural,” when used to market commercial pet foods or pet food ingredients in the United States, has been defined by the Association of American Feed Control Officials and requires, at minimum, that the pet food be preserved with natural
preservatives. However, pet owners may consider natural as something different than the regulatory definition. The natural pet food trend has focused on the inclusion of whole ingredients, including meats, fruits, and vegetables; avoiding ingredients perceived as heavily processed, including refined grains, fiber sources, and byproducts; and feeding according to ancestral or instinctual nutritional philosophies. Current scientific evidence supporting nutritional benefits of natural pet food products is limited to evaluations of dietary macronutrient profiles, fractionation of ingredients, and the processing of ingredients and final product. Domestic cats select a macronutrient profile (52% of ME from protein) similar to the diet of wild cats. Dogs have evolved much differently in their ability to metabolize carbohydrates and select a diet lower in protein (30% of ME from protein) than the diet of wild wolves. The inclusion of whole food ingredients in natural pet foods as opposed to fractionated ingredients may result in higher nutrient concentrations, including phytonutrients. Additionally, the processing of commercial pet food can impact digestibility, nutrient bioavailability, and safety, which are particularly important considerations with new product formats in the natural pet food category. Future opportunities exist to better understand the effect of natural diets on health and nutrition outcomes and to better integrate sustainable practices in the production of natural pet foods.

**Crossbred cats live longer than purebred cats.**


*Cabral, L.*

**Comparison of two techniques for the detection of flea faeces in canine and feline coat brushings.**


*Cadiergues, M. C., C. Cabaret-Mandin, and C. Solatges*

Flea infestation is diagnosed after the detection of either adult parasites or flea faeces in the fur. The latter is generally tested with the wet blotting paper technique (WBPT). However, microscopical examination (MT) of the coat brushing material is sometimes suggested as an alternative. This study aimed to compare the efficiency of the two techniques. In dogs, the entire body was hand-brushed and cats were combed. One half of the collected material was mounted in liquid paraffin on a glass slide and examined microscopically at low magnification. The second half was placed on a blotting paper and sterile water was added. After drying, reddish aureoles were counted. 255 animals (158 dogs and 97 cats) were included. 119 (47%) and 94 (37%) samples were revealed to be positive with WBPT and MT, respectively. 13 cases (5%) were positive with MT only and 38 cases (15%) were positive with WBPT only. 81 cases (32%) were positive and 123 (48%) were negative with both techniques. More positive cases were detected by WBPT than MT (P < 0.001). Amongst the 51 samples which were found positive with a sole technique, infestation was considered low in 43 cases and WBPT detected significantly more positive samples (31) than MT (12), P < 0.01.

**Evaluation of an indirect ELISA using recombinant granule antigen GRA7 for serodiagnosis of Toxoplasma gondii infection in cats.**

J Parasitol (2014)
Cai, Y., Z. Wang, J. Li, N. Li, F. Wei, and Q. Liu

Abstract The precise detection of Toxoplasma gondii infection in cats has important public health significance. In the present study, recombinant granule antigen protein GRA7 was evaluated as a potential diagnostic marker for T. gondii infection in cats by an indirect enzyme-linked immunosorbent assay (ELISA) using the classified serum samples from cats by immunofluorescence assay (IFA) and modified agglutination test (MAT). It showed a perfect agreement (97.2%) between GRA7-ELISA and MAT/IFAT (Kappaappa=0.92; 95% confidence interval [CI], 0.85 to 0.99), and GRA7-ELISA had a sensitivity of 94.9% and a specificity of 97.9%. No significant difference (P>0.05) was observed between the detection results by GRA7- and Toxoplasma lysate antigen (TLA)-based ELISA. Receiver operating characteristic (ROC) analysis showed a relative sensitivity and specificity of 89.7% and 92.5% at the cut-off value of 0.1 for GRA7-ELISA. These data demonstrate that GRA7 is a promising serodiagnostic marker for T. gondii infection in cats.

Pneumonia associated with Salmonella spp. infection in a cat receiving cyclosporine.


Callegari, Palermo, Greco, Corrente, Piseddu, Auriemma, and Zini

Salmonellosis is uncommon in cats, usually affects the gastrointestinal tract or skin, and can be fatal. This report describes a domestic shorthair cat with severe pneumonia caused by Salmonella spp. without accompanying gastrointestinal or skin manifestations, in which previous administration of cyclosporine may have played a permissive role in its development. Clinical and laboratory findings as well as follow-up are described from diagnosis until complete recovery. This unusual presentation serves to alert practitioners to consider Salmonella spp. as a possible cause of lung disease in cats, especially if immunocompromised.

Comparison of the effects of propofol or alfaxalone for anaesthesia induction and maintenance on respiration in cats.

Vet Anaesth Analg (2014)

Campagna, I., A. Schwarz, S. Keller, R. Bettschart-Wolfensberger, and M. Mosing

OBJECTIVE: To compare the effects of propofol and alfaxalone on respiration in cats. STUDY DESIGN: Randomized, ‘blinded’, prospective clinical trial. ANIMALS: Twenty cats undergoing ovariohysterectomy. METHODS: After premedication with medetomidine 0.01 mg kg-1 intramuscularly and meloxicam 0.3 mg kg-1 subcutaneously, the cats were assigned randomly into two groups: group A (n = 10) were administered alfaxalone 5 mg kg-1 minute-1 followed by 10 mg kg-1 hour-1 intravenously (IV) and group P (n = 10) were administered propofol 6 mg kg-1 minute-1 followed by 12 mg kg-1 hour-1 IV for induction and maintenance of anaesthesia, respectively. After endotracheal intubation, the tube was connected to a non-rebreathing system delivering 100% oxygen. The anaesthetic maintenance drug rate was adjusted (+/- 0.5 mg kg-1 hour-1) every 5 minutes according to a scoring sheet based on physiologic variables and clinical signs. If apnoea > 30 seconds, end-tidal carbon dioxide (Pe’CO2) > 7.3 kPa (55 mmHg) or arterial haemoglobin oxygen saturation (SpO2) < 90% occurred, manual ventilation was provided. Methadone was administered postoperatively. Data were analyzed using independent-samples t-tests, Fisher’s exact test, linear mixed-effects models and binomial test. RESULTS: Manual ventilation was required in two and eight
of the cats in group A and P, respectively (p = 0.02). Two cats in both groups showed apnoea. Pe’CO2 > 7.3 kPa was recorded in zero versus four and SpO2 < 90% in zero versus six cats in groups A and P respectively. Induction and maintenance dose rates (mean +/- SD) were 11.6 +/- 0.3 mg kg-1 and 10.7 +/- 0.8 mg kg-1 hour-1 for alfaxalone and 11.7 +/- 2.7 mg kg-1 and 12.4 +/- 0.5 mg kg-1 hour-1 for propofol. CONCLUSION AND CLINICAL RELEVANCE: Alfaxalone had less adverse influence on respiration than propofol in cats premedicated with medetomidine. Alfaxalone might be better than propofol for induction and maintenance of anaesthesia when artificial ventilation cannot be provided.

Human exposure to rabid free-ranging cats: a continuing public health concern in Pennsylvania.

Rabid free-ranging cats have been a public health concern in Pennsylvania since raccoon variant rabies first was recognized in the state in the early 1980s. Over the last decade, between 1.5 and 2.5% of cats submitted to Pennsylvania’s state laboratories for rabies testing have been positive. In this report, we describe the extent of rabies in free-ranging cats in Pennsylvania. We also present two examples of human exposure to rabid free-ranging cats that occurred in Pennsylvania during 2010-2011 and the public health actions taken to address rabies exposure in the humans and animals. We then describe the concerns surrounding the unvaccinated and free-ranging cat population in Pennsylvania and possible options in managing this public and animal health problem.

Genetic characterization of Toxoplasma gondii isolates and toxoplasmosis seroprevalence in stray cats of Izmir, Turkey.

Currently, some Toxoplasma gondii genotypes are being associated with serious clinical presentations. A recent report showing the Africa 1 genotype in two local congenital toxoplasmosis cases acquired in Turkey formed the basis of this study because atypical Africa 1 genotype is most frequently detected in animals and patients from sub-Saharan Africa. Since stray cats are considered as the linkage between wild life and urban life in T. gondii transmission, the present study aimed to isolate and characterize T. gondii strains circulating in stray cats of Izmir (Western Turkey). A secondary objective was to determine toxoplasmosis seroprevalence in this cat population. Tissues obtained from 100 deceased stray cats were bioassayed and isolated strains were genotyped using 15 microsatellite markers. In addition, toxoplasmosis seroprevalence was analyzed in 1121 cat sera collected from several large veterinary clinics in Izmir. Among the 22 isolates, 19 were Type II (86.3%), two were Type III (9%) and one was Africa 1 genotype (4.5%). The overall seropositivity rates in cats were 42-48% and 33.4-34.4% according to IFA and ELISA, respectively. Seroprevalence in deceased cats was significantly higher than in healthy cats (P = 0.0033). Finding both the major clonal Type II lineage together with the Type III lineage also found in Middle East, and an atypical genotype, Africa 1 appears consistent with the specific geographic location of Turkey between three continents and raises the possibility of transportation of these strains between continents through trade routes or long distance migratory birds.
In addition, the first large study of toxoplasma seroprevalence in a stray cat population was also reported. The relatively high seropositivity rates and the variety of T. gondii genotypes confirm the local stray cat population as a risk factor for human toxoplasmosis in Izmir.

Factors influencing wound healing complications after wide excision of injection site sarcomas of the trunk of cats.


*Cantatore, M., R. Ferrari, P. Boracchi, M. Gobbetti, O. Travetti, G. Ravasio, C. Giudice, M. Di Giancamillo, V. Grieco, and D. Stefanello*

OBJECTIVE: Wide surgery is the mainstay of the multimodal treatment of injection site sarcomas (ISS) in cats. The aim of the study was to analyze potential factors influencing the development of wound healing complications (WHC) in cats undergoing wide excision of ISS. STUDY DESIGN: Retrospective case series. ANIMALS: Forty-nine cats with ISS located on the trunk underwent wide excision after contrast-enhanced computed tomography planning. METHODS: The prognostic effect of covariates (sex, age, weight, body condition score (BCS), site, clinical dimension (CD), computed tomographic dimension (CTD), histotype, duration of surgery, surgical margin status, local anesthesia) on total, major and minor WHC was evaluated by univariate and bivariate analysis. Cox model was used for total WHC and Fine and Gray model was used for major and minor WHC. The relationship between duration of surgery and clinical and imaging variables was evaluated. RESULTS: The main factor associated to the risk of total and major WHC was surgical time. Based on univariate analysis, pattern of reconstruction, CDT, CD, weight, and BCS were significant prognostic factors for major WHC, but this was not confirmed when adjusted for other clinical variables in bivariate analysis. The duration of surgery was influenced by excision pattern and tumor CTD width. CONCLUSIONS: An increased duration of surgery as the consequence of complex surgical procedures represented the best predictor for the development of WHC.

**AAFP and ISFM Guidelines for Diagnosing and Solving House-Soiling Behavior in Cats.**


*Carney, H. C., T. P. Sadek, T. M. Curtis, V. Halls, S. Heath, P. Hutchison, K. Mundschenk, and J. L. Westropp*

RATIONALE: These Guidelines have been developed by the American Association of Feline Practitioners (AAFP) and the International Society of Feline Medicine (ISFM) as a resource for veterinary practitioners who want to better understand and manage the important clinical condition of house-soiling in their feline patients. The Guidelines offer straightforward, practical solutions that, in most cases, will help veterinarians and cat owners prevent, manage or entirely remediate feline house-soiling behavior. EVIDENCE BASE: The Guidelines include scientifically documented information when it is available. However, because research is often lacking, some recommendations reflect the accumulated clinical experience of the authors.

**Effect of GnRH analogs in postnatal domestic cats.**

Theriogenology (2014) **82**:138-143.
Carranza, A., M. Faya, M. L. Merlo, P. Batista, and C. Gobello

The aim of this study was to reproductively assess the clinical and hormonal effects of a GnRH agonist (AG) and an antagonist (AN) administered during the postnatal period in domestic cats. Forty-eight male and female postnatal kittens were randomly assigned to deslorelin acetate 1.6 mg subcutaneous (AG; n = 16), acyline 33 μg/100 g subcutaneous weekly for 3 months (AN; n = 16), or control (CO; n = 16) which remained untreated. The cats were followed up (behavioral observation, physical examination, fecal sexual steroid determinations, mating test, and pregnancy diagnosis) up to puberty. Puberty was delayed (weeks) in the AG animals (62.9 +/- 3.5; P < 0.01) but not in the AN (15.5 +/- 1.7; P > 0.05) when they were compared with CO kittens (13.4 +/- 0.4). Fifteen (15/16) of the AN and CO animals, and only 11 of 16 cats of the AG group were fertile (P > 0.1). No differences were found in body weight (P > 0.1) and measurements (P > 0.1), libido (P > 0.1) and in the appearance of side effects (P > 0.1; except a pyometra in an AG female) among groups. In both AG- and AN-treated males (testosterone; P < 0.01) and females (estradiol-17beta; P < 0.01) fecal hormone concentrations were lower than in CO group during the first five postnatal weeks but not later. It is concluded that the neonatal administration of these AG and AN decreased fecal sexual steroids during the first postnatal weeks causing, the agonists but not the antagonist, a significant, reversible delay in puberty appearance.

Evaluation of indirect immunofluorescence antibody test and enzyme-linked immunosorbent assay for the diagnosis of infection by Leishmania infantum in clinically normal and sick cats.

Exp Parasitol (2014)


Cats that live in areas where canine and human leishmaniosis due to Leishmania infantum is endemic may become infected and may develop anti-Leishmania antibodies. In this study 50 clinically normal and 50 cats with cutaneous and/or systemic signs that lived in an endemic area and had been previously examined for infection by L. infantum using PCR in four different tissues were serologically tested for the presence of anti-Leishmania IgG (IFAT and ELISA) and IgM (IFAT). The aim was to compare the results of IFAT, ELISA and PCR and to investigate the possible associations between seropositivity to Leishmania spp and signalment, living conditions, season of sampling, health status of the cats, and seropositivity to other infectious agents. Low concentrations of anti-Leishmania IgG were detected by IFAT in 10% of the cats and by ELISA in 1%, whereas anti-Leishmania IgM were detected by IFAT in 1%. There was disagreement between the results of IFAT and ELISA for anti-Leishmania IgG (P=0.039) and between all serological tests and PCR (P<0.001). The diagnostic sensitivity of all serological tests, using PCR as the gold standard, was very low, but ELISA and IFAT for anti-Leishmania IgM had 100% specificity. The diagnostic sensitivity of all serological tests could not be improved by changing the cut-off values. Seropositivity for Leishmania spp was not associated with signalment, living conditions, season of sampling and health status of the cats or with seropositivity to feline leukemia virus, feline immunodeficiency virus, feline coronavirus, Toxoplasma gondii and Bartonella henselae. In conclusion, because of their low sensitivity and very high specificity two of the evaluated serological tests (ELISA for anti-Leishmania IgG and IFAT for anti-Leishmania IgM) may be useless as population screening tests but valuable for diagnosing feline infection by L. infantum.

Molecular characterisation and phylogenetic analysis of feline astrovirus in Korean cats.

- 25 -
Astroviruses (AstVs) are important pathogens associated with enteric diseases in humans and other animals. However, most animal AstVs, including feline astrovirus (FAstV), are poorly understood. The aim of the present study was to investigate the prevalence and association of FAstV with enteric diseases in cats, and to conduct a molecular analysis of FAstVs, in Korea. Eleven faecal samples from 62 hospitalised cats at animal hospitals in the Moran market in South Korea tested positive for FAstV. The prevalence of FAstV was higher in cats <2 months old (25%) than in cats >2 months old (14.3%) (P = 0.31). Diarrhoea and normal faeces were observed in 19% (8/42) and 15% (3/20) of cats with FAstV, respectively (P = 1.00). Amino acid sequences alignment and phylogenetic tree analysis showed that FAstVs, including Korean strains, formed a single clade within the mamastroviruses.

Experimental infection of cats with Afipia felis and various Bartonella species or subspecies.


Based upon prior studies, domestic cats have been shown to be the natural reservoir for Bartonella henselae, Bartonella claridgeiae and Bartonella koehlerae. However, other Bartonella species, such as Bartonella vinsonii subsp. berkhoffii, Bartonella quintana or Bartonella bovis (ex weissii) have been either isolated from or Bartonella DNA sequences PCR amplified and sequenced. In the late 1980s, before B. henselae was confirmed as the etiological agent of cat scratch disease, Afipia felis had been proposed as the causative agent. In order to determine the feline susceptibility to A. felis, B. vinsonii subsp. berkhoffii, Bartonella rochalimae, B. quintana or B. bovis, we sought to detect the presence of bacteremia and seroconversion in experimentally-inoculated cats. Most of the cats seroconverted, but only the cats inoculated with B. rochalimae became bacteremic, indicating that cats are not natural hosts of A. felis or the other Bartonella species or subspecies tested in this study.

IMAGING DIAGNOSIS-URINARY BLADDER DUPLICATION IN A CAT.

Cook, A. B., C. E. Langston, A. J. Fischetti, and T. A. Donovan

A female kitten presented for chronic, intermittent, antibiotic-responsive urinary incontinence and chronic kidney disease. Abdominal ultrasound identified bilateral pelvic/ureteral dilation and three closely apposed thin-walled fluid-filled structures in the caudal abdomen, extending toward the pelvic inlet. Excretory urography and negative contrast cystography identified contrast medium accumulation from the dilated ureters into two tubular soft tissue masses of the caudal abdomen, with subsequent gradual filling of a more cranially located urinary bladder. A retrograde vaginocystourethrogram identified a normal uterus, normal vagina, and a single urethra continuous with the cranially located urinary bladder. Antemortem diagnosis was suspicious for bilateral ectopic ureteroceles. Postmortem diagnosis, 35 months following initial presentation, determined the fluid-filled masses to have abundant smooth muscle in the wall, including a muscularis mucosa connected by a common ostium, consistent with urinary bladder duplication. Urinary bladder duplication should be included as a differential
diagnosis in cats with these clinical and imaging characteristics. In this case, differentiation of ectopic ureterocele from urinary bladder duplication required histological confirmation.

**Metabolic determinants of body weight after cats were fed a low-carbohydrate high-protein diet or a high-carbohydrate low-protein diet ad libitum for 8 wk.**


*Coradini, M., J. S. Rand, J. M. Morton, and J. M. Rawlings*

Overweight and obese conditions are common in cats and are associated with the development of a number of diseases. Knowledge of metabolic determinants and predictors of weight gain may enable better preventative strategies for obesity in cats. Lean, healthy cats were fed either a low-carbohydrate high-protein diet (n 16) or a high-carbohydrate low-protein (n 16) diet ad libitum for 8 wk. Potential determinants and predictors of final body weight assessed were body fat and lean masses, energy required for maintenance, energy requirements above maintenance for each kilogram of weight gain, insulin sensitivity index, fasting, mean 24-h and peak plasma glucose, insulin, and leptin concentrations, and fasting and mean 24-h serum adiponectin concentrations. In cats fed the low-carbohydrate high-protein diet, after adjusting for initial body weight, those with higher energy requirements for weight gain and higher fasting glucose concentration had higher final body weights (P≤ 0.01). Predicted final body weights using initial body weight, fasting glucose and mean 24-h insulin concentrations (partial R(2) 37.3%) were imprecise. An equation using just initial body weight and fasting glucose concentration would be of more practical value, but was marginally less precise. In cats fed the high-carbohydrate low-protein diet, those with lower fasting leptin concentration initially had higher final body weights (P = 0.01). Predicted final body weights using initial body weight, energy requirements for maintenance, total body fat percentage and fasting leptin concentration (partial R(2) 39.2%) were reasonably precise. Further studies are warranted to confirm these findings and to improve the precision of predicted final body weights.

**Forelimb and hindlimb ground reaction forces of walking cats: Assessment and comparison with walking dogs.**


*Corbee, R. J., H. Maas, A. Doornenbal, and H. A. Hazewinkel*

The primary aim of this study was to assess the potential of force plate analysis for describing the stride cycle of the cat. The secondary aim was to define differences in feline and canine locomotion based on force plate characteristics. Ground reaction forces of 24 healthy cats were measured and compared with ground reaction forces of 24 healthy dogs. Force-time waveforms in cats generated by force plate analysis were consistent, as reflected by intra-class correlation coefficients for peak vertical force, peak propulsive force and peak braking force (0.94-0.95, 0.85-0.89 and 0.89-0.90, respectively). Compared with dogs, cats had a higher peak vertical force during the propulsion phase (cat, 3.89 +/- 0.19 N/kg; dog, 3.03 +/- 0.16 N/kg), and a higher hindlimb propulsive force (cat, -1.08 +/- 0.13 N/kg; dog, -0.87 +/- 0.13 N/kg) and hindlimb impulse (cat, -0.18 +/- 0.03 N/kg; dog, -0.14 +/- 0.02 N/kg). Force plate analysis is a valuable tool for the assessment of locomotion in cats, because it can be applied in the clinical setting and provides a non-invasive and objective measurement of locomotion characteristics with high repeatability in cats, as well as information about kinetic characteristics. Differences in force-
time waveforms between cats and dogs can be explained by the more crouched position of cats during stance and their more compliant gait compared with dogs. Feline waveforms of the medio-lateral ground reaction forces also differ between cats and dogs and this can be explained by differences in paw supination-pronation.

An experimental Toxoplasma gondii dose response challenge model to study therapeutic or vaccine efficacy in cats.


Cornelissen, J. B., J. W. van der Giessen, K. Takumi, P. F. Teunis, and H. J. Wisselink

High numbers of Toxoplasma gondii oocysts in the environment are a risk factor to humans. The environmental contamination might be reduced by vaccinating the definitive host, cats. An experimental challenge model is necessary to quantitatively assess the efficacy of a vaccine or drug treatment. Previous studies have indicated that bradyzoites are highly infectious for cats. To infect cats, tissue cysts were isolated from the brains of mice infected with oocysts of T. gondii M4 strain, and bradyzoites were released by pepsin digestion. Free bradyzoites were counted and graded doses (1000, 100, 50, 10), and 250 intact tissue cysts were inoculated orally into three cats each. Oocysts shed by these five groups of cats were collected from faeces by flotation techniques, counted microscopically and estimated by real time PCR. Additionally, the number of T. gondii in heart, tongue and brains were estimated, and serology for anti T. gondii antibodies was performed. A Beta-Poisson dose-response model was used to estimate the infectivity of single bradyzoites and linear regression was used to determine the relation between inoculated dose and numbers of oocyst shed. We found that real time PCR was more sensitive than microscopic detection of oocysts, and oocysts were detected by PCR in faeces of cats fed 10 bradyzoites but by microscopic examination. Real time PCR may only detect fragments of T. gondii DNA without the presence of oocysts in low doses. Prevalence of tissue cysts of T. gondii in tongue, heart and brains, and anti T. gondii antibody concentrations were all found to depend on the inoculated bradyzoite dose. The combination of the experimental challenge model and the dose response analysis provides a suitable reference for quantifying the potential reduction in human health risk due to a treatment of domestic cats by vaccination or by therapeutic drug application.

Palatability evaluation study of a new oral formulation of marbofloxacin in cats.


Cron, M., C. Zemirline, J. Beranger, and V. Privat

At a time when antimicrobial resistance is a global concern in human and animal health, it is of primary importance to draw attention to the problem of compliance with antibiotic therapy in animals hard to medicate such as cats. Resistance may develop because of poor patient compliance with the prescribed course of antibiotic therapy. Increasing palatability might enhance administration compliance. We assessed the acceptability of EFEX tablets, a new oral marbofloxacin formulation for cats. The objective of this study was to compare EFEX to two commercial formulations of marbofloxacin: MARBOCYL P palatable tablets and MARBOCYL Vet tablets. Acceptance tests were run in experimental conditions in 24 cats to compare the spontaneous intake and full consumption of the three pharmaceutical products. The results indicated that EFEX was more palatable than MARBOCYL Vet
(0.001<P <0.01) and equally comparable with MARBOCYL P in palatability. There was no difference in the short-term adverse effects between the products.

**Factors associated with the seroprevalence of leishmaniasis in dogs living around Atlantic Forest fragments.**


Canine visceral leishmaniasis is an important zoonosis in Brazil. However, infection patterns are unknown in some scenarios such as rural settlements around Atlantic Forest fragments. Additionally, controversy remains over risk factors, and most identified patterns of infection in dogs have been found in urban areas. We conducted a cross-sectional epidemiological survey to assess the prevalence of leishmaniasis in dogs through three different serological tests, and interviews with owners to assess features of dogs and households around five Atlantic Forest remnants in southeastern Brazil. We used Generalized Linear Mixed Models and Chi-square tests to detect associations between prevalence and variables that might influence Leishmania infection, and a nearest neighbor dispersion analysis to assess clustering in the spatial distribution of seropositive dogs. Our findings showed an average prevalence of 20% (ranging from 10 to 32%) in dogs. Nearly 40% (ranging from 22 to 55%) of households had at least one seropositive dog. Some individual traits of dogs (height, sterilization, long fur, age class) were found to positively influence the prevalence, while some had negative influence (weight, body score, presence of ectoparasites). Environmental and management features (number of cats in the households, dogs with free-ranging behavior) also entered models as negative associations with seropositivity. Strong and consistent negative (protective) influences of the presence of chickens and pigs in dog seropositivity were detected. Spatial clustering of cases was detected in only one of the five study sites. The results showed that different risk factors than those found in urban areas may drive the prevalence of canine leishmaniasis in farm/forest interfaces, and that humans and wildlife risk infection in these areas. Domestic dog population limitation by gonadectomy, legal restriction of dog numbers per household and owner education are of the greatest importance for the control of visceral leishmaniasis in rural zones near forest fragments.

**Molecular identity and prevalence of Cryptococcus spp. nasal carriage in asymptomatic feral cats in Italy.**


Danesi, P., C. Furnari, A. Granato, A. Schivo, D. Otranto, G. Capelli, and C. Cafarchia

Cryptococcosis is a life-threatening fungal disease that infects humans and animals worldwide. Inhalation of fungal particles from an environmental source can cause primary infection of the respiratory system. As animals can be considered a sentinel for human diseases, the aim of this study was to determine the prevalence and molecular identity of Cryptococcus spp. in the nasal cavity of feral cats. Cats from 162 urban and rural feral cat colonies were sampled over 3 years. Of 766 cats from which nasal swabs were obtained, Cryptococcus spp. were recovered from 95 (12.6%), including 37 C. magnus (4.8%), 16 C. albidus (2.0%), 15 C. carnescens (1.9%), 12 C. neoformans (1.6%), as well as C. oeirensis (n = 3), C. victoriae (n = 3), C. albidosimilis (n = 2), Filobasidium globisporum (n = 2), C.
adeliensis (n = 1), C. flavescens (n = 1), C. dimmae (n = 1), C. saitoi (n = 1), and C. wieringae (n = 1) with prevalence <1%. Thirteen Cryptococcus species were identified by polymerase chain reaction and sequencing of internal transcribed spacer amplicons. Statistical analysis did not identify any predisposing factors that contributed to nasal colonization (eg, sex, age, season, or habitat). Results suggest that asymptomatic feral cats may carry C. neoformans and other Cryptococcus species in their sinonasal cavity. Genotyping of the specific cryptococcal isolates provides a better understanding of the epidemiology of these yeasts.

Multilocus sequence typing (MLST) and M13 PCR fingerprinting revealed heterogeneity amongst Cryptococcus species obtained from Italian veterinary isolates.


Danesi, P., C. Firacatic, M. Cogliati, D. Otranto, G. Capelli, and W. Meyer

Cryptococcosis represents a fungal disease acquired from the environment with animals serving as host sentinels for human exposure. The aim of this study was to investigate the genetic characteristics of Cryptococcus isolates from veterinary sources (cats, dogs and birds) to understand their epidemiology and the genetic variability of the casual isolates. Mating-type PCR in connection with MLST analysis using the ISHAM consensus MLST scheme for the C. neoformans/C. gattii species complex was used to genotype 17 C. neoformans isolates. In the absence of an MLST typing scheme Cryptococcus adeliensis, C. albicus, C. aureus, C. carnescens, C. laurentii, C. magnus and C. uniguttulatus strains were typed using M13 PCR fingerprinting. All C. neoformans isolates were MATalpha mating type, but hybrids possessed alphaADa and aADalpha mating and serotypes. Two C. neoformans molecular types VNI, VNIV and VNIII and VNII/VNIV hybrids were identified. Amongst the 66 non-C. neoformans strains investigated 55 M13 PCR fingerprinting types were identified. The wide variety of MLST types of C. neoformans and the occurrence of alphaADa and aADalpha hybrids in our study supports the notion of genetic recombination in the area studied. The heterogeneity of the non-C. neoformans isolates remains open to further investigations and should be taken into consideration when identifying emergent pathogens.

Seroprevalence of Toxoplasma gondii in the Iranian general population: a systematic review and meta-analysis.


Daryani, A., S. Sarvi, M. Aarabi, A. Mizani, E. Ahmadpour, A. Shokri, M. T. Rahimi, and M. Sharif

Toxoplasma gondii is one of the most common protozoan parasites with widespread distribution globally. It is the causative agent of Toxoplasma infection, which is prevalent in human and other warm-blooded vertebrates. While T. gondii infection in healthy people is usually asymptomatic, it can lead to serious pathological effects in congenital cases and immunodeficient patients. We sought to identify the seroprevalence rate of Toxoplasma infection in the Iranian general population to develop a comprehensive description of the disease condition in Iran for future use. Electronic databases (PubMed, Google Scholar, Science Direct, and Scopus) and Persian language databases (Magiran, Scientific Information Database [SID], Iran Medex, and Iran Doc) were searched. Furthermore, graduate student dissertations and proceedings of national parasitology congresses were searched manually. Our search resulted in a total of 35 reports published from 1978 to 2012. These include 22
published articles, 1 unpublished study, 8 proceedings from the Iranian conference of parasitology, and 4 graduate student dissertations, resulting in 52,294 individuals and 23,385 IgG seropositive cases. The random errors method was used for this meta-analysis. The result shows that the overall seroprevalence rate of toxoplasmosis is among the general population in Iran was 39.3% (95% CI=33.0%-45.7%). There was no significant difference in the seroprevalence rate between male and female patients. A significant linear trend of increasing overall prevalence over age was noted (P<0.0001). In addition, the data indicates that there are high seroprevalence in groups who have direct contact with cats, consume uncooked meat and raw fruits or vegetables, in farmers and Housewife, individuals who have a low level of education, and live in rural areas. To the best of our knowledge, this is the first systematic review of T. gondii infection seroprevalence in Iran, which shows a high prevalence of Toxoplasma infection (more than one third). We highly recommend further study for the purposes of aiding patient management and developing more efficient diagnostic tests and effective prevention approaches.

**Patellar ligament rupture in the cat: repair methods and patient outcomes in seven cases.**


The medical records of cats receiving surgical treatment for unilateral patellar ligament rupture between 1999 and 2012 at 12 referral centres in the UK and Ireland were reviewed. Seven cases were identified: six were caused by trauma and one was iatrogenic, occurring as a complication following surgical stabilisation of a tibial fracture. All cases were treated by sutured anastomosis of the ruptured ligament, with six of the repairs protected by a circumpatellar and/or transpatellar loop of suture. The stifle was immobilised by transarticular external skeletal fixation in three cases. No cases required revision surgery. No complications were reported. Final evaluation, performed at a median time of 31 days, determined five patients to have returned to acceptable or good limb function; two cases were lost to follow-up. The data suggest that, in cats, the current surgical techniques extrapolated from their canine counterparts for repair of a completely or partially ruptured patellar ligament are successfully used and result in acceptable limb function.

**Carriage of methicillin-resistant staphylococci by healthy companion animals in the US.**


Antimicrobial-resistant staphylococci have been associated with wounded or ill companion animals, but little is known about the prevalence of resistant staphylococci among healthy animals. In this study, 276 healthy dogs and cats from veterinary clinics were tested for the presence of antimicrobial-resistant Staphylococcus spp. Isolates were tested for antimicrobial susceptibility and the presence of select resistance genes, and typed using Pulsed-Field Gel Electrophoresis (PFGE). Staphylococcus aureus and Staphylococcus pseudintermedius were also characterized using multilocus sequence typing (MLST), spa typing and SCCmec typing. Approximately 5% (14/276) of the animals were positive by enrichment for five species of staphylococci [Staph. aureus (n = 11), Staph. pseudintermedius (n = 4), Staphylococcus sciuri (n = 6), Staphylococcus simulans (n = 1) and Staphylococcus warneri (n = 1)]. Seventy-eight per cent (18/23) of staphylococci were resistant to oxacillin and also multidrug resistant
(resistance to >/= 2 antimicrobials). All Staph. aureus isolates were mecA+ and blaZ+, SCCmec type II, spa type t002, ST5 and clonal using PFGE. Staphylococcus pseudintermedius were SCCmec type IV or V, spa type t06 and ST170; two of the isolates were pvl(+). These results suggest that healthy companion animals may be a reservoir of multidrug-resistant staphylococci, which may be transferred to owners and others who handle companion animals. SIGNIFICANCE AND IMPACT OF THE STUDY: In this study, antimicrobial-resistant coagulase-negative and coagulase-positive staphylococci were isolated from various body sites on healthy dogs and cats. Resistance to 14 antimicrobials was observed including resistance to oxacillin; the majority of staphylococci were also multidrug resistant. Results from this study suggest that healthy dogs and cats may act as reservoirs of antimicrobial-resistant bacteria that may be transferred to people by simple interaction with the animals. Such carriage poses an underlying risk of infection, which should be considered during handling of healthy dogs and cats by pet owners and veterinary personnel.

**Recommendations on vaccination for Asian small animal practitioners: a report of the WSAVA Vaccination Guidelines Group.**

*J Small Anim Pract (2014)*


In 2012 and 2013, the World Small Animal Veterinary Association (WSAVA) Vaccination Guidelines Group (VGG) undertook fact-finding visits to several Asian countries, with a view to developing advice for small companion animal practitioners in Asia related to the administration of vaccines to dogs and cats. The VGG met with numerous first opinion practitioners, small animal association leaders, academic veterinarians, government regulators and industry representatives and gathered further information from a survey of almost 700 veterinarians in India, China, Japan and Thailand. Although there were substantial differences in the nature and magnitude of the challenges faced by veterinarians in each country, and also differences in the resources available to meet those challenges, overall, the VGG identified insufficient undergraduate and postgraduate training in small companion animal microbiology, immunology and vaccinology. In most of the countries, there has been little academic research into small animal infectious diseases. This, coupled with insufficient laboratory diagnostic support, has limited the growth of knowledge concerning the prevalence and circulating strains of key infectious agents in most of the countries visited. Asian practitioners continue to recognise clinical infections that are now considered uncommon or rare in western countries. In particular, canine rabies virus infection poses a continuing threat to animal and human health in this region. Both nationally manufactured and international dog and cat vaccines are variably available in the Asian countries, but the product ranges are small and dominated by multi-component vaccines with a licensed duration of immunity (DOI) of only 1 year, or no description of DOI. Asian practitioners are largely unaware of current global trends in small animal vaccinology or of the WSAVA vaccination guidelines. Consequently, most practitioners continue to deliver annual revaccination with both core and non-core vaccines to adult animals, with little understanding that “herd immunity” is more important than frequent revaccination of individual animals within the population. In this paper, the VGG presents the findings of this project and makes key recommendations for the Asian countries. The VGG recommends that (1) Asian veterinary schools review and increase as needed the amount of instruction in small animal vaccinology within their undergraduate curriculum and increase the availability of pertinent postgraduate education for practitioners; (2) national small animal veterinary associations, industry veterinarians and academic experts work together to improve the scientific
Antibiotics used most commonly to treat animals in Europe.


The Heads of Medicines Agencies and the Federation of Veterinarians of Europe undertook a survey to gain an insight into European prescribing of antibiotics for animals, in particular to highlight the diseases for which antibiotics are most commonly said to be prescribed and which different classes, including human critically important antibiotics (CIAs). The survey was completed by 3004 practitioners from 25 European countries. Many older antibiotics (eg, penicillins, tetracyclines) are cited most frequently as the prescribed classes to treat the main food producing species. The frequency of citation of non-CIAs predominates. CIAs are mostly frequently cited to be prescribed for: urinary diseases in cats (62 per cent), respiratory diseases in cattle (45 per cent), diarrhoea in cattle and pigs (respectively 29 per cent and 34 per cent), locomotion disorders in cattle (31 per cent), postpartum dysgalactia syndrome complex in pigs (31 per cent) and dental disease in dogs (36 per cent). Clear ‘preferences’ between countries can be observed between antibiotic classes. The use of national formularies and guidance helps to drive responsible use of antibiotics and can significantly reduce the extent of use of CIAs. A more widespread introduction of veterinary practice antibiotic prescribing policies and monitoring obedience to these should ensure more widespread compliance with responsible use guidelines.

Use of surgery and carboplatin in feline malignant mammary gland neoplasms with advanced clinical staging.


BACKGROUND/AIM: Feline mammary carcinomas (FMCs) are characterized by poor prognosis and little progress has been made in extending patient survival. The aim of the study was to compare overall survival periods of FMCs submitted to different treatment protocols, including surgery and adjuvant chemotherapy. MATERIALS AND METHODS: Analysis of conventional surgical excision
Analysis of single-nucleotide polymorphisms in the APOBEC3H gene of domestic cats (Felis catus) and their association with the susceptibility to feline immunodeficiency virus and feline leukemia virus infections.


Feline immunodeficiency virus (FIV) and feline leukemia virus (FeLV) are widely distributed retroviruses that infect domestic cats (Felis catus). Restriction factors are proteins that have the ability to hamper retroviruses’ replication and are part of the conserved mechanisms of anti-viral immunity of mammals. The APOBEC3 protein family is the most studied class of restriction factors; they are cytidine deaminases that generate hypermutations in provirus DNA during reverse transcription, thus causing hypermutations in the viral genome, hindering virus replication. One of the feline APOBEC3 genes, named APOBEC3H, encodes two proteins (APOBEC3H and APOBEC3CH). In other mammals, APOBEC3H single-nucleotide polymorphisms (SNPs) can alter the stability and cellular localization of the encoded protein, thus influencing its subcellular localization and reducing its anti-viral effect. In cats, the association of APOBEC3H SNPs with susceptibility to retroviral infections was not yet demonstrated. Therefore, this study aimed the investigation on the variability of APOBEC3H and the possible association with FIV/FeLV infections. DNA obtained from whole blood of fifty FIV and/or FeLV-infected cats and fifty-nine FIV and/or FeLV-uninfected cats were used as templates to amplify two different regions of the APOBEC3H, with subsequent sequencing and analysis. The first region was highly conserved among all samples, while in the second, six single-nucleotide variation points were identified. One of the SNPs, A65S (A65I), was significantly correlated with the susceptibility to FIV and/or FeLV infections. On the other hand, the haplotype analysis showed that the combination “GGGGCC” was positively correlated with the lack of FIV and/or FeLV infections. Our results indicate that, as previously shown in other mammals, variability of restriction factors may contribute to susceptibility of domestic cats to retroviral infections; however, these results should be confirmed by more extensive analysis and in vitro experiments.

Therapeutic serum phenobarbital concentrations obtained using chronic transdermal administration of phenobarbital in healthy cats.


Delamaide Gasper, J. A., H. L. Barnes Heller, M. Robertson, and L. A. Trepanier

Seizures are a common cause of neurologic disease, and phenobarbital (PB) is the most commonly used antiepileptic drug. Chronic oral dosing can be challenging for cat owners, leading to poor compliance. The purpose of this study was to determine if the transdermal administration of PB could achieve
serum PB concentrations of between 15 and 45 mug/ml in healthy cats. Nineteen healthy cats were enrolled in three groups. Transdermal PB in pluronic lecithin organogel (PLO) was applied to the pinnae for 14 days at a dosage of 3 mg/kg q12h in group 1 (n = 6 cats) and 9 mg/kg q12h in group 2 (n = 7 cats). Transdermal PB in Lipoderm Activemax was similarly applied at 9 mg/kg q12h for 14 days in group 3 (n = 6 cats). Steady-state serum PB concentrations were measured at trough, and at 2, 4 and 6 h after the morning dose on day 15. In group 1, median concentrations ranged from 6.0-7.5 mug/ml throughout the day, (observed range 0-11 mug/ml). Group 2 median concentrations were 26.0 mug/ml (observed range 18.0-37.0 mug/ml). For group 3, median concentrations ranged from 15.0-17.0 mug/ml throughout the day (range 5-29 mug/ml). Side effects were mild. One cat was withdrawn from group 2 owing to ataxia and sedation. These results show therapeutic serum PB concentrations can be achieved in cats following chronic transdermal administration of PB in PLO at a dosage of 9 mg/kg q12h. More individual variation was noted using Lipoderm Activemax. Transdermal administration may be an alternative for cats that are difficult to medicate orally.

**Influence of dietary protein level on body composition and energy expenditure in calorically restricted overweight cats.**

J Anim Physiol Anim Nutr (Berl) (2014)


High-protein (HP) diets help prevent loss of lean mass in calorie-restricted (CR) cats. However, it is not entirely known whether these diets also induce changes of energy expenditure during periods of CR. To investigate this issue, sixteen overweight cats were fed either a high-protein [(HP), 54.2% of metabolizable energy (ME)] or a moderate-protein [(MP), 31.5% of ME] diet at 70% of their maintenance energy intakes for 8 weeks, and energy expenditure, energy intake, body weight and composition, and serum metabolites and hormones were measured. While both groups of cats lost weight at a similar rate, only cats eating the HP diet maintained lean mass during weight loss. Indirect respiration calorimetry measurements revealed that both total and resting energy expenditure (kcal/d) significantly decreased during weight loss for both treatment groups. However, only cats eating the MP diet exhibited significant decreases of total and resting energy expenditures after energy expenditure was normalized for body weight or lean mass. Results from this study suggest that in addition to sparing the loss of lean mass, feeding HP diets to overweight cats in restricted amounts may be beneficial for preventing or minimizing decreases of mass-adjusted energy expenditure during weight loss.

**Role of sialic acids in feline enteric coronavirus infections.**


To initiate infections, many coronaviruses use sialic acids, either as receptor determinants or as attachment factors helping the virus find its receptor underneath the heavily glycosylated mucus layer. In the present study, the role of sialic acids in serotype I feline enteric coronavirus (FECV) infections was studied in feline intestinal epithelial cell cultures. Treatment of cells with neuraminidase (NA) enhanced infection efficiency, showing that terminal sialic acid residues on the cell surface were not receptor determinants and even hampered efficient virus-receptor engagement. Knowing that NA
treatment of coronaviruses can unmask viral sialic acid binding activity, replication of untreated and NA-treated viruses was compared, showing that NA treatment of the virus enhanced infectivity in untreated cells, but was detrimental in NA-treated cells. By using sialylated compounds as competitive inhibitors, it was demonstrated that sialyllactose (2,6-alpha-linked over 2,3-alpha-linked) notably reduced infectivity of NA-treated viruses, whereas bovine submaxillary mucin inhibited both treated and untreated viruses. In desialylated cells, however, viruses were less prone to competitive inhibition with sialylated compounds. In conclusion, this study demonstrated that FECV had a sialic acid binding capacity, which was partially masked by virus-associated sialic acids, and that attachment to sialylated compounds could facilitate enterocyte infections. However, sialic acid binding was not a prerequisite for the initiation of infection and virus-receptor engagement was even more efficient after desialylation of cells, indicating that FECV requires sialidases for efficient enterocyte infections.

**First report of Troglostrongylus brevior in a kitten in Greece.**
*Diakou, A., A. Di Cesare, T. Aeriniotaki, and D. Traversa*
The first case of a natural infestation with Troglostrongylus brevior in a kitten in Greece is described here. A approximately 40-day-old stray cat was referred to a private veterinary clinic with signs of respiratory distress. First stage larvae of a metastrongyloid nematode were observed in the wet mount faecal preparation. Despite an anthelmintic treatment, the respiratory signs worsened and the kitten died 2 days later. The larvae in the faeces were identified morphologically and genetically as T. brevior. The present evidence suggests a vertical or direct infestation of the kitten and a severe pathogenic role of T. brevior in young cats. This report expands the recent published cases of troglostrongyllosis in domestic cats to a wider geographical distribution and opens new questions on the apparent spreading of T. brevior from wild to domestic hosts.

**Use of visual and permanent identification for pets by veterinary clinics.**
*Dingman, P. A., J. K. Levy, L. E. Rockey, and M. M. Crandall*
It is estimated that more than 5 million stray dogs and cats enter animal shelters in the USA each year, but less than half are ever reunited with their owners. Lost pets with identification microchips are up to 21 times more likely to be reunited than those without. Finders of lost pets are more likely to consult veterinarians than shelters for assistance, and pet owners look first to veterinarians for advice regarding pet health, protection, and welfare. An online survey of 1086 veterinary clinics in the South-Eastern USA was conducted to evaluate how veterinary clinics functioned as a part of the pet identification network. Scanning and microchip implants were offered by 91% of surveyed clinics and 41% used ‘global’ scanners capable of detecting all currently used microchip brands. Clinics more frequently relied on pet owners to register contact information rather than providing this service for clients (52% vs. 43%, respectively). Even though lost dogs are more likely to be reunited with owners than lost cats, microchips and collars were more likely to be recommended for all dogs (85% and 93%, respectively) than for all cats (67% and 61%, respectively). Only half of clinics that recommended identification collars made them available to their clients. Veterinarians can protect animals, pet owners and the human-animal bond by integrating pet identification into preventive health care.
Feline urinary tract pathogens: prevalence of bacterial species and antimicrobial resistance over a 10-year period.

Vet Rec (2014)


The purpose of this retrospective study was to identify bacterial species in cats with bacterial urinary tract infections (UTIs) and to investigate their antimicrobial susceptibilities over a 10-year period. Three hundred and thirty cultures from 280 cats were included in the study. The mean age of affected cats was 9.9 years; female cats with bacterial UTIs were significantly older than male cats with UTIs. The most common pathogen identified was Escherichia coli (42.3 per cent), followed by Streptococcus species (19.3 per cent), Staphylococcus species (15.6 per cent), Enterococcus species (6.6 per cent) and Micrococcaceae (5.8 per cent). Forty specimens (12.1 per cent) yielded growth of more than one isolate. Streptococcus and Enterococcus isolates were resistant to a significantly higher number of antimicrobial agents than E coli and Staphylococcus species isolates. Applying the formula to select rational antimicrobial therapy, bacterial isolates were most likely to be susceptible to nitrofurantoin, amoxicillin clavulanic acid, enrofloxacin and gentamicin. The antimicrobial impact factor for nitrofurantoin increased significantly over the 10-year period, whereas there was no significant change in antimicrobial impact factors for doxycycline, trimethoprim-sulfamethoxazole, gentamicin, enrofloxacin, cephalothin and amoxicillin clavulanic acid. The detected changes in in vitro antimicrobial efficacy could help to develop hospital-specific guidelines for antimicrobial use to prevent the further development of resistance in feline uropathogens.

Molecular detection of haemotropic Mycoplasma species in urban and rural cats from Portugal.


OBJECTIVES: The aim of the present study was to evaluate the prevalence of haemoplasma infection in cats in Portugal and to assess risk factors for infection. METHODS: Real-time polymerase chain reaction techniques were used to assess 236 urban and rural cats from central and southern Portugal. RESULTS: The overall prevalence of haemoplasma in the target population was 27.1% (64/236), with individual species’ prevalences as follows: 17.8% (42/236) ‘Candidatus Mycoplasma haemominutum’ (CMhm), 14.4% (34/236) Mycoplasma haemofelis (Mhf) and only 5.9% (14/236) ‘Candidatus Mycoplasma turicensis’ (CMt). Multiple infections were detected in 8.1% (19/236) of the samples, with triple and double infections with Mhf and CMhm being most commonly detected (5.9% [14/236] of cats). Haemoplasma infection was significantly higher in shelter cats (P = 0.015) than in cats with other lifestyles (eg, free-roaming/house pet/blood donors). Haemoplasma prevalence was also higher in cats with feline immunodeficiency virus infection (FIV; P = 0.011). Although sex was not significantly associated with haemoplasma infection (P = 0.050), CMt was predominantly found in males (P = 0.032). Also, the presence of haemoplasma multiple infections was statistically associated with being in a shelter (P = 0.021), male (P = 0.057) and with FIV co-infection (P = 0.004). No evidence of an association between haemoplasma infection and geographical location, age or feline leukaemia virus co-infection was found. CONCLUSIONS AND RELEVANCE: The results obtained in our study are
consistent with the documented worldwide prevalence of feline haemoplasma infections, suggesting that the three main feline haemoplasma species are common in Portugal.

**Life Cycle of Cystoisospora felis (Coccidia: Apicomplexa) in Cats and Mice.**


*Dubey, J. P.*

Cystoisospora felis is a ubiquitous apicomplexan protozoon of cats. The endogenous development of C. felis was studied in cats after feeding them infected mice. For this, five newborn cats were killed at 24, 48, 72, 96, and 120 h after having been fed mesenteric lymph nodes and spleens of mice that were inoculated with C. felis sporulated sporocysts. Asexual and sexual development occurred in enterocytes throughout the villi of the small intestine. The number of asexual generations was not determined with certainty, but there were different sized merozoites. At 24 h, merogony was seen only in the duodenum and the jejunum. Beginning at 48 h, the entire small intestine was parasitized. At 24 h, meronts contained 1-4 zoites, and at 48 h up to 12 zoites. Beginning with 72 h, the ileum was more heavily parasitized than the jejunum. At 96 and 120 h, meronts contained many zoites in various stages of development; some divided by endodyogeny. The multiplication was asynchronous, thus both immature multinucleated meronts and mature merozoites were seen in the same parasitophorous vacuole. Gametogony occurred between 96 and 120 h, and oocysts were present at 120 h. For the study of the development of C. felis in murine tissues, mice were killed from day 1 to 720 d after having been fed 10(5) sporocysts, and their tissues were examined for the parasites microscopically, and by bioassay in cats. The following conclusions were drawn. (1) Cystoisospora felis most frequently invaded the mesenteric lymph nodes of mice and remained there for at least 23 mo. (2) It also invaded the spleen, liver, brain, lung, and skeletal muscle of mice, but division was not seen based on microscopical examination. (3) This species could not be passed from mouse to mouse.

**Life Cycle of Hammondia hammondi (Apicomplexa: Sarcocystidae) in Cats.**


*Dubey, J. P., and D. J. Ferguson*

Hammondia hammondi and Toxoplasma gondii are feline coccidians that are morphologically, antigenically, and phylogenetically related. Both parasites multiply asexually and sexually in feline intestinal enterocytes, but H. hammondi remains confined to enterocytes whereas T. gondii also parasitizes extra-intestinal tissues of the cat. Here, we studied multiplication of H. hammondi in feline intestine and compared with T. gondii cycle. Five parasite-free cats were inoculated orally with tissue cysts and free bradyzoites from skeletal muscles of gamma interferon gene knockout mice and killed at 1, 3, 4, 6, and 7 d later. At 1 and 3 d post inoculation (DPI), numerous individual intracellular bradyzoites were detected in histological sections of small intestine. At 4 DPI only schizonts were found and they were located in enterocyte cytoplasm above the host cell nucleus. At 6 and 7 DPI both schizonts and gamonts were seen and they were located in enterocytes. Ultrastructurally, schizogonic and gametogonic development of H. hammondi was similar to T. gondii. However, in H. hammondi merozoites rhoptries were longer, and coiled and contained more micronemes than in T. gondii. Ultrastructural development is illustrated in detail.
Serological evidence of exposure to Ehrlichia canis and Anaplasma phagocytophilum in Central Italian healthy domestic cats.


Ebani, V. V., and F. Bertelloni

The aim of the present survey was to estimate the seroprevalences of Ehrlichia canis and Anaplasma phagocytophilum in the Central Italian feline population. Serum samples of 560 healthy domestic cats were examined by indirect immunofluorescence assay (IFAT), considering an antibody titre of 1:40 as cut-off. Seroprevalences of 6.4% and 4.5% were found for E. canis and A. phagocytophilum, respectively. Adult, mixed breed cats showed seroprevalences higher than younger and purebred subjects, whereas no differences were observed in relation to gender and living conditions.

Outcome of positive-pressure ventilation in dogs and cats with congestive heart failure: 16 cases (1992-2012).


Edwards, T. H., A. Erickson Coleman, B. M. Brainard, T. C. DeFrancesco, B. D. Hansen, B. W. Keene, and A. Koenig

OBJECTIVE: To describe the indications, duration of ventilation, underlying cardiac diseases, and outcome of dogs and cats undergoing positive-pressure ventilation (PPV) for treatment of congestive heart failure (CHF). DESIGN: Two-site retrospective study (1992-2012). SETTING: Two university small animal teaching hospitals. ANIMALS: Six cats and 10 dogs undergoing PPV for CHF. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Medical records were searched to identify patients requiring PPV for treatment of pulmonary edema secondary to CHF. Sixteen animals fulfilled these criteria. Patient signalment, duration of PPV, underlying cardiac disease, arterial or venous blood gas values, pharmacologic therapy before, during, and after PPV, anesthetic drugs, complications, and outcome were recorded. Overall survival to discharge was 62.5% (10/16). Mean (+/-SD) duration of PPV was 30.8 +/- 21.3 hours and average time from presentation for CHF to initiation of PPV was 5.9 +/- 6.4 hours. Azotemia at the time of initiation of ventilation, development of anuria or oliguria, and use of pentobarbital for anesthesia were negatively associated with survival (P = 0.011, P = 0.036, and P = 0.036, respectively). Survival-to-discharge rate was 77% (10/13) for patients treated after 2005 and those not receiving pentobarbital. There was no significant effect attributed to age, sex, weight, species, nature of heart disease, furosemide dose, length of ventilation, use of vasopressors, first-time CHF events, or plasma lactate concentration on survival to discharge. CONCLUSIONS: Dogs and cats requiring PPV for CHF have a good overall prognosis for hospital discharge and require PPV for a relatively short duration. Azotemia, oliguria or anuria, and the use of pentobarbital are negatively associated with outcome.

High levels of Trypanosoma cruzi DNA determined by qPCR and infectiousness to Triatoma infestans support dogs and cats are major sources of parasites for domestic transmission.


Enriquez, G. F., J. Bua, M. M. Orozco, S. Wirth, A. G. Schijman, R. E. Gurtler, and M. V. Cardinal
The competence of reservoir hosts of vector-borne pathogens is directly linked to its capacity to infect the vector. Domestic dogs and cats are major domestic reservoir hosts of Trypanosoma cruzi, and exhibit a much higher infectiousness to triatomines than seropositive humans. We quantified the concentration of T. cruzi DNA in the peripheral blood of naturally-infected dogs and cats (a surrogate of intensity of parasitemia), and evaluated its association with infectiousness to the vector in a high-risk area of the Argentinean Chaco. To measure infectiousness, 44 infected dogs and 15 infected cats were each exposed to xenodiagnosis with 10-20 uninfected, laboratory-reared Triatoma infestans that blood-fed to repletion and were later individually examined for infection by optical microscopy. Parasite DNA concentration (expressed as equivalent amounts of parasite DNA per mL, Pe/mL) was estimated by real-time PCR amplification of the nuclear satellite DNA. Infectiousness increased steeply with parasite DNA concentration both in dogs and cats. Neither the median parasite load nor the mean infectiousness differed significantly between dogs (8.1Pe/mL and 48%) and cats (9.7Pe/mL and 44%), respectively. The infectiousness of dogs was positively and significantly associated with parasite load and an index of the host’s body condition, but not with dog’s age, parasite discrete typing unit and exposure to infected bugs in a random-effects multiple logistic regression model. Real-time PCR was more sensitive and less time-consuming than xenodiagnosis, and in conjunction with the body condition index, may be used to identify highly infectious hosts and implement novel control strategies.

Comparison of preoperative tramadol and pethidine on postoperative pain in cats undergoing ovariohysterectomy.


Background A variety of analgesic agents are available, and which one can be used in dogs and cats is a highly controversial issue, existing however a fear in the use of opiates due to possible adverse effects that these drugs can cause. The aim of this study was to compare the analgesic effect provided by the administration of tramadol or pethidine on early postoperative pain of cats undergoing ovariohysterectomy in a double-blind prospective study. Forty-two animals were randomly assigned into three groups. Pet received pethidine (6 mg/kg), Tra 2 received tramadol (2 mg/kg) and Tra 4 received tramadol (4 mg/kg); all intramuscularly and associated with acepromazine (0.1 mg/kg). The efficacy of each analgesic regimen was evaluated prior to surgery (baseline - TBL), during surgery and 1, 3 and 6 hours after extubation with subjective pain scale, physiologic parameters, serum concentrations of glucose, cortisol and IL-6. Results Changes in cardiovascular system were not clinically relevant. There were no significant differences in pain scores (P inverted question mark> inverted question mark0.05) during the study, although the number of rescue analgesia was significantly higher (P inverted question mark< inverted question mark0.05) at Pet group (5/14) than Tra 4 group (0/14), whereas in Tra 2, two animals (2/14) required additional analgesia. The serum cortisol values of Pet group were significantly higher at T1h T3h (P inverted question mark< inverted question mark0.05) and T6h (P inverted question mark< inverted question mark0.01) when compared to baseline (induction), also it was noticed a significant difference among the groups at T6h (Pet values were higher than Tra 2 and Tra 4; P inverted question mark< inverted question mark0.05). Conclusions Tramadol provided adequate analgesia and it was more effective than pethidine to at least six hours for the studied animals. At the higher dose (4 mg/kg) tramadol is probably more effective, since rescue analgesia was not necessary. No significant changes were observed.
physiological parameter that could contraindicate the use of these opioid in described doses, for the feline species.

**Feline mediastinal lymphoma: a retrospective study of signalment, retroviral status, response to chemotherapy and prognostic indicators.**


*Fabrizio, F.*, *A. E. Calam, J. M. Dobson, S. A. Middleton, S. Murphy, S. S. Taylor, A. Schwartz, and A. J. Stell*

Historically, feline mediastinal lymphoma has been associated with young age, positive feline leukaemia virus (FeLV) status, Siamese breed and short survival times. Recent studies following widespread FeLV vaccination in the UK are lacking. The aim of this retrospective multi-institutional study was to re-evaluate the signalment, retroviral status, response to chemotherapy, survival and prognostic indicators in feline mediastinal lymphoma cases in the post-vaccination era. Records of cats with clinical signs associated with a mediastinal mass and cytologically/histologically confirmed lymphoma were reviewed from five UK referral centres (1998-2010). Treatment response, survival and prognostic indicators were assessed in treated cats with follow-up data. Fifty-five cases were reviewed. The median age was 3 years (range, 0.5-12 years); 12 cats (21.8%) were Siamese; and the male to female ratio was 3.2:1.0. Five cats were FeLV-positive and two were feline immunodeficiency-positive. Chemotherapy response and survival was evaluated in 38 cats. Overall response was 94.7%; complete (CR) and partial response (PR) rates did not differ significantly between protocols: COP (cyclophosphamide, vincristine, prednisone) (n = 26, CR 61.5%, PR 34.0%); Madison-Wisconsin (MW) (n = 12, CR 66.7%, PR 25.0%). Overall median survival was 373 days (range, 20-2015 days) (COP 484 days [range, 20-980 days]; MW 211 days [range, 24-2015 days] [P = 0.892]). Cats achieving CR survived longer (980 days vs 42 days for PR; P = 0.032). Age, breed, sex, location (mediastinal vs mediastinal plus other sites), retroviral status and glucocorticoid pretreatment did not affect response or survival. Feline mediastinal lymphoma cases frequently responded to chemotherapy with durable survival times, particularly in cats achieving CR. The prevalence of FeLV-antigenaemic cats was low; males and young Siamese cats appeared to be over-represented.

**Effects of deafness and cochlear implant use on temporal response characteristics in cat primary auditory cortex.**


We have previously shown that neonatal deafness of 7-13 months duration leads to loss of cochleotopy in the primary auditory cortex (AI) that can be reversed by cochlear implant use. Here we describe the effects of a similar duration of deafness and cochlear implant use on temporal processing. Specifically, we compared the temporal resolution of neurons in AI of young adult normal-hearing cats that were acutely deafened and implanted immediately prior to recording with that in three groups of neonatally deafened cats. One group of neonatally deafened cats received no chronic stimulation. The other two groups received up to 8 months of either low- or high-rate (50 or 500 pulses per second per electrode, respectively) stimulation from a clinical cochlear implant, initiated at 10 weeks of age. Deafness of 7-13 months duration had no effect on the duration of post-onset response suppression, latency, latency
jitter, or the stimulus repetition rate at which units responded maximally (best repetition rate), but resulted in a statistically significant reduction in the ability of units to respond to every stimulus in a train (maximum following rate). None of the temporal response characteristics of the low-rate group differed from those in acutely deafened controls. In contrast, high-rate stimulation had diverse effects: it resulted in decreased suppression duration, longer latency and greater jitter relative to all other groups, and an increase in best repetition rate and cut-off rate relative to acutely deafened controls. The minimal effects of moderate-duration deafness on temporal processing in the present study are in contrast to its previously-reported pronounced effects on cochleotopy. Much longer periods of deafness have been reported to result in significant changes in temporal processing, in accord with the fact that duration of deafness is a major factor influencing outcome in human cochlear implantees.

The European wildcats (Felis silvestris silvestris) as reservoir hosts of Troglostrongylus brevior (Strongylida: Crenosomatidae) lungworms.


The increasing reports of Troglostrongylus brevior lungworm in domestic cats from Italy and Spain raised questions on its factual distribution and on the role wildcats play as reservoirs of these parasites. Carcasses of 21 wildcats were collected in natural parks of southern Italy (i.e., Catania, Sicily n=5 and Matera, Basilicata n=16) and biometrically and genetically identified as Felis silvestris silvestris, but two as hybrids. Troglostrongylus brevior and Eucoleus aerophilus lungworms were found in 15 (71.4%) and 7 (33.3%) individuals, respectively, being five (23.8%) co-infected by the two species. Both lungworms showed an aggregated distribution in the host population, assessed by k-index (i.e., 0.69 for T. brevior and 0.42 for E. aerophilus). Although no statistical significant difference was recorded among age, gender and geographical location of wildcats, a larger rate of infection by T. brevior was assessed in yearlings (85.7%) than adults (64.3%). This is the first epidemiological study reporting T. brevior infection in the European wildcat and discusses the potential threat this may represent for the conservation of this endangered species of felids. In addition, given the large frequency of lungworm infection herein recorded, the role of wildcats as reservoir hosts of these parasites to domestic cats is discussed.

Pain management in veterinary patients with cancer.


Fan, T. M.

Pain is a widespread clinical symptom in companion animals with cancer, and its aggressive management should be a priority. Education and skills can be acquired by health care professionals and caregivers to better understand, recognize, and treat cancer-associated pain. The early and rational institution of multimodality analgesic protocols can be highly effective and maximize the chances of improving quality of life in dogs and cats with cancer. This article describes the pathophysiology of pain in companion animals diagnosed with cancer. The foundational causes of cancer-associated pain and treatment strategies for alleviating discomfort in companion animals with cancer are discussed.
Effect of melatonin implants on spermatogenesis in the domestic cat (Felis silvestris catus).


Favre, R. N., M. C. Bonaura, R. Praderio, M. C. Stornelli, R. L. de la Sota, and M. A. Stornelli

The aim of this study was to assess the efficacy of subcutaneous melatonin implants to temporarily and reversibly suppress spermatogenesis in male cats. Tomcats (n = 8) were housed in a conditioned room with alternating long and short 2-month photoperiod cycles to maintain sperm production and quality. Animals were randomly assigned to one of the two treatments. Four animals received a subcutaneous melatonin implant (MEL, 18 mg; Syntex, Argentina), whereas the other four received a subcutaneous placebo implant (PLA, 0 mg; Syntex). Semen samples were collected by electroejaculation every 14 days for 252 days. Sperm parameters were evaluated in all ejaculates, and data were analyzed by ANOVA. Melatonin-implanted cats significantly decreased their sperm quality in all the parameters studied compared with the control group (MEL vs. PLA; least squares means +/- SEM; motility, 71.3 +/- 3.4 vs. 82.1 +/- 3.6; velocity, 3.4 +/- 0.1 vs. 4.6 +/- 0.1; total sperm count, 2.6 +/- 2.2 vs. 19.4 +/- 3.3; acrosome integrity, 48.7 +/- 5.6 vs. 62.8 +/- 5.6; plasma membrane integrity, 52.2 +/- 4.7 vs. 72.9 +/- 5.5; normal sperm morphology, 45.8 +/- 3.3 vs. 63.7 +/- 3.4; P < 0.05). Conversely, volume and serum testosterone concentrations were similar in both groups (volume, 0.15 +/- 0.02; serum testosterone concentrations, 1.1 +/- 0.1; CV 18.9%; P > 0.05). At 91 +/- 7 days after implant insertion, sperm motility decreased 38.5%, velocity 26.5%, total sperm count 82%, acrosome integrity 22%, plasma membrane integrity 30%, and normal sperm morphology decreased 32% of preimplant values. This effect was present until 120 +/- 15 days after implant insertion. After that, seminal parameters started to increase and reached preimplant values at about 140 +/- 7 days after implant insertion. Nevertheless, treated animals conserved the capacity to produce semen during the treatment period. In conclusion, a single subcutaneous melatonin implant effectively and reversibly reduced sperm production and quality in male domestic cats for approximately 120 +/- 15 days without clinically detectable adverse effects.

Measurement of glomerular filtration rate in cats: methods and advantages over routine markers of renal function.


Finch, N.

PRACTICAL RELEVANCE: Routinely used markers of renal function in clinical practice include urea and creatinine. However, these are insensitive markers, particularly in the early stages of kidney disease. Measurement of glomerular filtration rate (GFR) is regarded as the most sensitive index of functioning renal mass. It may be useful for feline patients in varying clinical scenarios; for example, where a more accurate measurement of renal function may aid diagnosis, to enable response to therapeutic interventions to be more closely monitored, or to evaluate renal function prior to the use of nephrotoxic or renally cleared drugs. CLINICAL CHALLENGES: Traditional methods of measuring GFR, such as renal clearance or multisample plasma clearance techniques, are generally impractical for clinical use. Limited sampling and single sample plasma clearance methods using the filtration marker iohexol have been validated in cats. These have the advantages of reduced stress to cats associated with repeated sampling and reduced costs of analysis, and therefore offer greater clinical utility. Attempts to develop an estimated GFR (eGFR) formula similar to that used in human patients have been made in cats, although currently an accurate and reliable formula is not available. AUDIENCE: This review
presents the basis for the theoretical understanding and practical measurement of GFR for any veterinary practitioner wishing to obtain a more accurate and sensitive assessment of renal function than routinely used markers provide. EVIDENCE BASE: The review draws evidence from peer-reviewed publications, the author’s PhD thesis and also clinical experience.

Esophagostomy feeding tube placement in the dog and cat.
Fink, L., M. Jennings, and A. M. Reiter

Pathology of articular cartilage and synovial membrane from elbow joints with and without degenerative joint disease in domestic cats.
Freire, M., D. Meuten, and D. Lascelles

The elbow joint is one of the feline appendicular joints most commonly and severely affected by degenerative joint disease. The macroscopic and histopathological lesions of the elbow joints of 30 adult cats were evaluated immediately after euthanasia. Macroscopic evidence of degenerative joint disease was found in 22 of 30 cats (39 elbow joints) (73.33% cats; 65% elbow joints), and macroscopic cartilage erosion ranged from mild fibrillation to complete ulceration of the hyaline cartilage with exposure of the subchondral bone. Distribution of the lesions in the cartilage indicated the presence of medial compartment joint disease (most severe lesions located in the medial coronoid process of the ulna and medial humeral epicondyle). Synovitis scores were mild overall and correlated only weakly with macroscopic cartilage damage. Intra-articular osteochondral fragments either free or attached to the synovium were found in 10 joints. Macroscopic or histologic evidence of a fragmented coronoid process was not found even in those cases with intra-articular osteochondral fragments. Lesions observed in these animals are most consistent with synovial osteochondromatosis secondary to degenerative joint disease. The pathogenesis for the medial compartmentalization of these lesions has not been established, but a fragmented medial coronoid process or osteochondritis dissecans does not appear to play a role.

Survey to investigate pet ownership and attitudes to pet care in metropolitan Chicago dog and/or cat owners.
Freiwald, A., A. Litster, and H. Y. Weng

The aims of this descriptive cross-sectional study were to investigate dog and cat acquisition and attitudes toward pet care among residents of the Chicago area (zip codes 60600-60660); to compare data obtained from owners of shelter-acquired pets with those of residents who acquired their pets from other sources; to compare data from dog owners with cat owners; and to compare pet health practices among the respondents of different zip code income groups. In-person surveys administered at five pet store locations collected data from 529 respondents, representing 582 dogs and 402 cats owned or
Feline Abstracts Jul-Oct 2014

continuously cared for in the past 3 years. Median household income data for represented zip codes was also obtained. Shelters were the most common source of cats (p<0.01) and were the second most common source of dogs. Cats were more likely to have been acquired as strays, while dogs were more likely to have been acquired from friends/family/neighbors, pet stores, breeders or rescue organizations and to be kept as outdoor-only pets (p<0.01). More cats were kept per household than dogs (dogs mean=1.32/household; cats mean=1.78/household; p<0.01). Pet owners were most commonly ‘very likely’ (5 on a 1-5/5 Likert scale) to administer all hypothetical treatments discussed, although cat owners were less likely to spend time training their pet (p=0.05). Cat owners were less likely to have taken their pet to a veterinarian for vaccinations or annual physical exams (p<0.01). Shelter-acquired cats were significantly more likely to have been taken by their owners to the veterinarian for annual exams (p=0.05) than cats obtained as strays. Owners of shelter-acquired pets were at least as willing as other respondents to administer hypothetical treatments and pay >/=$1000 for veterinary treatment. Respondents from site #3 lived in zip codes that had relatively lower median household incomes (p<0.01) and were less likely to spend >/=$1000 on their pets than those at the four other sites (p<0.01). Over 90% of pet owners from all acquisition categories expressed very high levels of attachment (>/>=8-10/10 on a Likert scale), except for owners of cats acquired as strays (84.9%) or from the ‘other’ category (75.0%). Survey respondents commonly acquired their pets from shelters and those who did were at least as willing to pay for and provide veterinary care as respondents who owned pets acquired from other sources. The data collected provides a snapshot of the attitudes of survey respondents in the Chicago area toward pet acquisition and care.

Efficacy of passively transferred antibodies in cats with acute viral upper respiratory tract infection.


Friedl, Y., B. Schulz, A. Knebl, C. Helps, U. Truyen, and K. Hartmann

A commercial hyperimmune serum, containing antibodies against feline calicivirus (FCV), feline herpesvirus 1 (FHV-1), and feline panleukopenia virus, is available for treatment of cats with feline upper respiratory tract disease (FURTD), but its efficacy has not been rigorously evaluated in scientific studies. The aim of this randomised, placebo-controlled, double-blind clinical trial was to evaluate the efficacy of passive immunisation in cats with acute viral FURTD caused by FCV and/or FHV-1 infection. All cats received symptomatic treatment during the study period. Hyperimmune serum was administered to one group (n = 22) and an equivalent amount of saline was administered to the control group (n = 20) as placebo, for 3 consecutive days. In the treatment group, cats </=12 weeks old received 2 mL, cats >12 weeks old received 4 mL, subcutaneously once daily and topically into eyes, nostrils, and mouth every 8 h. Clinical signs, including a ‘FURTD score’ and general health status, were recorded daily for 8 days and again on day 21. FCV shedding was determined by quantitative PCR on days 0 and 21. Clinical signs and health status in both groups improved significantly over time (P < 0.001). Cats receiving hyperimmune serum significantly improved in terms of ‘FURTD score’ (P = 0.046) and general health status (P = 0.032) by day 3, while cats in the placebo group only improved significantly by day 7. There was no significant difference in the number of cats shedding FCV between the two groups. Thus, administration of hyperimmune serum led to a more rapid improvement of clinical signs in cats with acute viral FURTD, but by day 7, clinical signs had improved equally in both groups.
Taurine: the comeback of a neutraceutical in the prevention of retinal degenerations.


Taurine is the most abundant amino acid in the retina. In the 1970s, it was thought to be involved in retinal diseases with photoreceptor degeneration, because cats on a taurine-free diet presented photoreceptor loss. However, with the exception of its introduction into baby milk and parenteral nutrition, taurine has not yet been incorporated into any commercial treatment with the aim of slowing photoreceptor degeneration. Our recent discovery that taurine depletion is involved in the retinal toxicity of the antiepileptic drug vigabatrin has returned taurine to the limelight in the field of neuroprotection. However, although the retinal toxicity of vigabatrin principally involves a deleterious effect on photoreceptors, retinal ganglion cells (RGCs) are also affected. These findings led us to investigate the possible role of taurine depletion in retinal diseases with RGC degeneration, such as glaucoma and diabetic retinopathy. The major antioxidant properties of taurine may influence disease processes. In addition, the efficacy of taurine is dependent on its uptake into retinal cells, microvascular endothelial cells and the retinal pigment epithelium. Disturbances of retinal vascular perfusion in these retinal diseases may therefore affect the retinal uptake of taurine, resulting in local depletion. The low plasma taurine concentrations observed in diabetic patients may further enhance such local decreases in taurine concentration. We here review the evidence for a role of taurine in retinal ganglion cell survival and studies suggesting that this compound may be involved in the pathophysiology of glaucoma or diabetic retinopathy. Along with other antioxidant molecules, taurine should therefore be seriously reconsidered as a potential treatment for such retinal diseases.

Evaluation of outcomes and radiation complications in 65 cats with nasal tumours treated with palliative hypofractionated radiotherapy.

Vet J (2014)


Feline nasal tumours (NTs) are locally invasive and occasionally metastasise to distant sites. Although palliative hypofractionated radiotherapy (HRT) is used, its efficacy and long-term complications have not been adequately evaluated. The purpose of this study was to evaluate the efficacy of HRT in treating feline malignant NTs, including monitoring improvement in clinical signs, acute and late complications, and prognosis. The medical records of 65 cats with malignant NTs treated with HRT were included. Overall survival (OS) and progression-free survival (PFS) were calculated using the Kaplan-Meier method. The log-rank test and Cox proportional hazard model were used to evaluate factors that influenced OS and PFS. Clinical signs improved in 86.2% of cats following radiotherapy. Acute complications were observed in 58.5% of cats but were manageable and acceptable. Among late complications, cataract was most frequently observed (20.5%), and atrophy of the entire eyeball and osteochondroma at the irradiation site were each observed in two cats. The median OS and PFS in 65 cats were 432 days and 229 days, respectively. No significant difference between OS of cats with nasal lymphoma and that of cats with other tumours was observed. Despite some limitations due to the retrospective nature of the study, palliative HRT for feline NTs can be considered a useful treatment option because of the high incidence of improvement and more favourable prognosis, although it may
be preferable not to use the hypofractionated regimen in young cats with lymphoma that are expected to survive for a long period.

A retrospective study of 1,098 blood samples with anemia from adult cats: frequency, classification, and association with serum creatinine concentration.


Furman, E., E. Leidinger, E. H. Hooijberg, N. Bauer, G. Beddies, and A. Moritz

BACKGROUND: Frequency and classification of anemia in terms of regeneration status and erythrocyte indices are not well described in cats. OBJECTIVE: To determine frequency and regenerative status of anemia in samples from adult cats, to assess the sensitivity and specificity of macrocytosis and hypochromasia for detecting regenerative anemia (RA), and to evaluate the association of anemia with increased serum creatinine concentration (SC). STUDY POPULATION: Laboratory records from 30,503 blood samples from cats (2003-2011). METHODS: Clinicopathologic data reviewed retrospectively. Anemia defined as hematocrit (Ht) \( \leq 27\% \), red blood cell count (RBC) \( \leq 5.5 \times 10^6/\mu L \) and hemoglobin (Hb) \( \leq 9.0 \text{ g/dL} \). RA defined by manual absolute reticulocyte count \( >50 \times 10^3/\mu L \). Macrocytosis was defined as mean corpuscular volume (MCV) \( >55 \text{ fL} \) and hypochromasia as mean corpuscular hemoglobin concentration (MCHC) \( <31 \text{ g/dL} \). Cutoff for increased serum creatinine concentration was 1.6 mg/dL. RESULTS: Overall, 1,098 of 30,503 blood samples (3.6\%) from cats fulfilled criteria for anemia, 633 of 1,098 (57.7\%) classified as nonregenerative (NRA) and 465 of 1,098 (42.3\%) as regenerative. RBC, Ht, and Hb were significantly lower in the RA compared to NRA group (P <.05). Sensitivity and specificity of the combined high MCV and low MCHC to detect samples with RA were 19.5 and 90.7\%. SC was increased in 572 of the 1,098 anemic samples (52.1\%) and in 11,121 of 29,405 of nonanemic samples (37.8\%). CONCLUSIONS AND CLINICAL IMPORTANCE: Majority of anemic samples were classified as NRA. Anemia was more severe in cats with RA. Erythrocyte indices were not sensitive indicators of RA.

An evaluation of fresh gas flow rates for spontaneously breathing cats and small dogs on the Humphrey ADE semi-closed breathing system.

Vet Anaesth Analg (2014)

Gale, E., K. E. Ticehurst, and S. Zaki

OBJECTIVE: To evaluate the fresh gas flow (FGF) rate requirements for the Humphrey ADE semi-closed breathing system in the Mapleson A mode; to determine the FGF at which rebreathing occurs, and compare the efficiency of this system to the Bain (Mapleson D) system in spontaneously breathing cats and small dogs. STUDY DESIGN: Prospective clinical study. ANIMALS: Twenty-five healthy (ASA score I or II) client-owned cats and dogs (mean +/- SD age 4.7 +/- 5.0 years, and body weight 5.64 +/- 3.26 kg) undergoing elective surgery or minor procedures. METHODS: Anaesthesia was maintained with isoflurane delivered via the Humphrey ADE system in the A mode using an oxygen FGF of 100 mL kg\(^{-1}\) minute\(^{-1}\). The FGF was then reduced incrementally by 5-10 mL kg\(^{-1}\) minute\(^{-1}\) at approximately five-minute intervals, until rebreathing (inspired CO\(_2\) \( >5 \text{ mmHg} \) (0.7 kPa)) was observed, after which flow rates were increased. In six animals, once the minimum FGF at which rebreathing occurred was found, the breathing system was changed to the Bain, and the effects of this
FGF delivery examined, before FGF was increased. RESULTS: Rebreathing did not occur at the FGF recommended by the manufacturer for the ADE. The mean +/- SD FGF that resulted in rebreathing was 60 +/- 20 mL kg^-1 minute^-1. The mean minimum FGF at which rebreathing did not occur with the ADE was 87 +/- 39 mL kg^-1 minute^-1. This FGF resulted in significant rebreathing (inspired CO2 8.8 +/- 2.6 mmHg (1.2 +/- 0.3 kPa)) on the Bain system. CONCLUSIONS: The FGF rates recommended for the Humphrey ADE are adequate to prevent rebreathing in spontaneously breathing cats and dogs <15 kg. CLINICAL RELEVANCE: The Humphrey ADE system used in the A mode is a more efficient alternative to the Bain system, for maintenance of gaseous anaesthesia in spontaneously breathing cats and small dogs.

A Novel Mutation in CLCN1 Associated with Feline Myotonia Congenita.
Myotonia congenita (MC) is a skeletal muscle channelopathy characterized by inability of the muscle to relax following voluntary contraction. Worldwide population prevalence in humans is 1/100,000. Studies in mice, dogs, humans and goats confirmed myotonia associated with functional defects in chloride channels and mutations in a skeletal muscle chloride channel (CLCN1). CLCN1 encodes for the most abundant chloride channel in the skeletal muscle cell membrane. Five random bred cats from Winnipeg, Canada with MC were examined. All cats had a protruding tongue, limited range of jaw motion and drooling with prominent neck and proximal limb musculature. All cats had blepharospasm upon palpebral reflex testing and a short-strided gait. Electromyograms demonstrated myotonic discharges at a mean frequency of 300 Hz resembling the sound of a ‘swarm of bees’. Muscle histopathology showed hypertrophy of all fiber types. Direct sequencing of CLCN1 revealed a mutation disrupting a donor splice site downstream of exon 16 in only the affected cats. In vitro translation of the mutated protein predicted a premature truncation and partial lack of the highly conserved CBS1 (cystathionine beta-synthase) domain critical for ion transport activity and one dimerization domain pivotal in channel formation. Genetic screening of the Winnipeg random bred population of the cats’ origin identified carriers of the mutation. A genetic test for population screening is now available and carrier cats from the feral population can be identified.

Endogenous retroviruses in domestic animals.
Garcia-Etxebarria, K., M. Sistiaga-Poveda, and B. M. Jugo
Endogenous retroviruses (ERVs) are genomic elements that are present in a wide range of vertebrates. Although the study of ERVs has been carried out mainly in humans and model organisms, recently, domestic animals have become important, and some species have begun to be analyzed to gain further insight into ERVs. Due to the availability of complete genomes and the development of new computer tools, ERVs can now be analyzed from a genome-wide viewpoint. In addition, more experimental work is being carried out to analyze the distribution, expression and interplay of ERVs within a host genome. Cats, cattle, chicken, dogs, horses, pigs and sheep have been scrutinized in this manner, all of which are interesting species in health and economic terms. Furthermore, several studies have noted differences
in the number of endogenous retroviruses and in the variability of these elements among different breeds, as well as their expression in different tissues and the effects of their locations, which, in some cases, are near genes. These findings suggest a complex, intriguing relationship between ERVs and host genomes. In this review, we summarize the most important in silico and experimental findings, discuss their implications and attempt to predict future directions for the study of these genomic elements.

**Personality structure in the domestic cat (Felis silvestris catus), Scottish wildcat (Felis silvestris grampia), clouded leopard (Neofelis nebulosa), snow leopard (Panthera uncia), and African lion (Panthera leo): A comparative study.**


_Gartner, M. C., D. M. Powell, and A. Weiss_

Although the study of nonhuman personality has increased in the last decade, there are still few studies on felid species, and the majority focus on domestic cats. We assessed the structure of personality and its reliability in five felids-domestic cats, clouded leopards, snow leopards, African lions, and previous data on Scottish wildcats-and compared the results. In addition to the benefits of understanding more about this taxon, comparative studies of personality structure have the potential to provide information on evolutionary relationships among closely related species. Each of the species studied was found to have three factors of personality. Scottish wildcats’ factors were labeled Dominance, Agreeableness, and Self Control; domestic cats’ factors were Dominance, Impulsiveness, and Neuroticism; clouded leopards’ factors were Dominance/Impulsiveness, Agreeableness/Openness, and Neuroticism; snow leopards’ factors were Dominance, Impulsiveness/Openness, and Neuroticism; and African lions’ factors were Dominance, Impulsiveness, and Neuroticism. The Neuroticism and Impulsiveness factors were similar, as were two of the Dominance factors. A taxon-level personality structure also showed three similar factors. Age and sex effects are also discussed. (PsycINFO Database Record (c) 2014 APA, all rights reserved).

**Safety of intrathecal administration of cytosine arabinoside and methotrexate in dogs and cats.**

Vet Comp Oncol (2014)

_Genoni, S., V. Palus, S. Eminaga, and G. B. Cherubini_

The objective of the study was to retrospectively evaluate the short-term safety of intrathecal administration of cytosine arabinoside alone or in combination with methotrexate in dogs and cats. One hundred and twelve dogs and eight cats admitted between September 2008 and December 2013, diagnosed with suspected inflammatory (meningoencephalomyelitis of unknown aetiology) or neoplastic disease affecting brain or spinal cord and treated with an intrathecal administration of cytosine arabinoside alone or in combination with methotrexate were included in the study. Recorded information regarding possible adverse events during administration while recovering from anaesthesia and during hospitalization period were evaluated. The results showed that one patient developed generalized tonic-clonic seizure activity after administration of cytosine arabinoside and methotrexate during recovery from anaesthesia, however responded to intravenous administration of diazepam. On the base of our results we can conclude that intrathecal administration of cytosine arabinoside alone or in combination with methotrexate is a safe procedure in dogs and cats.
Histological and dermatoscopic description of sphynx cat skin.
Genovese, D. W., T. L. Johnson, K. E. Lamb, and W. D. Gram
BACKGROUND: Histological and hair coat abnormalities of the alopecic sphynx cat have not been described in detail. The hairless allele (hr) in sphynx cats represents a mutation in the gene for keratin 71, a protein expressed in the inner root sheath of humans and mice. HYPOTHESIS/OBJECTIVES: To describe the histological and dermatoscopic abnormalities of sphynx cat skin. ANIMALS: Skin biopsies were collected from 14 sphynx cats and five cats with normal coats. Dermatoscopic examinations were performed on 11 sphynx cats and six additional control cats. METHODS: Vertical and horizontal sections of skin biopsy samples from sphynx and control cats were reviewed. Dermatoscopic images were compared between sphynx and control cats. RESULTS: Sphynx cat hair follicles were often small, curved and kinked and demonstrated infundibular hyperkeratosis and dilatation. Changes in the inner root sheath of sphynx cats included a poorly defined Henle’s layer in addition to vacuolar-like changes and eosinophilic globules in Huxley’s layer. Dermal papillae in sphynx cat anagen bulbs lacked the normal flame shape and were surrounded by epithelial cells arranged in a disorderly manner. The degree of follicular abnormalities varied between follicles. Follicular density was similar for both sphynx cats and control animals. Sphynx cat hair shafts were misshapen, smaller in diameter and rarely medullated. Dermatoscropy revealed similar hair coat density in sphynx and control cats. CONCLUSIONS AND CLINICAL IMPORTANCE: Sphynx cats demonstrated hair follicle dysplasia, with abnormal shaft production but without a decrease in follicle quantity. Abnormalities in sphynx cat follicles are similar to those in murine KRT71 mutants and suggest abnormal hair shaft keratinization.

A molecular study of hemotropic mycoplasmas (hemoplastmas) in cats in Iran.
BACKGROUND: Three feline hemoplasma species are recognized: Mycoplasma haemofelis, ‘Candidatus Mycoplasma haemominutum’, and ‘Candidatus Mycoplasma turicensis’. These species can cause anemia in cats and have a worldwide distribution. OBJECTIVES: There was no previous information on hemotropic mycoplasma spp in cats in Iran and the Middle East. Accordingly, we investigated the molecular presence, and clinical signs and hematological profile in cats infected with these microorganisms in Iranian cats. METHODS: Polymerase chain reaction (PCR) assays and cytology were performed on 100 blood samples collected from Iranian Shorthair cats. ACBC and case history were also collected for each sample. RESULTS: By PCR, 22 (22%; 14-30%, 95% CI) samples were positive. The prevalence of M haemofelis, ‘Ca M haemominutum’, and ‘Ca M turicensis’ was 63.63% (14/22), 54.54% (12/22), and 18.18% (4/22), respectively. Some double and triple co-infections were also found. Using PCR as the reference method, cytology had poor sensitivity (27%) and reasonable specificity (89.74%). Male cats were at a higher risk of infection (P =.001). Cats older than 8 years were more frequently infected than the younger cats (P =.0018). Lower HCT (P =.018), RBC count (P =.028) and HGB concentration (P =.003) were also associated with hemoplasma PCR-positive status. CONCLUSIONS: Based on this study, the most prevalent feline hemoplasma species in
Iranian cats was M haemofelis, but double and triple co-infections are also documented. Age and sex, as well as reduced RBC parameters, were predisposing factors for hemoplasma infection.

Cystatin C: a new renal marker and its potential use in small animal medicine.

Ghys, L., D. Paepe, P. Smets, H. Lefebvre, J. Delanghe, and S. Daminet

The occurrence of chronic kidney disease is underestimated in both human and veterinary medicine. Glomerular filtration rate (GFR) is considered the gold standard for evaluating kidney function. However, GFR assessment is time-consuming and labor-intensive and therefore not routinely used in practice. The commonly used indirect GFR markers, serum creatinine (sCr) and urea, are not sufficiently sensitive or specific to detect early renal dysfunction. Serum cystatin C (sCysC), a proteinase inhibitor, has most of the properties required for an endogenous GFR marker. In human medicine, numerous studies have evaluated its potential use as a GFR marker in several populations. In veterinary medicine, this marker is gaining interest. The measurement is easy, which makes it an interesting parameter for clinical use. This review summarizes current knowledge about cystatin C (CysC) in humans, dogs, and cats, including its history, assays, relationship with GFR, and biological and clinical variations in both human and veterinary medicine.

Pathological and histological findings associated with the feline lungworm Troglostrongylus brevior.


Troglostrongylus brevior is a neglected feline lungworm species, which has been increasingly reported in the Mediterranean area, although scant data are available on the respiratory alterations it causes in cats. Therefore, we describe the gross and histological lesions of a 20-week old kitten that succumbed due to the onset of a fulminant respiratory failure. At necropsy, a catarrhal exudate was observed in the airways, along with nematodes in the trachea and bronchi. The lungs were processed for histological examination and serial pulmonary sections were performed. A total of 14 nematodes were collected, being all morphologically and molecularly identified as T. brevior. Lungworms were histologically localized within the bronchial lumen, surrounded by an eosinophilic infiltrate. The presence of T. brevior in the airways has been histologically documented for the first time and its life-threatening potential is discussed.

A molecular survey of Rickettsia felis in fleas from cats and dogs in Sicily (Southern Italy).

Giudice, E., S. Di Pietro, A. Alaimo, V. Blanda, R. Lelli, F. Francaviglia, S. Caracappa, and A. Torina

Rickettsia felis, the agent of flea-borne spotted fever, has a cosmopolitan distribution. Its pathogenic role in humans has been demonstrated through molecular and serologic tests in several cases. The cat flea (Ctenocephalides felis) is considered the main reservoir and the biological vector. The aim of this
study was to assess the presence and occurrence of R. felis in fleas collected from dogs and cats in various sites of Palermo (Sicily). Between August and October 2012, 134 fleas were collected from 42 animals: 37 fleas from 13 dogs and 97 fleas from 29 cats. Two species of fleas were identified: 132 Ctenocephalides felis (98.51%) collected on all animals and only two C. canis (1.49%) on one dog. Out of 132 C. felis, 34 (25.76%), 12 from dogs (32.43%) and 22 (22.68%) from cats, were positive for R. felis DNA by a polymerase chain reaction (PCR), confirmed by sequencing. The only two C. canis fleas were negative. About half of examined animals (47.62%, 20/42) were infested with at least one infected flea; in particular 46.15% of dogs (6/13) and 48.28% of cats (14/29). It seems that in the Palermo district there is a peri-domestic cycle, with a relatively high prevalence of R. felis infection in the cat flea, an insect widely diffused in home environments and which can frequently bite humans. The results also suggest that R. felis should be considered in the human differential diagnosis of any spotted-like fever or febrile illness without a clear source of infection in Sicily, especially if the patient is known to have been exposed to flea bites.

**Quality of life measurement in prospective studies of cancer treatments in dogs and cats.**


*Giuffrida, M. A., and S. M. Kerrigan*

BACKGROUND: Quality of life (QOL) is an important consideration in healthcare decision-making for pets with cancer. To determine the effect of disease and treatment on pet QOL, this important variable should be objectively measured as an outcome in veterinary cancer studies. OBJECTIVES: To determine the prevalence and methodology of QOL measurement in a sample of recently published reports of prospective studies evaluating cancer treatments in client-owned dogs and cats; to characterize reporting of QOL outcomes and to identify article characteristics associated with QOL measurement. METHODS: English-language reports of prospective studies of cancer treatments in dogs and cats published from 2008 to 2013 were identified using medical research databases combined with a hand-searching strategy. Data pertaining to general article characteristics and QOL measurement were abstracted and summarized. RESULTS: Reports of 144 eligible studies were identified. QOL was measured in 16 (11.1%) studies, with 8 (5.6%) reporting the results. All studies that measured QOL reported using unvalidated instruments, or did not report how QOL was assessed. Only 1 study provided sufficient information for QOL measurements to be replicated. Recently published articles (2011-2013) were significantly more likely to report measuring QOL, compared with earlier articles. CONCLUSIONS: Quality of life of pets undergoing cancer treatment is largely unreported and cannot be meaningfully compared across treatments or disease states using the existing literature. Reliable, validated instruments are needed to facilitate the measurement and comparison of pet QOL in veterinary cancer research. Consistent reporting practices could improve transparency and interpretation of QOL results.

**Hydroxyethyl starch: A review of pharmacokinetics, pharmacodynamics, current products, and potential clinical risks, benefits, and use.**


*Glover, P. A., E. Rudloff, and R. Kirby*
OBJECTIVE: To review and summarize the pharmacokinetics and pharmacodynamics of hydroxyethyl starch (HES), as well as reported risks and benefits of HES infusion, and to provide administration and monitoring recommendations for HES use in dogs and cats. DATA SOURCES: Veterinary and human peer-reviewed medical literature, including scientific reviews, clinical and laboratory research articles, and authors’ clinical experience. SUMMARY: HES solutions are the most frequently used synthetic colloid plasma volume expanders in human and veterinary medicine. The majority of research in human medicine has focused on the adverse effects of HES infusion, with emphasis on acute kidney injury and coagulation derangements. The studies often differ in or fail to report factors, such as the type, amount, interval, and concentration of HES administered; the patient population studied; or concurrent fluids administered. Currently, there is no definitive clinical evidence that the reported adverse effects of HES use in human medicine occur in veterinary species. There is little information available on HES administration techniques or simultaneous administration of additional fluids in human and veterinary medicine. The rationale for HES use in small animals has been largely extrapolated from human medical studies and guidelines. A controlled approach to intravenous fluid resuscitation using crystalloid and HES volumes titrated to reach desired resuscitation end point parameters is outlined for small animal practitioners. CONCLUSION: The extrapolation of data from human studies directly to small animals should be done with the knowledge that there may be species variations and different pharmacokinetics with different HES solutions. Veterinary reports indicate that bolus and continuous rate infusions of 6% hetastarch solutions at moderate doses are well tolerated in feline and canine subjects. Further research in domesticated species is necessary to better define and expand the knowledge regarding use of HES solutions in small animal medicine.

Caudal mucogingival lesions secondary to traumatic dental occlusion in 27 cats: Macroscopic and microscopic description, treatment and follow-up.


Gracis, M., E. Molinari, and S. Ferro

The main aim of this retrospective study was to describe clinical and histopathological findings in cats with mucogingival lesions developed at the contact point of the premolar and molar teeth of the opposite quadrant. Cases were retrieved following manual review of the medical records, dental records and photographic documentation of all feline dental patients visited in the period between February 2001 and August 2011. Cats showing different lesions at different times were calculated as multiple cases. A total of 27 cats (31 cases) with 44 lesions (26 proliferations [59%], 11 clefts [25%] and seven foveae (16%)) were included. Mean age at the time of the first visit was 6.6 years. The lesion object of the study was the main reason for presentation in only five cases (16%). Proliferations showed two different histopathological patterns and had characteristics in common with human oral pyogenic granuloma. Successful treatment was achieved in all cases by removing the occlusal contact by dental extraction or coronal reduction, possibly associated with lesion excision. This study underlines the need for a thorough oral examination and evaluation of dental occlusion in all patients. Causes for the development of traumatic occlusion may include an acquired overbite (possibly secondary to selective dental extraction), congenital or post-traumatic malocclusion, abnormal latero-lateral mobility of the mandible, occlusal drift of the premolar and molar teeth, and/or alveolar bone expansion.
Per-endoscopic trans-tympanic traction for the management of feline aural inflammatory polyps: a case review of 37 cats.

Greci, V., E. Vernia, and C. M. Mortellaro

Feline aural inflammatory polyps are benign growths originating from the tympanic cavity or the Eustachian tube. They usually occur in young cats, which present either signs of otitis externa and otitis media, or respiratory signs, depending on the direction of polyp growth. Neurological signs are also reported. Simple traction and ventral bulla osteotomy (VBO) are the most common techniques used for treating this condition in cats; corticosteroids are recommended to reduce risk of recurrence given the inflammatory nature of the disease. The most common complications after treatment are Horner’s syndrome, polyp recurrence and facial nerve paralysis. The aim of this report is to describe the per-endoscopic trans-tympanic traction (PTT) technique for treating feline aural inflammatory polyps and to report the short- and long-term follow-up of this procedure. PTT allowed resolution of the aural inflammatory polyps in 94% of cats during a mean long-term outcome of 19 months. Three cats (8%) developed Horner’s syndrome immediately after the PTT procedure, which resolved within a few weeks, and five cats had polyp recurrence (13.5%). Only two cats had a poor outcome and were diagnosed with chronic otitis media at 22 months, and chronic otitis media and polyp recurrence at 46 months after the PTT procedure, respectively. PTT was shown to be an effective technique for treating aural inflammatory polyps and registered fewer neurological complications (8%) than VBO (57-81%) or simple traction (43%), and a recurrence percentage (13.5%) similar to VBO (0-33%) and much lower than traction alone (57%).

Pharmacokinetics and pharmacodynamics of propofol with or without 2% benzyl alcohol following a single induction dose administered intravenously in cats.
Vet Anaesth Analg (2014)

Griffenhagen, G. M., M. L. Rezende, D. L. Gustafson, R. J. Hansen, P. J. Lunghofer, and K. R. Mama

OBJECTIVE: To compare the pharmacokinetics and pharmacodynamics of propofol with or without 2% benzyl alcohol administered intravenously (IV) as a single induction dose in cats. STUDY DESIGN: Prospective experimental study. ANIMALS: Six healthy adult cats, three female intact, three male castrated, weighing 4.8 +/- 1.8 kg. METHODS: Cats received 8 mg kg-1 IV of propofol (P) or propofol with 2% benzyl alcohol (P28) using a randomized crossover design. Venous blood samples were collected at predetermined time points to 24 hours after drug administration to determine drug plasma concentrations. Physiologic and behavioral variables were also recorded. Propofol and benzyl alcohol concentrations were determined using high pressure liquid chromatography with fluorescence detection. Pharmacokinetic parameters were described using a 2-compartment model. Pharmacokinetic and pharmacodynamic parameters were analyzed using repeated measures anova (p < 0.05). RESULTS: Plasma concentrations of benzyl alcohol were below the lower limits of quantification (LLOQ) at all time points for two of the six cats (33%), and by 30 minutes for the remaining four cats. Propofol pharmacokinetics, with or without 2% benzyl alcohol, were characterized by rapid distribution, a long elimination phase, and a large volume of distribution. No differences were noted between treatments with the exception of clearance from the second compartment (CLD2), which was 23.6 and 38.8 mL kg-1 minute-1 in the P and P28 treatments, respectively. Physiologic and behavioral variables were not different between treatments with the exception of heart rate at 4 hours post
administration. CONCLUSIONS AND CLINICAL RELEVANCE: The addition of 2% benzyl alcohol as a preservative minimally altered the pharmacokinetics and pharmacodynamics of propofol 1% emulsion when administered as a single IV bolus in this group of cats. These data support the cautious use of propofol with 2% benzyl alcohol for induction of anesthesia in healthy cats.

**Large Outbreak Caused by Methicillin Resistant Staphylococcus pseudintermedius ST71 in a Finnish Veterinary Teaching Hospital - From Outbreak Control to Outbreak Prevention.**

*Gronthal, T., A. Moodley, S. Nykasenoja, J. Junnila, L. Guardabassi, K. Thomson, and M. Rantala*

INTRODUCTION: The purpose of this study was to describe a nosocomial outbreak caused by methicillin resistant *Staphylococcus* pseudintermedius (MRSP) ST71 SCCmec II-III in dogs and cats at the Veterinary Teaching Hospital of the University of Helsinki in November 2010 - January 2012, and to determine the risk factors for acquiring MRSP. In addition, measures to control the outbreak and current policy for MRSP prevention are presented. METHODS: Data of patients were collected from the hospital patient record software. MRSP surveillance data were acquired from the laboratory information system. Risk factors for MRSP acquisition were analyzed from 55 cases and 213 controls using multivariable logistic regression in a case-control study design. Forty-seven MRSP isolates were analyzed by pulsed field gel electrophoresis and three were further analyzed with multi-locus sequence and SCCmec typing. RESULTS: Sixty-three MRSP cases were identified, including 27 infections. MRSPs from the cases shared a specific multi-drug resistant antibiogram and PFGE-pattern indicated clonal spread. Four risk factors were identified: skin lesion (OR = 6.2; CI95% 2.3-17.0, P = 0.0003), antimicrobial treatment (OR = 3.8, CI95% 1.0-13.9, P = 0.0442), cumulative number of days in the intensive care unit (OR = 1.3, CI95% 1.1-1.6, P = 0.0007) or in the surgery ward (OR = 1.1, CI95% 1.0-1.3, P = 0.0401). Tracing and screening of contact patients, enhanced hand hygiene, cohorting and barrier nursing, as well as cleaning and disinfection were used to control the outbreak. To avoid future outbreaks and spread of MRSP a search-and-isolate policy was implemented. Currently nearly all new MRSP findings are detected in screening targeted to risk patients on admission. CONCLUSION: Multidrug resistant MRSP is capable of causing a large outbreak difficult to control. Skin lesions, antimicrobial treatment and prolonged hospital stay increase the probability of acquiring MRSP. Rigorous control measures were needed to control the outbreak. We recommend the implementation of a search-and-isolate policy to reduce the burden of MRSP.

**Clinical trials involving cats: what factors affect owner participation?**


*Gruen, M. E., K. N. Jiamachello, A. Thomson, and B. D. Lascelles*

STUDY RATIONALE: Clinical trials are frequently hindered by difficulties in recruiting eligible participants, increasing the timeline and limiting generalizability of results. In veterinary medicine, where proxy enrollment is required, no studies have detailed what factors influence owner participation in clinical trials involving cats. We aimed to investigate these factors through a survey of owners at first opinion practices. PROTOCOL: The survey was designed using feedback from a pilot study and input from clinical researchers. Owners were asked demographic questions and whether they would, would not, or were unsure about participating in a clinical trial with their cat. They then ranked the
importance and influence of various factors on participation using a five-point Likert-type scale, and incentives from most to least encouraging. A total of 413 surveys were distributed to cat owners at four hospitals, two feline-only and two multi-species; 88.6% were completed. Data for importance and influence factors as well as incentive rankings were analyzed overall, and by hospital type, location and whether owners would consider participating. FINDINGS: The most influential factors were trust in the organization, benefit to the cat and veterinarian recommendation. Importance and influence factors varied by willingness to participate. Ranked incentives were not significantly different across groups, with ‘Free Services’ ranked highest. RELEVANCE: This study provides a first look at what factors influence participation in clinical trials with cats. Given the importance placed in the recommendation of veterinarians, continued work is needed to determine veterinarian-related factors affecting clinical trial participation. The results provide guidance towards improved clinical trial design, promotion and education.

Diagnostic accuracy of the vertebral heart score and other radiographic indices in the detection of cardiac enlargement in cats with different cardiac disorders.


Guglielmini, C., M. Baron Toaldo, H. Poser, G. Menciotti, M. Cipone, A. Cordella, B. Contiero, and A. Diana

A retrospective search was conducted to evaluate the diagnostic accuracy of the vertebral heart score (VHS) and other related radiographic indices in the detection of cardiac enlargement associated with different cardiac disorders in the cat. One hundred and five cats with a complete echocardiographic examination and radiographic examination of the thorax with at least two orthogonal views were enrolled. Eighty-three cats had different cardiac disorders, 72 with left-sided cardiac disorders (LSCD) and 11 with right-sided cardiac disorders; 22 cats were free of cardiovascular abnormalities. Measurements of VHS and cardiac long and short axes on lateral (L) and dorsoventral or ventrodorsal radiographs were obtained. Receiver operating characteristic curves were calculated to evaluate the diagnostic accuracy of each radiographic index in differentiating between cats with cardiac disorders or cats with LSCD and cats without cardiac abnormalities and, among cats with LSCD, between those with no or mild left atrial enlargement (LAE) or those with moderate-to-severe LAE and healthy cats. The L-VHS at the cut-off of 7.9 had high diagnostic accuracy in distinguishing cats with LSCD and moderate-to-severe LAE from healthy cats, but all the other radiographic indices were moderately accurate in discriminating between cats with overall cardiac disorders or LSCD, either with no or mild LAE and moderate-to-severe LAE, and healthy cats. The considered radiographic indices were also moderately accurate in predicting different degrees of LAE in cats with LSCD. Radiographic indices are reasonably specific, but less sensitive predictors of cardiac enlargement in cats with heart disorders.

Feline mycobacterial infections.


Gunn-Moore, D. A.

Mycobacteria of feline importance include (1) obligate pathogens (tuberculosis), (2) mycobacteria that are difficult to grow, so the environmental niche is unknown (feline leprosy syndrome), and (3) facultative pathogenic opportunistic saprophytes (non-tuberculous mycobacteriosis). Most cats present
with cutaneous disease, although some have systemic involvement. Diagnosis is challenging because there are no pathognomonic histopathological changes and many mycobacteria fail to culture, so molecular diagnostics are required. Treatment can involve extended multidrug therapy and prognosis is variable. This article reviews the microbiology, clinical diagnosis, management and prognosis of feline mycobacterial infections.

Analgesia for pelvic limb surgery. A review of peripheral nerve blocks and the extradural technique.


Gurney, M. A., and E. A. Leece

OBJECTIVES: To describe the anatomy and approaches reported for peripheral nerve blockade (PNB) of the pelvic limb in dogs and cats and to consider the role of PNB in relation to the extradural technique. DATABASES USED: This review was conducted using the terms ‘nerve block’, ‘extradural’ ‘dog’ and ‘cat’ entered into Pubmed and Google. Results were filtered manually to narrow the field to pelvic limb nerve blocks. The reference lists of retrieved papers were scrutinized to identify further studies for inclusion. CONCLUSIONS: Successful PNB techniques require thorough anatomical knowledge for the establishment of reliable landmarks, puncture sites, the direction and depth of needle insertion, and relevant structures to be avoided. To date, clinical evaluations have been made in subjects undergoing stifle surgery where the sciatic nerve has been blocked in combination with various approaches to the femoral nerve. Currently the bulk of literature examines new approaches to these nerves and each of these is described. To date there are no veterinary studies directly comparing one approach versus another, and therefore one is unable to draw conclusions of superiority. The role of PNB’s versus the extradural technique is discussed.

Intensive intravenous infusion of insulin in diabetic cats.


BACKGROUND: Remission occurs in 10-50% of cats with diabetes mellitus (DM). It is assumed that intensive treatment improves beta-cell function and increases remission rates. HYPOTHESIS: Initial intravenous infusion of insulin that achieves tight glycemic control decreases subsequent insulin requirements and increases remission rate in diabetic cats. ANIMALS: Thirty cats with newly diagnosed DM. METHODS: Prospective study. Cats were randomly assigned to one of 2 groups. Cats in group 1 (n = 15) received intravenous infusion of insulin with the goal of maintaining blood glucose concentrations at 90-180 mg/dL, for 6 days. Cats in group 2 (n = 15) received subcutaneous injections of insulin glargine (cats <4 kg: 0.5-1.0 IU, q12h; >4 kg 1.5-2.0 IU, q12h), for 6 days. Thereafter, all cats were treated with subcutaneous injections of insulin glargine and followed up for 6 months. Cats were considered in remission when euglycemia occurred for >/=4 weeks without the administration of insulin. Nonparametric tests were used for statistical analysis. RESULTS: In groups 1 and 2, remission was achieved in 10/15 and in 7/14 cats (P = .46), and good metabolic control was achieved in 3/5 and in 1/7 cats (P = .22), respectively. Overall, good metabolic control or remission occurred in 13/15 cats of group 1 and in 8/14 cats of group 2. In group 1, the median insulin dosage given during the 6-month follow-up was significantly lower than in group 2 (group 1: 0.32 IU/kg/day, group 2: 0.51 IU/kg/day;
= .013). **CONCLUSIONS AND CLINICAL IMPORTANCE:** Initial intravenous infusion of insulin for tight glycemic control in cats with DM decreases insulin requirements during the subsequent 6 months.

**Incidence of pyometra in Swedish insured cats.**

Theriogenology (2014) **82:**114-120.

**Hagman, R., B. Strom Holst, L. Moller, and A. Egenvall**

Pyometra is a clinically relevant problem in intact female cats and dogs. The etiology is similar in both animal species, with the disease caused by bacterial infection of a progesterone-sensitized uterus. Here, we studied pyometra in cats with the aim to describe the incidence and probability of developing pyometra based on age and breed. The data used were reimbursed claims for veterinary care insurance or life insurance claims or both in cats insured in a Swedish insurance database from 1999 to 2006. The mean incidence rate (IR) for pyometra was about 17 cats per 10,000 cat years at risk (CYAR). Cats with pyometra were diagnosed at a median age of 4 years and a significant breed effect was observed. The breed with the highest IR (433 cats per 10,000 CYAR) was the Sphynx, and other breeds with IR over 60 cats per 10,000 CYAR were Siberian cat, Ocicat, Korat, Siamese, Ragdoll, Maine coon, and Bengal. Pyometra was more commonly diagnosed with increasing age, with a marked increase in cats older than 7 years. The mean case fatality rate in all cats was 5.7%, which is slightly higher than corresponding reports in dogs of 3% to 4%. Geographical location (urban or rural) did not affect the risk of developing the disease. The present study provides information of incidence and probability of developing pyometra based on age, breed, and urban or rural geographical location. These data may be useful for designing cat breeding programs in high-risk breeds and for future studies of the genetic background of the disease.

**Comparison of serum fatty acid concentrations in cats with hypertrophic cardiomyopathy and healthy controls.**


**Hall, D. J., L. M. Freeman, J. E. Rush, and S. M. Cunningham**

n-3 fatty acids have some benefits in humans and dogs with cardiac disease, and plasma n-3 fatty acid concentrations have been shown to be decreased in dogs with congestive heart failure (CHF). However, there are no published studies reporting fatty acid concentrations in cats with cardiac disease. Therefore, the goal of this study was to compare serum fatty acid concentrations in normal cats and cats with hypertrophic cardiomyopathy (HCM), and determine if fatty acid concentrations correlate with left atrial size or the presence of CHF. Serum fatty acid concentrations were measured in normal cats and cats with HCM by gas chromatography. Twenty-three cats with HCM and 20 healthy controls were enrolled. Compared with healthy controls, cats with HCM had higher concentrations of palmitic acid (P = 0.01), docosahexanoic acid (DHA; P = 0.001) and total n-3 fatty acids (P = 0.03), and lower concentrations of linoleic acid (P = 0.03). Among cats with HCM, there were no differences in plasma fatty acid concentrations, and no association between left atrial dimension and fatty acid concentrations. Cats with HCM have some alterations in plasma fatty acids compared with healthy controls. Given the higher plasma concentrations of DHA, DHA supplementation is unlikely to have benefits in terms of correcting a deficiency; however, other effects of DHA or of supplementation of EPA warrant further investigation.
Comparison of serum concentrations of symmetric dimethylarginine and creatinine as kidney function biomarkers in cats with chronic kidney disease.

Hall, J. A., M. Yerramilli, E. Obare, M. Yerramilli, and D. E. Jewell

BACKGROUND: Symmetric dimethylarginine (SDMA) has been shown to be an accurate and precise biomarker for calculating estimated glomerular filtration rate (GFR) in humans, as well as a more sensitive biomarker than serum creatinine concentration (sCr) for assessing renal dysfunction.

OBJECTIVES: The purpose of this retrospective study was to report on the utility of measuring serum SDMA concentrations in cats for detection of chronic kidney disease (CKD) before diagnosis by conventional measurement of sCr. ANIMALS: Chronic kidney disease cats (n = 21) included those persistently azotemic for >/=3 months (n = 15), nonazotemic cats with GFR >30% decreased from median GFR of normal cats (n = 4), and nonazotemic cats with calcium oxalate kidney stones (n = 2). Healthy geriatric cats (n = 21) were selected from the same colony.

METHODS: Symmetric dimethylarginine concentrations (liquid chromatography-mass spectroscopy) and sCr (enzymatic colorimetry) were determined retrospectively from historical data or banked serum samples in azotemic cats or at the time GFR (iohexol clearance) was measured in nonazotemic cats.

RESULTS: Serum SDMA (r = -0.79) and sCr (r = -0.77) concentrations were significantly correlated to GFR (both P <.0001). Symmetric dimethylarginine became increased before sCr in 17/21 cats (mean, 17.0 months; range, 1.5-48 months). Serum SDMA had higher sensitivity (100%) compared with sCr (17%), but lower specificity (91% versus 100%) and positive predictive value (86% versus 100%).

CONCLUSION AND CLINICAL IMPORTANCE: Using serum SDMA as a biomarker for CKD allows earlier detection of CKD in cats compared with sCr, which may be desirable for initiating renoprotective interventions that slow progression of CKD.

A survey of the prevalence of Lynxacarus radovskyi in cats in Malaysia.
Vet Dermatol (2014)
Han, H. S.

Nucleic acid-based differential diagnostic assays for feline coronavirus.

Han, J. I., S. Y. Kang, K. J. Yoon, and K. J. Na

Feline coronavirus (FCoV) is a pleomorphic, enveloped, positive-sense single-stranded RNA virus. Owing to the differences in its genotype, FCoV belongs to a separate clade along with other viruses, such as transmissible gastroenteritis virus (TGEV) and canine coronavirus (CCoV), which can be isolated from cats. In this study, a PCR assay was developed to differentiate these coronaviruses concurrently. Multiplex differential RT-PCR was performed with primers based on the highly conserved coronavirus membrane protein. Three primer sets were designed: a primer pair (S1 and S2) that can bind to conserved sequences in all target coronaviruses, a CCoV-specific primer (S3), and a TGEV-specific primer (S4). Because of the high sequence homology among FCoV, CCoV, and TGEV,
a nucleotide preceding the last pair of dissimilar nucleotides in S3 and S4 was substituted with an inosine to allow primer binding. This assay could detect and differentiate FCoV (n=7), CCoV (n=4), and TGEV (n=8) precisely and did not show any cross-reactivity with other pathogens. These results suggest that this molecular approach provides a rapid and reliable way to detect FCoV, especially in feline clinical specimens.

**Corticotropin-releasing factor family peptide signaling in feline bladder urothelial cells.**


Corticotropin-releasing factor (CRF) plays a central role in the orchestration of behavioral and neuroendocrine responses to stress. The family of CRF-related peptides (CRF and paralogs: urocortin (Ucn)-I, -II, and -III) and associated receptors (CRFR1 and CRFR2) are also expressed in peripheral tissues such as the skin and gastrointestinal tract. Local signaling may exert multiple effects of stress-induced exacerbation of many complex syndromes, including psoriasis and visceral hypersensitivity. Interstitial cystitis/painful bladder syndrome (IC/PBS), a chronic visceral pain syndrome characterized by urinary frequency, urgency, and pelvic pain, is reported to be exacerbated by stress. Functional changes in the epithelial lining of the bladder, a vital blood-urine barrier called the urothelium, may play a role in IC/PBS. This study investigated the expression and functional activity of CRF-related peptides in the urothelium of normal cats and cats with feline interstitial cystitis (FIC), a chronic idiopathic cystitis exhibiting similarities to humans diagnosed with IC/PBS. Western blots analysis showed urothelial (UT) expression of CRFR1 and CRFR2. Enzyme immunoassay revealed release of endogenous ligands (CRF and Ucn) by UT cells in culture. Evidence of functional activation of CRFR1 and CRFR2 by receptor-selective agonists (CRF and UCN3 respectively) was shown by i) the measurement of ATP release using the luciferin-luciferase assay and ii) the use of membrane-impermeant fluorescent dyes (FM dyes) for fluorescence microscopy to assess membrane exocytotic responses in real time. Our findings show evidence of CRF-related peptide signaling in the urothelium. Differences in functional responses between FIC and normal UT indicate that this system is altered in IC/PBS.

**The Effect of Chinese rhubarb, Rheum officinale, with and without benazepril on the progression of naturally occurring chronic kidney disease in cats.**


*Hanzlicek, A. S., C. J. Roof, M. W. Sanderson, and G. F. Grauer*

**BACKGROUND:** Renal fibrosis is common in progressive kidney disease. Transforming growth factors beta (TGF-beta) are important mediators of all types of fibrosis, including renal fibrosis. Chinese rhubarb has been shown to have antifibrotic properties in part because of inhibition of TGF-beta and has slowed the progression of kidney disease in rodent models. **HYPOTHESIS:** That administration of a Chinese rhubarb supplement will slow the progression of chronic kidney disease (CKD) in cats and the concurrent administration of Chinese rhubarb and benazepril will be more effective than either alone. **ANIMALS:** Twenty-nine client-owned cats with naturally occurring IRIS Stage 2 or early Stage 3 CKD and without comorbidity such as cancer, urinary tract obstruction, urinary tract infection, poorly controlled hyperthyroidism, or systemic hypertension were enrolled in
the study. METHODS: A randomized, positive-controlled, prospective study was performed. Cats received Chinese rhubarb, benazepril, or both in addition to standard treatment for CKD. Repeated measures ANOVA was used to assess changes in serum creatinine concentration, body weight, hematocrit, urine protein: urine creatinine ratio (UPC), and systemic arterial blood pressure over time between and within treatment groups over an average of 22 months. RESULTS: No significant differences were detected in serum creatinine concentration, body weight, hematocrit, UPC, and systemic arterial pressure over time between or within treatment groups. CONCLUSIONS AND CLINICAL IMPORTANCE: This study failed to detect a significant difference in the progression of CKD in cats treated with Chinese rhubarb, benazepril, or both. Further study in specific subsets of cats with CKD is warranted.

Electroencephalographic features of familial spontaneous epileptic cats.


A feline strain of familial spontaneous epileptic cats (FSECs) with typical limbic seizures was identified in 2010, and have been maintained as a novel animal model of genetic epilepsy. In this study, we characterized the electroencephalographic (EEG) features of FSECs. On scalp EEG under sedation, FSECs showed sporadic, but comparatively frequent interictal discharges dominantly in the uni- or bilateral temporal region. Bemegride activation was performed in order to evaluate the predisposition of epileptogenicity of FSECs. The threshold doses of the first paroxysmal discharge, clinical myoclonus and generalized convulsion in FSECs were significantly lower than those in control cats. Chronic video-intracranial EEG monitoring revealed subclinical or clinical focal seizures with secondarily generalization onset from the unilateral amygdala and/or hippocampus. Clinical generalized seizures were also recorded, but we were unable to detect the onset site. The results of the present study show that FSECs resemble not only feline kindling or the kainic acid model and El mouse, but also human familial or sporadic mesial temporal lobe epilepsy. In addition, our results indicate that FSECs are a natural and valuable model of mesial temporal lobe epilepsy.

Oxidative Modification, Inflammation and Amyloid in the Normal and Diabetic Cat Pancreas.

J Comp Pathol (2014)

Herndon, A. M., M. A. Breshears, and D. McFarlane

The pathogenesis of beta-cell dysfunction leading to pancreatic beta-cell failure seen in type 2 diabetes mellitus is incompletely understood. Pancreatic tissues were collected from nine control cats and nine diabetic cats and labelled immunohistochemically to examine expression of interleukin (IL)-1beta, insulin, islet amyloid polypeptide (IAPP) and 4-hydroxynonenal (4-HNE). Thioflavin-S was used to stain for amyloid. All control cats showed positive labelling for IL-1beta and 4-HNE. Diabetic cats showed varying degrees of inflammation and oxidative modification, owing in large part to the very small amount of islet structure remaining in the typical diabetic cat pancreas. Amyloid deposition was identified in 8/9 diabetic cats and 1/9 control cats. In order to validate these findings, paired biopsy samples taken from an additional group of cats enrolled in a study of obesity and hyperglycaemia (sampling at baseline and after 8-16 weeks of obesity and hyperglycaemia) were labelled for IL-1beta
and 4-HNE. A similar pattern of labelling was identified in the baseline samples to that seen in control cats. A significant increase in IL-1beta and 4-HNE expression was seen after a period of hyperglycaemia and obesity. Taken together, these findings suggest that while present in normal cats, markers of inflammation and oxidative modification increase very early during the development of disease. Future studies focusing on these earlier time points are needed to understand the factors that function in protection of the islet beta cell and the development of islet pathology in type 2 diabetes mellitus in the cat.

**Medical management and monitoring of the hyperthyroid cat: a survey of UK general practitioners.**


*Higgs, P., J. K. Murray, and A. Hibbert*

Feline hyperthyroidism is commonly diagnosed in general practice. This study assessed the opinions and experiences of UK general practitioners (GPs) regarding the management of feline hyperthyroidism. This included an evaluation of preferred treatment modalities and the monitoring of medically treated cats in relation to thyroxine (T4) level, co-morbid disease and adverse drug reactions. Six hundred and three GPs completed an online questionnaire comprising 34 questions. Oral medication was the most commonly preferred treatment option (65.7% of respondents), followed by thyroidectomy (27.5%) and then radioiodine (5.5%). When cost of treatment was eliminated as a consideration factor, significantly more respondents selected radioiodine (40.5%, P <0.001). Concerning target total T4 levels during medical management, 48.4% aimed for the lower half of the reference interval (RI), 32.3% anywhere within RI, 13.1% within the top half of RI and 0.5% above the RI; 3.4% evaluated efficacy by physical assessment only. In the presence of chronic kidney disease (CKD) respondents were significantly more likely to target total T4 levels within the upper half of the RI (40.3%) or above it (9.8%) when compared with targets for routine cases (P <0.001). Assessment for unmasking of CKD after initiating treatment or for hypertension was not consistently performed. Variability in monitoring strategies may result in CKD and hypertension remaining undetected, inadequate suppression of T4 levels in cats with concurrent CKD and delayed recognition of potentially significant haematological abnormalities.

**The pharmacokinetics of methimazole in a novel lipophilic formulation administered transdermally to healthy cats.**


*Hill, K. E., M. A. Gieseg, J. Bridges, and J. P. Chambers*

AIM: To determine the pharmacokinetics of a novel lipophilic formulation of transdermal methimazole compared to oral carbimazole. METHODS: Healthy cats received 5 mg carbimazole orally every 12 hours for 13 treatments (n=6), then received transdermal methimazole (n=5) at a dose of 5 mg, then 10 mg, once daily on the pinna for 7 days, with 21 days between treatments. Concentrations of methimazole in serum over 24 hours and at 148 hours were determined by high performance liquid chromatography. RESULTS: Concentrations of methimazole in serum for the first 24 hours were not reliably detected in all cats treated with 5 mg methimazole transdermally, while for those receiving 5 mg carbimazole orally and 10 mg methimazole transdermally all cats had detectable concentrations of
methimazole in serum. The maximum concentration and area under the curve were lower in cats receiving 10 mg methimazole transdermally (108 (SD 25) ng/mL and 2544 (SD 216) mg-hour/mL, respectively) than those receiving 5 mg oral carbimazole (355 (SD 113) ng/mL and 31,866 (SD 439) ng-hour/mL, respectively) (p<0.05). The time at maximal concentration and elimination half-life were longer for 10 mg transdermal methimazole (5.2 (SD 1.1) hours and 13 (SD 3) hours, respectively) compared to 5 mg oral carbimazole (2.1 (SD 1.6) hours and 5.1 (SD 1.2) hours, respectively). At 148 hours, mean concentrations of methimazole in serum were higher in cats receiving 10 mg methimazole transdermally (506 (SD 165) ng/mL) than for 5 mg oral carbimazole (255 (SD 28) ng/mL) or 5 mg transdermally (204 (SD 76) ng/mL). The mean relative bioavailability of 10 mg transdermal methimazole compared to oral carbimazole was 48 (min 43, max 55)%.

CONCLUSION: Transdermal methimazole at a dose of 10 mg administered to the pinnae of healthy cats once daily in a novel lipophilic formulation has half the relative bioavailability compared to 5 mg oral carbimazole.

CLINICAL RELEVANCE: Transdermal methimazole can be absorbed from the skin of healthy cats.

A retrospective histopathological survey on canine and feline liver diseases at the University of Tokyo between 2006 and 2012.


Hirose, N., K. Uchida, H. Kanemoto, K. Ohno, J. K. Chambers, and H. Nakayama

To determine the incidence of hepatic diseases in dogs and cats in Japan, a retrospective study was performed using data of 463 canine and 71 feline liver biopsies at the Veterinary Medical Center of the University of Tokyo. The most common canine hepatic disease was microvascular dysplasia (MVD) and occupied 29.4% of all diagnoses. This terminology might contain “real” MVD and primary portal vein hypoplasia, because these two conditions were difficult to be clearly distinguished histopathologically. Parenchymal and interstitial hepatitis and primary hepatic tumors accounted for 23.5% and 21.0% of the diagnoses, respectively. Parenchymal and interstitial hepatitis occupied 34.1% of non-proliferative canine hepatic diseases, while hepatocellular adenoma and carcinoma were 26.6% and 24.5% of proliferative hepatic diseases, respectively. Breed-specificity was seen in MVD for Yorkshire terrier, Papillon and Toy poodle, in hepatitis for Doberman pinscher and Labrador retriever, in cholangiohepatitis for American cocker spaniel, Miniature schnauzer and Pomeranian, in hepatocellular adenoma for Golden retriever and Shiba and in hepatocellular carcinoma for Shih Tzu. The most common feline liver disease was parenchymal and interstitial hepatitis (45.1% of all diagnoses). Among feline hepatitis, neutrophilic cholangiohepatitis (23.9%), lymphocytic cholangiohepatitis (14.1%) and chronic hepatitis (5.6%) were recorded. Adult polycystic liver disease was 5.6%. Among proliferative diseases in the feline liver (11.3% of the all), lymphoma (4.2%) and primary epithelial tumors (4.2%) including hepatocellular carcinoma, cholangiocellular adenoma and cholangiocellular carcinoma were observed. Hepatic degeneration was 14.1%, and MVD was 12.7%, respectively.

Evaluation of facial expression in acute pain in cats.

J Small Anim Pract (2014)

Holden, E., G. Calvo, M. Collins, A. Bell, J. Reid, E. M. Scott, and A. M. Nolan
OBJECTIVES: To describe the development of a facial expression tool differentiating pain-free cats from those in acute pain. METHODS: Observers shown facial images from painful and pain-free cats were asked to identify if they were in pain or not. From facial images, anatomical landmarks were identified and distances between these were mapped. Selected distances underwent statistical analysis to identify features discriminating pain-free and painful cats. Additionally, thumbnail photographs were reviewed by two experts to identify discriminating facial features between the groups. RESULTS: Observers (n = 68) had difficulty in identifying pain-free from painful cats, with only 13% of observers being able to discriminate more than 80% of painful cats. Analysis of 78 facial landmarks and 80 distances identified six significant factors differentiating pain-free and painful faces including ear position and areas around the mouth/muzzle. Standardised mouth and ear distances when combined showed excellent discrimination properties, correctly differentiating pain-free and painful cats in 98% of cases. Expert review supported these findings and a cartoon-type picture scale was developed from thumbnail images. CLINICAL SIGNIFICANCE: Initial investigation into facial features of painful and pain-free cats suggests potentially good discrimination properties of facial images. Further testing is required for development of a clinical tool.


Hopper, K., S. E. Epstein, P. H. Kass, and M. S. Mellema

OBJECTIVE: To compare the diagnostic performance of the traditional approach to acid-base analysis with the Stewart approach and a semiquantitative approach. DESIGN: Prospective cohort study. SETTING: University teaching hospital. ANIMALS: A total number of 84 dogs and 14 cats presenting to a university teaching hospital emergency room. PROCEDURES: All dogs and cats in which venous blood samples for acid-base, lactate, and serum biochemical analysis were all collected within 60 minutes of each other, over a 5-month enrollment period. Acid-base analysis was performed using the traditional approach, Stewart approach, and a semiquantitative approach. RESULTS: Traditional acid-base analysis identified respiratory acid-base abnormalities in 14/98 animals and metabolic acid-base abnormalities in 67/98. A mixed disorder of metabolic acidosis and respiratory alkalosis was most common occurring in 29/98 patients. The Stewart approach identified metabolic abnormalities in 82/98 patients; strong ion difference abnormalities were evident in 68/98 cases; an increased strong ion gap acidosis was identified in 49/98 cases; and changes in the quantity of weak acids in 25/98 cases. The semiquantitative approach identified abnormalities in all cases evaluated. Of the 14 patients with a primary respiratory acid-base abnormality, the Stewart approach identified metabolic abnormalities in 9 and the semiquantitative approach found abnormalities in all animals. CONCLUSIONS AND CLINICAL RELEVANCE: The physicochemical approaches diagnosed more acid-base abnormalities in this population than the traditional approach although many of the abnormalities identified were small and of unknown clinical relevance. The physicochemical approaches may provide greater insight as to the underlying etiology of abnormalities, which maybe of particular relevance to cases with changes in albumin and/or phosphorus concentration.

Hopper, K., S. E. Epstein, P. H. Kass, and M. S. Mellema

OBJECTIVE: To compare the diagnostic performance of the anion gap (AG) with 2 physicochemical approaches to identify unmeasured anions. DESIGN: Prospective cohort study. SETTING: University teaching hospital. ANIMALS: Eighty-four dogs and 14 cats presenting to a university teaching hospital emergency room. INTERVENTIONS: All dogs and cats in which venous blood samples for acid-base, lactate, and serum biochemical analysis were all collected within 60 minutes of each other, over a 5-month enrollment period. Unmeasured anions were quantified using each of three approaches: the anion gap (AG), strong ion gap (SIG), and a semiquantitative approach (XA). MEASUREMENTS AND MAIN RESULTS: An increased AG metabolic acidosis was evident in 34/98 of cases. The Stewart approach identified an increased SIG acidosis in 49/98 of cases. There was a strong correlation between SIG and AG (r = 0.89; P < 0.001). The semiquantitative approach identified increased unmeasured anions in 68/98 of cases. There was a moderate correlation between AG and XA (r = 0.68; P < 0.001) and a slightly stronger correlation between SIG and XA (r = 0.75; P < 0.001). Plasma lactate concentrations and AG were poorly correlated (r = 0.22; P = 0.029) and there was no correlation between lactate concentrations and BE (r = 0.19; P = 0.069). CONCLUSIONS: Unmeasured anions occurred commonly in this sample of small animal emergency room patients and physiochemical approaches identified more animals with unmeasured anions than the traditional AG calculation. Further studies are needed to determine if the results of the physicochemical approach improves clinical management and warrants the associated increases in cost and complexity.

Horta, M. C., M. Ogrzewalska, M. C. Azevedo, F. B. Costa, F. Ferreira, and M. B. Labruna

This study evaluated rickettsial infection in 701 Ctenocephalides felis felis fleas that were collected from dogs and cats in 31 municipalities, encompassing all regions and major biomes of Brazil. A total of 268 (38.2%) fleas from 30 municipalities were polymerase chain reaction (PCR) positive for the rickettsial gltA gene. The PCR products from 44 fleas, consisting of at least 1 PCR-positive flea from each of 30 municipalities, generated DNA sequences identical to Rickettsia felis. Rickettsial prevalence was highly variable among 30 municipalities, with values ranging from 2.9% to 100%. Significantly higher infection rates by R. felis were associated with the Pampa biome (southern Brazil), and the temperate climate that prevails in southern Brazil. In contrast, lowest R. felis-infection rates were significantly associated with the Caatinga biome, and its semiarid climate. Further studies should evaluate the effect of temperature and moisture on the R. felis infection in Ctenocephalides fleas world widely.

Hourani, L., C. Weingart, and B. Kohn

This prospective study evaluated a novel immunochromatographic (IC) blood typing test for the AB blood group system. Typing was conducted comparatively on ethylenediamine tetra-acetic acid-
anticoagulated blood samples from 89 sick and 16 healthy cats with the IC test, as well as two tests as reference methods, a tube agglutination and a gel column test. The samples were between 0 and 10 days old (median 3 days) and were tested for haemolysis and agglutination; the packed cell volume ranged from 0.07 to 0.57 l/l (median 0.40 l/l). The reference methods agreed with each other in 100% of the test runs. Of the 85 samples tested as blood type A by the two reference methods, 80 were correctly identified by the IC test, four were misidentified as AB and one was rated inconclusive. All B samples were correctly typed. Two of the three AB samples were correctly identified by the IC test and one was rated inconclusive. The sample quality had no influence on test performance. Of 30 repeats, 28 were readable and showed agreement in 27 cases. The agreement of the IC test with the control methods was 96.1% for the 103 conclusive tests, and it showed high sensitivity and specificity for A and B antigen detection. It is suggested that AB results be reconfirmed with a laboratory method and that a ‘back-typing’ be performed with plasma from B samples to detect the presence of alloantibodies. Given its very good performance and ease of use, the IC test can be recommended for clinical settings.

Bovine lactoferrin and piroxicam as an adjunct treatment for lymphocytic-plasmacytic gingivitis stomatitis in cats.


Feline lymphocytic-plasmacytic gingivitis/stomatitis (LPGS) or caudal stomatitis is an inflammatory disease that causes painfully erosive lesions and proliferations of the oral mucosa. The disease is difficult to cure and can affect cats at an early age, resulting in lifetime therapy. In this study, a new treatment using a combination of bovine lactoferrin (bLf) oral spray and oral piroxicam was investigated using a randomized double-blinded clinical trial in 13 cats with caudal stomatitis. Oral lesion grading and scoring of clinical signs were conducted during and after the trial to assess treatment outcome. Oral mucosal biopsies were used to evaluate histological changes during and after treatment. Clinical signs were significantly improved in 77% of the cats. In a 4-week study, clinical signs were considerably ameliorated by oral piroxicam during the first 2 weeks. In a 12-week study, the combined bLf oral spray and piroxicam, when compared with piroxicam alone, exhibited an enhanced effect that reduced the severity of the oral lesions (P = 0.059), while also significantly improving clinical signs (P <0.05), quality of life (P <0.05), and weight gain (P <0.05). The remission of oral inflammation was closely correlated with the decreased number of macrophages (OR = 4.719, P < 0.05). There was no detectable influence on liver or kidney function during a 12-week assessment. It was concluded that combining oral bLf spray and piroxicam was safe and might be used to decrease the clinical signs of caudal stomatitis in cats.

Tramadol toxicity in a cat: case report and literature review of serotonin syndrome.


Indrawirawan, Y., and T. McAlees

OVERVIEW: Tramadol toxicity has not previously been reported in a cat. CASE SUMMARY: This report describes the clinical signs, diagnosis and treatment of tramadol toxicity, manifesting as serotonin syndrome, in a cat in Australia. PRACTICAL RELEVANCE: For any cat with suspicion of serotonin syndrome, in particular secondary to tramadol overdose, it is recommended that
decontamination, monitoring and supportive care are instituted as soon as clinical signs develop. Prolonged hospitalisation may be required in the event of a severe overdose. LITERATURE REVIEW: The literature relating to the pharmacology of tramadol and tramadol overdose, clinical manifestations of tramadol overdose, and serotonin syndrome in cats, humans and dogs is reviewed. Recommended treatment for tramadol overdose and serotonin syndrome is also discussed.

**Gastrointestinal perforation associated with endoscopy in cats and dogs.**


*Irom, S., R. Sherding, S. Johnson, and P. Stromberg*

Gastrointestinal endoscopy is a minimally invasive diagnostic tool for cats and dogs with signs of gastrointestinal disease. This retrospective study examined the case records of six cats and one dog diagnosed with perforation secondary to gastrointestinal endoscopy. Gastrointestinal perforation occurred in 1.6% of cats and 0.1% of dogs that underwent endoscopy during the 17 yr study period (from 1993 to 2010). It can be difficult to predict what animals are at risk for gastrointestinal perforation but possible risk factors suggested by this study include small intestinal infiltrative disease in cats and preexisting gastrointestinal ulceration in both cats and dogs. Overall, gastrointestinal endoscopy is associated with a low rate of gastrointestinal perforation.

**A nationwide survey of ixodid tick species recovered from domestic dogs and cats in Japan in 2011.**

Ticks Tick Borne Dis (2014) **5**:771-779.

*Iwakami, S., Y. Ichikawa, and H. Inokuma*

A nationwide survey of ixodid ticks was performed in 2011, during which a total of 4237 and 298 ticks were recovered from 1162 dogs and 136 cats, respectively. Haemaphysalis longicornis was the most frequently found tick species on canine hosts (739 dogs), followed by *H. flava* (166), *Ixodes ovatus* (139), and *Rhipicephalus sanguineus sensu lato* (70). *H. hystricis*, *H. japonica*, *H. megaspinosa*, *H. formosensis*, *H. campanulata*, *H. ias*, *I. nipponensis*, *I. persulcatus*, and *Amblyomma testudinarius* were also recovered. *H. longicornis* was also the most frequently found species on feline hosts (52 cats), followed by *I. ovatus* (34), *A. testudinarius* (19), and *H. flava* (12). *H. hystricis*, *H. japonica*, *H. megaspinosa*, *I. nipponensis*, *I. persulcatus*, *I. granulatus* and *R. sanguineus sensu lato* were also recovered from cats. The three major species of ticks found on dogs and cats, *H. longicornis*, *H. flava*, and *I. ovatus*, displayed a wide geographical distribution, with specimens found throughout northern and southern Japan. *R. sanguineus sensu lato* was primarily recovered in Okinawa, but was also found in Kanagawa, Wakayama, Hiroshima, and Yamaguchi Prefectures. *A. testudinarius* was mainly distributed throughout western Japan, but small numbers were also recovered from Gumma and Shizuoka Prefectures. *H. longicornis* was more frequently found on dogs in rural areas than those in urban or suburban areas. Exposure to woodland environments was significantly associated with *H. flava* and *I. ovatus* in dogs. Dogs in urban or suburban areas encountered *R. sanguineus sensu lato* more often than other tick species. Most of the cats surveyed in the present study were from rural areas. In the present study, *H. hystricis* and *R. sanguineus sensu lato* were found on cats for the first time in Japan.
Molecular survey of Babesia gibsoni using Haemaphysalis longicornis collected from dogs and cats in Japan.


Iwakami, S., Y. Ichikawa, and H. Inokuma
A nationwide survey of Babesia gibsoni using Haemaphysalis longicornis collected from dogs and cats in Japan was conducted using molecular methods. A total of 1,341 H. longicornis, including 305 females, 14 males, 332 nymphs and 690 larvae (153 pools) from 44 prefectures, were examined by B. gibsoni-targeted PCR. Partial sequence analysis revealed that 12 of 13 positive samples sequenced, including samples from Tottori, Hiroshima, Yamaguchi, Tokushima, Ehime and Oita prefectures (all in western Japan), were identical to B. gibsoni, and 1 sample from Kyoto Prefecture was most closely related to a Babesia species recently detected from feral raccoons in Hokkaido. H. longicornis is a candidate for transmission vector tick of the new Babesia species.

Comparison of whole blood and plasma colloid osmotic pressure in healthy cats.


Jackson, M. L., M. E. Kerl, B. Tynan, and F. A. Mann
OBJECTIVE: To establish reference intervals for whole blood and plasma colloid osmotic pressure (COP) in healthy cats between the ages of 1 and 10 years using a cage-side colloid osmometer.
DESIGN: Prospective, observational study. SETTINGS: University veterinary teaching hospital.
ANIMALS: Sixty-three healthy cats. INTERVENTIONS: Phlebotomy. MEASUREMENTS AND MAIN RESULTS: Whole blood COP mean was 24.4 (+/-2.78) mmHg and plasma COP mean was 24.3 (+/-2.59) mmHg. Reference interval for our study population of feline whole blood COP was 18.9 to 30.4 mmHg, and for our study population of feline plasma COP was 18.3 to 30.8 mmHg. Difference of paired whole blood COP and plasma COP was +0.23 +/- 1.68 mmHg (P = 0.32). There was no significant difference when comparing COP from neutered male and neutered female cats. Total protein and albumin were significantly correlated with whole blood COP (total protein to whole blood COP P < 0.0001, r = 0.53; albumin to whole blood COP P <0.0001, r = 0.68) and plasma COP (total protein to plasma COP P = 0.0025, r = 0.41; albumin to plasma COP P < 0.0001, r = 0.66).
CONCLUSIONS: No significant difference was found between mean whole blood and plasma COP in this study population of cats. Even though not statistically significant, evaluation of paired whole blood COP and plasma COP did reveal a slight difference; therefore, it seems prudent to maintain sample consistency for serial evaluations in cats.

Study of the effect on shelter cat intakes and euthanasia from a shelter neuter return project of 10,080 cats from March 2010 to June 2014.


Johnson, K. L., and J. Cicirelli
Cat impoundments were increasing at the municipal San Jose animal shelter in 2009, despite long-term successful low cost sterilization programs and attempts to lower the euthanasia rate of treatable-rehabilitatable impounds beginning in 2008. San Jose Animal Care and Services implemented a new strategy designed to control overall feral cat reproduction by altering and returning feral cats entering
the shelter system, rather than euthanizing the cats. The purpose of this case study was to determine how the program affected the shelter cat intakes over time. In just over four years, 10,080 individual healthy adult feral cats, out of 11,423 impounded at the shelter during this time frame, were altered and returned to their site of capture. Included in the 11,423 cats were 862 cats impounded from one to four additional times for a total of 958 (9.5%) recaptures of the previously altered 10,080 cats. The remaining 385 healthy feral cats were euthanized at the shelter from March 2010 to June 2014. Four years into the program, researchers observed cat and kitten impounds decreased 29.1%; euthanasia decreased from over 70% of intakes in 2009, to 23% in 2014. Euthanasia in the shelter for Upper Respiratory Disease decreased 99%; dead cat pick up off the streets declined 20%. Dog impounds did not similarly decline over the four years. No other laws or program changes were implemented since the beginning of the program.

**Surveillance of diarrhoea in small animal practice through the Small Animal Veterinary Surveillance Network (SAVSNET).**


*Jones, P. H., S. Dawson, R. M. Gaskell, K. P. Coyne, A. Tierney, C. Setzkorn, A. D. Radford, and P. J. Noble*

Using the Small Animal Veterinary Surveillance Network (SAVSNET), a national small animal disease-surveillance scheme, information on gastrointestinal disease was collected for a total of 76 days between 10 May 2010 and 8 August 2011 from 16,223 consultations (including data from 9115 individual dogs and 3462 individual cats) from 42 premises belonging to 19 UK veterinary practices. During that period, 7% of dogs and 3% of cats presented with diarrhoea. Adult dogs had a higher proportional morbidity of diarrhoea (PMD) than adult cats (P <0.001). This difference was not observed in animals <1 year old. Younger animals in both species had higher PMDs than adult animals (P < 0.001). Neutering was associated with reduced PMD in young male dogs. In adult dogs, miniature Schnauzers had the highest PMD. Most animals with diarrhoea (51%) presented having been ill for 2-4 days, but a history of vomiting or haemorrhagic diarrhoea was associated with a shorter time to presentation. The most common treatments employed were dietary modification (66% of dogs; 63% of cats) and antibacterials (63% of dogs; 49% of cats). There was variability in PMD between different practices. The SAVNET methodology facilitates rapid collection of cross-sectional data regarding diarrhoea, a recognised sentinel for infectious disease, and characterises data that could benchmark clinical practice and support the development of evidence-based medicine.

**Association between feline immunodeficiency virus (FIV) plasma viral RNA load, concentration of acute phase proteins and disease severity.**


*Kann, R. K., J. M. Seddon, M. T. Kyaw-Tanner, J. Henning, and J. Meers*

Veterinarians have few tools to predict the rate of disease progression in FIV-infected cats. In contrast, in HIV infection, plasma viral RNA load and acute phase protein concentrations are commonly used as predictors of disease progression. This study evaluated these predictors in cats naturally infected with FIV. In older cats (>5 years), log10 FIV RNA load was higher in the terminal stages of disease compared to the asymptomatic stage. There was a significant association between log10 FIV RNA load
and both log10 serum amyloid A concentration and age in unwell FIV-infected cats. This study suggests that viral RNA load and serum amyloid A warrant further investigation as predictors of disease status and prognosis in FIV-infected cats.

**Effects of photoperiod on food intake, activity and metabolic rate in adult neutered male cats.**


With the continued rise in feline obesity, novel weight management strategies are needed. To date, strategies aimed at altering physical activity, an important factor in weight maintenance, have been lacking. Photoperiod is known to cause physiological changes in seasonal mammals, including changes in body weight (BW) and reproductive status. Thus, our objective was to determine the effect of increased photoperiod (longer days) on voluntary physical activity levels, resting metabolic rate (RMR), food intake required to maintain BW, and fasting serum leptin and ghrelin concentrations in adult cats. Eleven healthy, adult, neutered, male domestic shorthair cats were used in a randomized crossover design study. During two 12-week periods, cats were exposed to either a short-day (SD) photoperiod of 8 h light: 16 h dark or a long-day (LD) photoperiod of 16 h light: 8 h dark. Cats were fed a commercial diet to maintain baseline BW. In addition to daily food intake and twice-weekly BW, RMR (via indirect calorimetry), body composition (via dual-energy X-ray absorptiometry (DEXA)) and physical activity (via Actical activity monitors) were measured at week 0 and 12 of each period. Fasting serum leptin and ghrelin concentrations were measured at week 0, 6 and 12 of each period. Average hourly physical activity was greater (p = 0.008) in LD vs. SD cats (3770 vs. 3129 activity counts/h), which was primarily due to increased (p < 0.001) dark period activity (1188 vs. 710 activity counts/h). This corresponded to higher (p < 0.0001) daily metabolizable energy intake (mean over 12-week period: 196 vs. 187 kcal/day), and increased (p = 0.048) RMR in LD cats (9.02 vs. 8.37 kcal/h). Body composition, serum leptin and serum ghrelin were not altered by photoperiod. More research is needed to determine potential mechanisms by which these physiological changes occurred and how they may apply to weight management strategies.

**Genetic diversity in Enterocytozoon bieneusi isolates from dogs and cats in China: host specificity and public health implications.**


To explore the genetic diversity, host specificity, and zoonotic potential of Enterocytozoon bieneusi, feces from 348 stray and pet dogs and 96 pet cats from different locations in China were examined by internal transcribed spacer (ITS)-based PCR. *E. bieneusi* was detected in 15.5% of the dogs, including 20.5% of stray dogs and 11.7% of pet dogs, and in 11.5% of the pet cats. Higher infection rates were recorded in the >2-year and the 1- to 2-year age groups in dogs and cats, respectively. Altogether, 24 genotypes, including 11 known and 13 new, were detected in 65 infected animals. In 54 positive dogs, 18 genotypes, 9 known (PtEbIX, O, D, CM1, EbpA, Peru8, type IV, EbpC, and PigEBITS5) and 9 new (CD1 to CD9), were found. In contrast, 8 genotypes, 4 known (D, BEB6, I, and PtEbIX) and 4 new (CC1 to CC4), were identified in 11 infected cats. The dominant genotype in dogs was PtEbIX (26/54). Phylogenetic analysis revealed that 8 known genotypes (D, Peru8, type IV, CM1, EbpC, PigEBITS5,
O, and EbpA) and 7 new genotypes (CD1 to CD4 and CC2 to CC4) were the members of zoonotic group 1, whereas genotypes CD7, CD8, and CD9 together with PtEbIX belonged to the dog-specific group, and genotypes CD6 and CC1 were placed in group 2 with BEB6 and I. Conversely, genotype CD5 clustered with CM4 without belonging to any previous groups. We conclude that zoonotic genotypes are common in dogs and cats, as are host-specific genotypes in dogs.

Preliminary Study of Interaction of Clarithromycin with Tacrolimus in Cats.

Katayama, M., T. Ushio, S. Shimamura, Y. Okamura, and Y. Uzuka

Tacrolimus (Tac) is a core immunosuppressive drug in human organ transplantation. In feline kidney transplantation, however, the cost of Tac therapy is a significant obstacle. Clarithromycin (CLM) increases the blood trough level of Tac, effectively reducing the Tac dosage in human transplant patients. The interaction between CLM and Tac in cats has not been reported. In this study, the effect of multiple CLM dosing on the pharmacokinetics of Tac in three healthy cats was investigated. The treatments included Tac at 0.3 mg/kg and Tac at 0.3 mg/kg + multiple-dose CLM at 10 mg/kg. Co-administration of CLM and Tac resulted in significant increases in the oral bioavailability of Tac. These preliminary findings suggest that administration of multiple doses of CLM may decrease the required Tac dosage in Tac-based immunosuppressive therapy used as an alternative to the classic cyclosporine-based protocol for feline renal transplantation.

In vitro efficacy of cefovecin against anaerobic bacteria isolated from subgingival plaque of dogs and cats with periodontal disease.


Periodontal disease is a common disease of dogs and cats often requiring antimicrobial treatment as an adjunct to mechanical debridement. However, correct compliance with oral antimicrobial therapy in companion animals is often difficult. Cefovecin is a recently introduced veterinary cephalosporin that has demonstrated prolonged concentrations in extracellular fluid, allowing for dosing intervals of up to 14 days. Subgingival samples were collected from the oral cavity of 29 dogs and eight cats exhibiting grade 2 or grade 3 periodontal disease. Samples were cultivated on Wilkin Chalgrens agar and incubated in an anaerobic chamber for seven days. Selected anaerobic bacteria were isolated and identified to species level using 16S rRNA gene sequence analysis. Minimum inhibitory concentrations were determined for cefovecin and six additional antimicrobials using the agar dilution methodology recommended by the Clinical and Laboratory Standards Institute. The 65 clinical isolates were identified as Porphyromonas gulae (n = 45), Porphyromonas crevioricanis (n = 12), Porphyromonas macacae (n = 1), Porphyromonas cangingivalis (n = 1) Fusobacterium nucleatum (n = 2), Fusobacterium russii (n = 1) and Solobacterium moorei (n = 3). This is the first report of S. moorei being isolated from companion animals with periodontal disease. All isolates were highly susceptible to cefovecin, with a MIC90 of \(<0.125\) mug/ml. Conversely, different resistance rates to ampicillin, amoxicillin and erythromycin between isolates were detected. Cefovecin is thus shown to be effective in vitro against anaerobic bacteria isolated from dogs and cats with periodontal disease.
The pharmacokinetics and in vitro/ex vivo cyclooxygenase selectivity of parecoxib and its active metabolite valdecoxib in cats.


Kim, T. W., C. Vercelli, A. Briganti, G. Re, and M. Giorgi

Parecoxib (PX) is an injectable prodrug of valdecoxib (VX, which is a selective cyclo-oxygenase-2 (COX-2)) inhibitor licensed for humans. The aim of the present study was to evaluate pharmacokinetics and in vitro/ex vivo cyclooxygenase selectivity of PX and VX in cats. In a whole blood in vitro study, PX did not affect either COX enzymes whereas VX revealed a COX-2 selective inhibitory effect in feline whole blood. The IC50 values of VX for COX-2 and COX-1 were 0.45 and 38.6 microM, respectively. Six male cats were treated with 2.5 mg/kg of PX by intramuscular injection. PX was rapidly converted to VX with a relatively short half-life of 0.4 h. VX achieved peak plasma concentration (2.79 +/- 1.59 microg/mL) at 7 h following PX injection. The mean residence times for PX and VX were 0.43 +/- 0.15 and 5.94 +/- 0.88 h, respectively. In the ex vivo study, PX showed a COX-2 inhibition rate of about 70% in samples taken at 1, 2, 4 and 10 h after injection, with a significant difference compared to the control. In contrast, COX-1 was slightly inhibited, ranging from 0.7% to 9.7% of the control inhibition rate without any significant difference for 24 h after PX administration. The preliminary findings of the present research appear promising and encourage further studies to investigate whether PX can be successfully used in feline medicine.

Use of brachial plexus blockade and medetomidine-ketamine-isoflurane anaesthesia for repair of radio-ulna fracture in an adult cheetah (acinonyx jubatus).


BackgroundRegional anaesthetic techniques have been used in combination with systemic analgesics during small animal surgery to provide multimodal analgesia. Brachial plexus nerves block using local anaesthetics provides analgesia of the thoracic limb through desensitization of the nerves that provide sensory and motor innervation. This has been shown to reduce intra-operative anesthetic requirements and provide postoperative pain relief. Decreasing the doses of general anaesthetics allows more stable cardiopulmonary function during anaesthesia and the development of less side effects. The present case reports a successful use of brachial plexus blockade to supplement medetomidine-ketamine-isoflurane anaesthesia for repair of radio-ulna fracture in an adult cheetah (acinonyx jubatus). Case presentationAn adult male Cheetah weighing about 65 kg was presented with a history of leg carrying lameness of the left forelimb sustained following a car accident a week earlier. Clinical examination under general anaesthesia revealed slight dehydration and a swelling with a wound on the caudo-medial aspect of the left radio-ulna region. Crepititation was present on manipulation and radiography confirmed a complete transverse radio-ulna fracture of the left forelimb, which required open reduction and internal fixation. Brachial plexus blockade using lignocaine hydrochloride was used to supplement medetomidine-ketamine-isoflurane anaesthesia for the surgical procedure. Isoflurane anaesthesia was maintained at 0.5 - 2.0% throughout the surgical procedure, which was uneventful. Temperature and cardiopulmonary parameters remained stable intra-operatively. Limb paralysis extended for 5 hours post-operatively, suggesting prolonged anaesthesia. ConclusionTo the researchers inverted question mark knowledge, this is the first reported case of the use of brachial plexus blockade to supplement general
anaesthesia to facilitate forelimb surgery in an adult cheetah. The use of brachial plexus block with a light plane of general anaesthesia proved to be successful. Brachial plexus block had a sparing effect on isoflurane anaesthesia as evidenced by the concentration used for maintenance of anaesthesia and the stability of the cardiopulmonary function. Moreover, absence of autonomic cardiopulmonary reactions to the surgical manipulation may be attributed to the efficacy of brachial plexus block. This anaesthesia protocol is therefore recommended for surgeries of the forelimb in wild cats.

Efficacy, acceptability and tolerability of the new oral phosphate binder Lenziaren(R) in healthy cats fed a standard diet.


King, J. N., H. L. Erasmus, P. C. Delport, I. Bester, and W. Seewald

Background
The efficacy, acceptability and tolerability of the new oral phosphate binder Lenziaren(R) (SBR759) were evaluated in a randomized parallel-group design study in 36 healthy cats (n =6 per group). Five groups were fed once daily with a commercial diet containing 0.2% phosphorus (inverted question markstandard diet inverted question mark) into which was mixed Lenziaren(R) at 0.25, 0.5, 1.0 or 2.0 g/day or no treatment (control group) daily for 30 days. A sixth group was fed a commercial diet containing lower amounts (0.12%) of phosphorus (inverted question markrenal diet inverted question mark) and no treatment.

Results
When compared to the control group, Lenziaren(R) produced significant dose-related reductions in urine phosphate concentrations, urine phosphate excretion and fractional urinary phosphate excretion. Significant effects versus the control group were observed at the 0.5, 1.0 and 2.0 g/day dosages. Lenziaren(R) was well tolerated and was associated with higher food consumption and serum iron concentrations versus the control. When compared to the control group, the renal diet was associated with significantly lower urine phosphate concentrations and loss of body weight. Lenziaren(R) had similar effects on urine phosphate concentrations compared to the renal diet, but was not associated with loss of body weight.

Conclusions
Lenziaren(R) was effective as an oral phosphate binder in cats fed with a standard diet containing 0.2% phosphorus. The acceptability and tolerability were good. Dosages of 0.5-1.0 g/cat per day are recommended for clinical testing in cats fed with a standard diet.

Therapeutic efficacy of Broadline(R) against notoedric mange in cats.


Knaus, M., B. Capari, and M. Visser

The efficacy of a novel topical combination of fipronil 8.3 % w/v, (S)-methoprene 10 % w/v, eprinomectin 0.4 % w/v, and praziquantel 8.3 % w/v (Broadline(R), Merial) was evaluated in 18 cats naturally infested by Notoedres cati in a controlled, blinded clinical efficacy study. Cats were blocked on pretreatment bodyweight and randomly allocated to two groups of nine cats each. One group served as control (untreated) and one group was treated once topically with Broadline(R) according to the label instructions. Skin scrapings (three scrapings per animal per occasion) were collected prior to treatment and every other week for 8 weeks thereafter and examined for live N. cati mites. In addition, lesions were evaluated at each sampling to monitor the clinical recovery. Based on live mite counts, efficacy against N. cati of a single topical administration with Broadline(R) was >99 %, and all treated
cats recovered from clinical signs of notoedric mange. No treatment-related adverse events were observed.

**Prevalence of Biofilms on Surgical Suture Segments in Wounds of Dogs, Cats, and Horses.**

*Vet Pathol (2014)*

*Konig, L., R. Klopfeisch, O. Kershaw, and A. D. Gruber*

The formation of biofilms on surgical implants is thought to play a major role in chronic infection and wound-healing disorders and has been rarely described in veterinary medicine. Due to poor and unreliable results from bacterial culturing, histology may be an economic tool for the detection of biofilms. In this study, the prevalence of biofilms on surgical suture materials and swabs with chronic wound-healing complications in dogs, cats, and horses was assessed by histologic examination using hematoxylin and eosin, Gram, and Giemsa stains, as well as periodic acid-Schiff reaction. Of the 91 tissue samples with intralosomal suture material or swab residues associated with inflammation, only 2 contained bacterial colonies arranged in an extracellular polymeric matrix consistent with a biofilm. The results of this study suggest that biofilms on suture material may occur in veterinary medicine.

**Molecular identification of Cryptosporidium spp. in seagulls, pigeons, dogs, and cats in Thailand.**


Zoonotic Cryptosporidium spp., particularly *C. meleagridis*, *C. canis*, and *C. felis*, are enteric protozoa responsible for major public health concerns around the world. To determine the spread of this parasite in Thailand, we conducted molecular identification of Cryptosporidium spp. from animal samples around the country, by collecting and investigating the feces of seagulls (*Chroicocephalus brunnicephalus* and *Chroicocephalus ridibundus*), domestic pigeons (*Columba livia domestica*), dogs, and cats. Seagull and pigeon samples were collected at the seaside and on the riverside to evaluate their potential for waterborne transmission. Ten pigeon samples were combined into one set, and a total of seven sets were collected. Seventy seagull samples were combined into one set, and a total of 13 sets were collected. In addition, 111 dog samples were collected from cattle farms, and 95 dog and 80 cat samples were collected from a temple. We identified *C. meleagridis* in pigeons, *Cryptosporidium avian genotype III* in seagulls, *C. canis* in dogs, and *C. felis* in cats. In the temple, the prevalence was 2.1% (2/95) for dogs and 2.5% (2/80) for cats. No *Cryptosporidium* was found in dog samples from cattle farms. These are the first findings of *C. meleagridis* in domestic pigeons, and *Cryptosporidium avian genotype III* in seagulls. Our study invites further molecular epidemiological investigations of *Cryptosporidium* in these animals and their environment to evaluate the public health risk in Thailand.

**Association between oral health status and retrovirus test results in cats.**


*Kornya, M. R., S. E. Little, M. A. Scherk, W. C. Sears, and D. Bienzle*
OBJECTIVE: To determine associations between oral health status and seropositivity for FIV or FeLV in cats. DESIGN: Cross-sectional survey. ANIMALS: 5,179 cats. PROCEDURES: Veterinarians at veterinary clinics and animal shelters completed online training on oral conditions in cats and then scored oral health status of cats with no known history of vaccination against FIV. Age, sex, and results of an ELISA for retroviruses were recorded. Results were analyzed by means of standard logistic regression with binary outcome. RESULTS: Of 5,179 cats, 237 (4.6%) and 186 (3.6%) were seropositive for FIV and FeLV, respectively, and of these, 12 (0.2%) were seropositive for FIV and FeLV. Of all 5,179 cats, 1,073 (20.7%) had gingivitis, 576 (11.1%) had periodontitis, 203 (3.9%) had stomatitis, and 252 (4.9%) had other oral conditions (overall oral disease prevalence, 2,104/5,179 [40.6%]). Across all age categories, inflammatory oral disease was associated with a significantly higher risk of a positive test result for FIV, compared with the seropositivity risk associated with other oral diseases or no oral disease. Stomatitis was most highly associated with risk of FIV seropositivity. Cats with any oral inflammatory disease were more likely than orally healthy cats to have a positive test result for FeLV. Increasing age was associated with a higher prevalence of oral disease in retrovirus-seronegative cats. CONCLUSIONS AND CLINICAL RELEVANCE: Inflammatory oral disease was associated with an increased risk of seropositivity for retroviruses in naturally infected cats. Therefore, retroviral status of cats with oral inflammatory disease should be determined and appropriate management initiated.

Corneal grafting for the treatment of feline corneal sequestrum: a retrospective study of 18 eyes (13 cats).

Vet Ophthalmol (2014)

Laguna, F., M. Leiva, D. Costa, R. Lacerda, and T. Pena Gimenez

OBJECTIVE: To determine the clinical outcome of corneal grafting for the treatment of feline corneal sequestrum (FCS). ANIMAL STUDIED: Domestic cats. PROCEDURES: A review of the medical records of cats that underwent keratoplasty as a treatment of FCS at the VTH-UAB, from 2002 to 2012, was carried out. RESULTS: Thirteen cats (18 eyes) of different breed, age, and gender were included. Persian cats were overrepresented (12/13;92%). There were nine males and four females, of a mean age of 3.4 years (0.7-7.1). Ipsilateral chronic corneal ulceration was reported as the most common concurrent ocular disease (6/18;33%). Keratoplasty was performed bilaterally in 5 cats (5/13;38%) and unilaterally in 8 (8/13;62%). Lamellar keratoplasty was performed in 17 eyes (17/18;95%) and full-thickness keratoplasty in 1 (1/18;5%). Mean graft size was 8.3 mm (4-11.5). Fresh homologous graft was performed in 2 eyes (2/18;11%) and frozen graft in 16 (16/18;89%). Of the latter group, homologous graft was performed in 6 eyes (6/16;37.5%) and heterologous in 10 (10/16;62.5%). In all the cats, postoperative treatment included topical antibiotics, corticosteroids, cycloplegics, and 0.2% cyclosporine A. Median follow-up time was 18.2 months, and main postoperative complications were diffuse mild epithelial pigment formation (2/18;11%), graft malacia (1/18;5%), and sequestrum recurrence (1/18;5%). Mean epithelial healing time was 19.2 days. Good visual outcome was achieved in all the eyes (100%), the majority of them having faint or mild corneal opacity (15/18;83%). CONCLUSIONS: Keratoplasty is an effective surgical treatment for FCS. The donor tissue provides excellent tectonic support to the affected corneas, with good visual and cosmetic outcome.

DIAGNOSTIC ACCURACY OF TESTS BASED ON RADIOLOGIC MEASUREMENTS OF DOGS AND CATS: A SYSTEMATIC REVIEW.
A systematic review of diagnostic tests based on radiologic measurements of structures in dogs and cats was done in order to reach generalizable conclusions about the value of making such measurements. Literature search was done using the ISI Web of KnowledgeSM for studies in the subject category Veterinary sciences. Studies were eligible for inclusion that employed length, angle, area or volume measurements from radiographic, ultrasonographic, CT or MR images of dogs or cats as a diagnostic test for a naturally occurring condition, compared the results of imaging with a reference standard, included at least 10 subjects, and sufficient data that a 2 x 2 table of results could be constructed. Quality of studies was assessed using the QUADAS-2 tool. Twenty-six studies were found describing 40 tests that satisfied the inclusion criteria. Tests were radiographic in 22 (55%) instances and ultrasonographic in 18 (45%). Quality of studies was generally low, with a risk of bias in patient selection in 92% studies, performance of the index test in 73% studies, and patient flow in 42% studies. Median (range) number of subjects was 64 (20-305), sensitivity was 77% (38-99%), specificity was 82% (50-99%), positive likelihood ratio was 4.1 (1-103), and negative likelihood ratio was 0.29 (0.01-1). Two studies that compared accuracy of radiographic measurements to subjective image interpretation alone found no difference. Evidence is weak that radiologic measurements of structures in dogs and cats are useful for diagnosis, hence measurements should not be emphasized as a basis for diagnosis in either teaching or clinical imaging reports.

Cardiac troponin I and T as prognostic markers in cats with hypertrophic cardiomyopathy.


Langhorn, R., I. Tarnow, J. L. Willesen, M. Kjelgaard-Hansen, I. M. Skovgaard, and J. Koch

BACKGROUND: Myocardial injury detected by cardiac troponin I and T (cTnI and cTnT) in cardiac disease is associated with increased risk of death in humans and dogs. HYPOTHESIS: Presence of myocardial injury predicts long-term death in cats with hypertrophic cardiomyopathy (HCM), and ongoing myocardial injury reflects change in left ventricular wall thickness over time. ANIMALS: Thirty-six cats with primary HCM. METHODS: Prospective cohort study. Cats with HCM were included consecutively and examined every 6 months. Echocardiography, ECG, blood pressure, and serum cTnI and cTnT were evaluated at each visit. Cox proportional hazards regression analysis was performed to evaluate prognostic potential of serum troponin concentrations at admission and subsequent examinations. Correlations were used to examine associations between troponin concentrations and cardiac hypertrophy. RESULTS: Troponin concentrations at admission were median [range] 0.14 [0.004-1.02] ng/mL for cTnI, and 13 [13-79.5] ng/L for cTnT. Both were prognostic for death (P = .032 and .026) as were the last available concentrations of each (P = .016 and .003). The final cTnT concentration was a significant predictor of death even when adjusting for the admission concentration (P = .043). In a model containing both markers, only cTnT remained significant (P = .043). Left ventricular free wall thickness at end-diastole (LVFWd) at admission was correlated with cTnI at admission (r = 0.35, P = .035), however no significant correlations (r = 0.2-0.31, P = .074-.26) were found between changes in troponin concentrations and left ventricular thickness over time. CONCLUSIONS AND CLINICAL IMPORTANCE: Myocardial injury is part of the pathophysiology leading to disease progression and death. Low sensitivities and specificities prevent outcome prediction in individual cats.
Effect of ciclosporin and methylprednisolone acetate on cats previously infected with feline herpesvirus 1.


Lappin, M. R., and L. M. Roycroft

Feline herpesvirus 1 (FHV-1) is a common ocular and respiratory pathogen of cats that can be associated with recurrent clinical signs of disease. Ciclosporin (cyclosporine) is commonly administered per os (PO) for the treatment of a number of inflammatory diseases in cats. A number of client-owned cats administered cyclosporine A (CsA) PO to block renal transplant rejection have developed clinical signs of upper respiratory tract disease that may have been from activated FHV-1. In this study, cats experimentally inoculated with FHV-1 several months previously were administered methylprednisolone acetate intramuscularly, CsA PO or a placebo PO. While clinical signs of activated FHV-1 occurred in some cats, disease was mild and self-limited in most cats. There was no vomiting, diarrhea, inappetence, weight loss, polydipsia, polyuria or polyphagia recognized.

Feline respiratory disease: What is the role of Mycoplasma species?


Lee-Fowler, T.

PRACTICAL RELEVANCE: Non-hemotropic Mycoplasma species are frequently implicated in cases of respiratory disease, and also conjunctivitis, in cats. CLINICAL CHALLENGES: Mycoplasma species are considered commensal bacteria of the conjunctiva and the upper respiratory tract of cats, and hence their role as a primary pathogen is difficult to determine. These organisms certainly appear to play a significant role as a secondary pathogen in the upper airways, and there is increasing evidence that in some animals they may represent a primary infection. However, mycoplasmas have not been found in the lower airways of clinically healthy cats - suggesting that, when present, they likely represent a pathologic process. Diagnostic challenges exist as well; Mycoplasma species are not typically identified via cytology due to their small size, and culture of these organisms requires special media and handling. Although PCR has improved identification and allowed for speciation, conflicting culture and PCR results can create a dilemma regarding the clinical relevance of infection. EVIDENCE BASE: This article draws on original research and case reports to provide information about the role of Mycoplasma species in the feline upper and lower respiratory tract, diagnostic methods and associated challenges, and treatment options. AUDIENCE: The goal is to provide small animal practitioners with a current and organized review of the often-conflicting literature regarding the role of Mycoplasma species in feline respiratory infections.

Inflammatory joint disease in cats: Diagnostic approach and treatment.


Lemetyer, J., and S. Taylor

PRACTICAL RELEVANCE: Osteoarthritis, a degenerative non-inflammatory joint disease, is common in cats, usually causing gradual changes in behavior and lifestyle rather than severe lameness. Inflammatory arthritis occurs much less frequently and is nearly always associated with debilitating
lameness. It may have an infectious or immune-mediated cause - but, unlike the canine disease, is much more likely to be infectious in origin. CLINICAL CHALLENGES: Cats with inflammatory joint disease are presented for evaluation of lethargy, anorexia, reluctance to walk or fever. Synovial fluid collection and analysis is required to confirm joint inflammation, but this is a procedure many veterinarians are not comfortable performing in cats. Once inflammatory arthritis is confirmed, extensive testing is required to diagnose infectious causes and determine appropriate treatment. Immune-mediated polyarthritis can be treated with immunosuppressive drugs only after all infectious possibilities are eliminated. Radiographs are used to characterize the arthritis as erosive or nonerosive, but radiographic changes in cats are often subtle compared with those described in canine rheumatoid-like arthritis. AUDIENCE: This review, aimed at all veterinarians who treat cats, describes the general clinical approach to feline joint disease, the collection and analysis of synovial fluid, and the diagnosis and management of inflammatory joint diseases affecting cats. The diagnostic approach to an unusual case of erosive polyarthritis is discussed in the Case Notes. EVIDENCE BASE: To date, the veterinary literature on inflammatory joint disease in cats has been limited to older reviews of immune-mediated disorders and multiple single case reports or small case series describing infectious disorders. This article offers a current comprehensive review of these disorders.


Lenchner, I., I. Aroch, G. Segev, E. Kelmer, and Y. Bruchim

OBJECTIVE: To describe the clinical signs, clinicopathologic abnormalities, treatment, complications and outcome, and to identify risk factors for death in cats envenomed by Vipera palaestinae (Vp).

DESIGN: Retrospective study. SETTING: Veterinary teaching hospital. ANIMALS: Eighteen client-owned cats envenomed by Vp. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: All envenomations occurred during the hot season (May to October), mostly in young (<4 years, 66%) domestic shorthair, outdoor or indoor-outdoor cats. Clinical signs included tachypnea (>40/min, 100%), lameness (78%), depression (71%), fang penetration marks (55%), hypothermia (<37.5 degrees C, 43%), hematoma at the envenomation site (27%), tachycardia (>220/min, 20%), and bradycardia (<140/min, 20%). Hematologic abnormalities included thrombocytopenia (89%), hemoconcentration (33%), and leukocytosis (33%). The activated partial thromboplastin and prothrombin times were prolonged in 100% and in 93% of the cats at presentation to a veterinarian, and remained prolonged 12-24 hours later in 92% and in 77% of the cats, respectively. Cats displayed increased serum creatine kinase activity (100%) and hyperglycemia (89%). Four cats (22%) did not survive. Median hospitalization time was 2 days. Variables associated with death included lower body weight (P = 0.01), lower initial rectal temperature (P = 0.02), lower initial hematocrit (P < 0.001) and 12-24 hours later (P = 0.001), and lower total plasma protein at 12-24 hours following presentation (P = 0.001). There was no association between death and administration of antivenom (10 mL/cat), fresh frozen plasma, or corticosteroids. CONCLUSIONS: Cats are at least as susceptible as dogs to Vp envenomation. Lower body weight, rectal temperature, and hematocrit at presentation were associated with nonsurvival.

Evaluation of low-dose metronomic (LDM) cyclophosphamide toxicity in cats with malignant neoplasia.
Leo, C., A. Stell, J. Borrego, E. Martinez de Merlo, K. Ruess-Melzer, and A. Lara-Garcia

Oral administration of low-dose cyclophosphamide in pets with spontaneously occurring malignant neoplasms has become a common practice in veterinary medicine. The purpose of this retrospective study was to investigate toxicity events in cats with spontaneous malignancies receiving cyclophosphamide as a metronomic therapy for at least 1 month. The number and severity of clinical, haematological and biochemical adverse events were recorded according to the Veterinary Cooperative Oncology Group’s Common Terminology Criteria for Adverse Events v1.1 classification scheme. Twenty-four cats were enrolled in the study with a total number of 27 neoplasms: 13 sarcomas, 12 carcinomas, one melanoma and one neuroendocrine tumour. Seventeen cats presented with macroscopic disease, while seven had microscopic disease. Seven cats (29%) had metastasis either to the regional lymph nodes and/or distant sites at the time of study enrolment. Additional medications, administered concurrently, included non-steroidal anti-inflammatory drugs (17), toceranib (4) and thalidomide (7). Four cats showed grade I gastrointestinal toxicity during the first month of treatment, which was controlled with antiemetics. Overall, 2/24 cats (8%) showed grade I haematological toxicities and 1/24 (4%) showed grade I renal toxicity in the first 4 weeks. Median follow-up for all cats was 30 days (range 30-360 days). For the 15 cats with follow-up longer than 1 month the only additional toxicities observed were two grade III and one grade II azotaemia that occurred after 2 months of therapy. Low-dose cyclophosphamide seems to be a well-tolerated option for cats bearing primary or metastatic tumours. Evaluation of toxicity after long-term administration is still needed.

Contrast videofluoroscopic assessment of dysphagic cats.


Levine, J. S., R. E. Pollard, and S. L. Marks

The diagnostic utility of contrast-enhanced videofluoroscopic esophagography in dysphagic cats has been rarely studied relative to dogs. Current literature regarding feline dysphagia typically consists of individual case reports or small case series. This retrospective study analyzed the imaging findings in 11 cats undergoing 15 videofluoroscopic swallow studies. Hiatal hernia (n = 5), esophageal stricture (n = 3), and esophageal dysmotility (n = 7) were the most common diagnoses (some cats having more than 1 diagnosis) in dysphagic cats that underwent videofluoroscopic swallow studies. Esophageal dysmotility appeared to be associated with a higher percentage of swallows from which no peristaltic waves were generated. Oropharyngeal and cricopharyngeal causes of dysphagia were not identified in any cat and quantitative assessment of the swallowing reflex (pharyngeal constriction ratio = 0.17 +/- 0.09; time to maximum pharyngeal contraction = 0.13 +/- 0.02 s; time to proximal esophageal sphincter opening = 0.07 +/- 0.02 s; time to proximal esophageal sphincter closed = 0.23 +/- 0.05 s; time to opening of the epiglottis = 0.27 +/- 0.04 s) was similar to quantitative swallowing parameters previously reported in healthy dogs. In conclusion, videofluoroscopy is a diagnostic tool that can identify esophageal abnormalities that are not readily apparent on survey radiographs. Limitations include the potential need for multiple studies, and the possibility of poor compliance in the feline patient. Results of this study are intended to help veterinarians define a prioritized differential diagnosis list for dysphagic cats.
Effect of high-impact targeted trap-neuter-return and adoption of community cats on cat intake to a shelter.


Levy, J. K., N. M. Isaza, and K. C. Scott

Approximately 2-3 million cats enter animal shelters annually in the United States. A large proportion of these are unowned community cats that have no one to reclaim them and may be too unsocialized for adoption. More than half of impounded cats are euthanased due to shelter crowding, shelter-acquired disease or feral behavior. Trap-neuter-return (TNR), an alternative to shelter impoundment, improves cat welfare and reduces the size of cat colonies, but has been regarded as too impractical to reduce cat populations on a larger scale or to limit shelter cat intake. The aim of this study was to assess the effect of TNR concentrated in a region of historically high cat impoundments in a Florida community. A 2-year program was implemented to capture and neuter at least 50% of the estimated community cats in a single 11.9 km(2) zip code area, followed by return to the neighborhood or adoption. Trends in shelter cat intake from the target zip code were compared to the rest of the county. A total of 2366 cats, representing approximately 54% of the projected community cat population in the targeted area, were captured for the TNR program over the 2-year study period. After 2 years, per capita shelter intake was 3.5-fold higher and per capita shelter euthanasia was 17.5-fold higher in the non-target area than in the target area. Shelter cat impoundment from the target area where 60 cats/1000 residents were neutered annually decreased by 66% during the 2-year study period, compared to a decrease of 12% in the non-target area, where only 12 cats/1000 residents were neutered annually. High-impact TNR combined with the adoption of socialized cats and nuisance resolution counseling for residents is an effective tool for reducing shelter cat intake.

Assessment of post-operative pain in cats: a case study on veterinary students of Universiti Putra Malaysia.


Lim, M. Y., H. C. Chen, and M. A. Omar

The ability to assess and control pain is listed as one of the desired Day One competencies among veterinary graduates. As such, a study was conducted to examine the current status and effectiveness of a video-based training module on the attitude toward and knowledge of pain assessment in cats among fourth- and final-year veterinary students of Universiti Putra Malaysia (UPM) in January of 2013. A total of 92 students participated in this study, resulting in a response rate of 60.1%. Upon completion of a pre-training survey, the respondents undertook an interactive video-based presentation, followed by a post-training survey. The majority of the students (96.7%) agreed on the importance of pain management. Before the training, many (76.1%) disagreed that they had received adequate training, while 53.3% were not confident in their pain-recognition skills. After training, their knowledge and confidence in pain assessment increased. Responses to the survey were not associated with differences in gender, level of study, or field of interest. Students were found to have mistaken some physiologic parameters as good pain indicators after ovariohysterectomy. Their assessment of three standardized video cases revealed that they could recognize prominent signs of pain but failed to identify changes in behavior that were more subtle. Refinement to the training module is required to address the above deficiencies.
Functional assessment of expiratory flow pattern in feline lower airway disease.


Feline lower airway disease (FLAD) is a chronic respiratory disease of which there is a lack of information on functional assessment in current veterinary medicine. The purposes of this study were to investigate expiratory pattern and evaluate the diagnostic utility of functional parameters in cats with FLAD. Thirty-three client-owned cats (23 FLAD cats and 10 control cats) were studied. Under quiet tidal breathing, pseudo-tidal breathing flow-volume loop (pTBFVL) was obtained from a barometric whole body plethysmography (BWBP) device. There were significant differences in the shapes of expiratory, but not inspiratory, curves between FLAD and control cats. The incidence of the presence of concave expiratory curve indicating lower airway obstruction was 74% in FLAD cats. To assess the diagnostic utility of pTBFVL indices in cats with FLAD, area under the receiver-operator curve was 0.86 for PEF/EF50 (peak expiratory flow divided by expiratory flow at end expiratory volume plus 50% tidal volume); a cuff-off value of PEF/EF50 >1.51 distinguished normal from FLAD (73.9% sensitivity, 100% specificity). There were no significant differences in traditionally measured BWBP parameters (ie, enhanced pause) between cats with and without FLAD in the present study. In conclusion, underlying change on expiratory flow pattern during natural tidal breathing existed in FLAD cats, and selected pTBFVL indices were useful in discriminating FLAD from normal cats. Tidal breathing pattern depicted by pseudoflow-pseudovolume loops from a BWBP system could be a non-invasive tool for functional assessment in client-owned cats.

Transmission of feline immunodeficiency virus (FIV) among cohabiting cats in two cat rescue shelters.


Litster, A. L.

Conflicting accounts have been published in the veterinary literature regarding transmission of feline immunodeficiency virus (FIV) between cohabiting cats in mixed households, and the mechanics of possible casual transmission, if it occurs, are poorly understood. Similarly, there are conflicting reports of vertical transmission of FIV. The aim of the present study was to document the FIV serological status of cats taken into two rescue shelters. At rescue shelter 1 (Rescue 1), cats cohabited in a multi-cat household of FIV-negative and naturally-infected, FIV-positive cats. A study was performed that combined a retrospective review of records of FIV serological status at intake (Test 1) and prospective FIV serological testing (Tests 2 and 3). Retrospective records were analyzed at rescue shelter 2 (Rescue 2), where FIV-positive queens with litters of nursing kittens were taken into the shelter, before being rehomed. FIV serology was performed on all kittens after weaning. Initial test results (Test 1) for 138 cohabiting cats from Rescue 1 showed that there were 130 FIV-negative cats and eight FIV-positive cats (six male neutered and two female spayed). A second test (Test 2), performed in 45 of the FIV-negative and five of the FIV-positive cats at median 28 months after Test 1 (range, 1 month to 8.8 years) showed that results were unchanged. Similarly, a third test (Test 3), performed in four of the original FeLV-negative cats and one remaining FIV-positive cat at median 38 months after Test 1 (range, 4 months to 4 years), also showed that results were unchanged. These results show a lack of evidence of FIV transmission, despite years of exposure to naturally-infected, FIV-positive cats in a
mixed household. At Rescue 2, records were available from five FIV-positive queens with 19 kittens. All 19 kittens tested FIV-negative, suggesting that vertical transmission had not occurred.

**Identification and characterization of dermatophyte species and strains with PCR amplification.**


*Liu, G., C. He, and H. Zhang*

The aim of the present study was to use two polymerase chain reaction (PCR) methods, with (GACA)4 and non-transcribed spacer (NTS) as primers, to identify and characterize dermatophyte isolates from dogs and cats to a species and strain level. A total of 45 isolates from nine dermatophyte species were collected from pet dogs and cats and subjected to PCR amplification with the microsatellite primer (GACA)4. Dermatophyte strains of three of the same species collected from four cities were subjected to PCR amplification with the NTS primer set. These two PCR methods were applied to identify and characterize the dermatophyte isolates to a species and strain level. Regional differences among the strain specificities were also examined. The results from PCR with (GACA)4 demonstrated that strains from the same species produced similar PCR product band patterns. In addition, these patterns differed among species, indicating that (GACA)4 primer-based PCR was able to distinguish between the various dermatophyte species. By contrast, dermatophyte isolates and/or strains within the same species revealed various band patterns with NTS-based PCR. In addition, the results indicated that regional differences contributed to the variations in PCR product band patterns. Therefore, the results of the present study indicate that the NTS-based PCR method is efficient in distinguishing dermatophytes to the strain level, while a combination of (GACA)4 and NTS primer-based PCR methods is able to clarify dermatophyte isolates to a species and strain level. The present study provides information concerning the identification of pathogenic fungi and the epidemiological characteristics of fungal skin diseases.

**Clinical use of deslorelin (GnRH agonist) in companion animals: a review.**


*Lucas, X.*

Over the years, many contraceptive medications have been developed for companion animals, but many secondary adverse effects have limited their use. A major advancement was achieved with the use of gonadotropin-releasing hormone (GnRH) analogues, mainly GnRH agonists, which mimic the effects of native GnRH. The development of effective low-dose, slow-release implants with potent agonists such as deslorelin (Suprelorin(R), Virbac) have allowed their use to become widespread in recent years, with many potential benefits in companion animals. While the major application of deslorelin was initially male contraception, due to its two differing actions, either the stimulation of oestrus or the sterilization of fertility, its use has been increasing in the bitch as well. The aim of this study is to review the applications of deslorelin GnRH agonist implants in companion animal, such as dogs, cats and some exotic pets.

**Antimicrobial susceptibility in bacterial isolates from Norwegian cats with lower urinary tract disease.**
Studies of feline lower urinary tract disease (FLUTD) among Norwegian cats have shown higher prevalences of bacterial cystitis than most previously published reports. The aims of the present study were to identify bacterial isolates obtained from the urine of Norwegian cats with FLUTD and their susceptibility to antimicrobial agents. Eighty-two bacterial isolates from 72 urine cultures obtained from 71 different cats were included. Escherichia coli, Staphylococcus species, Enterococcus species and Streptococcus species were the most frequently detected. The percentages of isolates susceptible to the included antimicrobial agents were as follows: enrofloxacin - 92%; trimethoprim/sulfonamide - 91%; nitrofurantoin - 89%; tetracycline - 78%; ampicillin - 73%; amoxicillin/clavulanic acid - 72%; trimethoprim - 68%; amoxicillin - 58%; cephalaxin - 51%; spiramycin - 39%; penicillin - 34%; fucidic acid - 34%; lincomycin - 27%. Although several tendencies towards increasing antimicrobial resistance were detected among the isolates included, the species of bacteria isolated and their patterns of antimicrobial resistance were, in general, in concurrence with the existing literature. Thus, the results do not fully explain the higher prevalence of bacterial cystitis found in Norwegian cats. Moreover, additional explanatory factors beside the inclusion of primary accession cases rather than referred cases were not found.

A comparison of low dose tiletamine-zolazepam or acepromazine combined with methadone for pre-anaesthetic medication in cats.

Vet Anaesth Analg (2014) 41:630-635.

Mair, A., H. Kloeppel, and K. Ticehurst

OBJECTIVE: To compare the level of sedation, cardiorespiratory changes, and quality of recovery in cats receiving methadone plus either low dose tiletamine-zolazepam or acepromazine for premedication prior to general anaesthesia for neutering. STUDY DESIGN: Prospective, randomized, blinded clinical study. ANIMALS: Twenty cats 0.54 +/- 0.12 years-old (mean +/- SD), weighing 3.17 +/- 0.65 kg (10 male and 10 female). METHODS: Cats were allocated randomly to receive intramuscularly either 0.03 mg kg(-1) acepromazine (ACE) or 3 mg kg(-1) tiletamine-zolazepam (TZ), both regimens combined with 0.2 mg kg(-1) methadone for premedication. Sedation was assessed 25 minutes after premedication using a visual analogue scale (VAS) and a simple descriptive scale (SDS). Anaesthesia was induced with alfaxalone and maintained with isoflurane. Physiological parameters were recorded at 1, 3 and 5 minutes post-endotracheal intubation. Recovery from cessation of isoflurane was timed and quality assessed using a SDS and a VAS. Data was analysed with Mann-Whitney U-test, students t-test, anova or ordinal logistic regression as relevant. Significance was taken as p < 0.05. RESULTS: Sedation was more pronounced in TZ than ACE as indicated by higher VAS (67 +/- 21 versus 13 +/- 5) and SDS scores [4 (1-4) versus 1 (0-1)]. Following sedation, Heart (HR) and respiratory (fR) rates did not differ between groups. After anaesthetic induction, at times 1, 3 and 5 HR, systolic arterial pressure and end tidal carbon dioxide were significantly higher and fR was significantly lower in TZ than ACE. Recovery quality was similar between groups. In both groups, times to extubation, head lift and sternal recumency were similar, but time (minutes) until standing was significantly longer in TZ (31 +/- 16) than ACE (18 +/- 11). CONCLUSION AND CLINICAL RELEVANCE: Low dose tiletamine-zolazepam combined with methadone provided superior sedation to ACE. Recovery quality was similar, although time to standing was longer.
Indwelling double pigtail ureteral stent combined or not with surgery for feline ureterolithiasis: complications and outcome in 15 cases.


Ureteral obstruction secondary to ureterolithiasis in cats is a challenging situation. Ureteral stenting has recently been introduced to prevent complications that often occurred after ureterotomy or other invasive surgeries. The purpose of this study is to describe the stenting technique and perioperative difficulties, as well as long-term outcome and complications with ureteral stenting in 12 cats with ureteroliths. Fifteen 2.5 Fr soft double pigtail multi-fenestrated ureteral stents were placed in an antegrade fashion under open surgical approaches and with fluoroscopic guidance in 12 cats. Nine cats received a unilateral stent and three received bilateral stents. Ureterotomy or ureteral resection and end-to-end anastomosis were performed in three and four cases, respectively. In six cats, papillotomy was performed to facilitate dilator and stent placement. All cats recovered well from the surgical procedure, except one cat, which died during the anaesthesia recovery period. Postoperative complications included dysuria (three cases, diagnosed at 15 days, 1 month and 3 months, respectively), urinary tract infection (one case, 1 month after surgery), stent migration requiring stent replacement (one case, 19 months after surgery) and stent obstruction requiring stent removal (three cases with previously end-to-end anastomosis between 2 and 8 months after surgery). Nine cats (75%) were alive at a mean follow-up of 453 +/- 194 (123-720) days. The median survival time was >415 days. Stent placement appeared to be a valuable and safe option for treating ureteral obstruction in cats. However, periodic and long-term monitoring of stents is warranted.

Improving the diagnosis, treatment, and biology patterns of feline mammary intraepithelial lesions: a potential model for human breast masses with evidence from epidemiologic and cytohistopathologic studies.

Tumour Biol (2014)


In this study, the frequency of different types of mammary masses and their relationship with cytohistopathologic changes was investigated and data on history, macroscopic description, clinical examination and treatment were collected. To determine the prevalence and types of cytohistopathologic changes, mammary glands from 12 female cats were evaluated. The mean age of cats at the time of diagnosis was 11.5 +/- 1.9 years (range 4-14 years), the mean gross size of the masses was 3.1 +/- 2.4 cm, 4/12 (33.3 %) masses were <=3.0 cm in diameter, and the maximum diameter of the largest mass had a median of 5 cm, with a range of diameter of 6 x 5 x 4 cm. Moreover, the preferential localization of mammary masses was the abdominal lobes (%50) and thoracic lobes (%33.3), and inguinal lobes (%16.7 of cases). Furthermore, two cases of the inguinal masses affected the caudo-inguinal lobe, six cases caudo-abdominal lobe, and thoracic masses were found in four cases. Eventually, six cases (%50) of masses were found in the right mammary lobes and six cases (%50) in the left mammary lobes. The majority of the masses revealed elastic (%50 of cases), hard (%25 of cases), or soft (%25 of cases) consistency. In the present study, according to the criteria of the
veterinary and the medical WHO classification system, of the 12 cats with the cytohistopathological features of six (50 %) cases qualified abscess, 3 (25 %) cases as cystic hyperplasia and 3 (25 %) cases were called situ carcinoma. Whereas, all hyperplastic lesions (case nos. 7-9 and ranging in size from, 1 to >4 cm3) and carcinomas in situ lesions (case nos. 10-12 and ranging in size from, 1 to >3 cm3) were found incidentally upon routine cytohistology. Other lesions were observed grossly and removed either at surgery (case nos. 1-6). Finally, the cats were treated with unilateral lumpectomy (3 cases) and also, nine (75 %) cases had subsequent drainage, 3 (25 %) of which showed cystic hyperplasia and 6 (50 %) showed abscess on subsequent histopathological evaluation. Therefore, a correct diagnosis must be established quickly, and treatment must be instituted rapidly when alteration is noted in the mammary glands.

Comparison of intranasal and intramuscular ketamine-midazolam combination in cats.
Vet Anaesth Analg (2014)
Marjani, M., V. Akbarinejad, and M. Bagheri

OBJECTIVE: The aim of the present study was to compare intranasal (INS) and intramuscular (IM) routes of administration of a ketamine-midazolam combination in cats. STUDY DESIGN: Randomized block design. ANIMALS: Twelve healthy mixed breed cats (six males and six females). METHODS: The drug combination was ketamine (14 mg kg\(^{-1}\)) and midazolam (0.5 mg kg\(^{-1}\)). In the IM group, drugs were injected into quadratus femoris muscle; in the INS group, the combination dropped equally into the two nostrils. Pulse and respiratory rates, peripheral haemoglobin oxygen saturation (SpO\(_2\)) and rectal temperature were monitored before and at intervals after drug administration. Time to onset and duration of sedation and, during recovery to head up, sternal recumbency and recovery were recorded. RESULTS: There were no significant differences between the groups in any time measured except for recovery to sternal recumbency, where time was lower in the INS than in the IM (p = 0.034). Respiratory rate was greater in the INS than in the IM group (p = 0.029), but there was no difference between groups in other physiological parameters. In both groups SpO\(_2\) was low before and fell further during sedation. CONCLUSIONS: The results substantiated that INS ketamine-midazolam can produce effective sedation in cats. CLINICAL RELEVANCE: Intranasal (INS) administration of ketamine-midazolam is atraumatic, and its use may avoid the pain of injection of ketamine combinations when this drug is used to induce sedation in cats.

Familial cardiomyopathy in Norwegian Forest cats.
Marz, I., L. J. Wilkie, N. Harrington, J. R. Payne, R. A. Muzzi, J. Haggstrom, K. Smith, and V. Luis Fuentes

Norwegian Forest cats (NFCs) are often listed as a breed predisposed to cardiomyopathy, but the characteristics of cardiomyopathy in this breed have not been described. The aim of this preliminary study was to report the features of NFC cardiomyopathy based on prospective echocardiographic screening of affected family groups; necropsy findings; and open-source breed screening databases. Prospective examination of 53 NFCs revealed no murmur or left ventricular (LV) outflow tract obstruction in any screened cat, though mild LV hypertrophy (defined as diastolic LV wall thickness \(\geq\)5.5mm) was present in 13/53 cats (25%). Gross pathology results and histopathological sections
were analysed in eight NFCs, six of which had died of a cardiac cause. Myocyte hypertrophy, myofibre disarray and interstitial fibrosis typical of hypertrophic cardiomyopathy were present in 7/8 cats, but endomyocardial fibrosis suggestive of restrictive cardiomyopathy was also present in the same cats. Pedigree data analysis from 871 NFCs was supportive of a familial cardiomyopathy in this breed.

**Partial carpal arthrodesis using a medially applied mini-plate in three cats with carpometacarpal hyperextension injury.**

Mathis, K. R., and K. Voss

Hyperextension injury to the feline carpus usually results in disruption of the palmar ligament support at the level of the carpometacarpal joint. Treatment options include pancarpal or partial carpal arthrodesis. Partial carpal arthrodesis preserves range of motion of the antebrachiocarpal joint, and pronation and supination of the foarserm. The surgical technique and three cases of partial carpal arthrodesis using medially applied mini-plates are described. Partial carpal arthrodesis of the feline carpus using medially applied mini-plates may be a safe and effective treatment for hyperextension injury to the carpometacarpal joints.

**Conjunctival lymphoma: immunophenotype and outcome in five dogs and three cats.**


Conjunctival lymphoma is well documented in the medical literature, but veterinary reports are few. We report five cases of canine lymphoma, and three of feline in which the presenting sign was conjunctival involvement. All animals were in apparently good health at the time of presentation, and attended the referring clinic because of conjunctival disease. One dog showed generalized lymphadenopathy at presentation, although the ocular lesion was the reason for consultation, but all other patients were well with no detectable disease beyond the eye. All cats were presented for their ocular disease. All dogs were confirmed to have T-cell tumors, although the histological appearance of these was variable. In contrast, all cats had B-cell tumors. Referring clinicians and owners were contacted for follow-up information. Three dogs had been euthanasied within 6 months of diagnosis for deterioration of general health. The remaining two were alive and showed no signs of systemic disease. Two cats had good survival following diagnosis, the other died of lesions that may not be related.

**Treatment of chronically FIV-infected cats with suberoylanilide hydroxamic acid.**

McDonnel, S. J., M. L. Liepnieks, and B. G. Murphy

Feline immunodeficiency virus (FIV) is a naturally-occurring, large animal model of lentiviral-induced immunodeficiency syndrome, and has been used as a model of HIV pathogenesis and therapeutic interventions. HIV reservoirs in the form of latent virus remain the primary roadblock to viral eradication and cure, and FIV has been previously established an animal model of lentiviral latency. The goal of this study was to determine whether administration of the histone deacetylase inhibitor
(HDACi) suberoylanilide hydroxamic acid (SAHA) to aviremic, chronically FIV-infected cats would induce latent viral reactivation in vivo. A proof-of-concept experiment in a Transwell co-culture system demonstrated the ability of SAHA to reactivate latent virus which was replication competent and able to infect naive cells. Oral SAHA (250mg/m(2)) was administered with food to four asymptomatic, experimentally FIV-infected cats and one uninfected control cat, and a limited pharmacokinetic and pharmacodynamic analysis was performed. A statistically significant increase in cell-associated FIV RNA was detected in the cat with the greatest serum SAHA exposure, and cell-free viral RNA was detected at one time point in the three cats that achieved the highest levels of SAHA in serum. Interestingly, there was a significant decrease in viral DNA burden at 2h post drug administration in the same three cats. Though the sample size is small and the drug response was modest, this study provides evidence that in vivo treatment of FIV-infected cats with the HDACi SAHA can induce viral transcriptional reactivation, which may be dependent upon the concentration of SAHA achieved in blood. Importantly, alternative putative antilatency therapy drugs, and multimodal drug combinations, could be studied in this in vivo system. The FIV/cat model provides a unique opportunity to test novel therapeutic interventions aimed at eradicating latent virus in vivo.

Prevalence of upper respiratory pathogens in four management models for unowned cats in the Southeast United States.


Upper respiratory infection (URI) is a pervasive problem in cats and impacts the capacity and cost of sheltering programs. This study determined the pattern of respiratory pathogens in cats with and without clinical signs of URI in four different models for managing unowned cats, namely, (1) short-term animal shelters (STS), (2) long-term sanctuaries (LTS), (3) home-based foster care programs (FCP), and (4) trap-neuter-return programs for community cats (TNR). Conjunctival and oropharyngeal swabs from 543 cats, approximately half of which showed clinical signs of URI, were tested for feline herpes virus-1 (FHV), feline calicivirus (FCV), Chlamydia felis, Bordetella bronchiseptica, Mycoplasma felis, and canine influenza virus by real-time PCR. FHV (59%, 41%) and B. bronchiseptica (33%, 24%) were more prevalent in both clinically affected and nonclinical cats, respectively, in STS than other management models. FCV (67%, 51%) and M. felis (84%, 86%) were more prevalent in LTS than any other management model. Clinically affected cats in FCP were more likely to carry FHV (23%, 6%), C. felis (24%, 10%), or M. felis (58%, 38%) than were nonclinical cats. Clinically affected cats in TNR were more likely to carry FCV (55%, 36%) or C. felis (23%, 4%) than were nonclinical cats. The prevalence of individual pathogens varied between different management models, but the majority of the cats in each model carried one or more respiratory pathogens regardless of clinical signs. Both confined and free-roaming cats are at risk of developing infectious respiratory disease and their health should be protected by strategic vaccination, appropriate antibiotic therapy, effective biosecurity, feline stress mitigation, and alternatives to high-density confinement.

Epidermolysis bullosa in animals: a review.

Vet Dermatol (2014)
Medeiros, G. X., and F. Riet-Correa

Epidermolysis bullosa (EB) is a hereditary mechanobullous disease of animals and humans, characterized by an extreme fragility of the skin and mucous membranes. The main feature of EB in humans and animals is the formation of blisters and erosions in response to minor mechanical trauma. Epidermolysis bullosa is caused by mutations in the genes that code for structural proteins of the cytoskeleton of the basal keratinocytes or of the basement membrane zone. Based on the ultrastructural levels of tissue separation, EB is divided into the following three broad categories: epidermolysis bullosa simplex, junctional epidermolysis bullosa and dystrophic epidermolysis bullosa. Human types of EB are divided into several subtypes based on their ultrastructural changes and the mode of inheritance; subtypes are not fully established in animals. In humans, it is estimated that EB affects one in 17,000 live births; the frequency of EB in different animal species is not known. In all animal species, except in buffalo with epidermolysis bullosa simplex, multifocal ulcers are observed on the gums, hard and soft palates, mucosa of the lips, cheek mucosa and dorsum of the tongue. Dystrophic or absent nails, a frequent sign seen in human patients with EB, corresponds to the deformities and sloughing of the hooves in ungulates and to dystrophy or atrophy of the claws in dogs and cats. This review covers aspects of the molecular biology, diagnosis, classification, clinical signs and pathology of EB reported in animals.

Feline cutaneous mast cell tumours: a UK-based study comparing signalment and histological features with long-term outcomes.

Melville, K., K. C. Smith, and M. J. Dobromylskyj

Feline cutaneous mast cell tumours (MCTs) are the second most common skin tumour in cats, but unlike in dogs, there is currently no histological grading system for this type of tumour. This study recorded the signalment and anatomical location from a total of 287 records from MCTs submitted to a UK commercial diagnostic laboratory. Questionnaires to submitting practices were used to obtain follow-up data, and the histological features of 86 tumours were evaluated from 69 cats with a known outcome. Twelve of the 69 cats (17.4%) died of MCTs, with significantly lower survival times. The median age of cats presenting with MCTs was 11 years (range 5 months-19 years), with no sex or neutered status predilection. Some pedigree breeds were more susceptible to MCTs, particularly the Siamese, Burmese, Russian Blue and Ragdoll. The head was the most common site in younger cats, compared to the trunk in older cats. The number of tumours had no effect on survival. A new subcategory of well-differentiated MCTs with prominent multinucleated cells is described, and three of the five cats with this novel form died from MCT-related disease. There was an association between mitotic index and survival time. However, there was no significant association between histological type and survival.

Evaluation of an in-house dot enzyme-linked immunosorbent assay to detect antibodies against feline panleukopenia virus.

Mende, K., B. Stuetzer, U. Truyen, and K. Hartmann
Measuring antibody titres to determine a cat’s immunity to core diseases instead of just administering annual vaccinations has not been established in Germany so far. An in-house test kit for the detection of antibodies against feline panleukopenia virus (FPV), feline herpesvirus-1 and feline calicivirus-- the ImmunoComb Feline VacciCheck--is now available in several European countries. The aim of this study was to assess the quality of the ImmunoComb Feline VacciCheck to determine antibodies by comparing it to a gold standard. The test is aimed for use in practice to assist decision-making when performing an individual health assessment to see whether a cat is potentially unprotected against FPV and requires FPV vaccination. Sera from 347 cats were included in the study. For antibody detection, haemagglutination inhibition (HI) was performed as gold standard. Sensitivity, specificity and positive and negative predictive values of the ImmunoComb Feline VacciCheck were determined for three different HI titre cut-off points (1:20, 1:40, 1:80). In comparison to the HI, the ImmunoComb Feline VacciCheck showed a sensitivity of 79%, 83% and 87%, and a specificity of 89%, 86% and 81%, respectively. Specificity of the ImmunoComb Feline VacciCheck, which was considered the most important parameter, was acceptable in comparison to HI. Especially when considering an antibody titre of 1:20 sufficient for protection (eg, in an adult animal), the ImmunoComb Feline VacciCheck can be recommended for use in veterinary practice.

Proportion of and risk factors for open fractures of the appendicular skeleton in dogs and cats.


Millard, R. P., and H. Y. Weng

OBJECTIVE: To evaluate the proportion of and risk factors for open fractures of the appendicular skeleton in dogs and cats that were a result of acute trauma. DESIGN: Cross-sectional and case-control study. ANIMALS: 84,629 dogs and 26,675 cats. PROCEDURES: Dogs and cats examined at Purdue University Veterinary Teaching Hospital from January 1993 through February 2013 were identified; the proportion of open fractures was estimated from the medical records. Additionally, all incident cases of open (77 dogs and 33 cats) and closed (469 dogs and 80 cats) fractures between January 1993 and February 2013 and a random sample of nonfracture patients (722 dogs and 330 cats) in 2010 were used to assess risk for open appendicular fractures. RESULTS: Proportion of open fractures for the 20-year period was 0.09% (95% confidence interval [CI], 0.07% to 0.11%) in dogs and 0.12% (95% CI, 0.09% to 0.17%) in cats. Seventy-seven of 546 (14.1%) and 33 of 113 (29.2%) traumatic fractures were classified as open in dogs and cats, respectively. Comminuted fractures were more likely than other configurations to be open in dogs (OR, 5.9; 95% CI, 2.9 to 12.2) and cats (OR, 3.5; 95% CI, 1.0 to 12.0). Vehicle-related trauma was a significant risk factor for open fractures in dogs (OR, 13.8; 95% CI, 3.1 to 61.8). CONCLUSIONS AND CLINICAL RELEVANCE: The proportion of incident open fractures in dogs and cats was low. Age, body weight, affected bone or bone segment, fracture configuration, and method of trauma were associated with an open fracture.

Prognostic Value of Histologic Grading for Feline Mammary Carcinoma: A Retrospective Survival Analysis.

Vet Pathol (2014)

Mills, S. W., K. M. Musil, J. L. Davies, S. Hendrick, C. Duncan, M. L. Jackson, B. Kidney, H. Philibert, B. K. Wobeser, and E. Simko
Feline mammary carcinoma is highly malignant and generally associated with a poor prognosis, although studies suggest the range of survival times in affected cats is broad. Histologic grading of these tumors is achieved using the Elston and Ellis system, originally developed for human breast cancer. In cats, however, classification using this method has variable prognostic value. Therefore, objectives of this study were (1) to evaluate the Elston and Ellis grading system for feline mammary carcinoma in a predominantly spayed population and (2) to determine whether modification of this system or development of a novel system improved the prognostic value of histologic grading. Survey data and histologic features for 108 carcinomas from 97 cats were analyzed with respect to overall survival. Elston and Ellis grading failed to correlate significantly with overall survival. Using multivariable analysis, lymphovascular invasion, nuclear form, and mitotic count each demonstrated independent prognostic significance (P = .008, <.001, and .004, respectively). Modifications of the Elston and Ellis system and a novel grading system were proposed based on these results; all showed significant correlation with overall survival (P <.001). Median survival times were 27, 29, or 31 months for grade I; 14, 12, or 14 months for grade II; and 13, 5, or 8 months for grade III carcinomas using the mitotic-modified Elston and Ellis, the revised Elston and Ellis, or the novel grading system, respectively. Based on this retrospective study, adoption of the species-specific systems as proposed here may improve the prognostic value of histologic grading for feline mammary carcinoma.

**Ultrasonographic biometry of the normal eye of the Persian cat.**


*Mirshahi, A., S. H. Shafigh, and M. Azizzadeh*

OBJECTIVE: To describe the normal ultrasonographic biometry of the Persian cat’s eyes using B-mode ultrasonography. METHODS: In a cross-sectional study, 20 healthy Persian cats with no history of previous ophthalmic disease were examined. Ocular biometry of the left and right eyes was measured using B-mode ultrasonography. Comparison of the average measurements between left and right eyes and between vertical and horizontal planes was performed using paired-sample t test. Correlation of ocular parameters with sex, age, head circumference and eye colour was evaluated. RESULTS: Mean +/- standard deviation (SD) measurements of the ocular structures of anterior chamber, lens thickness, vitreous chamber and anterior to posterior dimension of the globe in 40 eyes were 4.1 +/- 0.7, 7.7 +/- 0.5, 8.2 +/- 0.4 and 20.7 +/- 1.0 mm, respectively. No significant difference was found between the ocular biometry of the left and right eyes or the horizontal and vertical planes. Of the ocular parameters, the following had a significant positive correlation with head circumference: axial globe length, anterior chamber and lens thickness. The vitreous body had a positive correlation with age. CONCLUSIONS: Regarding the breed predisposition of Persian cats to ocular problems, the present study provides baseline information for further clinical investigations of ocular abnormalities using B-mode ultrasonography.

**Alveolar macrophages are the main target cells in feline calicivirus-associated pneumonia.**


Feline calicivirus (FCV) is a pathogen of felids and one of the most common causative agents of feline upper respiratory disease (URD). Reports of natural FCV pneumonia in the course of respiratory tract infections are sparse. Therefore, knowledge on the pathogenesis of FCV-induced lung lesions comes only from experimental studies. The aim of the present study was to assess the type and extent of pulmonary involvement in natural respiratory FCV infections of domestic cats and to identify the viral target cells in the lung. For this purpose, histology, immunohistochemistry and RNA-in situ hybridisation for FCV and relevant cell markers were performed on diagnostic post-mortem specimens collected after fatal URD, virulent systemic FCV or other conditions. All groups of cats exhibited similar acute pathological changes, dominated by multifocal desquamation of activated alveolar macrophages (AM) and occasional type II pneumocytes with fibrin exudation, consistent with diffuse alveolar damage (DAD). In fatal cases, this was generally seen without evidence of epithelial regeneration. In cats without clinical respiratory signs, type II pneumocyte hyperplasia was present alongside the other changes, consistent with the post-damage proliferative phase of DAD. FCV infected and replicated in AM and, to a lesser extent, type II pneumocytes. This study shows that lung involvement is an infrequent but important feature of FCV-induced URD. AM are the main viral target cell and pulmonary replication site, and their infection is associated with desquamation and activation, as well as death via apoptosis.

Epidemiology of the eye worm Thelazia callipaeda in cats from southern Switzerland.


Motta, B., F. Nageli, C. Nageli, F. Solari-Basano, B. Schiessl, P. Deplazes, and M. Schnyder

Thelazia callipaeda is a spiruroid nematode of dogs, cats and wild carnivores transmitted by zoophilic drosophilid Phortica flies and found in an increasing number of European countries. In cats the disease is diagnosed sporadically. This study presents an epidemiological investigation of feline thelaziosis, performed in southern Ticino, Switzerland, an endemic area for T. callipaeda. Between January 2009 and July 2011 2171 cats, having outdoor access and presenting for various reasons, were examined by in-depth eye examinations, and clinical and anamnestic data were collected. The overall prevalence of T. callipaeda in the study area was 0.8% (17/2171 cats, 95% confidence interval: 0.5-1.3%). Among cats showing ocular illness, the prevalence was 9.2% (11/120, CI: 4.7-15.8%). Cats with eye worms had no international travel history and were significantly more often diagnosed between June and December than during other months. With one exception, one single eye per cat was infested, each harboring between 1 and 10 eye worms (arithmetic mean: 2.8 per cat). One cat presented with conjunctivitis and ulcers, seven with conjunctivitis only and 3 with a mildly increased lacrimation, while 6 cats were asymptomatic. Significantly more male than female cats had eye worms and cats older than one year were overrepresented. No pure-bred cats were infested. This study confirms the establishment of this potentially zoonotic parasite in cats from the study area. Due to the clinical relevance and pain caused by the infestations, increased disease awareness and in depth eye examination for the detection of T. callipaeda in cats are recommended, even in absence of obvious clinical signs, in order to initiate appropriate anthelmintic treatment.

Echocardiographic findings in 11 cats with acromegaly.


Myers, J. A., K. F. Lunn, and J. M. Bright
BACKGROUND: Information regarding cardiac changes in domestic cats with acromegaly is limited.

HYPOTHESIS/OBJECTIVES: The objective of this study was to describe the echocardiographic findings in cats with acromegaly.

ANIMALS: Eighteen cats diagnosed with acromegaly at Colorado State University between 2008 and 2012. Of these 18 cats, 11 had echocardiography performed.

METHODS: A retrospective review of medical records was made to identify cats with acromegaly that also had echocardiography performed.

RESULTS: Of the 11 cats identified, 7 had left ventricular concentric hypertrophy, 6 had left atrial enlargement, and 7 had evidence of abnormal diastolic function. All 11 cats had evidence of structural or functional cardiac disease.

CONCLUSIONS AND CLINICAL IMPORTANCE: Cardiovascular abnormalities frequently are present in cats with acromegaly, and a complete cardiac evaluation should be considered in these patients.

Animal models of disease: classification and etiology of diabetes in dogs and cats.


Nelson, R. W., and C. E. Reusch

Diabetes mellitus is a common disease in dogs and cats. The most common form of diabetes in dogs resembles type 1 diabetes in humans. Studies suggest that genetics, an immune-mediated component, and environmental factors are involved in the development of diabetes in dogs. A variant of gestational diabetes also occurs in dogs. The most common form of diabetes in cats resembles type 2 diabetes in humans. A major risk factor in cats is obesity. Obese cats have altered expression of several insulin signaling genes and glucose transporters and are leptin resistant. Cats also form amyloid deposits within the islets of the pancreas and develop glucotoxicity when exposed to prolonged hyperglycemia. This review will briefly summarize our current knowledge about the etiology of diabetes in dogs and cats and illustrate the similarities among dogs, cats, and humans.

Management of endemic Microsporum canis dermatophytosis in an open admission shelter: a field study.


Newbury, S., K. Moriello, K. Coyner, A. Trimmer, and D. Kunder

Endemic Microsporum canis dermatophytosis was identified in a large, open admission, private, no-kill shelter that admitted >1200 cats per year. Fungal culture (FC) screening revealed that 166/210 (79%) and 38/99 (38%) cats in the non-public and public area were culture positive, respectively. However, pending screening FC results, the 99 cats in the public area were treated with once-weekly lime sulfur rinses and monitored with once-weekly FC. Cats in the non-public area were not treated. When FC results were available, cats were separated into low-risk (n = 61) and high-risk (n = 38) groups based upon the presence or absence of skin lesions. Low-risk cats continued to receive once-weekly topical lime sulfur and rapidly achieved culture-negative status. High-risk cats were divided into two groups based upon the number of colony-forming units/plate (low or high). All 38 cats were treated with twice-weekly lime sulfur and oral terbinafine and within 6-7 weeks only 5/38 cats were still FC-positive. These cats were moved to a separate room. Dermatophytosis was eradicated within 5 months; eradication was prolonged owing to reintroduction of disease into the remaining room of cats under treatment from three kittens returning from foster care. Continued admissions and adoptions were
possible by the institution of intake procedures that specifically included careful Wood’s lamp examination to identify high-risk cats and use of a ‘clean break strategy’.

Gastrointestinal parasites in rural dogs and cats in Selangor and Pahang states in Peninsular Malaysia.


To estimate the current prevalence of gastrointestinal (GI) parasites in dogs and cats, a total of 105 fresh faecal samples were collected from rural areas in Peninsular Malaysia. Each faecal sample was examined for the presence of GI parasites by microscopic examination after formalin-ether concentration technique and for protozoa, trichrome and Ziehl-Neelsen staining were employed. The overall prevalence of GI parasitic infection was 88.6% (95% CI = 82.5-94.7) in which 88.3% of dogs and 89.3% of cats were infected with at least one parasites species, respectively. There were 14 different GI parasites species (nematodes, cestodes and protozoa) detected, including Ancylostoma spp. (62.9%), Toxocara spp. (32.4%), Trichuris vulpis (21.0%), Spirometra spp. (9.5%), Toxascaris leonina (5.7%), Dipylidium caninum (4.8%), Ascaris spp. (2.9%), Hymenolepis diminuta (1.0%) and others. General prevalence of GI parasites showed a significant difference between helminth (84.4%) and protozoa (34.3%) infections. Monoparasitism (38.1%) was less frequent than polyparasitism (46.7%). As several of these GI parasites are recognized as zoonotic agents, the results of this investigation revealed that local populations may be exposed to a broad spectrum of zoonotic agents by means of environmental contamination with dogs and cats faeces and this information should be used to mitigate public health risks. Prevention and control measures have to be taken in order to reduce the prevalence rates especially in socioeconomically disadvantaged communities where animals live in close proximity to people, poor levels of hygiene and overcrowding together with a lack in veterinary attention and zoonotic awareness.

Evaluation of factors associated with work-related injuries to veterinary technicians certified in Minnesota.


Nordgren, L. D., S. G. Gerberich, B. H. Alexander, T. R. Church, J. B. Bender, and A. D. Ryan

OBJECTIVE: To evaluate the magnitude and consequences of work-related injuries and associated factors among veterinary technicians certified in Minnesota. DESIGN: Cross-sectional survey. SAMPLE: 1,427 certified veterinary technicians (CVTs). PROCEDURES: Surveys were used to collect data on demographics, personal characteristics, injury occurrences in the 12 months prior to survey completion, and injury consequences. Annual injury rates were estimated on the basis of demographic and work-related characteristics. Risk of injury associated with various factors was estimated by calculation of incidence rate ratios, controlling for multiple factors. RESULTS: 465 of 873 eligible CVTs reported 1,827 injury events (total and bite injury rates, 237 and 78 injuries/100 persons/y). Primary injury sources were cats and dogs, and most injuries occurred during animal restraint or treatment. Self-reported most severe injuries involved bites; cuts, lacerations, or scratches; bruises or contusions; and abrasions. Injury consequences included treatment and restricted work
activity. Risk of work-related injury was lower for CVTs who worked < 40 h/wk than for those who worked >/= 40 h/wk. The risk was higher for CVTs working in small animal or mixed mostly small animal facilities and lower for those working in mixed large and small animal facilities, commercial or industry operations, and government or regulatory facilities, compared with CVTs in colleges or universities. Handling 4 to > 6 (vs < 4) animal species during the 12 months prior to the survey and belief that injuries are not preventable were also associated with higher risk of injury. CONCLUSIONS AND CLINICAL RELEVANCE: Several factors associated with the risk of work-related injury among CVTs were identified. Beyond these risk factors, investigation of additional exposures is integral to relevant intervention strategies.

Patent ductus arteriosus in an adult cat with pulmonary hypertension and right-sided congestive heart failure: hemodynamic evaluation and clinical outcome following ductal closure.


Novo-Matos, J., K. Hurter, R. Bektas, P. Grest, and T. Glaus

Right-sided congestive heart failure (CHF) developed secondary to severe pulmonary hypertension (PH) in an 8-year-old cat with a left-to-right shunting patent ductus arteriosus (PDA). Vascular reactivity was tested prior to shunt ligation by treatment with oxygen and sildenafil. This treatment was associated with a significant decrease in pulmonary artery pressure as assessed by echocardiography. Subsequently surgical shunt ligation was planned. During thoracotomy, digital occlusion of the PDA was performed for 10 min with simultaneous catheter measurement of right ventricular pressure, which did not increase. Permanent shunt ligation resulted in a complete and sustained clinical recovery. A lung biopsy sample obtained during thoracotomy demonstrated histopathological arterial changes typical of PH. Cats can develop clinically severe PH and right-sided CHF secondary to a left-to-right PDA even at an advanced age. Assuming there is evidence of pulmonary reactivity, PDA occlusion might be tolerated and can potentially produce long-term clinical benefits.

Prevalence of disorders recorded in cats attending primary-care veterinary practices in England.

Vet J (2014)

O’Neill, D. G., D. B. Church, P. D. McGreevy, P. C. Thomson, and D. C. Brodbelt

Improved understanding of absolute and relative prevalence values for common feline disorders could support clinicians when listing differential diagnoses and also assist prioritisation of breeding, research and health control strategies. This study aimed to analyse primary-care veterinary clinical data within the VetCompass project to estimate the prevalence of the most common disorders recorded in cats in England and to evaluate associations with purebred status. It was hypothesised that common disorders would be more prevalent in purebred than in crossbred cats. From a study population of 142,576 cats attending 91 clinics across Central and South-East England from 1 September 2009 to 15 January 2014, a random sample of 3584 was selected for detailed clinical review to extract information on all disorders recorded. The most prevalent diagnosis-level disorders were periodontal disease (n = 499; prevalence, 13.9%, 95% confidence intervals [CI], 12.5-15.4), flea infestation (n = 285; prevalence, 8.0%; 95% CI, 7.0-8.9) and obesity (n = 239; prevalence, 6.7%; 95% CI, 5.7-7.6). The most prevalent disorder groups recorded were dental conditions (n = 540; prevalence, 15.1%, 95% CI, 13.6-16.6), traumatic injury (n = 463; prevalence, 12.9%; 95% CI, 11.6-14.3) and dermatological disorders (n =
Crossbred cats had a higher prevalence of abscesses (excluding cat bite abscesses) \( (P = 0.009) \) and hyperthyroidism \( (P = 0.002) \) among the 20 most common disorders recorded. Purebreds had a higher prevalence for coat disorders \( (P <0.001) \). Veterinarians could use these results to focus their diagnostic and prophylactic efforts towards the most prevalent feline disorders. The study did not show an increased prevalence of common disorders in purebred cats compared with crossbred cats. Primary-care veterinary clinical data were versatile and useful for demographic and clinical feline studies.

**Pain assessment in cats undergoing ovariohysterectomy by midline or lateral celiotomy through use of a previously validated multidimensional composite pain scale.**


*Oliveira, J. P., R. Mencalha, C. A. Sousa, M. Abidu-Figueiredo, and F. Jorge Sda*

PURPOSE: To assess pain in the immediate postoperative period in cats submitted into two different celiotomy techniques for ovariohysterectomy. METHODS: Fourteen healthy female cats up to three years old with a mean weight 2.75kg, without breed specification, were used in this double blind experiment. The animals were randomly assigned to two treatments: I- ovariohysterectomy by lateral approach (LA) or II - by midline approach (MA). The anesthesia consisted of acepromazine \( (0.1 \text{mg.kg}^{-1}) \) and midazolam \( (0.25\text{mg.kg}^{-1}) \) followed isoflurane vaporization to induce and maintain hypnosis. A bolus of fentanyl \( (5\text{mug.kg}^{-1}) \) was administered intravenously to provide intraoperative analgesia. After surgery, pain scores were assessed through a multidimensional composite pain scale at four different times. RESULTS: Generally all factors related to psychomotor changes and pain expression showed higher scores in cats neutered by LA, but only psychomotor changes and total pain score presented statistical differences \( (p<0.05) \). The animals that underwent lateral celiotomy showed higher pain scores, at 1, 4 and 6 hours after surgery. CONCLUSIONS: Multidimensional analgesic scales were highly reliable. There was a tendency for the cats neutered by lateral approach to suffer more postoperative pain, including requiring a large number of analgesic rescues.

**Review of gunshot injuries in cats and dogs and utility of a triage scoring system to predict short-term outcome: 37 cases (2003-2008).**


*Olsen, L. E., E. M. Streeter, and R. R. DeCook*

OBJECTIVE: To describe the signalment, wound characteristics, and treatment of gunshot injuries in cats and dogs in urban and rural environments, and to evaluate the utility of the animal trauma triage (ATT) score as an early predictor of survival to discharge from the hospital. DESIGN: Retrospective case series. ANIMALS: 29 dogs and 8 cats. PROCEDURES: Medical records of cats and dogs evaluated for gunshot wounds from 2003 and 2008 at a private urban referral practice in Cedar Rapids, Iowa, and an urban veterinary teaching hospital in Ames, Iowa, were reviewed. Information collected included signalment, chief reason for evaluation, circumstance of the injury, general physical examination findings, wound characteristics, treatments provided, cost of care, survival to discharge from the hospital (yes vs no), and duration of hospital stay. For each animal, ATT scores were calculated and evaluated as a prognostic tool. RESULTS: 37 animals met study inclusion criteria. Animals with higher ATT scores had a greater likelihood of poor outcome following gunshot injury.
Animals with higher ATT scores, classified as low (< 4.5) or high (> 4.5), were found to have a longer duration of stay, classified as zero (0 days), short (1 to 3 days), or long (> 3 days). Young male dogs generally considered working breeds were overrepresented (29/37 [78.4%]). A preference for low-velocity, low-kinetic-energy firearms was identified (19/37 [52%]). The most numerous wounds were those inflicted to the limbs (12/37 [32.4%]), during low-visibility hours or hunting excursions. Calculated ATT scores on admission were higher in animals requiring blood products or surgical procedures and in nonsurvivors. **CONCLUSIONS AND CLINICAL RELEVANCE:** Results of the present study suggested that regional preferences in breed ownership and firearm choice are responsible for variation in gunshot injury characteristics and management in animals sustaining injuries in rural and urban settings in Iowa. In cats and dogs, calculation of an ATT score may provide a useful predictor of the need for surgery or blood products, duration of stay, and likelihood of survival to discharge from the hospital.

**A morphological and immunohistochemical study of the effects of prednisolone or ursodeoxycholic acid on liver histology in feline lymphocytic cholangitis.**


Feline lymphocytic cholangitis (LC) has been commonly treated with prednisolone, and more recently with ursodeoxycholic acid (UDCA). Previously, we found that prednisolone treatment resulted in a statistically longer survival time than treatment with UDCA. In order to explain this difference, we compared the effects of prednisolone and UDCA treatment on hepatic tissue by evaluating consecutive liver biopsies. Archival serial biopsy materials from cats with LC treated with prednisolone (*n* = 5) or UDCA (*n* = 4) were evaluated. We employed haematoxylin and eosin staining to evaluate inflammation, and reticulin staining for fibrosis. Immunohistochemical stainings for Ki-67, K19 (Cytokeratin 19) and alpha-smooth muscle actin were used to evaluate cell type-specific proliferation and activation of hepatic stellate cells. Inflammation decreased more in the group treated with prednisolone, while the number of cholangiocytes, progenitor cells and fibroblasts did not differ between the treatment groups. Additionally, no difference was found for the amount of fibrosis in both treatment groups.

**Total dietary fiber composition of diets used for management of obesity and diabetes mellitus in cats.**


OBJECTIVE: To determine total dietary fiber (TDF) composition of feline diets used for management of obesity and diabetes mellitus. **DESIGN:** Cross-sectional survey. **SAMPLE:** Dry veterinary (*n* = 10), canned veterinary (12), and canned over-the-counter (3) feline diets. **PROCEDURES:** Percentage of TDF as insoluble dietary fiber (IDF), high-molecular-weight soluble dietary fiber (HMWSDF), and low-molecular-weight soluble dietary fiber (LMWSDF) was determined. **RESULTS:** Median measured TDF concentration was greater than reported maximum crude fiber content in dry and canned diets. Median TDF (dry-matter) concentration in dry and canned diets was 12.2% (range, 8.11% to 27.16%) and 13.8% (range, 4.7% to 27.9%), respectively. Dry and canned diets, and diets with and without a
source of oligosaccharides in the ingredient list, were not different in energy density or concentrations of TDF, IDF, HMWSDF, or LMWSDF. Similarly, loaf-type (n = 11) and gravy-type (4) canned diets differed only in LMWSDF concentration. Disparities in TDF concentrations among products existed despite a lack of differences among groups. Limited differences in TDF concentration and dietary fiber composition were detected when diets were compared on the basis of carbohydrate concentration. Diets labeled for management of obesity were higher in TDF concentration and lower in energy density than diets for management of diabetes mellitus. CONCLUSIONS AND CLINICAL RELEVANCE: Diets provided a range of TDF concentrations with variable concentrations of IDF, HMWSDF, and LMWSDF. Crude fiber concentration was not a reliable indicator of TDF concentration or dietary fiber composition. Because carbohydrate content is calculated as a difference, results suggested that use of crude fiber content would cause overestimation of both carbohydrate and energy content of diets.

**Relationship between rate of infection and markers of inflammation/immunity in Holy Birman cats with feline coronavirus.**


Paltrinieri, S., G. Rossi, and A. Giordano

The aim of this study was to assess whether Holy Birman cats (HB) have a peculiar immune profile and a higher rate of infection by feline coronaviruses (FCoV). Leucocyte and lymphocyte subsets, antibody titers, alpha1-acid glycoprotein (AGP), globulin fractions, IL4, IL-12 and IFN-gamma in blood and fecal FCoV excretion were determined in HB (n = 75) and in cats from other breeds (n = 94). Significantly higher CD4/CD8 ratio, IFN-gamma concentration and IL12/IL4 ratio and significantly lower IL-4 concentration and proportion of shedders were found in HB than in other breeds. No other differences were found. In conclusion, this study did not provide evidence of peculiar immune profiles in HB, except for a prevalent Th1 profile, that may explain why in our caseload the rate of shedders was lower in HB than in other breeds.

**Identification of a natural recombination in the F and H genes of feline morbillivirus.**


Feline morbillivirus (FmoPV) has recently been identified in Hong Kong and Japan. FmoPV is considered to belong to the genus Morbillivirus, in the family Paramyxoviridae. In this study, the complete nucleotide sequences of three strains of FmoPV detected in cats in Japan were determined. Among the six genes in FmoPV; N, P/V/C, M, F, H and L, the P gene showed the highest polymorphism in the nucleotide and putative amino acid sequences among the FmoPV strains. There was no geographical association in terms of the FmoPV phylogeny; however, from extensive phylogenetic and recombination analyses, we found that one Japanese FmoPV strain, MiJP003, was a probable recombinant between two virus strains in the independent lineages found in Japan and Hong Kong, respectively. The recombination was considered to have occurred within the F and H genes. Such recombination is thought to be involved in the evolution of FmoPV.
**Determination of Age by Pulp Cavity/Tooth Width Ratio Using Dental Radiography in Cats.**


Park, K., J. Ahn, S. Kang, E. Lee, S. Kim, S. Park, S. Park, H. Noh, and K. Seo

The purpose of this study was to identify the effect of age on the ratio of pulp cavity/tooth width (P/T ratio) in healthy cats. The dental radiographs of 32 cats (16 males, 16 females) were generated with a digital dental X-ray unit under general anesthesia. Standardized measurement of the canine teeth was achieved by drawing a line on the radiograph perpendicular to the cemento-enamel junction of the tooth. There was an inversely proportional correlation between the chronological age and the P/T ratio. Moreover, a strong squared Pearson correlation ($\gamma^2 = 0.92$) was revealed in the curved regression model. In terms of the cats’ sex and breeds, no significant difference in the P/T ratio was found. These results suggest that determination of age by P/T ratio could be clinically useful in estimating the chronological age of unknown-aged cats.

**Liver and kidney concentrations of strontium, barium, cadmium, copper, zinc, manganese, chromium, antimony, selenium and lead in cats.**


Passlack, N., B. Mainzer, M. Lahrssen-Wiederholt, H. Schafft, R. Palavinskas, A. Breithaupt, and J. Zentek

BACKGROUND: In order to provide new knowledge on the storage of strontium (Sr), barium (Ba), cadmium (Cd), copper (Cu), zinc (Zn), manganese (Mn), chromium (Cr), antimony (Sb), selenium (Se) and lead (Pb) in the feline organism, we measured the concentrations of these elements in the liver, renal cortex and renal medulla, evaluating also the impact of age, sex or the occurrence of a chronic kidney disease (CKD). The element concentrations in the tissues of 47 cats (22 male; 25 female; aged between 2 months and 18 years) were measured using inductively coupled plasma mass spectrometry.

RESULTS: Cu, Zn and Mn were the highest in the liver, followed by the renal cortex and the renal medulla. The Cd concentrations were lower in the renal medulla compared to the renal cortex and the liver, and Sr was higher in the renal medulla compared to the liver. The Se concentrations in the cortex of the kidneys were higher than in the medulla of the kidneys and in the liver. Higher Cd concentrations were measured in the renal medulla of female cats, while no further gender-related differences were observed. Except for Cr, Sb and Se, age-dependencies were detected for the storage of all elements. The occurrence of a CKD also affected the storage of the elements, with lower concentrations of Ba (renal medulla), Zn (renal cortex; renal medulla) and Mn (liver; renal medulla), but higher Cd concentrations (liver; renal cortex) in diseased cats. CONCLUSIONS: In conclusion, the present results provide new information on the accumulation of specific elements in the feline liver and kidneys, demonstrating a dependency on age and an impaired kidney function, but not on the sex of the animals.

**Short term effects of increasing dietary salt concentrations on urine composition in healthy cats.**


Passlack, N., H. Burmeier, T. Brenten, K. Neumann, and J. Zentek
High dietary salt (NaCl) concentrations are assumed to be beneficial in preventing the formation of calcium oxalate (CaOx) uroliths in cats, since increased water intake and urine volume have been observed subsequent to intake. In human beings, dietary NaCl restriction is recommended for the prevention of CaOx urolith formation, since high NaCl intake is associated with increased urinary Ca excretion. The aim of the present study was to clarify the role of dietary NaCl in the formation of CaOx uroliths in cats. Eight cats received four diets that differed in Na and Cl concentrations (0.38-1.43% Na and 0.56-2.52% Cl dry matter, DM). Each feeding period consisted of a 21 day adaptation period, followed by a 7 day sampling period for urine collection. Higher dietary NaCl concentrations were associated with increased urine volume and renal Na excretion. Urinary Ca concentration was constant, but renal Ca excretion increased from 0.62 to 1.05 mg/kg bodyweight (BW)/day with higher dietary NaCl concentrations (P \leq 0.05). Urinary oxalate (Ox), citrate, P and K concentrations decreased when NaCl intake was high (P \leq 0.05), and urinary pH was low in all groups (6.33-6.45; P > 0.05). Relative supersaturation of CaOx in the urine was unaffected by dietary NaCl concentrations. In conclusion, the present study demonstrated several beneficial effects of high dietary NaCl intake over a relatively short time period. In particular, urinary Ca concentration remained unchanged because of increased urine volume. Decreased urinary Ox concentrations might help to prevent the formation of CaOx uroliths, but this should be verified in future studies in diseased or predisposed cats.

An update on feline infectious peritonitis: virology and immunopathogenesis.


Pedersen, N. C.

Feline infectious peritonitis (FIP) continues to be one of the most researched infectious diseases of cats. The relatively high mortality of FIP, especially for younger cats from catteries and shelters, should be reason enough to stimulate such intense interest. However, it is the complexity of the disease and the grudging manner in which it yields its secrets that most fascinate researchers. Feline leukemia virus infection was conquered in less than two decades and the mysteries of feline immunodeficiency virus were largely unraveled in several years. After a half century, FIP remains one of the last important infections of cats for which we have no single diagnostic test, no vaccine and no definitive explanations for how virus and host interact to cause disease. How can a ubiquitous and largely non-pathogenic enteric coronavirus transform into a highly lethal pathogen? What are the interactions between host and virus that determine both disease form (wet or dry) and outcome (death or resistance)? Why is it so difficult, and perhaps impossible, to develop a vaccine for FIP? What role do genetics play in disease susceptibility? This review will explore research conducted over the last 5 years that attempts to answer these and other questions. Although much has been learned about FIP in the last 5 years, the ultimate answers remain for yet more studies.

The influence of age and genetics on natural resistance to experimentally induced feline infectious peritonitis.

Vet Immunol Immunopathol (2014)

Pedersen, N. C., H. Liu, B. Gandolfi, and L. A. Lyons

Naturally occurring feline infectious peritonitis (FIP) is usually fatal, giving the impression that immunity to the FIP virus (FIPV) is extremely poor. This impression may be incorrect, because not all
cats experimentally exposed to FIPV develop FIP. There is also a belief that the incidence of FIP may be affected by a number of host, virus, and environmental cofactors. However, the contribution of these cofactors to immunity and disease incidence has not been determined. The present study followed 111 random-bred specific pathogen free (SPF) cats that were obtained from a single research breeding colony and experimentally infected with FIPV. The cats were from several studies conducted over the past 5 years, and as a result, some of them had prior exposure to feline enteric coronavirus (FECV) or avirulent FIPVs. The cats were housed under optimized conditions of nutrition, husbandry, and quarantine to eliminate most of the cofactors implicated in FIPV infection outcome and were uniformly challenge exposed to the same field strain of serotype 1 FIPV. Forty of the 111 (36%) cats survived their initial challenge exposure to a Type I cat-passaged field strains of FIPV. Six of these 40 survivors succumbed to FIP to a second or third challenge exposure, suggesting that immunity was not always sustained. Exposure to non-FIP-inducing feline coronaviruses prior to challenge with virulent FIPV did not significantly affect FIP incidence but did accelerate the disease course in some cats. There were no significant differences in FIP incidence between males and females, but resistance increased significantly between 6 months and 1 or more years of age. Genetic testing was done on 107 of the 111 infected cats. Multidimensional scaling (MDS) segregated the 107 cats into three distinct families based primarily on a common sire(s), and resistant and susceptible cats were equally distributed within each family. Genome-wide association studies (GWAS) on 73 cats that died of FIP after one or more exposures (cases) and 34 cats that survived (controls) demonstrated four significant associations after 100k permutations. When these same cats were analyzed using a sib-pair transmission test, three of the four associations were confirmed although not with genome-wide significance. GWAS was then done on three different age groups of cases to take into account age-related resistance, and different associations were observed. The only common and strong association identified between the various GWAS case configurations was for the 34.7-45.8Mb region of chromosome A3. No obvious candidate genes were present in this region.

**Differential pharmacokinetics and pharmacokinetic/pharmacodynamic modelling of robenacoxib and ketoprofen in a feline model of inflammation.**


Pelligand, L., J. N. King, V. Hormazabal, P. L. Toutain, J. Elliott, and P. Lees

Robenacoxib and ketoprofen are acidic nonsteroidal anti-inflammatory drugs (NSAIDs). Both are licensed for once daily administration in the cat, despite having short blood half-lives. This study reports the pharmacokinetic/pharmacodynamic (PK/PD) modelling of each drug in a feline model of inflammation. Eight cats were enrolled in a randomized, controlled, three-period cross-over study. In each period, sterile inflammation was induced by the injection of carrageenan into a subcutaneously implanted tissue cage, immediately before the subcutaneous injection of robenacoxib (2 mg/kg), ketoprofen (2 mg/kg) or placebo. Blood samples were taken for the determination of drug and serum thromboxane (Tx)B2 concentrations (measuring COX-1 activity). Tissue cage exudate samples were obtained for drug and prostaglandin (PG)E2 concentrations (measuring COX-2 activity). Individual animal pharmacokinetic and pharmacodynamic parameters for COX-1 and COX-2 inhibition were generated by PK/PD modelling. S(+) ketoprofen clearance scaled by bioavailability (CL/F) was 0.114 L/kg/h (elimination half-life = 1.62 h). For robenacoxib, blood CL/F was 0.684 L/kg/h (elimination half-life = 1.13 h). Exudate elimination half-lives were 25.9 and 41.5 h for S(+) ketoprofen and robenacoxib, respectively. Both drugs reduced exudate PGE2 concentration significantly between 6
Ketoprofen significantly suppressed (>97%) serum TxB2 between 4 min and 24 h, whereas suppression was mild and transient with robenacoxib. In vivo IC50 COX-1/IC50 COX-2 ratios were 66.9:1 for robenacoxib and 1:107 for S(+) ketoprofen. The carboxylic acid nature of both drugs may contribute to the prolonged COX-2 inhibition in exudate, despite short half-lives in blood.

**Dietary management of feline endocrine disease.**


*Peterson, M. E., and L. Eirmann*

When treating cats with endocrine disease, most veterinarians concentrate on medical or surgical treatments that can be used to manage or cure the disease. Dietary issues are frequently ignored or not properly addressed. However, nutritional support can play an integral role in the successful management of feline endocrine diseases. Furthermore, because most cats with endocrine disease are senior or geriatric, they may also have concurrent health conditions that warrant dietary intervention. This article discusses recommendations for nutritional support of the 2 most common endocrine problems of cats seen in clinical practice: hyperthyroidism and diabetes mellitus.

**Cytologic and immunocytochemical characterization of feline progressive histiocytosis.**


BACKGROUND: Feline Progressive Histiocytosis (FPH) is a cutaneous dendritic cell neoplasm characterized by slow progression and spread to internal organs in the terminal stage. FPH is often misdiagnosed as an inflammatory reaction and has not been fully characterized from a cytologic diagnostic perspective. OBJECTIVES: The purpose of the study was to characterize the cytologic and immunocytochemical aspects useful for FPH diagnosis. METHODS: Fine-needle aspiration cytologic samples of 5 cases of FPH confirmed by skin biopsy and necropsy were evaluated. Immunocytochemistry with antibodies recognizing CD1a, CD1c, CD3, CD11b, CD18, CD21, and MHCII was performed on air-dried, acetone-fixed smears. E-cadherin expression was assessed on paraffin-embedded skin biopsies. Transmission electron microscopy (TEM) was performed in one case. RESULTS: Main cytologic findings on variably cellular samples were characterized by single to cohesive large, round to polygonal cells with intermediate to low N/C ratio, abundant clear homogeneous cytoplasm, and round to oval nuclei with rare bi- to multinucleated atypical cells, associated with low numbers of small lymphocytes and/or neutrophils. Neoplastic cells expressed CD1a, CD1c, CD11b, CD18, and MHCII. Anti-CD3 antibodies identified reactive T cells admixed with the neoplastic cells. E-cadherin expression was observed in all but one case. TEM failed to identify Birbeck granules in one case. CONCLUSIONS: FPH is a distinctive neoplastic lesion composed of nonphagocytizing histiocytes variably admixed with neutrophils and small mature lymphocytes. Immunocytochemical analysis with CD1 is mandatory to confirm a dendritic cell origin. Immunocytochemistry and cytomorphology allowed the specific and rapid diagnosis of FPH on cytologic samples.
Effect of Laparotomy on the Swallow-Breathing Relationship in the Cat.
Lung (2014)
Pitts, T., M. J. Rose, I. Poliacek, J. Condrey, P. W. Davenport, and D. C. Bolser

Swallow occurs predominantly in the expiratory phase (E) of breathing. This phase preference is thought to contribute to airway protection by limiting the passage of material through the pharyngeal airway with little or no inspiratory (I) airflow. This phase preference is attributed to central interactions between the swallow and breathing pattern generators. We speculated that changes in peripheral mechanical factors would influence the respiratory phase preference for swallow initiation. We induced swallowing in anesthetized spontaneously breathing cats by injection of water into the oropharynx. In animals with intact abdomens, 83 % of swallows were initiated during E, 7 % during I, 7 % during E-I phase transition, and 3 % during I-E transition. In animals with open anterior midline laparotomy, only 38 % of swallows were initiated during E, 33 % during I, 17 % during the E-I transition, and 12 % during I-E. The results support an important role for feedback from somatic and/or visceral thoraco-abdominal mechanoreceptors for swallow-breathing coordination after laparotomy.

Pharmacokinetics of oral transmucosal and intramuscular dexmedetomidine combined with buprenorphine in cats.
J Vet Pharmacol Ther (2014)
Porters, N., H. de Rooster, T. Bosmans, K. Baert, M. Cherlet, S. Croubels, P. De Backer, and I. Polis

Plasma concentrations and pharmacokinetics of dexmedetomidine and buprenorphine after oral transmucosal (OTM) and intramuscular (i.m.) administration of their combination in healthy adult cats were compared. According to a crossover protocol (1-month washout), a combination of dexmedetomidine (40 mug/kg) and buprenorphine (20 mug/kg) was given OTM (buccal cavity) or i.m. (quadriiceps muscle) in six female neutered cats. Plasma samples were collected through a jugular catheter during a 24-h period. Plasma dexmedetomidine and buprenorphine concentrations were determined by liquid chromatography-tandem mass spectrometry. Plasma concentration-time data were fitted to compartmental models. For dexmedetomidine and buprenorphine, the area under the plasma concentration-time curve (AUC) and the maximum plasma concentrations (Cmax) were significantly lower following OTM than following i.m. administration. For buprenorphine, time to reach Cmax was also significantly longer after OTM administration than after i.m. injection. Data suggested that dexmedetomidine (40 mug/kg) combined with buprenorphine (20 mug/kg) is not as well absorbed from the buccal mucosa site as from the intramuscular injection site.

Prepubertal gonadectomy in cats: different injectable anaesthetic combinations and comparison with gonadectomy at traditional age.

Anaesthetic and analgesic effects of three different injectable anaesthetic combinations for prepubertal gonadectomy (PPG) in cats were studied. One anaesthetic protocol was compared with a similar one for gonadectomy at traditional age (TAG). Kittens were randomly assigned to PPG or TAG. For PPG, three different protocols were compared: (1) intramuscular (IM) administration of 60 mug/kg
dexmedetomidine plus 20 mug/kg buprenorphine followed by an IM injection of the anaesthetic agent (20 mg/kg ketamine) (DB-IM protocol); (2) oral transmucosal (OTM) administration of 80 mug/kg dexmedetomidine plus 20 mug/kg buprenorphine followed by an IM injection of 20 mg/kg ketamine combined with 20 microg/kg dexmedetomidine (DB-OTM protocol); (3) IM injection of a 40 mug/kg medetomidine-20 mug/kg buprenorphine-20 mg/kg ketamine combination (MBK-IM protocol). For TAG, a DB-IM protocol was used, but with different doses for dexmedetomidine (40 mug/kg) and ketamine (5 mg/kg). All cats (PPG and TAG) received a non-steroidal anti-inflammatory before surgery. Anaesthetic and analgesic effects were assessed pre- and postoperatively (until 6 h). Cumulative logit, linear and logistic regression models were used for statistical analysis. Compared with the DB-OTM protocol, the DB-IM and MBK-IM protocols provided better anaesthesia with fewer adverse effects in PPG cats. Postoperative pain was not significantly different between anaesthetic protocols. PPG and TAG cats anaesthetised with the two DB-IM protocols differed significantly only for sedation and pain scores, but sedation and pain scores were generally low. Although there were no anaesthesia-related mortalities in the present study and all anaesthetic protocols for PPG in cats provided a surgical plane of anaesthesia and analgesia up to 6 h postoperatively, our findings were in favour of the intramuscular (DB-IM and MBK-IM) protocols.

Prepubertal gonadectomy in cats: different surgical techniques and comparison with gonadectomy at traditional age.

Porters, N., I. Polis, C. Moons, L. Duchateau, K. Goethals, S. Huyghe, and H. de Roos

Feasibility, surgical time and complications of different surgical techniques for prepubertal gonadectomy (PPG; 8-12 weeks of age) in cats were studied and compared to gonadectomy at traditional age (TAG; 6-8 months of age). Kittens were randomly assigned to PPG or TAG. Ovarian pedicle haemostasis for PPG was achieved by ligatures (n=47), vascular clips (n=50), bipolar electrocoagulation (n=50), or pedicle tie (n=50); for TAG (n=34) ligatures were used. In male cats, PPG consisted of closed castration by spermatic cord knot (n=92) or ligature (n=91) while TAG (n=34) was an open castration by spermatic cord knot. A linear (surgical time) and a logistic regression (complications) model were designed. Significance was set at 0.05. For female PPG, clips and coagulation were the fastest procedures; placement of ligatures was most time-consuming. In male PPG, knot placement was significantly faster than ligation. In both sexes, very few intraoperative or wound complications were observed, irrespective of the surgical technique used. Surgical times in females (ligatures) as well as in males (knot) were significantly shorter for PPG than for TAG. PPG was as safe as TAG, yet took less time to perform and did not result in a greater rate of postoperative complications.

Corneal collagen cross-linking as treatment for infectious and noninfectious corneal melting in cats and dogs: results of a prospective, nonrandomized, controlled trial.


OBJECTIVE: UV-A/Riboflavin cross-linking of corneal collagen fibers (CXL) is a highly promising therapy for corneal melting in humans. A prospective interventional, nonrandomized, controlled study
was conducted to compare the stabilizing effect of CXL treatment on melting keratitis in dogs and cats and the complication rate of CXL to those of standardized intensive medical treatment.

PROCEDURES: Forty-nine eyes with melting keratitis were included in the study between October 2009 and October 2012. All eyes were treated according to the same medical treatment protocol. Nineteen eyes were CXL-treated, and 30 eyes were not. Follow-up included slit-lamp examination, fluorescein staining, ulcer size measurement, stromal stability evaluation, photographic documentation, and documentation of complications. RESULTS: Five of 19 eyes in the CXL group and 9/30 eyes in the control group required rescue stabilization due to continued melting. Seven of the nine control group corneas stabilized after rescue CXL treatment. At initial presentation, the ulcers in the canine CXL group were significantly deeper and larger than in the control group. Ulcer deepening during follow-up was more pronounced in the canine control group than in the canine CXL group. CXL treatment-related complications were not observed. CONCLUSIONS: Based on the similar failure rates in the control and CXL treatment groups despite the poorer initial situation in the CXL group, the tendency for the ulcers in the control group to deepen and the stabilization of all corneas receiving CXL rescue treatment, we believe that CXL has its place as an adjunctive therapy for melting keratitis in veterinary ophthalmology.

Pancreatic surgical biopsy in 24 dogs and 19 cats: postoperative complications and clinical relevance of histological findings.

J Small Anim Pract (2014)
Pratschke, K. M., J. Ryan, A. McAlinden, and G. McLauchlan

OBJECTIVE: To assess the immediate postoperative complications associated with pancreatic biopsy in dogs and cats and review the clinical relevance of biopsy findings. METHODS: Retrospective review of clinical records from two referral institutions for cases undergoing pancreatic biopsy between 2000 and 2013. RESULTS: Twenty-four dogs and 19 cats that had surgical pancreatic biopsy had sufficient detail in their clinical records and fulfilled the inclusion criteria. Postoperative complications were seen in 10 cases of which 5 were suggestive of post-surgical pancreatitis. Two patients were euthanased within 10 days of surgery because of the underlying disease; neither suffered postoperative complications. Pancreatic pathology was found in 19 cases, 7 cases showed no change other than benign pancreatic nodular hyperplasia, and no abnormalities were seen in 18 cases. CLINICAL SIGNIFICANCE: Complications may be encountered following surgical pancreatic biopsy, although the risk should be minimal with good surgical technique. Pancreatic biopsy may provide a useful contribution to case management but it is not clear whether a negative pancreatic biopsy should be used to rule out pancreatic disease. Dogs were more likely to have no significant pathology found on pancreatic biopsy than cats, where chronic pancreatitis was the most common finding.


Pratt, C. L., E. L. Reineke, and K. J. Drobatz

OBJECTIVE: To characterize clinical signs, diagnostic test results, foreign body location, treatment, and outcome for dogs and cats with sewing needle foreign bodies. DESIGN: Retrospective case series. ANIMALS: 65 dogs and cats with sewing needle foreign bodies. PROCEDURES: Medical records of
27 dogs and 38 cats examined because of sewing needle foreign bodies from January 2000 to February 2012 were reviewed for signalment, medical history, physical examination findings, diagnostic test results, interval from witnessed exposure and radiographic imaging to definitive treatment, definitive treatment, sewing needle location, complications, and outcome. RESULTS: 7 (10.8%) animals had sewing needles in extragastrointestinal locations that were not causing clinical signs. The remaining 58 (89.2%) animals had known sewing needle exposure or acute clinical signs associated with ingestion. The esophageal and gastric regions were the most common location for a sewing needle (10/21 [47.6%] dogs; 19/37 [51.4%] cats), followed by the oropharynx (7/21 [33.3%] dogs; 11/37 [29.7%] cats) and small and large intestines (4/21 [19.0%] dogs; 7/37 [18.9%] cats). Gastrointestinal perforation was detected in 10 of 58 (17.2%) animals (5/21 [23.8%] dogs; 5/37 [13.5%] cats). Sewing needles in the esophagus and stomach were successfully removed endoscopically in 8 of 9 dogs and 18 of 19 cats. Survival rate was 98.1% (51/52) for animals receiving definitive treatment. CONCLUSIONS AND CLINICAL RELEVANCE: Endoscopic removal of ingested sewing needles was highly successful and should be recommended to prevent gastrointestinal tract perforation and associated morbidity. Prognosis for dogs and cats receiving definitive treatment for sewing needle foreign body ingestion was excellent.

Concurrent diseases in hyperthyroid cats undergoing assessment prior to radioiodine treatment.

Puig, J., I. Cattin, and M. Seth

Hyperthyroidism is a common endocrinopathy of geriatric cats, which are also prone to various other diseases. This retrospective study examined the prevalence and type of non-renal concurrent diseases present in cats referred for radioiodine assessment that were believed to have no other comorbidities at the time of referral. Ninety-four cats were included and analysed. Seventeen cases (18%) were identified as having concurrent disorders, with alimentary lymphoma (n = 5) and chronic enteropathy (n = 4) as the two most common comorbid diseases. The eosinophil count, total bilirubin and total calcium were significantly higher in the concurrent disease group, although the differences are unlikely to be clinically useful. The results support the utility of careful and individual assessment for all hyperthyroid cats prior to receiving radioiodine.

Chronic use of maropitant for the management of vomiting and inappetence in cats with chronic kidney disease: a blinded placebo-controlled clinical trial.

Quimby, J. M., W. T. Brock, K. Moses, D. Bolotin, and K. Patricelli

OBJECTIVES: Maropitant is commonly used for acute vomiting. A pharmacokinetic and toxicity study in cats indicated that longer term usage appears safe. The aim of this study was to assess the efficacy of maropitant for management of chronic vomiting and inappetence associated with feline chronic kidney disease (CKD). METHODS: Forty-one cats with stable International Renal Interest Society Stage II or III CKD, no known concurrent illness, and a complaint of chronic vomiting and inappetence attributed to CKD were enrolled in a randomized, placebo-controlled, blinded clinical study. A complete blood count, serum biochemistry, urinalysis, urine culture, T4 and blood pressure were required for entry. Maropitant was administered at a dose of 4 mg orally (median 1.1 mg/kg,
range 0.6–2.9 mg/kg) daily for 2 weeks. Owners kept daily logs of vomiting incidence, appetite and activity scores. Physical examination, weight, body condition score and serum biochemistry were performed before and after the trial period. Mann-Whitney statistics were used to compare treatment groups. RESULTS: Thirty-three cats successfully completed the trial: 21 cats received the drug (nine Stage II cats, 12 Stage III cats) and 12 cats received placebo (seven Stage II cats, five Stage III cats). There was a statistically significant decrease in vomiting in cats with CKD that received maropitant (P <0.01). Cats that received maropitant did not have statistically significant differences in appetite scores, activity scores, weight or serum creatinine compared with placebo. CONCLUSIONS AND RELEVANCE: Maropitant was demonstrated to palliate vomiting associated with CKD, and may be helpful in the nutritional management of cats with CKD.

Oral, subcutaneous, and intravenous pharmacokinetics of ondansetron in healthy cats.
Quimby, J. M., R. C. Lake, R. J. Hansen, P. J. Lunghofer, and D. L. Gustafson

Ondansetron is a 5-HT3 receptor antagonist that is an effective anti-emetic in cats. The purpose of this study was to evaluate the pharmacokinetics of ondansetron in healthy cats. Six cats with normal complete blood count, serum biochemistry, and urinalysis received 2 mg oral (mean 0.43 mg/kg), subcutaneous (mean 0.4 mg/kg), and intravenous (mean 0.4 mg/kg) ondansetron in a cross-over manner with a 5-day wash out. Serum was collected prior to, and at 0.25, 0.5, 1, 2, 4, 8, 12, 18, and 24 h after administration of ondansetron. Ondansetron concentrations were measured using liquid chromatography coupled to tandem mass spectrometry. Noncompartmental pharmacokinetic modeling and dose interval modeling were performed. Repeated measures anova was used to compare parameters between administration routes. Bioavailability of ondansetron was 32% (oral) and 75% (subcutaneous). Calculated elimination half-life of ondansetron was 1.84 +/- 0.58 h (intravenous), 1.18 +/- 0.27 h (oral) and 3.17 +/- 0.53 h (subcutaneous). The calculated elimination half-life of subcutaneous ondansetron was significantly longer (P < 0.05) than oral or intravenous administration. Subcutaneous administration of ondansetron to healthy cats is more bioavailable and results in a more prolonged exposure than oral administration. This information will aid management of emesis in feline patients.

Effect of pre-cardiac and adult stages of Dirofilaria immitis in pulmonary disease of cats: CBC, bronchial lavage cytology, serology, radiographs, CT images, bronchial reactivity, and histopathology.
Vet Parasitol (2014)

A controlled, blind study was conducted to define the initial inflammatory response and lung damage associated with the death of precardiac stages of Dirofilaria immitis in cats as compared to adult heartworm infections and normal cats. Three groups of six cats each were used: UU: uninfected untreated controls; PreS I: infected with 100 D. immitis L3 by subcutaneous injection and treated topically with selamectin 32 and 2 days pre-infection and once monthly for 8 months); IU: infected with 100 D. immitis L3 and left untreated. Peripheral blood, serum, bronchial lavage, and thoracic
radiographic images were collected from all cats on Days 0, 70, 110, 168, and 240. CT images were acquired on Days 0, 110, and 240. Cats were euthanized, and necropsies were conducted on Day 240 to determine the presence of heartworms. Bronchial rings were collected for in vitro reactivity. Lung, heart, brain, kidney, and liver tissues were collected for histopathology. Results were compared for changes within each group. Pearson and Spearman correlations were performed for association between histologic, radiographic, serologic, hematologic and bronchoalveolar lavage (BAL) results. Infected cats treated with selamectin did not develop radiographically evident changes throughout the study, were heartworm antibody negative, and were free of adult heartworms and worm fragments at necropsy. Histologic lung scores and CT analysis were not significantly different between PreS I cats and UU controls. Subtle alveolar myofibrosis was noted in isolated areas of several PreS I cats and an eosinophilic BAL cytology was noted on Days 75 and 120. Bronchial ring reactivity was blunted in IU cats but was normal in PreS I and UU cats. The IU cats became antibody positive, and five cats developed adult heartworms. All cats with heartworms were antigen positive at one time point; but one cat was antibody positive, antigen negative, with viable adult females at necropsy. The CT revealed early involvement of all pulmonary arteries and a random pattern of parenchymal disease with severe lesions immediately adjacent to normal areas. Analysis of CT 3D reconstruction and Hounsfield units demonstrated lung disease consistent with restrictive pulmonary fibrosis with an interstitial infiltrate, absence of air trapping, and decrease in total lung volume in Group IU as compared to Groups UU and PreS I. The clinical implications of this study are that cats pretreated with selamectin 1 month before D. immitis L3 infection did not become serologically positive and did not develop pulmonary arterial hypertrophy and myofibrosis.

Assessment of five formulae to predict post-transfusion packed cell volume in cats.


Reed, N., I. Espadas, S. M. Lalor, and C. Kisielewicz

This retrospective study aimed to identify the most accurate formula for estimating the increase in packed cell volume (PCV) after whole blood transfusion of cats, as several formulae have been reported but not validated. Forty cats, of varying breeds and gender, were included from two referral institutions after database searches over a 13 year period. Five formulae were used to calculate an estimated post-transfusion PCV based on the re-working of formulae for determining the volume of donor blood to be transfused; three formulae were derived from those previously reported in the feline literature and two from human paediatric medicine, where a similar mean blood volume has been described. Cats were subdivided into two groups, the first consisting of 17 cats with non-regenerative anaemia and the second consisting of 23 cats with ongoing losses such as haemolysis and haemorrhage; it was hypothesised that formulae could be more accurate for group 1 cats, whereas formulae applied to group 2 cats could have overestimated the post-transfusion PCV. Bland-Altman analysis was performed for all cats to compare the actual increase in PCV with the calculated increase for the five formulae. Formula 1 (PCV % increase = volume of blood transfused in ml/2 x bodyweight in kg) performed best overall and is easy to calculate; however, no single formula was highly accurate at predicting the PCV increase after whole blood transfusion in cats and, owing to the wide confidence intervals, these formulae should be applied judiciously in the clinical setting.

Case-control study of the effects of pimobendan on survival time in cats with hypertrophic cardiomyopathy and congestive heart failure.
OBJECTIVE: To assess survival time and adverse events related to the administration of pimobendan to cats with congestive heart failure (CHF) secondary to hypertrophic cardiomyopathy (HCM) or hypertrophic obstructive cardiomyopathy (HOCM). DESIGN: Retrospective case-control study.

ANIMALS: 27 cats receiving treatment with pimobendan and 27 cats receiving treatment without pimobendan.

PROCEDURES: Medical records between 2003 and 2013 were reviewed. All cats with HCM or HOCM treated with a regimen that included pimobendan (case cats) were identified. Control cats (cats with CHF treated during the same period with a regimen that did not include pimobendan) were selected by matching to case cats on the basis of age, sex, body weight, type of cardiomyopathy, and manifestation of CHF. Data collected included signalment, physical examination findings, echocardiographic data, serum biochemical values, and survival time from initial diagnosis of CHF. Kaplan-Meier survival curves were constructed and compared by means of a log rank test.

RESULTS: Cats receiving pimobendan had a significant benefit in survival time. Median survival time of case cats receiving pimobendan was 626 days, whereas median survival time for control cats not receiving pimobendan was 103 days. No significant differences were detected for any other variable.

CONCLUSIONS AND CLINICAL RELEVANCE: The addition of pimobendan to traditional treatment for CHF may provide a substantial clinical benefit in survival time for HCM-affected cats with CHF and possibly HOCM-affected cats with CHF.

Open wide: blindness in cats after the use of mouth gags.


Reiter, A. M.

Plasma exogenous creatinine clearance in clinically healthy cats: Comparison with urinary exogenous creatinine clearance, tentative reference intervals and indexation to bodyweight.


Glomerular filtration rate (GFR) is considered to be the best indicator of overall kidney function. The major objectives of this study were to compare plasma exogenous creatinine clearance (PECC) with a reference method, to establish reference intervals (RIs) for PECC and to assess the effects of indexation of GFR to bodyweight (BW) in cats. PECC was compared with urinary clearance of exogenous creatinine (UECC) in six clinically healthy domestic shorthair cats (experiment 1). Tentative RIs were determined according to current guidelines and the effects of indexation to BW and of covariables on GFR were assessed in 43 clinically healthy cats of various breeds (experiment 2). PECC was 15% higher than UECC (P <0.01), but the two estimates were strongly correlated (r(2)=0.97, P = 0.001). RIs for PECC were 6.4-21.3 mL/min or 1.2-4.9 mL/min/kg. The absolute (i.e. non-indexed) GFR value was not dependent on BW. Thus, indexation of GFR to BW in cats would not standardize the GFR value,
but could introduce bias in clinical interpretation. Significant effects of breed, plasma protein concentration and plasma albumin concentration on GFR were demonstrated. Plasma concentrations of urea and creatinine, when assessed separately, were also weakly correlated with GFR in healthy cats. These combined findings contribute to a better understanding of renal function assessment in cats.

**Routine plasma biochemistry analytes in clinically healthy cats: within-day variations and effects of a standard meal.**


Reynolds, B. S., C. Brosse, E. Jeunesse, D. Concordet, and H. P. Lefebvre

Limited information is available on pre-analytical variations in plasma analytes in cats. The objectives of this study were to assess the effects of the time of sampling and a standard meal on plasma analytes in healthy cats. Eight healthy, adult, fasted cats underwent blood sampling every 2 h from 8 am to 8 pm twice at a 12 day interval. On the days of sampling, four cats were kept fasted and the others were fed just after the first sample, in a crossover design. Plasma glucose, urea, creatinine, sodium, potassium, chloride, CO2, calcium, phosphate, proteins, albumin, cholesterol and triglycerides, alanine aminotransferase and alkaline phosphatase were assayed on each sample. Effects of time of sampling and meal on plasma biochemistry results were tested using a general linear model. Diurnal variations in tested plasma analytes in fasted cats were negligible except for urea and creatinine, which gave noticeably higher plasma concentrations in the afternoon than in the morning. Observed postprandial variations were of some importance for phosphate and creatinine and of indisputable clinical relevance for CO2 and urea.

**Effects of intramuscular sedation with alfaxalone and butorphanol on echocardiographic measurements in healthy cats.**


OBJECTIVES: To evaluate the effects of intramuscular (IM) injections of alfaxalone combined with butorphanol on echocardiographic (ECG) measurements in cats. METHODS: Client-owned adult domestic shorthair cats younger than 5 years of age were recruited. All cats that were considered healthy on the basis of physical examination, blood work, urinalysis, blood pressure measurement and baseline ECG underwent a second ECG under sedation. Cats were sedated with two separate IM injections of butorphanol at 0.2 mg/kg and alfaxalone at 2 mg/kg. ECG variables were analysed using a linear mixed model, and sedation scores were analysed using an ordinal mixed logistic model. The significance level was set at alpha = 0.05 and adjusted at alpha = 0.0017 for multiple comparisons of the ECG measurements. RESULTS: Ten healthy cats were included. Sedation was uneventful, and recovery was smooth and quick for all cats. The mean duration of lateral recency was 36.3 +/- 4.37 mins. Reduction in heart rate following sedation approached statistical significance (P = 0.002). The thickness of the interventricular septum, the thickness of the left ventricular free wall, and the left ventricular internal dimensions in diastole and systole were not affected by the sedation. The changes in left atrium/aortic ratio and shortening fraction were statistically significant. Although the peak velocity of early diastolic transmitral flow (E) and late diastolic transmitral flow (A), the peak early diastolic (Ea) mitral valve annulus velocity, and the peak late diastolic (Aa) mitral valve annulus
velocity changed after sedation, the ratios E/A, E/Ea and Ea/Aa were not significantly different before or after sedation. CONCLUSIONS AND RELEVANCE: IM injections of alfaxalone and butorphanol induced rapid, deep and short-lasting sedation. The mean differences after sedation were not clinically significant for most echocardiographic measurements.

Clinicopathologic characterization of oral pyogenic granuloma in 8 cats.
Riehl, J., C. M. Bell, M. E. Constantaras, C. J. Snyder, C. J. Charlier, and J. W. Soukup
This case series characterizes the clinicopathologic features and treatment of oral pyogenic granuloma in 8 cats. The cats reported here were patients originating from collaborative efforts at an academic clinical teaching hospital and a specialty dentistry/oral surgery referral practice. Although the initial biopsy results were variable, in all cases the diagnosis reflected an inflammatory process. A second clinicopathologic evaluation of these cases determined that all lesions were consistent with oral pyogenic granuloma. The location of the lesion was consistent among all cats within the present study. Lesions developed at the vestibular mucogingival tissues of the mandibular first molar teeth. We propose that malocclusion and secondary traumatic contact of the ipsilateral maxillary fourth premolar tooth with the mandibular soft tissues is a possible contributing factor in the etiopathogenic mechanism.

Factors affecting urine specific gravity in apparently healthy cats presenting to first-opinion practice for routine evaluation.
Rishniw, M., and R. Bicalho
Evidence suggests that apparently healthy cats presenting for routine evaluation should have a randomly sampled urine specific gravity (USG) >1.035. A USG <1.035 might reflect inappropriate concentrating ability warranting further investigation. We measured the USG of 1040 apparently healthy cats presenting to first-opinion practice in an observational study, using either in-clinic refractometers or measurements provided by reference laboratories, and examined factors that might affect USG. In-clinic refractometers were calibrated using distilled water (specific gravity = 1.000). The USG was >1.030 in 91% of cats and >1.035 in 88% of cats; 121 adult cats (>=6 months old) and five young cats (<6 months old) had USGs of <1.035. Of these 126 cats, a pathological cause was identified in 27 adult cats - of these, 26 were >9 years old - but no young cats. No cause was identified in 43 adult cats, and further investigation was not pursued in 51 adult cats. Factors that affected USG included age, diet type, sex, fasting status, drinking avidity, refractometer type, and the interaction between sex and diet - increasing dietary moisture content lowered USG only in female cats. Most factors minimally affected USG. The odds of having a USG <1.035 without apparent pathology included age and dietary moisture content. Drinking avidity decreased with increasing dietary moisture content. Our results show that most apparently healthy cats presenting to first-opinion practice should have a USG >1.035. Dietary management strategies to lower USG might be less effective than anticipated, and warrant monitoring of USG to determine efficacy. Older cats with USG <1.035 are more likely to have pathological causes identified, although clinicians are more likely to examine these
cats for possible pathology. A lack of stringent refractometer calibration could have caused some errors in estimates of USG by some observers, but would be unlikely to alter markedly the findings.

**Capturing the complexity of first opinion small animal consultations using direct observation.**

*Vet Rec (2014)*

*Robinson, N. J., M. L. Brennan, M. Cobb, and R. S. Dean*

Various different methods are currently being used to capture data from small animal consultations. The aim of this study was to develop a tool to record detailed data from consultations by direct observation. A second aim was to investigate the complexity of the consultation by examining the number of problems discussed per patient. A data collection tool was developed and used during direct observation of small animal consultations in eight practices. Data were recorded on consultation type, patient signalment and number of problems discussed. During 16 weeks of data collection, 1901 patients were presented. Up to eight problems were discussed for some patients; more problems were discussed during preventive medicine consultations than during first consultations (P<0.001) or revisits (P<0.001). Fewer problems were discussed for rabbits than cats (P<0.001) or dogs (P<0.001). Age was positively correlated with discussion of specific health problems and negatively correlated with discussion of preventive medicine. Consultations are complex with multiple problems frequently discussed, suggesting comorbidity may be common. Future research utilising practice data should consider how much of this complexity needs to be captured, and use appropriate methods accordingly. The findings here have implications for directing research and education as well as application in veterinary practice.

**Comparison of two coproparasitological techniques for the detection of Platynosomum sp. infection in cats.**


*Rocha, N. O., R. W. Portela, S. S. Camargo, W. R. Souza, G. C. Carvalho, and T. C. Bahiense*

Platynosomum sp. is the etiologic agent of platynosomiasis, a hepatic disease that affects domestic cats. The parasite develops in the bile ducts and gallbladder, causing severe hepatobiliary disease. Considering the importance of the disease and the increase in the number of households with cats, the aim of this study was to compare two different techniques for the detection of the parasite’s eggs and to assess the frequency of Platynosomum sp. infection in cats. Forty fecal samples from cats of different ages, from an animal shelter in the city of Salvador, Bahia State, Brazil, were subjected to two different techniques: a centrifugal fecal flotation procedure in Sheather’s sugar solution and centrifugal sedimentation in formalin-ether solution. Positive results were found for 12.5% of the samples using the centrifugal fecal flotation assay, whereas all samples were negative when employing the centrifugal sedimentation test. The results suggest that this parasite can be found infecting cats in Salvador city and that centrifugal fecal flotation in sugar solution can be a more suitable detection of the parasite’s eggs at fecal samples. Therefore, platynosomiasis must be included in the diseases to be studied routinely in domestic felids.
Dietary supplementation of propionylated starch to domestic cats provides propionic acid as gluconeogenic substrate potentially sparing the amino acid valine.


Rochus, K., A. Cools, G. P. Janssens, L. Vanhaecke, B. Wuyts, T. Lockett, J. M. Clarke, V. Fievez, and M. Hesta

In strict carnivorous domestic cats, a metabolic competition arises between the need to use amino acids for gluconeogenesis and for protein synthesis both in health and disease. The present study investigated the amino acid-sparing potential of propionic acid in cats using dietary propionylated starch (HAMSP) supplementation. A total of thirty cats were fed a homemade diet, supplemented with either HAMSP, acetylated starch (HAMSA) or celite (Control) for three adaptation weeks. Propionylated starch was hypothesised to provide propionic acid as an alternative gluconeogenic substrate to amino acids, whereas acetic acid from HAMSA would not provide any gluconeogenic benefit. Post-adaptation, a 5-d total faecal collection was carried out to calculate apparent protein digestibility coefficients. Fresh faecal and blood samples were collected to analyse fermentation endproducts and metabolites. The apparent protein digestibility coefficients did not differ between supplements (P = 0.372) and were not affected by the protein intake level (P = 0.808). Faecal propionic acid concentrations were higher in HAMSP than in HAMSA (P = 0.018) and Control (P = 0.003) groups, whereas concentrations of ammonia (P = 0.007) were higher in HAMSA than in HAMSP cats. Tendencies for or higher propionylcarnitine concentrations were observed in HAMSP compared with HAMSA (P = 0.090) and Control (P = 0.037) groups, and for tiglyl- + 3-methylcrotonylcarnitine concentrations in HAMSP as compared with Control (P = 0.028) cats. Methylmalonylcarnitine concentrations did not differ between groups (P = 0.740), but were negatively correlated with the protein intake level (r = 0.459, P = 0.016). These results suggest that HAMSP cats showed more saccharolytic fermentation patterns than those supplemented with HAMSA, as well as signs of sparing of valine in cats with a sufficient protein intake.

Characterization of an avirulent FCV strain with a broad serum cross-neutralization profile and protection against challenge of a highly virulent vs feline calicivirus.


Rong, S., D. Lowery, K. Floyd-Hawkins, and V. King

Highly virulent, systemic strains of Feline calicivirus (vs FCV) have been described in recent years. These vs FCV isolates cause severe edema, cutaneous ulcers, lameness and other upper respiratory and oral clinical signs typically associated with FCV infection in cats. Vs FCV isolates can cause high mortality even in cats vaccinated with currently available commercial vaccines. This study reports identification and characterization of an avirulent FCV strain (FCV 21). This strain offers a broader serum cross-neutralization profile in comparison with the commonly used vaccine strain (FCV F9), as tested with two separate viral panels of FCV isolates. The first viral panel consists of 45 FCV strains isolated around 1993. The second viral panel consists of 26 FCV strains with most isolated around 2003. The potential of using this strain as a vaccine, in a 3-way (FCV+FHV+FPV) or 4-way (FCV+FHV+FPV+FCp) format, was tested by using a highly virulent vs FCV strain (FCV-33585) as a challenge virus. The mortality induced by this vs FCV in unvaccinated control cats was 78% (7 out of 9 cats). The mortality decreased to 44% (4 out of 9 cats) in cats vaccinated with a 4-way vaccine containing FCV F9. However, when this novel FCV vaccine strain (FCV 21) was used, either in
combination with FCV F9 or by itself, the mortality decreased to 0% (0 out of 10 cats). The 3-way vaccine (FCV+FHV+FPV) that contained both FCV 21 and FCV F9 also had mortality of 0% (0 out of 10 cats). The clinical scores, as calculated taking into consideration the frequency and severity of various clinical signs, correlated with mortality data. The results suggested this FCV vaccine has the potential to be broadly protective against newly emergent FCV isolates, including complete protection against challenge with a highly virulent vs FCV 33585.

Complications associated with corrective surgery for patellar luxation in 85 feline surgical cases.
Rutherford, L., S. J. Langley-Hobbs, R. J. Whitelock, and G. I. Arthurs

The objective was to review surgical techniques and postoperative complications of surgical correction for patellar luxation (PL) in cats. A retrospective study evaluating 85 surgeries in 71 cats was performed. The records from four referral centres were searched for cats with surgical management of PL. Signalment, history, PL grade and direction, corrective surgical techniques and outcome were retrieved. Binary logistic regression analysis was used to interrogate relationships between case features, surgical correction methods and outcomes. The outcomes were classified as minor and major complications (requiring revision surgery), including continued PL (reluxation). Postoperative complications occurred in 26% of cases; 20% had major complications, including 5% patellar reluxation, and 6% had minor complications. Cats with previous ipsilateral femoral fracture were significantly more likely to suffer complications, including minor (P = 0.02, odds ratio = 12.67), major (P = 0.03, OR = 7.2) and patellar reluxation (P = 0.01, OR = 19.25). Minor complications were significantly more likely with grade 4 PL (P = 0.03, OR = 8.5). Major complications were significantly more likely with tibial tuberosity transposition (TTT; P = 0.03, OR = 5.57). Patellar reluxation was significantly more likely if stifle surgery had been performed previously (P = 0.05, OR = 8.00). The presence of bilateral PL, hip dysplasia, grade 1, 2 or 3 PL, corrective surgery using an anti-rotational suture or femoral sulcoplasty did not influence complications. Complications were more likely for grade 4 PL, previous ipsilateral femoral fracture, if TTT was performed and for cases with previous stifle surgery. This information allows consideration of risks and complicating factors.

Feline ischemic myelopathy and encephalopathy secondary to hyaline arteriopathy in five cats.
Rylander, H., S. Eminaga, V. Palus, H. Steinberg, A. Caine, B. A. Summers, J. Gehrke, C. West, P. R. Fox, T. Donovan, and G. B. Cherubini

Five cats presented with acute-onset neurological signs. Magnetic resonance imaging in four cats showed a T2-weighted hyperintense spinal cord lesion that was mildly contrast-enhancing in three cats. Owing to inflammatory cerebrospinal fluid changes three cats were treated with immunosuppression. One cat was treated with antibiotics. All cats improved initially, but were eventually euthanased owing to the recurrence of neurological signs. Histopathology in all cats showed hyaline degeneration of the ventral spinal artery, basilar artery or associated branches with aneurysmal dilatation, thrombosis and ischemic degeneration and necrosis of the spinal cord and brain. Two cats also had similar vascular changes in meningeal vessels. Vascular hyaline degeneration resulting in vascular aneurysmal dilatation
and thrombosis should be a differential diagnosis in cats presenting with acute central nervous system signs.

**Palliative radiation therapy outcomes for cats with oral squamous cell carcinoma (1999-2005).**


Sabhlok, A., and R. Ayl

Squamous cell carcinoma (SCC) accounts for approximately 10% of all feline tumors. The purpose of this retrospective study was to describe outcomes for a group of cats with oral SCC that were treated with palliative radiation therapy. Fifty-four cats met the inclusion criteria of nonresectable, oral SCC treated with coarse fractionated megavoltage (MeV) radiation therapy. Radiation therapy for all cats was delivered with a 6 MeV linear accelerator. Total radiation doses of 24 Gray to 40 Gray were administered in three to four fractions, once-per-week over 4 to 5 weeks. Concurrent chemotherapy protocols varied and were administered at the discretion of the clinician and client. Forty-nine patients completed the planned treatment protocols. Overall mean and median survival times for cats completing the planned treatment protocols were 127 and 92 days (n = 49). Mean and median survival times of cats receiving palliative radiation therapy alone were 157 and 113 days (n = 12). Mean and median survival times of patients receiving both radiation therapy and chemotherapy were 116 and 80 days (n = 37). Patients with sublingual tumors had a median survival time of 135 days (n = 15), compared to mandibular tumors that had a median survival time of 80 days (n = 26). For the majority of patients that completed the planned treatment protocol (65%), owners reported a subjectively improved quality of life. Findings from this uncontrolled study supported the use of palliative radiation therapy for cats with nonresectable oral squamous cell carcinoma.

**Genetic diversity of feline morbilliviruses isolated in Japan.**


Feline morbillivirus (FmoPV) is an emerging virus in domestic cats and considered to be associated with tubulointerstitial nephritis. Although FmoPV was first described in China in 2012, there has been no report of the isolation of this virus in other countries. In this report, we describe the isolation and characterization of FmoPV from domestic cats in Japan. By using reverse transcription (RT)-PCR, we found that three of 13 urine samples from cats brought to veterinary hospitals were positive for FmoPV. FmoPV strains SS1 to SS3 were isolated from the RT-PCR-positive urine samples. Crandell-Rees feline kidney (CRFK) cells exposed to FmoPV showed cytopathic effects with syncytia formation, and FmoPV N protein was detected by indirect immunofluorescence assays. In addition, pleomorphic virus particles with apparent glycoprotein envelope spikes were observed by electron microscopy. By sequence analysis of FmoPV H and L genes, we found that FmoPVs showed genetic diversity; however, signatures of positive selection were not identified.

**Feline Chronic Kidney Disease Is Associated With Upregulation of Transglutaminase 2: A Collagen Cross-Linking Enzyme.**
Chronic kidney disease is a major cause of morbidity and mortality in cats. Transglutaminase 2 (TG2) is a calcium-dependent enzyme proposed to mediate tubulointerstitial fibrosis in the kidney by cross-linking collagen fibrils. Postmortem kidney tissue was obtained from primary renal azotemic (n = 10) and nonazotemic (n = 5) cats (14 domestic short hair, 1 Burmese; aged 9-23.7 years). Extracellular matrix protein deposition was determined by Masson’s trichrome staining and collagen immunofluorescence. Total kidney transglutaminase (TG) enzyme activity and TG2 protein were measured in tissue homogenates by putrescine incorporation and Western blotting. Extracellular TG enzyme activity and TG2 protein were determined in situ by immunofluorescence, quantified by multiphase image analysis. Results were compared using the unpaired Student’s t-test with Welch’s correction. Elevated plasma creatinine, urea, and phosphate concentrations were associated with tubulointerstitial fibrosis but not glomerular fibrosis. Kidney homogenates from azotemic cats showed a 3-fold higher total TG enzyme activity and TG2 protein compared with kidneys from nonazotemic cats. Immunofluorescent studies performed in situ confirmed a 3-fold higher extracellular TG enzyme activity and TG2 protein in cats with azotemia. Tubulointerstitial TG2 showed a positive linear correlation with both renal function and tubulointerstitial fibrosis. In conclusion, for cats with azotemia, both filtration failure and tubulointerstitial fibrosis were associated with the upregulation of TG2, a collagen cross-linking enzyme and the major isoform of transglutaminase in the kidney. TG2 may provide a new therapeutic target for drugs designed to slow the progression of feline chronic kidney disease.

Radiographic and echocardiographic assessment of left atrial size in 100 cats with acute left-sided congestive heart failure.


Schober, K. E., E. Wetli, and W. T. Drost

The aims of this study were to evaluate left atrial size in cats with acute left-sided congestive heart failure. We hypothesized that left atrial size as determined by thoracic radiography can be normal in cats with acute left-sided congestive heart failure. One hundred cats with acute left-sided congestive heart failure in which thoracic radiography and echocardiography were performed within 12 h were identified. Left atrial size was evaluated using right lateral and ventrodorsal radiographs. Measurements were compared to two-dimensional echocardiographic variables of left atrial size and left ventricular size. On echocardiography, left atrial enlargement was observed in 96% cats (subjective assessment) whereas maximum left atrial dimension was increased (>15.7 mm) in 93% cats. On radiographs left atrial enlargement (subjective assessment) was found in 48% (lateral view), 53% (ventrodorsal view), and 64% (any view) of cats whereas left atrial enlargement was absent in 36% of cats in both views. Agreement between both methods of left atrial size estimation was poor (Cohen’s kappa 0.17). Receiver operating characteristic curve analysis identified a maximum echocardiographic left atrial dimension of approximately 20 mm as the best compromise (Youden index) between sensitivity and specificity in the prediction of radiographic left atrial enlargement. Left atrial enlargement as assessed by thoracic radiography may be absent in a clinically relevant number of cats with congestive heart failure. Therefore, normal left atrial size on thoracic radiographs does not rule out presence of left-sided congestive heart failure in cats with clinical signs of respiratory distress.
Comparative study of Microsporum canis isolates by DNA fingerprinting.
Shafiee, S., A. R. Khosravi, and I. Ashrafi Tamai

Microsporum canis is a zoophilic fungus and it is an important agent of dermatophytosis. Cats act as important reservoirs. Clinically, it is too difficult to differentiate dermatophytosis caused by various species, also this fungus loses its morphological characteristics easily because of subculture; so using of rapid and accurate laboratory techniques for identifying the dermatophytes is important, therefore, RAPD-PCR was applied for the differentiation of the isolates. In this study, 10 M. canis isolates were detected in cats, dog, human, fox and rabbit at the Mycology Research Center, Faculty of Veterinary Medicine, University of Tehran. For running the RAPD-PCR, PCR set system and three random primers OPU 15, OPU 13 and OPA 04 were used. Then phylogenetic tree and similarity coefficient table were drawn. The results showed that there were some common bands between M. canis isolates. There were some specific bands for each isolates, as well. Our study showed, despite the typical morphology of the whole isolates, they were placed in different branches in molecular typing.

Cardiopulmonary Effects of Laparoscopic Ovariectomy of Variable Duration in Cats.
Vet Surg (2014)
Shih, A. C., J. B. Case, J. G. Coisman, N. M. Isaza, D. Amora-Junior, and H. W. Maisenbacher

OBJECTIVE: To evaluate the cardiopulmonary effects of low-pressure (6 mmHg) peritoneal insufflation of varying duration in healthy cats during ovariectomy (OVE). STUDY DESIGN: Prospective, randomized study. ANIMALS: Female cats (n = 24). METHODS: After anesthesia induction, cats had short (Short LAP; n = 8) or long duration (Long LAP; n = 8) laparoscopic ovariectomy, or Open OVE (Open; n = 8) for comparison. Hemodynamic and pulmonary measurements were recorded after induction of anesthesia (T0), 5 minutes after abdominal insufflation had reached 6 mmHg of pressure (T1), after the 2nd ovary had been resected (T2), after abdominal decompression (T3), and at the end of anesthesia, after abdominal closure (T4). Hemodynamic and pulmonary variables were compared between groups. RESULTS: Low-pressure abdominal insufflation caused cardiopulmonary changes in cats. At T1 and T2, Long LAP and Short LAP caused a significant change in PvCO2 and RC when compared with Open. During T3, RC was lower only in Long LAP. At T2, there was decrease in SV, but not CO for Long LAP when compared with Open. CONCLUSIONS: Duration of insufflation was associated with worsening of negative cardiopulmonary effects; however, these effects were reversible and resolved by the end of the procedure.

Post-operative complications and owner satisfaction following partial caudectomies: 22 cases (2008 to 2013).
Simons, M. C., R. Ben-Amotz, and C. Popovitch

OBJECTIVES: To report complications and owner satisfaction for dogs and cats following partial caudectomy. METHODS: Medical records of dogs and cats (n = 22) that underwent partial caudectomy between 2008 and 2013 were retrospectively reviewed. Signalment, reason for amputation, level of
amputation, and complications were recorded. Owners were contacted via telephone to obtain follow-up data. RESULTS: The most common reason for partial caudectomy was tail wounds (16 of 22; 72.7%). Complications were typically minor incisional crusting (4 of 20; 20%). Major complications (3 of 20; 15%) included prolonged healing after partial incisional dehiscence, continued self-trauma requiring revision surgery, and severe inflammation with ulceration requiring revision surgery. The majority of owners surveyed (10 of 12; 83.3%) were satisfied with the post-operative outcome and would recommend this procedure if warranted. CLINICAL SIGNIFICANCE: Partial caudectomy is well tolerated in both dogs and cats with no loss of function. Pet owners did not perceive any behavioural changes following partial caudectomy. However, in cases of continued self-mutilation and/or incisional dehiscence, revision procedures may be required.

**Effect of acarbose on postprandial blood glucose concentrations in healthy cats fed low and high carbohydrate diets.**


Singh, R., J. S. Rand, M. Coradini, and J. M. Morton

OBJECTIVES: Feeding a low carbohydrate diet is recommended for diabetic cats; however, some cats may require diets containing moderate-to-high carbohydrate and may benefit from the use of therapeutic agents to improve glycemic control. The aim of the study was to determine the effect of the alpha-glucosidase inhibitor acarbose on postprandial plasma glucose concentration when combined with commercially available feline diets high and low in carbohydrate. METHODS: Twelve healthy, adult, non-obese, neutered cats were enrolled. Plasma glucose concentrations were assessed over 24 h after feeding high and low carbohydrate diets, with and without acarbose, during single and multiple meal tests, in a crossover study. Commercially available feline diets were used, which were high and low in carbohydrate (providing 51% and 7% of metabolizable energy, respectively). RESULTS: In cats fed the high carbohydrate diet as a single meal, mean 24 h glucose concentrations were lower when acarbose was administered. Mean glucose concentrations were lower in the first 12 h when acarbose was given once daily, whereas no significant difference was observed in mean results from 12-24 h. Acarbose had little effect in cats eating multiple meals. Compared with consumption of the high carbohydrate diet with acarbose, lower mean 24 h and peak glucose concentrations were achieved by feeding the low carbohydrate diet alone. CONCLUSIONS AND RELEVANCE: In healthy cats meal-fed diets of similar composition to the diets used in this study, acarbose has minimal effect when a low carbohydrate diet is fed but reduces postprandial glucose concentrations over 24 h when a high carbohydrate diet is fed. However, mean glucose concentrations over 24 h are still higher when a high carbohydrate diet with acarbose is fed relative to the low carbohydrate diet without acarbose. Future studies in diabetic cats are warranted to confirm these findings.

**New broad-spectrum beta-lactamases emerging among Enterobacteriaceae from healthy cats and dogs: a public health concern?**


Smet, A., R. Vaes, K. Praud, B. Doublet, S. Daminet, A. Cloeckaert, and F. Haesebrouck

- 117 -
A study on Borna disease virus infection in domestic cats in Japan.


Borna disease virus (BDV) infection causes neurological disease in cats. Here, we report BDV infection in 199 hospitalized domestic cats in the Tokyo area. BDV infection was evaluated by detection of plasma antibodies against BDV-p24 or -p40. BDV-specific antibodies were detected in 54 cats (27.1%). Interestingly, the percentage of seropositive cats was not significantly different among the three clinical groups, i.e., healthy (29.8%), neurologically asymptomatic disease (22.2%) and neurological disease (33.3%). The specific antibodies were present even in cats aged below one year. The seropositive ratio was constant, irrespective of age and sampling season. The present study suggests that additional factors are required for onset of Borna disease in naturally infected cats and that BDV is transmitted through vertical routes in cats.

Guidelines for vaccination of dogs and cats in Korea.

Song, W. J., H. T. Kim, H. S. Yoo, and H. Y. Youn

This guideline contains the recommended vaccination schedules of dogs and cats from World Small Animal Veterinary Association (WSAVA) and American Animal Hospital Association (AAHA). In 2010, WSAVA published guidelines for the vaccination of dogs and cats. And, in 2011, AAHA also published guidelines for vaccination of dogs. In Korea, there is no published guideline for vaccination of dogs and cats yet. Therefore, the plane of vaccination also reports the present situation of vaccination schedule of dogs and cats in Korean animal hospitals.

Clinical and haematological responses of feline blood donors anaesthetised with a tiletamine and zolazepam combination.


This prospective study investigated the effect on clinical and haematological variables of the anaesthetic combination of tiletamine and zolazepam in feline blood donors. Blood (10 ml/kg bodyweight to a maximum volume of 60 ml) was collected from the jugular vein of 31 owned healthy cats anaesthetised with 2.5 mg/kg of tiletamine and 2.5 mg/kg of zolazepam intramuscularly. Rectal temperature (RT), systolic arterial pressure (SAP), mean arterial pressure (MAP), diastolic arterial pressure (DAP), heart rate (HR) and complete blood count (including red blood cells [RBC], haemoglobin [HB], haematocrit [HT], platelet [PLT] count, white blood cells [WBC], lymphocyte, neutrophils, eosinophils, monocytes and basophils count were evaluated pre- and postdonation. RT decreased significantly (P <0.01) after blood donation (mean change in RT -0.7 degrees C). Significant increases in SAP (P = 0.03), MAP (P <0.01) and DAP (P <0.01) occurred after blood donation (mean increase 13 mmHg, 12 mmHg and 11 mmHg, respectively). Although RBC, HT, HB, WBC, PLT, neutrophil and monocyte counts decreased, and HR, lymphocytes, eosinophils and basophils counts
increased after blood donation this change was not statistically significant. Mean time from pre- to postdonation evaluation was 39 +/- 11 mins (range 24-76 mins). None of the cats had evidence of pallor or collapse after recovery from anaesthesia. The collection of blood at 10 ml/kg bodyweight to a maximum volume of 60 ml in healthy cats using a low dose tiletamine and zolazepam anaesthetic appears to be well tolerated by feline blood donors.

**Molecular study on selected vector-borne infections in urban stray colony cats in northern Italy.**


Feline vector-borne diseases can be caused by a range of pathogens transmitted by arthropods. Many of these infections have zoonotic implications, and stray cats are potential sentinels for human and pet health. This study investigated the prevalence of selected vector-borne infections in stray colony cats in Milan. Blood samples from 260 stray cats were evaluated, using conventional polymerase chain reaction tests (cPCRs), for the presence of DNA associated with Rickettsia species, Anaplasma phagocytophilum and Ehrlichia species. Positive cPCR results occurred in 127/260 subjects (48.9%; 95% confidence interval [CI] = 40.7-58.1), with a prevalence of 31.9% (83/260, 95% CI = 25.4-39.6) for Rickettsia species, 17.7% (46/260, 95% CI= 13.0-23.6) for A phagocytophilum, and 5.4% (14/260, 95% CI = 2.9-9.0) for Ehrlichia species. There was no statistical association between a positive PCR test for vector-borne infections surveyed and colony location, age, gender, body condition score or complete blood count abnormalities, nor feline immunodeficiency virus, feline leukaemia virus or Toxoplasma gondii status. The only variable linked to positive PCR results was detection of signs of ocular infection and PCR positivity for Rickettsia species (P = 0.04, odds ratio [OR] = 2.2, 95% CI = 1.1-4.4, P = 0.02). There is a significant prevalence of vector-borne infections with zoonotic potential in urban stray cats in Milan. Thus, dogs and pet cats with outdoor access should be monitored and treated for ectoparasites on a regular basis to minimise risks of disease and the potential transmission of zoonotic agents to people.

**Development and analytical validation of an enzyme-linked immunosorbent assay for the measurement of feline tumor necrosis factor alpha in serum.**


*Steiner, J. M., P. G. Xenoulis, V. M. Schwierk, and J. S. Suchodolski*

**BACKGROUND:** The role of tumor necrosis factor alpha (TNF-alpha), a cytokine shown to play a crucial role in human Crohn’s disease patients, has not been documented in cats with chronic enteropathies. Also, currently, no validated assay for measurement of TNF-alpha in cats is available. **OBJECTIVES:** The objective of this study was to develop and analytically validate an enzyme-linked immunosorbent assay (ELISA) for the quantification of TNF-alpha in serum from cats. **METHODS:** A sandwich ELISA was developed and analytically validated by assessment of detection limit, linearity, accuracy, precision, and reproducibility. A control range for serum fTNF-alpha concentration in healthy cats was established. In addition, serum concentrations of fTNF-alpha in 39 cats with chronic enteropathies were compared with those in 20 healthy cats. **RESULTS:** The detection limit of the assay was 38.4 ng/L. Observed-to-expected ratios for serial dilutions of 4 serum samples ranged from 75.1%...
to 111.9%. Observed-to-expected ratios for spiking recovery for 4 serum samples ranged from 91.3% to 129.7%. Coefficients of variation for intra- and inter-assay variability ranged from 3.9% to 7.6% and from 7.8% to 12.5%, respectively. The control range of the assay was < 38.4-223.5 ng/L. Serum concentrations of feline TNF-alpha were significantly higher in cats with chronic enteropathies and diarrhea than in cats with chronic enteropathies without diarrhea, or in healthy control cats.

CONCLUSIONS: The ELISA described here was suitable for the quantification of fTNF-alpha in feline serum and should facilitate research into the importance of TNF-alpha in cats with chronic enteropathies.

Clinical Presentation and Outcome of Cats with Circumcaval Ureters Associated with a Ureteral Obstruction.

Steinhaus, J., A. C. Berent, C. Weisse, A. Eatroff, T. Donovan, J. Haddad, and D. Bagley

BACKGROUND: Circumcaval ureters (CU) are a rare embryological malformation resulting in ventral displacement of the caudal vena cava, which crosses the ureter, potentially causing a ureteral stricture.

OBJECTIVES: To evaluate cats with obstructed CU(s) and report the presenting signs, diagnostics, treatment(s), and outcomes. Cats with obstructed CU(s) were compared to ureterally obstructed cats without CU(s). ANIMALS: 193 cats; 22 circumcaval obstructed (Group 1); 106 non-circumcaval obstructed (Group 2); 65 non-obstructed necropsy cases (Group 3). METHODS: Retrospective study, review of medical records for cats treated for benign ureteral obstructions from AMC and University of Pennsylvania between 2009 and 2013. Inclusion criteria: surgical treatment of benign ureteral obstruction, complete medical record including radiographic, ultrasonographic, biochemistry, and surgical findings. RESULTS: Seventeen percent (22/128) of obstructed cats had a CU (80% right-sided) compared to 14% (9/65) non-obstructed necropsy cats (89% right-sided). Clinical presentation, radiographic findings, and creatinine were not statistically different between Groups 1 and 2. Strictures were a statistically more common (40%) cause of ureteral obstruction in Group 1 compared to Group 2 (17%) (P = .01). The MST for Groups 1 and 2 after ureteral decompression was 923 and 762 days, respectively (P = .62), with the MST for death secondary to kidney disease in both groups being >1,442 days. Re-obstruction was the most common complication in Group 1 (24%) occurring more commonly in ureters of cats treated with a ureteral stent(s) (44%) compared to the subcutaneous ureteral bypass (SUB) device (8%) (P = .01). CONCLUSIONS AND CLINICAL IMPORTANCE: Ureteral obstructions in cats with a CU(s) have a similar outcome to those cats with a ureteral obstruction and normal ureteral anatomy. Long-term prognosis is good for benign ureteral obstructions treated with a double pigtail stent or a SUB device. The SUB device re-obstructed less commonly than the ureteral stent, especially when a ureteral stricture was present.

Feline hyperthyroidism reported in primary-care veterinary practices in England: prevalence, associated factors and spatial distribution.


Feline hyperthyroidism is a commonly diagnosed endocrinopathy that can have a substantial deleterious impact on the welfare of affected cats. This study aimed to estimate the prevalence,
associated factors and geographical distribution for feline hyperthyroidism in England, using primary-care veterinary practice clinical data from the VetCompass Animal Surveillance Project. Prevalence was estimated from the overall cat cohort. Associated factor analysis used an age-matched, nested, case-control design with multivariable logistic regression. There were 2,276 cases of feline hyperthyroidism identified from 95,629 cats attending 84 practices from September 2009 to December 2011. Cases were aged 6-25 years. 3.7 per cent of cases and 9.9 per cent of controls were purebred, 56.4 per cent of cases and 56.5 per cent of controls were female, and 88.1 per cent of cases and 86.0 per cent of controls were neutered. The apparent prevalence was 2.4 per cent (95% CI 2.3 to 2.5 per cent) overall, and 8.7 per cent (95% CI 8.3 to 9.0 per cent) in cats aged 10 years or above. Burmese (OR 0.15, 95% CI 0.07 to 0.32, P<0.0001), Persian (OR 0.17, 95% CI 0.08 to 0.33, P<0.0001), Siamese (OR 0.4, 95% CI 0.21 to 0.75, P=0.004) and purebred cats overall (OR 0.33, 95% CI 0.25 to 0.42, P<0.0001) had lower odds of feline hyperthyroidism than non-purebred cats. Insured cats had increased odds (OR 1.78, 95% CI 1.56 to 2.03, P<0.001). There was little evidence of spatial variation. This study highlights feline hyperthyroidism as a high-prevalence disease in England, and reports reduced odds of diagnosis in certain breeds and purebred cats overall.

Ocular manifestations of feline viral diseases.

Stiles, J.

Feline viral diseases are common and cats can be presented with a variety of clinical manifestations. Ocular disease associated with viral pathogens is not unusual, particularly with viruses causing upper respiratory tract disease in cats, such as feline herpesvirus type 1 and feline calicivirus. These agents mainly cause ocular surface disease. Other viruses, such as feline immunodeficiency virus and feline coronavirus, can cause uveitis, while feline leukemia virus can induce ocular lymphosarcoma. This review covers the most common viral pathogens of cats that cause ocular manifestations, the specific features of the ocular diseases caused by these viruses and therapeutic recommendations.

Feline parvovirus infection and associated diseases.

Stuetzer, B., and K. Hartmann

Feline panleukopenia, caused by the single-stranded DNA virus feline parvovirus (FPV), is a highly contagious and often lethal disease of cats and other Felidae. FPV, but also canine parvovirus (CPV) can be isolated from both healthy and diseased cats. In Germany, CPV was detected in only approximately 10% of feline samples, but in Southeast Asia, reports estimated that up to approximately 80% of diseased cats were infected with CPV. Infection spreads rapidly, especially in cells with high mitotic activity, such as bone marrow, lymphoid tissue and intestinal crypt cells. Anorexia, vomiting, diarrhoea, neutropenia and lymphopenia are common in clinically affected cases. In utero or neonatal infection can result in cerebellar hypoplasia. Depending on the severity of clinical signs, mortality ranges from 25 to 100%. Effective vaccination and thorough disinfection are of the utmost importance in the prevention of disease transmission in multi-cat households and animal shelters. If clinical signs develop, supportive treatment should be commenced. The efficacy of feline recombinant interferon and FPV antibodies has not been clearly demonstrated. Commercially available vaccines should induce
protective immunity when administered according to current guidelines. Recent studies suggest that in some kittens, maternally derived antibodies (MDA) can persist for much longer than has been previously recognised. FPV serum antibody tests are available, but protection status needs to be interpreted with caution in kittens with MDA and a negative titre in adult cats does not necessarily denote lack of protection.

**Histologic characterization of the cat middle ear: in sickness and in health.**


*Sula, M. M., B. L. Njaa, and M. E. Payton*

The purpose of this study was to establish microscopic normal in the middle ear of the cat while concurrently characterizing gross and microscopic lesions reflecting spontaneous otitis media. Both ears from 50 cats were examined grossly and processed for histologic examination of the external, middle, and internal ear on a single slide. Gross lesions of the middle ear were present in 14 of 100 (14%) and included turbid fluid, frank pus, hemorrhage, and fibrous thickening of the auricular mucoperiosteum. Histologically, 48 of 100 (48%) ears had evidence of ongoing or previous inflammatory middle ear disease, including proteinaceous fluid; vascular ectasia; expansion of the auricular mucoperiosteum by neutrophils, lymphocytes, and macrophages; cholesterol clefts; hemorrhage; fibrin; granulation tissue; membranous pseudo-glands; fibrosis; proliferation and/or osteolysis of the tympanic and septum bullae. Histologic lesions were identified in 34 of 100 ears (34%) lacking gross evidence of disease. Ears were classified histologically as either normal (52/100 [52%]) or diseased (48/100 [48%]). Diseased ears were further classified as mild to moderate (37/100 [37%]) or severely (11/100 [11%]) affected. Internal ear involvement was present in 11 of 100 (11%) ears. Histologic evidence of middle ear disease in cats is far greater than gross lesions or clinical literature suggests; further investigation and correlation of clinical and histologic disease are warranted. With minimal additional preparation, diagnostic specimens may be readily prepared and evaluated for this integral sensing organ.

**Pradofloxacin: a novel veterinary fluoroquinolone for treatment of bacterial infections in cats.**


*Sykes, J. E., and J. M. Blondeau*

Pradofloxacin is a novel third-generation oral veterinary fluoroquinolone with activity against Gram-positive aerobic bacteria and anaerobes (lower minimum inhibitory concentrations in vitro). It also has activity against other bacterial species, including Bartonella henselae, Pasteurella multocida, Bordetella bronchiseptica, extra-intestinal Escherichia coli, and some mycobacterial species. This review focuses on the current knowledge of the mechanism of action, adverse effects, clinical applications, and pharmacokinetic/pharmacodynamic properties of pradofloxacin in cats.

**Annotated features of domestic cat - Felis catus genome.**


BACKGROUND: Domestic cats enjoy an extensive veterinary medical surveillance which has described nearly 250 genetic diseases analogous to human disorders. Feline infectious agents offer powerful natural models of deadly human diseases, which include feline immunodeficiency virus, feline sarcoma virus and feline leukemia virus. A rich veterinary literature of feline disease pathogenesis and the demonstration of a highly conserved ancestral mammal genome organization make the cat genome annotation a highly informative resource that facilitates multifaceted research endeavors. FINDINGS: Here we report a preliminary annotation of the whole genome sequence of Cinnamon, a domestic cat living in Columbia (MO, USA), bisulfite sequencing of Boris, a male cat from St. Petersburg (Russia), and light 30x sequencing of Sylvester, a European wildcat progenitor of cat domestication. The annotation includes 21,865 protein-coding genes identified by a comparative approach, 217 loci of endogenous retrovirus-like elements, repetitive elements which comprise about 55.7% of the whole genome, 99,494 new SNVs, 8,355 new indels, 743,326 evolutionary constrained elements, and 3,182 microRNA homologues. The methylation sites study shows that 10.5% of cat genome cytosines are methylated. An assisted assembly of a European wildcat, Felis silvestris silvestris, was performed; variants between F. silvestris and F. catus genomes were derived and compared to F. catus. CONCLUSIONS: The presented genome annotation extends beyond earlier ones by closing gaps of sequence that were unavoidable with previous low-coverage shotgun genome sequencing. The assembly and its annotation offer an important resource for connecting the rich veterinary and natural history of cats to genome discovery.

Emergence of pathogenic coronaviruses in cats by homologous recombination between feline and canine coronaviruses.

Type II feline coronavirus (FCoV) emerged via double recombination between type I FCoV and type II canine coronavirus (CCoV). In this study, two type I FCoVs, three type II FCoVs and ten type II CCoVs were genetically compared. The results showed that three Japanese type II FCoVs, M91-267, KUK-H/L and Tokyo/cat/130627, also emerged by homologous recombination between type I FCoV and type II CCoV and their parent viruses were genetically different from one another. In addition, the 3’-terminal recombination sites of M91-267, KUK-H/L and Tokyo/cat/130627 were different from one another within the genes encoding membrane and spike proteins, and the 5’-terminal recombination sites were also located at different regions of ORF1. These results indicate that at least three Japanese type II FCoVs emerged independently. Sera from a cat experimentally infected with type I FCoV was unable to neutralize type II CCoV infection, indicating that cats persistently infected with type I FCoV may be superinfected with type II CCoV. Our previous study reported that few Japanese cats have antibody against type II FCoV. All of these observations suggest that type II FCoV emerged inside the cat body and is unable to readily spread among cats, indicating that these recombination events for emergence of pathogenic coronaviruses occur frequently.

Tackling feline infectious peritonitis via reverse genetics.
Bioengineered (2014) 5
Thiel, V., H. J. Thiel, and G. Tekes

Feline infectious peritonitis (FIP) is caused by feline coronaviruses (FCoVs) and represents one of the most important lethal infectious diseases of cats. To date, there is no efficacious prevention and treatment, and our limited knowledge on FIP pathogenesis is mainly based on analysis of experiments with field isolates. In a recent study, we reported a promising approach to study FIP pathogenesis using reverse genetics. We generated a set of recombinant FCoVs and investigated their pathogenicity in vivo. The set included the type I FCoV strain Black, a type I FCoV strain Black with restored accessory gene 7b, two chimeric type I/type II FCoVs and the highly pathogenic type II FCoV strain 79-1146. All recombinant FCoVs and the reference strain isolates were found to establish productive infections in cats. While none of the type I FCoVs and chimeric FCoVs induced FIP, the recombinant type II FCoV strain 79-1146 was as pathogenic as the parental isolate. Interestingly, an intact ORF 3c was confirmed to be restored in all viruses (re)isolated from FIP-diseased animals.

Relationship Between Degenerative Joint Disease, Pain, and Bartonella spp. Seroreactivity in Domesticated Cats.


BACKGROUND: Recently, a potential association was identified between Bartonella exposure and arthritides in mammalian species other than cats. HYPOTHESIS/OBJECTIVES: We hypothesized that Bartonella exposure is associated with more severe degenerative joint disease (DJD) and a greater burden of DJD-associated pain in client-owned cats. ANIMALS: Ninety-four client-owned cats (6 months to 20 years old), ranging from clinically unaffected to severely lame because of DJD. METHODS: Using physical examination and radiography, pain and radiographic scores were assigned to each part of the bony skeleton. Sera were tested for Bartonella henselae, B. koehlerae, and B. vinsonii subsp. berkhoffii (genotypes I, II, and III) antibodies using immunofluorescence antibody assays. Variables were categorized and logistic regression used to explore associations. RESULTS: Seropositivity to Bartonella was identified in 33 (35.1%) cats. After multivariate analysis controlling for age, total DJD score (OR, 0.51; 95% CI, 0.26-0.97; P =.042), appendicular pain score (OR, 0.33; 95% CI, 0.17-0.65; P =.0011), and total pain score (OR, 0.35; 95% CI, 0.17-0.72; P =.0045) were significantly inversely associated with Bartonella seroreactivity status, indicating that cats with higher DJD and pain scores were less likely to be Bartonella seropositive. CONCLUSIONS AND CLINICAL IMPORTANCE: Based upon this preliminary study, Bartonella spp. seropositivity was associated with decreased severity of DJD and decreased DJD-associated pain in cats. Additional studies are needed to verify these findings, and if verified, to explore potential mechanisms.

The urban risk and migration risk factors for schizophrenia: Are cats the answer?
Schizophr Res (2014)
Torrey, E. F., and R. H. Yolken

Being born in and/or raised in an urban area is a proven risk factor for developing schizophrenia. Migrating from countries such as Jamaica or Morocco to countries such as England or the Netherlands is also a proven risk factor for developing schizophrenia. The transmission of Toxoplasma gondii oocysts to children is reviewed and proposed as a partial explanation for both of these risk factors.
Hypercobalaminaemia is associated with hepatic and neoplastic disease in cats: a cross sectional study.


Trehy, M. R., A. J. German, P. Silvestrini, G. Serrano, and D. J. Batchelor

BACKGROUND: When increased serum cobalamin concentrations are encountered clinically they are usually attributed to parenteral supplementation, dietary factors, or otherwise ignored. However, recently, hypercobalaminaemia has been associated with numerous diseases in humans, most notably neoplastic and hepatic disorders. The aim of this retrospective, observational, cross-sectional study was to determine the significance of increased cobalamin in cats. RESULTS: In total, 237 records were retrieved and 174 cats, of various ages and sexes met the inclusion criteria. A total of 42 cats had increased serum cobalamin concentration, and had not received prior supplementation. Multiple logistic regression analysis revealed that increased serum cobalamin concentration was positively related to pedigree breed (pedigree breeds more likely to have increased cobalamin concentration, odds ratio [OR] 4.24, 95% CI 1.78-10.15, \( P = 0.001 \)), to having liver disease (OR 9.91, 95% CI 3.54-27.68), and to having a solid neoplasm (OR 8.54, 95% CI 1.10-66.45). CONCLUSIONS: The results of the current study suggest that increased serum cobalamin concentrations should not be ignored in cats with no history of supplementation, and investigation for underlying hepatic or neoplastic disease is warranted.

Concurrent diseases and conditions in cats with renal infarcts.


Valeika, S.

Monoparesis in association with feline pulmonary carcinoma: a literature review with 3 new cases.


van Stee, L., S. Boston, A. Singh, F. Park, D. Richardson, A. Abrams-Ogg, and A. Vince

We describe 3 cases of cats that were presented with a sudden onset of monoparesis as a result of arterial thromboembolism without evidence of cardiovascular disease that were subsequently diagnosed with a primary pulmonary carcinoma. Arterial tumor thromboemboli due to pulmonary carcinoma should be considered as a differential diagnosis in cases of lameness or paresis in older cats. We theorize that large tumor emboli may obstruct peripheral arteries leading to acute monoparesis.

Computed tomographic findings in 44 dogs and 10 cats with grass seed foreign bodies.


Vansteenkiste, D. P., K. C. Lee, and C. R. Lamb
OBJECTIVE: To supplement recent reports of computed tomographic (CT) findings in dogs and cats with grass seed foreign bodies. METHODS: Retrospective review of cases that had CT scan and subsequent retrieval of a grass seed during the same period of hospitalisation from a site included in the scan. RESULTS: Records of 44 dogs and 10 cats were reviewed. Most were presented in the months July to December. Median duration of clinical signs was 4 weeks (range 2 days to 2 years). The most frequent clinical signs were soft tissue swelling (30% cases), coughing (28%), sneezing (28%) and discharge (26%). Grass seeds were retrieved from the thorax (35% cases), nasal cavity (31%), ear (7%), other sites in the head and neck (22%), sublumbar muscles (2%) and pelvic limb (2%). The grass seed was visible in CT images in 10 (19%) cases. Secondary lesions were visible in CT images of 52 (96%) cases, including collection of exudate (37%), abscess (24%), enlarged lymph nodes (22%) and pulmonary consolidation (20%). CT images appeared normal in 4% animals. CLINICAL SIGNIFICANCE: Grass seeds within the respiratory tract are frequently visible in CT images, but in general CT appears to be more useful for localisation of secondary lesions than as a method of definite diagnosis.

Risk factors for MRSA infection in companion animals: Results from a case-control study within Germany.


Increasing numbers of companion animals suffering from infections with methicillin-resistant Staphylococcus aureus (MRSA) have been reported in the recent past. These infections are of particular concern because of the limited treatment options for MRSA and their transferability to humans. Since MRSA lineages isolated from infected companion animals often mirror typical human epidemic strains circulating in the same region, successful strategies to combat MRSA need strong and coordinated efforts from both, the human and the veterinary field according to the “One Health” concept. Hence, to identify potential risk factors related to MRSA infections in dogs, cats and horses, a case-control study was conducted, including data on 106 MRSA-infected animal patients as cases and 102 MSSA-infected animals as controls, originating from 155 different veterinary settings within Germany. Demographic data on animal patients, patient history and administration of antibiotics as well as practice/clinic specific parameters were assessed as putative risk factors. Multivariable logistic regression identified the following variables as risk factors for MRSA infection compared to MSSA infection: number of employees working at the veterinary setting (n>10; p<0.001), antibiotic treatment prior to sampling (systemic: p=0.002; local: p=0.049, both: p=0.011) and surgical site infection (p<0.001). Spa typing revealed predominantly clonal complexes well-known for hospital-associated lineages spreading in human health-care settings in Germany (CC5 and CC22) for isolates of dog and cat origin. CC398-MRSA dominated among equine isolates, a CC that was described as a nosocomial pathogen in equine clinical settings before. The identified risk factors and genotyping results are in accordance with numerous study outcomes from the field of human medicine and point towards reasonable problems with nosocomial spread of MRSA, especially within companion animal veterinary clinics. To define targeted infection control strategies against nosocomial pathogens, it is important to accomplish intervention studies addressing routes of transmission in companion animal veterinary settings.
Sedative, hematologic and hemostatic effects of dexmedetomidine-butorphanol alone or in combination with ketamine in cats.


Acute stress induced by physical restraint can interfere with the validity of laboratory findings. Sedation could minimize such stress. However, it is not known whether sedation can affect hematologic and hemostatic parameters in cats. The purpose of this study was to evaluate hematologic and hemostatic parameters in domestic cats subjected to physical restraint in addition to one of two sedation protocols. In total, 50 cats were subjected to physical restraint and were then randomly divided into two groups of 25 animals, receiving dexmedetomidine (5 microg/kg) and butorphanol (0.3 mg/kg; DB group) or dexmedetomidine (5 microg/kg), butorphanol (0.3 mg/kg) and ketamine (3 mg/kg; DBK group). The cats were assessed for acute stress, sedation level, onset of sedation and duration of sedation. Blood samples were collected after handling and after sedation. The complete blood count (CBC), platelet count, buccal mucosal bleeding time (BMBT), whole-blood clotting time, prothrombin time (PT), activated partial thromboplastin time (aPTT) and thrombin time (TT) were determined for each sample, before and after chemical restraint. No statistically significant differences were found in the hematologic parameters. Certain hemostatic parameters (PT, aPTT and TT) were higher in the DB group (P <0.05). The onset of sedation was similar in the two groups, and the duration of sedation was longer in the DBK group. Both sedation protocols were effective for short-duration chemical restraint for blood collection from the studied cats, and no clinically relevant effects on hematologic or hemostatic parameters were detected.

Evaluation of the perioperative analgesic efficacy of buprenorphine, compared with butorphanol, in cats.


Warne, L. N., T. Beths, M. Holm, J. E. Carter, and S. H. Bauquier

OBJECTIVE: To compare the analgesic effects of buprenorphine and butorphanol in domestic cats. DESIGN: 2-phase positive-controlled randomized masked clinical trial. ANIMALS: 39 healthy female cats (10 in phase 1 and 29 in phase 2). PROCEDURES: Cats admitted for ovariohysterectomy received buprenorphine (4 in phase 1; 14 in phase 2) or butorphanol (6 in phase 1; 15 in phase 2). In phase 1, cats were premedicated with buprenorphine (0.02 mg/kg [0.009 mg/lb], IM) or butorphanol (0.4 mg/kg [0.18 mg/lb], IM), in combination with medetomidine. Anesthesia was induced with propofol (IV) and maintained with isoflurane in oxygen. After extubation, medetomidine was antagonized with atipamezole. A validated multidimensional composite scale was used to assess signs of pain after surgery starting 20 minutes after extubation and continuing for up to 360 minutes, and pain score comparisons were made between the 2 groups. Phase 2 proceeded similar to phase 1 with the following addition: during wound closure, cats from the butorphanol and buprenorphine groups received butorphanol (0.02 mg/kg, IM) or buprenorphine (0.02 mg/kg, IM), respectively. RESULTS: Phase 1 of the study was stopped after 10 cats were ovariohysterectomized because 9 of 10 cats required rescue analgesia at the first evaluation. In phase 2, at the first pain evaluation, pain scores from the buprenorphine group were lower, and all cats from the butorphanol group required rescue analgesia. None of the cats from the buprenorphine group required rescue analgesia at any time. CONCLUSIONS
AND CLINICAL RELEVANCE: Buprenorphine (0.02 mg/kg, IM) given before surgery and during wound closure provided adequate analgesia for 6 hours following ovariohysterectomy in cats, whereas butorphanol did not.

**Bornavirus infection in cats.**

_Vet J_ (2014) **201**:142-149.

_Wensman, J. J., K. H. Jaderlund, B. S. Holst, and M. Berg_

Bornaviruses are known to cause neurological disorders in a number of animal species. Avian Bornavirus (ABV) causes proventricular dilatation disease (PDD) in birds and Bornavirus (BDV) causes Bornavirus disease in horses and sheep. BDV also causes staggering disease in cats, characterised by ataxia, behavioural changes and loss of postural reactions. BDV-infection markers in cats have been reported throughout the world. This review summarizes the current knowledge of Bornavirus infections in cats, including etiological agent, clinical signs, pathogenesis, epidemiology and diagnostics, with comparisons to Bornavirus infections in other species.

**Effect on renal function of restoration of euthyroidism in hyperthyroid cats with iatrogenic hypothyroidism.**


_Williams, T. L., J. Elliott, and H. M. Syme_

BACKGROUND: Iatrogenic hypothyroidism is associated with an increased incidence of azotemia after treatment of hyperthyroidism, and decreased survival time in azotemic hyperthyroid cats. HYPOTHESIS: Restoration of euthyroidism will decrease plasma creatinine concentrations. ANIMALS: Nineteen client-owned, methimazole- or carbimazole-treated, hyperthyroid cats with documented iatrogenic hypothyroidism (based on subnormal plasma total thyroxine concentrations [TT4] and increased plasma thyroid-stimulating hormone concentrations). METHODS: Prospective interventional study. Doses of antithyroid medication were reduced until euthyroidism was restored (TT4 10-40 nmol/L). Plasma creatinine concentration and selected other clinicopathologic variables were evaluated before and after restoration of euthyroidism and compared by nonparametric statistics. Data are presented as median [25th, 75th percentile]. RESULTS: Restoration of euthyroidism was associated with a significant decrease in plasma creatinine concentrations (2.61 [1.90, 3.26] mg/dL versus 2.07 [1.42, 2.82] mg/dL; _P_ <.001) and body weight (4.03 [3.59, 4.53] kg versus 3.89 [3.34, 4.18] kg; _P_ =.019), and a significant increase in packed cell volume (30 [28, 39]% versus 34 [29, 39]%; _P_ =.038), heart rate (174 [163, 201] bpm versus 190 [164, 202] bpm; _P_ =.009), and plasma alkaline phosphatase activity (26.6 [17.0, 33.0] IU/L versus 38.0 [23.5, 46.5] IU/L; _P_ <.001). CONCLUSIONS AND CLINICAL IMPORTANCE: Restoration of euthyroidism in medically treated hyperthyroid cats with iatrogenic hypothyroidism causes a reduction in plasma creatinine concentrations, and thus might improve renal function; however, this could be influenced by concurrent changes in body weight.

**Associations between ‘valentine’ heart shape, atrial enlargement and cardiomyopathy in cats.**


_Winter, M. D., R. F. Giglio, C. R. Berry, D. J. Reese, H. W. Maisenbacher, and J. A. Hernandez_
‘Valentine’ heart shape is a common qualifier used in veterinary radiology to describe a cardiac silhouette with focal enlargement at the level of the base of the heart in feline patients. Anecdotally, this sign has been thought to be related to biatrial enlargement and also to hypertrophic cardiomyopathy (HCM). However, to our knowledge, there has been no study performed to assess the association between cardiac chamber enlargement and cardiac disease with the ‘valentine’-shaped heart. The aim of this study was to verify the association between the ‘valentine’ heart shape observed in ventrodorsal thoracic radiographs and the presence of singular or combined cardiac chamber enlargement, and also the presence and type of cardiomyopathy (CM) in cats. A search of the database of the Small Animal Veterinary Hospital of the University of Florida for cats with a radiology report of thoracic radiographs that contained the words ‘valentine’ and ‘biatrial’, and echocardiography performed within 1 week, was undertaken; 41 cases met the inclusion criteria. Eighty-two percent of the cats of the study sample had some form of CM. The ‘valentine’ heart shape was associated with biatrial enlargement in 41% of the patients in our study sample that had some form of CM and just 8% of cases diagnosed with HCM, suggesting that the ‘valentine’ heart shape has a low association with HCM or biatrial enlargement; however, it should be considered a sign of feline CM.

Management of feline distal tibial fractures using a hybrid external skeletal fixator.


Witte, P. G., M. A. Bush, and H. W. Scott

OBJECTIVE: To document the results of management of feline distal tibial fractures with circular-linear hybrid external skeletal fixators. METHODS: Retrospective examination of case records and radiographs of cats with distal tibial fractures managed with hybrid external skeletal fixators. Signalment, pre-operative fracture conformation, post-operative fracture reduction, implant complications, time to tibial and fibular fracture healing and time to hybrid external skeletal fixators removal were analysed. RESULTS: Case records of eight cats were reviewed and included three closed fractures and five type 1 open fractures. Post-operative fracture reduction was considered appropriate in all cases. Healing of five tibial fractures was complete and hybrid external skeletal fixators were removed within a mean of 13 weeks. Healing of the fibular fracture was complete within a mean of 12.1 weeks. Three tibial fractures demonstrated non-union and were revised after a mean duration of 24 weeks. All three non-union fractures were open on presentation. CLINICAL SIGNIFICANCE: Feline distal tibial fractures may be managed with hybrid external skeletal fixators, however, non-union still occurs. In this study type I open feline distal tibial fractures appeared more likely to develop non-union.

Comparison of digital radiography, ultrasonography, and positive contrast vaginourethrography for determining reproductive status of female cats.


Woodland, M., L. Pack, P. Rist, and B. Crane

It is not always possible to identify female cats that have undergone previous ovariohysterectomy based on physical examination alone. An easy, cost-effective method for screening female cats for reproductive status would be helpful for avoiding unnecessary exploratory laparotomies. The purpose of this prospective study was to compare diagnostic sensitivities of digital radiography, ultrasonography, and positive contrast vaginourethrography for determining reproductive status in
female cats. Sixty-seven recently euthanized female cats of unknown medical history and reproductive status were randomly selected and included in the study. Digital abdominal radiography, digital abdominal radiography with compression, abdominal ultrasonography, and positive contrast vaginourethrography were performed in sequence by a board-certified veterinary radiologist and a second-year radiology resident. Immediately following diagnostic imaging procedures, necropsy was performed. Ultrasonography of the uterus had the highest sensitivity (86%) for determining reproductive status of all the imaging modalities tested. The specificity was 88%, and the positive predictive value and negative predictive value were 96% and 68%, respectively. The calculated sensitivities and specificities of other modalities were as follows: digital radiographs (28%, 100%), digital compression radiographs (58%, 100%), and vaginourethrography (32%, 100%). Based on McNemar’s test statistic, there was a significant difference in the sensitivity of ultrasound compared to digital radiographs (P \leq 0.05), compression radiographs (P \leq 0.05), and vaginourethrogram (P \leq 0.05). Findings from the current study indicated that ultrasonography is a sensitive diagnostic test for determining reproductive status in female cats. Although more readily available in private practice and shelters, digital radiography and vaginourethrography are not reliable predictors of reproductive status.

Post-transplant malignant neoplasia associated with cyclosporine-based immunotherapy: prevalence, risk factors and survival in feline renal transplant recipients.

Vet Comp Oncol (2014)

Wormser, C., A. Mariano, E. S. Holmes, L. R. Aronson, and S. W. Volk

The study objective was to compare the prevalence of malignant neoplasia in feline renal transplant recipients (n = 111) with a control population of cats that did not receive transplantation (n = 142); and to determine whether the development of post-transplant malignant neoplasia (PTMN) affects long-term survival. Twenty-five (22.5%) renal transplant recipients were diagnosed with PTMN, and of those 14 (56%) were diagnosed with lymphoma. The overall survival time in cats that developed PTMN following renal transplantation (median 646 days, IQR 433-1620 days) was not significantly different from the survival time in cats that did not develop PTMN (median 728 days, IQR 201-1942 days), although median survival after diagnosis of PTMN was only 13 days. Six control cats (4.2%) were diagnosed with malignant neoplasia. Compared to the control population, transplant cats had a 6.6 times higher odds of developing malignant neoplasia and a 6.7 times higher odds of developing lymphoma.

Biochemical survey of free-roaming cats (Felis catus) in New York City presented to a trap-neuter-return program.


Wycislo, K. L., S. L. Connolly, M. R. Slater, and K. V. Makolinski

Free-roaming cats in New York, NY, USA, that presented to a trap-neuter-return program were surveyed for biochemical data. One hundred and one cats had blood collected for a plasma biochemistry panel after the induction of surgical anesthesia. Reference intervals for 18 analytes were generated for the sample population, along with age-specific reference intervals when statistically appropriate. Age groups (juveniles and adults) differed in 10 of the 18 analytes measured, including protein levels and albumin/globulin ratio, aspartate aminotransferase, alkaline phosphatase, creatine
kinase, creatinine, phosphorus, calcium and potassium. No differences were found between males and females. This is the first report of biochemical reference intervals for a group of free-roaming cats within the USA.

**Prepubertal neutering of cats: three key points.**

Vet Rec (2014) **175**:221-222.

_Yates, D., and J. Yeates_

**Faecal virome of cats in an animal shelter.**


_Zhang, W., L. Li, X. Deng, B. Kapusinszky, P. A. Pesavento, and E. Delwart_

We describe the metagenomics-derived feline enteric virome in the faeces of 25 cats from a single shelter in California. More than 90 % of the recognizable viral reads were related to mammalian viruses and the rest to bacterial viruses. Eight viral families were detected: Astroviridae, Coronaviridae, Parvoviridae, Circoviridae, Herpesviridae, Anelloviridae, Caliciviridae and Picobirnaviridae. Six previously known viruses were also identified: feline coronavirus type 1, felid herpes 1, feline calicivirus, feline norovirus, feline panleukopenia virus and picobirnavirus. Novel species of astroviruses and bocaviruses, and the first genome of a cyclovirus in a feline were characterized. The RNA-dependent RNA polymerase region from four highly divergent partial viral genomes in the order Picornavirales were sequenced. The detection of such a diverse collection of viruses shed within a single shelter suggested that such animals experience robust viral exposures. This study increases our understanding of the viral diversity in cats, facilitating future evaluation of their pathogenic and zoonotic potentials.

**Corpora lutea of pregnant and pseudopregnant domestic cats reveal similar steroidogenic capacities during the luteal life span.**


In domestic cats, luteal phases of pregnancy and pseudopregnancy (non-pregnant luteal phase) differ in the course and level of plasma progesterone (P4). Therefore, we assumed differences in luteal steroidogenic capacities. Here we present a comprehensive analysis of intraluteal steroid biogenesis in the domestic cat. We quantitatively measured relative mRNA levels of steroidogenic acute regulatory protein (STAR), cytochrome P450 oxidases (CYP), hydroxysteroid dehydrogenases (HSD), steroid reductase (SRD) and enzymes involved in sulfoconjugation of steroids, i.e. sulfotransferase (SULT) and sulfatase (STS). Protein expression was analysed by Western Blot for HSD3B. Additionally, intraluteal steroid contents were determined. During the pseudopregnant luteal phase, expression of STAR (p=0.005), HSD3B1 (p<0.0001), CYP19A1 (p<0.0001) and HSD17B7 (p=0.008) decreased from formation of the corpus luteum (CL) onwards. HSD3B protein expression was highest in the development/maintenance stage of CL and declined during the subsequent luteal phase of pregnancy.
and pseudopregnancy. This was in accordance with decreasing intraluteal levels of P4, oestrogens and androgens. In contrast, expression of SRD5A1 (p<0.001) increased with progression through stages of the pseudopregnant CL, being indicative of P4 metabolism via an alternate pathway to dihydrotestosterone (DHT). Compared to the formation stage, expression of SULT1E1 was higher in all other luteal stages of pseudopregnancy (p=0.004), implying a potential sulfoconjugation of oestrogens. Expression of CYP11A1 and CYP17A1 was unaffected by the luteal stage (p>0.05), suggesting a permanent capacity of cat CL to convert progestogens via androgen and oestrogen pathways. In general, mRNA expression profiles of steroidogenic enzymes during the pregnant luteal phase reflected the pseudopregnancy profiles. Intraluteal oestrogen (p<0.0001) and androgen (p=0.008) levels were higher in the formation stage compared to the following luteal stages of pseudopregnancy. Concentrations of P4 were higher in the development/maintenance compared to the regression stages (p=0.01). We conclude that cat CL of the same histomorphological stage are characterised by identical steroidogenic capacities independently of an on-going pregnancy.
Occurrence of extended spectrum beta-lactamase-producing Enterobacteriaceae among pet dogs and cats: an emerging public health threat outside health care facilities.


Abdel-Moein, K. A., and A. Samir

We aimed to investigate the potential role of pet dogs and cats in the epidemiology of extended spectrum beta-lactamase-producing Enterobacteriaceae. Twenty bacterial isolates were recovered from rectal swabs obtained from 110 dogs and cats. The occurrence of extended spectrum beta-lactamase-producing Enterobacteriaceae in pets spotlights the emergence of a significant public health threat.

Feline patent Toxoplasma-like coccidiosis among feral cats (Felis catus) in Doha city, Qatar and its immediate surroundings.


Abu-Madi, M. A., and J. M. Behnke

Doha city has a high feral cat population and studies of hospital records in Doha have shown that human toxoplasmosis also occurs. Clearly, there is a need to understand the role of cats as vectors of human toxoplasmosis in the city and as a first step we assessed the extent of patent Toxoplasma-like coccidial infections among feral cats. Oocysts in cat faeces were detected between June 2008 and April 2010, from a range of locations radiating out of the city centre in concentric semi circular/elliptic rings and by north, west and south divisions within each of the rings. In total 4,652 cats were sampled and overall prevalence of oocysts was 9.1%. Prevalence was 10.1% in the first summer, and then dropped to 8.4% in the following winter and further to 6.8% in the next summer before rising to 10.6% in the final winter of the study; this interaction between annual period and season was significant. There were also significant changes in prevalence across each of the consecutive months of the study, but no clear pattern was evident. Prevalence did not vary significantly by city sector and there was no difference in prevalence between the host sexes. We conclude therefore, that despite minor and significant perturbations, the prevalence of patent Toxoplasma-like coccidial infections among cats in Doha is remarkably stable throughout the year, across years and spatially within the city’s districts.

Pharmacological appetite stimulation: rational choices in the inappetent cat.


Agnew, W., and R. Korman

PRACTICAL RELEVANCE: Inappetence is a commonly encountered problem in feline medicine. Primary goals in managing the inappetent or anorectic cat are to diagnose and treat the underlying disease and reinstate adequate nutrition. RATIONALE: As cats are intolerant of prolonged periods of inadequate nutritional intake, especially given their propensity to develop hepatic lipidosis, their increased requirements for amino acids, and inability to slow their rate of gluconeogenesis, symptomatic therapy and nutritional support is often required during diagnostic investigations. CLINICAL CHALLENGES: Most cats presenting with reduced food intake will be suffering from an underlying systemic disease, and so the mechanism of action, pharmacokinetics and contraindications of appetite-stimulating medications will need to be considered in each case to ensure rational use of these agents. Pharmacological appetite stimulation should never replace monitoring and ensuring
Adequate caloric intake, and may not be appropriate in some cases, such as critically ill or severely malnourished patients. Evidence Base: While there are no medications approved specifically for the treatment of anorexia in cats, some drugs have proven efficacious in the clinical field. Although several agents have been used historically for appetite stimulation, due to potential side effects and/or lack of efficacy or predictability only cyproheptadine and mirtazapine can currently be recommended for use.

**Ganglion cyst arising from the composite occipito-atlanto-axial joint cavity in a cat.**


*Aikawa, T., S. Sadahiro, M. Nishimura, Y. Miyazaki, and M. Shibata*

A four-year-old, female spayed Domestic Longhaired cat was referred for evaluation with a two month history of initial inability to jump progressing to ambulatory tetraparesis. Magnetic resonance imaging studies demonstrated a cystic lesion arising from the composite occipito-atlanto-axial joint cavity and extending to the region of the occipital bone and the axis. The lesion surrounded the spinal canal, causing moderate dorsal spinal cord compression at the atlanto-occipital joint. A dynamic myelographic study demonstrated attenuation of the dorsal contrast column at the atlanto-occipital joint when the cervical spine was positioned in extension. Partial excision of the cyst capsule by a ventral approach resulted in long-term (64 months) resolution of clinical signs. Histological evaluation was consistent with a ganglion cyst. An intra-spinal ganglion cyst arising from the composite occipito-atlanto-axial joint cavity may be considered as an uncommon differential diagnosis for cats with cervical myelopathy.

**Electrophysiologic confirmation of heterogenous motor polyneuropathy in young cats.**


*Aleman, M., P. J. Dickinson, D. C. Williams, B. K. Sturges, R. A. LeCouteur, K. M. Vernau, and G. D. Shelton*

Background: Reports of motor polyneuropathies in young cats are scarce. Further, in-depth electrophysiologic evaluation to confirm a motor polyneuropathy in young cats of various breeds other than 2 Bengal cats is lacking. Hypothesis/Objectives: To confirm a motor polyneuropathy in young cats of various breeds. Animals: Five young cats with heterogenous chronic or relapsing episodes of weakness. Methods: Retrospective case series. Cats were presented for evaluation of generalized neuromuscular disease and underwent electrophysiologic examination including electromyography, nerve conduction, and repetitive nerve stimulation. Minimum database and muscle and nerve biopsy analyses were carried out. Descriptive statistics were performed. Results: Disease onset was at 3 months to 1 year of age and in 5 breeds. The most common clinical sign (5 of 5 cats) was weakness. Additional neurologic deficits consisted of palmigrade and plantigrade posture (4/4), low carriage of the head and tail (4/4), and variable segmental reflex deficits (5/5). Motor nerve conduction studies were abnormal for the ulnar (4/4), peroneal (5/5), and tibial (2/2) nerves (increased latencies, reduced amplitudes, slow velocities). A marked decrement was observed on repetitive nerve stimulation of the peroneal nerve in 3 cats for which autoimmune myasthenia gravis was ruled out. All sensory nerve conduction studies were normal. Histologic evaluation of muscle and nerve biopsies supported heterogenous alterations consistent with motor polyneuropathy with distal nerve fiber loss.
CONCLUSIONS AND CLINICAL IMPORTANCE: Heterogenous motor polyneuropathies should be considered in young cats of any breed and sex that are presented with relapsing or progressive generalized neuromuscular disease.

**Genome-wide association and linkage analyses localize a progressive retinal atrophy locus in Persian cats.**


Hereditary eye diseases of animals serve as excellent models of human ocular disorders and assist in the development of gene and drug therapies for inherited forms of blindness. Several primary hereditary eye conditions affecting various ocular tissues and having different rates of progression have been documented in domestic cats. Gene therapy for canine retinopathies has been successful, thus the cat could be a gene therapy candidate for other forms of retinal degenerations. The current study investigates a hereditary, autosomal recessive, retinal degeneration specific to Persian cats. A multi-generational pedigree segregating for this progressive retinal atrophy was genotyped using a 63 K SNP array and analyzed via genome-wide linkage and association methods. A multi-point parametric linkage analysis localized the blindness phenotype to a ~1.75 Mb region with significant LOD scores (Z approximately 14, theta = 0.00) on cat chromosome E1. Genome-wide TDT, sib-TDT, and case-control analyses also consistently supported significant association within the same region on chromosome E1, which is homologous to human chromosome 17. Using haplotype analysis, a ~1.3 Mb region was identified as highly associated for progressive retinal atrophy in Persian cats. Several candidate genes within the region are reasonable candidates as a potential causative gene and should be considered for molecular analyses.

**High prevalence of Toxoplasma gondii antibodies in dogs in Veracruz, Mexico.**


*Alvarado-Esquivel, C., D. Romero-Salas, A. Cruz-Romero, Z. Garcia-Vazquez, A. Peniche-Cardena, N. Ibarra-Priego, C. Ahuja-Aguirre, A. A. Perez-de-Leon, and J. P. Dubey*

BACKGROUND: Little is known concerning the prevalence of Toxoplasma gondii infection in dogs in Mexico. Here, we investigated antibodies to T. gondii and associated risk factors in 101 dogs from an animal shelter in Veracruz State, Mexico. Canine sera were assayed for T. gondii IgG antibodies by using the modified agglutination test (MAT, cut off 1:25). RESULTS: Sixty eight (67.3%) of 101 dogs were seropositive with titers of 1:25 in 16, 1:50 in 8, 1:100 in 9, 1:200 in 10, 1:400 in 10, 1:800 in 10, 1:1600 in 3, and 1:3200 or higher in 2. None of the dogs’ characteristics studied including age, sex, breed, and history of deworming, rabies vaccination and contact with cats was associated with seroprevalence of T. gondii infection. CONCLUSION: Using the dogs as sentinel animals, the results indicate high contamination with T. gondii of the environment in Veracruz, Mexico. Results have public health implications, and further studies in Veracruz should be conducted to establish the sources of environmental contamination with T. gondii and to determine optimal preventive measures against T. gondii infection in humans.
Pathological and parasitological traits in experimentally infected cats with Gnathostoma binucleatum (Spirurida: Gnathostomatidae).


Alvarez-Guerrero, C., M. A. Munoz-Guzman, and F. Alba-Hurtado

This study aims to describe some of the unknown pathological and parasitological traits of experimental feline gnathostomosis. Thirteen female cats were orally inoculated with 30 advanced third-stage Gnathostoma binucleatum larvae and were euthanized at various post-infection (p.i.) periods. Clinically, the cats presented with nausea, vomiting, abdominal pain and other nonspecific signs. None of the cats shed eggs in their fecal matter. One cat, euthanized at 6 months p.i., developed a fibrous vascular nodule 2-3 cm in diameter within its gastric wall. The nodule contained caverns filled with mucous and bloody fluid as well as a juvenile worm. The histological characteristics of the nodule were observed, and the morphology of the juvenile worm was revealed using scanning electron microscopy. Another cat, euthanized at 10 months p.i., was found to have a larva within its diaphragm. Infected cats developed increased antibody titers against antigens of G. binucleatum adults and larvae beginning in the first month p.i., and these titers were maintained until the end of the experiment, suggesting the presence of undetected migrating larvae. The low number of cats with parasites and poor development of the parasites found suggest that cats have a low susceptibility to infection by G. binucleatum and cast doubt on the importance of domestic cats in maintaining the biological cycle of this parasite in nature.

Pharmacokinetics and pharmacodynamics of a constant rate infusion of fentanyl (5 mug/kg/h) in awake cats.


Ambros, B., J. Alcorn, T. Duke-Novakovski, A. Livingston, and P. M. Dowling

OBJECTIVE: To evaluate the pharmacokinetics and thermal and mechanical antinociceptive effects of a fentanyl constant rate infusion (CRI) in conscious cats. ANIMALS: 8 healthy adult cats. PROCEDURES: At a >/= 14-day interval, 7 cats received a loading dose (LD) of fentanyl (5 mug/kg, IV [administered at 0 hours]) followed by fentanyl infusion (5 mug/kg/h, IV) for 2 hours or similar administrations of equivalent volumes of 0.9% saline (NaCl) solution. One cat received only the fentanyl treatment. For both treatments, sedation and adverse events were evaluated and mechanical threshold (MT) and thermal threshold (TT) testing was performed prior to (baseline) and at predetermined times up to 26 hours after LD administration; plasma fentanyl concentrations were determined at similar times when the cats received fentanyl. RESULTS: Fentanyl induced mild sedation during the infusion. The only adverse effect associated with fentanyl LD administration was profuse salivation (1 cat). Saline solution administration did not significantly change MT or TT over time. For the duration of the CRI, MT and TT differed significantly between treatments, except for TT 1 hour after LD administration. For the fentanyl treatment, MT and TT were significantly higher than baseline at 0.25 to 0.75 hours and at 0.25 to 1 hour, respectively. During the fentanyl CRI, mean +/- SD plasma fentanyl concentration decreased from 4.41 +/- 1.86 ng/mL to 2.99 +/- 1.28 ng/mL and was correlated with antinociception; plasma concentrations < 1.33 +/- 0.30 ng/mL were not associated with antinociception. CONCLUSIONS AND CLINICAL RELEVANCE: Fentanyl CRI (5 mug/kg/h) induced mechanical and thermal antinociception in cats.
Arthropod-borne pathogens circulating in free-roaming domestic cats in a zoo environment in Brazil.

Ticks Tick Borne Dis (2014) 5:545-551.


Recently, tick and flea-borne pathogens have been detected in wild carnivores maintained in captivity in Brazilian zoos. Since free-roaming cats are frequently found in Brazilian zoos, they could act as reservoirs for arthropod-borne pathogens, which could be transmitted to endangered wild carnivores maintained in captivity in these institutions. On the other hand, stray cats in zoos may play a role as sentinels to pathogens that circulate among wild animals in captivity. The present work aimed to detect the presence of Anaplasmataceae agents, hemoplasmas, Bartonella species, piroplasmas, and Hepatozoon sp. DNA in blood samples of 37 free-roaming cats in a Brazilian zoo. Three (8%) cats were positive for Anaplasma spp. closed related to Anaplasma phagocytophilum; 12 (32%) cats were positive for hemoplasmas [two (5%) for Mycoplasma haemofelis, five (13.5%) for Candidatus Mycoplasma haemominutum, and five (13.5%) for Candidatus Mycoplasma turicensis]; 11 (30%) were positive for Bartonella spp., six (16%) were positive Babesia vogeli and one (3%) for Theileria sp. Coinfection with multiple arthropod-borne agents was observed in sampled cats. None of sampled cats were positive for Ehrlichia spp., Cytauxzoon spp., or Hepatozoon spp. in PCR. This is the first molecular detection of Babesia vogeli and Theileria sp. in domestic cats in Brazil. The control of the population of free-roaming cats in these conservation institutions is much needed aiming to prevent the potential transmission to endangered wild animals maintained in captivity, such as wild neotropical wild felids, as well as to human beings visiting zoos.

Effect of small interfering RNAs on in vitro replication and gene expression of feline coronavirus.


OBJECTIVE: To evaluate the ability of small interfering RNAs (siRNAs) to inhibit in vitro viral replication and gene expression of feline coronavirus (FCoV). SAMPLE: Cell cultures of Crandell-Rees feline kidney cells. PROCEDURES: 5 synthetic siRNAs that each targeted a different region of the FCoV genome were tested individually and in various combinations for their antiviral effects against 2 strains of FCoV (feline infectious peritonitis virus WSU 79-1146 and feline enteric coronavirus WSU 79-1683) in cell cultures. Tested combinations targeted the FCoV leader and 3’ untranslated region, FCoV leader region and nucleocapsid gene, and FCoV leader region, 3’ untranslated region, and nucleocapsid gene. For each test condition, assessments included relative quantification of the inhibition of intracellular viral genomic RNA synthesis by means of real-time, reverse-transcription PCR analysis; flow cytometric evaluation of the reduction of viral protein expression in infected cells; and assessment of virus replication inhibition via titration of extracellular virus with a TCID(5)(0) infectivity assay. RESULTS: The 5 siRNAs had variable inhibitory effects on FCoV when used singly. Combinations of siRNAs that targeted different regions of the viral genome resulted in more effective viral inhibition than did individual siRNAs that targeted a single gene. The tested siRNA combinations resulted in approximately 95% reduction in viral replication (based on virus titration results), compared with findings in negative control, nontargeting siRNA-treated, FCoV-
infected cells. CONCLUSIONS AND CLINICAL RELEVANCE: In vitro replication of FCoV was specifically inhibited by siRNAs that targeted coding and noncoding regions of the viral genome, suggesting a potential therapeutic application of RNA interference in treatment of feline infectious peritonitis.

**Comparison of two techniques for ultrasound-guided axillary brachial plexus blockade in cats.**


Anson, A., F. G. Laredo, F. Gil, M. Soler, E. Belda, M. D. Ayala, and A. Agut

Axillary blockade of the brachial plexus (BP) is advocated in humans and dogs for surgical procedures carried out on the foot, carpus and elbow as it provides complete analgesia distally from above the elbow joint. The aim of this study was to develop an ultrasound (US)-guided approach to block the BP in cats. Two groups of 12 feline cadavers each were used to compare two different techniques to block the BP at the axillary level. The reliability of the techniques was assessed by anatomical and computed tomography (CT) studies. Cadavers of the first group were positioned in dorsal recumbency with the forelimb to be blocked adducted (thoracic limbs flexed and orientated caudally) (FAD technique). The second group was positioned in dorsal recumbency with the forelimb abducted 90 degrees (FAB technique). The accuracy of the techniques was determined by US after injecting 1 ml blue ink along the BP nerves, and by CT after injecting 1 ml of an iodinated contrast medium. The anatomical and CT studies confirmed the accuracy of the US location of the BP nerves. Staining of the axillaris, musculocutaneous, radialis, medianus and ulnaris nerves was observed in 100% of cats using the FAB technique and in 66% of the cats using the FAD technique. Rate of complications was higher in the FAD technique. In conclusion, a US-guided axillary approach to the BP by the use of a FAB technique is a safe and feasible procedure to block the BP in the cat. Further studies are needed to ascertain whether the technique can be applied in a clinical setting.

**Owner experiences in treating dogs and cats diagnosed with diabetes mellitus in the United States.**


Aptekmann, K. P., J. Armstrong, M. Coradini, and J. Rand

The objective of this study was to report owner experiences and satisfaction in treating a pet with diabetes mellitus using a descriptive report from an Internet-based survey. Descriptive analysis of results was performed, chi(2) tests were used to detect differences in responses between dog and cat owners, and correlations were assessed using the nonparametric Spearman rank correlation. A total of 834 owners participated in the survey. More diabetic dogs (97%) than cats (82%) were treated with insulin injections. Insulin was administered twice daily in 87% of dogs and 73% of cats. Porcine lente and neutral protamine Hagedorn were the most commonly administered insulins in dogs. In cats, glargine and protamine zinc insulin were the most commonly used insulins. Most pets were not fed a prescribed diabetes diet. More cat (66%) than dog (50%) owners were satisfied with the diabetic control achieved. Cat owners were more likely to use home blood glucose monitoring. Treatment was considered expensive by the majority of owners. Few published reports follow diabetic pets after diagnosis or report owner satisfaction. The results of this study provide useful information that may
help veterinarians better educate owners and set expectations regarding diabetes treatment and quality of life for diabetic pets.

**A questionnaire on survival of kittens depending on the blood groups of the parents.**


Axner, E.

Cats more than 2 months of age have alloantibodies against the blood type antigen that they do not possess. Maternal antibodies, including alloantibodies against blood groups, are transferred to the kittens’ systemic circulation when they suckle colostrum during the first 12-16 h after birth. If kittens with blood group A or AB nurse from a mother with blood group B they may develop neonatal isoerythrolysis (NI). Breeders can prevent kittens at risk of NI from nursing during the first 16-24 h; after this period it is safe to let them nurse. Kittens depend, however, on the passive transfer of antibodies from the colostrum for early protection against infections. Although it is known that kittens deprived of colostrum will also be deprived of passive systemic immunity, it is not known if this will affect their health. Therefore, the aim of this study was to evaluate kitten mortality in litters with B-mothers and A-fathers compared to litters with A-mothers. In addition, the aim was to evaluate the effects of colostrum deprivation on the health of the mothers, and the breeders’ opinions and experiences of these combinations of breedings. A web-based questionnaire was constructed and distributed to breeders. The results indicate that there is no difference in mortality between planned litters that have mothers with blood group A and litters with mothers that have blood group B and fathers that have blood group A. When managing blood group incompatibility in cat all factors affecting the health of the cats, including genetic variation, should be considered.

**Facilitation of ipsilateral actions of corticospinal tract neurons on feline motoneurons by transcranial direct current stimulation.**


Baczyk, M., L. G. Pettersson, and E. Jankowska

Ipsilateral actions of pyramidal tract (PT) neurons are weak but may, if strengthened, compensate for deficient crossed PT actions following brain damage. The purpose of the present study was to examine whether transcranial direct current stimulation (tDCS) can strengthen ipsilateral PT (iPT) actions; in particular, those relayed by reticulospinal neurons co-excited by axon collaterals of fibres descending in the iPT and contralateral PT (coPT) and of reticulospinal neurons descending in the medial longitudinal fascicle (MLF). The effects of tDCS were assessed in acute experiments on deeply anaesthetized cats by comparing postsynaptic potentials evoked in hindlimb motoneurons and discharges recorded from their axons in a ventral root, before, during and after tDCS. tDCS was consistently found to facilitate joint actions of the iPT and coPT, especially when they were stimulated together with the MLF. Both excitatory postsynaptic potentials and inhibitory postsynaptic potentials evoked in motoneurons and the ensuing ventral root discharges were facilitated, even though the facilitatory effects of tDCS were not sufficient for activation of motoneurons by iPT neurons alone. Facilitation outlasted single tDCS periods by at least a few minutes, and the effects evoked by repeated tDCS by up to 2 h. The results of this study thus indicate that tDCS may increase the contribution of
Mutations of 3c and spike protein genes correlate with the occurrence of feline infectious peritonitis.


The genes encoding accessory proteins 3a, 3b, 3c, 7a and 7b, the S2 domain of the spike (S) protein gene and the membrane (M) protein gene of feline infectious peritonitis virus (FIPV) and feline enteric coronavirus (FECV) samples were amplified, cloned and sequenced. For this faeces and/or ascites samples from 19 cats suffering from feline infectious peritonitis (FIP) as well as from 20 FECV-infected healthy cats were used. Sequence comparisons revealed that 3c genes of animals with FIP were heavily affected by nucleotide deletions and point mutations compared to animals infected with FECV; these alterations resulted either in early termination or destruction of the translation initiation codon. Two ascites-derived samples of cats with FIP which displayed no alterations of ORF3c harboured mutations in the S2 domain of the S protein gene which resulted in amino acid exchanges or deletions. Moreover, changes in 3c were often accompanied by mutations in S2. In contrast, in samples obtained from faeces of healthy cats, the ORF3c was never affected by such mutations. Similarly ORF3c from faecal samples of the cats with FIP was mostly intact and showed only in a few cases the same mutations found in the respective ascites samples. The genes encoding 3a, 3b, 7a and 7b displayed no mutations linked to the feline coronavirus (FCoV) biotype. The M protein gene was found to be conserved between FECV and FIPV samples. Our findings suggest that mutations of 3c and spike protein genes correlate with the occurrence of FIP.

Assessments of feline plasma biochemistry reference intervals for three in-house analysers and a commercial laboratory analyser.


Baral, R. M., N. K. Dhand, M. B. Krockenberger, and M. Govendir

For each species, the manufacturers of in-house analysers (and commercial laboratories) provide standard reference intervals (RIs) that do not account for any differences such as geographical population differences and do not overtly state the potential for variation between results obtained from serum or plasma. Additionally, biases have been demonstrated for in-house analysers which result in different RIs for each different type of analyser. The objective of this study was to calculate RIs (with 90% confidence intervals [CIs]) for 13 biochemistry analytes when tested on three commonly used in-house veterinary analysers, as well as a commercial laboratory analyser. The calculated RIs were then compared with those provided by the in-house analyser manufacturers and the commercial laboratory. Plasma samples were collected from 53 clinically normal cats. After centrifugation, plasma was divided into four aliquots; one aliquot was sent to the commercial laboratory and the remaining three were tested using the in-house biochemistry analysers. The distribution of results was used to choose the appropriate statistical technique for each analyte from each analyser to calculate RIs. Provided reference limits were deemed appropriate if they fell within the 90% CIs of the calculated reference limits. Transference validation was performed on provided and calculated RIs. Twenty-nine of a
possible 102 provided reference limits (28%) were within the calculated 90% CIs. To ensure proper interpretation of laboratory results, practitioners should determine RIs for their practice populations and/or use reference change values when assessing their patients’ clinical chemistry results.

Bias in feline plasma biochemistry results between three in-house analysers and a commercial laboratory analyser: results should not be directly compared.


In-house analysers are commonplace in small animal practices but cannot be calibrated by the operator; therefore, any bias in the generated plasma analyte values cannot be corrected. Guidelines such as grading of renal disease and published reference intervals (RIs) in veterinary textbooks assume plasma biochemistry values generated by different analysers are equivalent. This study evaluated the degree of bias, as well as if bias was constant or proportional, for feline plasma biochemical analytes assessed by three in-house biochemistry analysers compared with a commercial laboratory analyser. Blood samples were collected on 101 occasions from 94 cats and, after centrifugation, plasma was divided into four aliquots. One aliquot was sent to the commercial laboratory and the remaining three were tested using the in-house biochemistry analysers. Results from each analyser were compared with the commercial laboratory results by difference plots and analyses, and by comparing percentages of results within provided RIs. Substantial bias was evident relative to the results of the commercial analyser for at least half of the analytes tested for each machine. In most cases, bias was proportional, meaning that the difference between the methods varied with the concentration of the analyte. The results demonstrate that values obtained from these analysers should not be directly compared and that RIs are not transferable between these analysers. Potential effects of bias on clinical decision making may be overcome by use of appropriately generated RIs, or reference change values which, for most biochemistry analytes, are more appropriate than subject-based RIs.

Computed tomographic features of feline sino-nasal and sino-orbital aspergillosis.


Feline upper respiratory tract aspergillosis (URTA) occurs as two distinct anatomical forms, namely, sino-nasal aspergillosis (SNA) and sino-orbital aspergillosis (SOA). An emerging pathogen, Aspergillus felis, is frequently involved. The pathogenesis of URTA, in particular the relationship between the infecting isolate and outcome, is poorly understood. In this study, computed tomography was used to investigate the route of fungal infection and extension in 16 cases (SNA n = 7, SOA n = 9) where the infecting isolate had been identified by molecular testing. All cases had nasal cavity involvement except for one cat with SNA that had unilateral frontal sinus changes. There was a strong association between the infecting species and anatomic form (P = 0.005). A. fumigatus infections remained within the sino-nasal cavity, while cryptic species infections were associated with orbital and paranasal soft-tissue involvement and with orbital lysis. Cryptic species were further associated with a mass in the nasal cavity, paranasal sinuses or nasopharynx. Orbital masses showed heterogeneous contrast enhancement, with central coalescing hypoattenuating foci and peripheral rim enhancement.
Severe, cavitated turbinate lysis, typical of canine SNA, was present only in cats with SNA. These findings support the hypothesis that the nasal cavity is the portal of entry for fungal spores in feline URTA and that the route of extension to involve the orbit is via direct naso-orbital communication from bone lysis. Additionally, a pathogenic role for A. wyomingensis and a sinolith in a cat with A. udagawae infection are reported for the first time.

**Benzalkonium chloride exposure in cats: a retrospective analysis of 245 cases reported to the Veterinary Poisons Information Service (VPIS).**

*Vet Rec* (2014)

*Bates, N., and N. Edwards*

Benzalkonium chloride is commonly found in household products. This retrospective study examined 245 cases of feline exposure to benzalkonium chloride-containing products reported to the Veterinary Poisons Information Service (VPIS). A single route of exposure was reported in 188 cats (ingestion 126, skin 58, buccal 4); 57 cats had multiple routes. The common products involved were household antibacterial cleaners (43.6 per cent), household disinfectants (22.3 per cent) and patio cleaners (17.5 per cent). The most common signs were hypersalivation/drooling (53.9 per cent), tongue ulceration (40.4 per cent), hyperthermia (40.4 per cent) and oral ulceration (22.9 per cent). The mean time recorded for onset of the first clinical sign was 6.4 hours (range five minutes to 48 hours, median 4.5 hours, n=60), however, the VPIS was not contacted until 14.0 +/- 13.2 hours after exposure (n=120). This figure also reflects the time of presentation. The most common treatments given were antibiotics (82.0 per cent), fluids (50.2 per cent), analgesia (45.3 per cent), gastroprotectants (31.0 per cent), dermal decontamination (24.1 per cent) and steroids (22.7 per cent). 13 cats (5.3 per cent) received syringe or nasogastric feeding. Of 245 cats, 12 (4.9 per cent) remained asymptomatic, 230 (93.9 per cent) recovered and three died (1.2 per cent). The time to recovery ranged from 1 to 360 hours (n=67) with a mean of 100.4 +/- 82.0 hours (4.2 +/- 3.4 days, median 72 hours).

**Felis catus gammaherpesvirus 1; a widely endemic potential pathogen of domestic cats.**


Felis catus gammaherpesvirus 1 (FcaGHV1), recently discovered in the USA, was detected in domestic cats in Australia (11.4%, 95% confidence interval 5.9-19.1, n=110) and Singapore (9.6%, 95% confidence interval 5.9-14.6, n=176) using qPCR. FcaGHV1 qPCR positive cats were 2.8 times more likely to be sick than healthy. Risk factors for FcaGHV1 detection included being male, increasing age and coinfection with pathogenic retroviruses, feline immunodeficiency virus (FIV) or feline leukaemia virus. FcaGHV1 DNA was detected in multiple tissues from infected cats with consistently high virus loads in the small intestine. FcaGHV1 viral load was significantly higher in FIV-infected cats compared with matched controls, mimicking increased Epstein-Barr virus loads in human immunodeficiency virus-infected humans. FcaGHV1 is endemic in distant geographic regions and is associated with being sick and with coinfections. Horizontal transmission of FcaGHV1 is supported, with biting being a plausible route. A pathogenic role for FcaGHV1 in domestic cats is supported.
Presumed primary intraocular chondrosarcoma in cats.


Beckwith-Cohen, B., L. B. Teixeira, and R. R. Dubielzig

Following unilateral enucleation, 4 Domestic Shorthair cats with an average age of 12.5 years (range: 9-16 years) were histologically diagnosed with a presumed primary intraocular chondrosarcoma at the Comparative Ocular Pathology Laboratory of Wisconsin (Madison, Wisconsin). Medical records and follow-up were available for 3 of the 4 cats. Clinically, only 1 eye was affected in each cat; a mass lesion was noted in 2 cats, and a neoplasm was suspected in the other 2 cats. Grossly, 3 tumors presented as coalescing, poorly demarcated, white, friable masses filling the vitreous and intraocular chambers; 1 tumor presented as a solitary, well-demarcated, tan mass involving the iris and ciliary body. Histologically, all 4 neoplasms were composed of haphazardly arranged plump neoplastic spindle cells surrounded by irregular islands and thick trabeculae of abundant, variably basophilic, and Alcian blue-positive chondromatous matrix. None of the cats presented histologically or clinically with signs suggestive of feline posttraumatic ocular sarcoma. Two cats are still alive and healthy 6 months and 3 years following enucleation. One cat died 6 months following enucleation; however, this cat suffered from poorly controlled diabetes mellitus, and the cause of death is undetermined. No other tumors or skeletal lesions were identified that could suggest a metastatic tumor to the eye. The origin of primary intraocular chondrosarcoma is unclear, but is presumed to be ocular multipotent mesenchymal stem cells. Four cases of intraocular chondrosarcoma in cats not associated with the posttraumatic sarcoma complex of intraocular tumors are described.

Faecal microbiota of cats with insulin-treated diabetes mellitus.


Microorganisms within the gastrointestinal tract significantly influence metabolic processes within their mammalian host, and recently several groups have sought to characterise the gastrointestinal microbiota of individuals affected by metabolic disease. Differences in the composition of the gastrointestinal microbiota have been reported in mouse models of type 2 diabetes mellitus, as well as in human patients. Diabetes mellitus in cats has many similarities to type 2 diabetes in humans. No studies of the gastrointestinal microbiota of diabetic cats have been previously published. The objectives of this study were to compare the composition of the faecal microbiota of diabetic and non-diabetic cats, and secondarily to determine if host signalment and dietary factors influence the composition of the faecal microbiota in cats. Faecal samples were collected from insulin-treated diabetic and non-diabetic cats, and Illumina sequencing of the 16S rRNA gene and quantitative PCR were performed on each sample. ANOSIM based on the unweighted UniFrac distance metric identified no difference in the composition of the faecal microbiota between diabetic and non-diabetic cats, and no significant differences in the proportions of dominant bacteria by phylum, class, order, family or genus as determined by 16S rRNA gene sequencing were identified between diabetic and non-diabetic cats. qPCR identified a decrease in Faecalibacterium spp. in cats aged over ten years. Cat breed or gender, dietary carbohydrate, protein or fat content, and dietary formulation (wet versus dry food) did not affect the composition of the faecal microbiota. In conclusion, the composition of the faecal microbiota was not altered by the presence of diabetes mellitus in cats. Additional studies that compare the functional products of the microbiota in diabetic and non-diabetic cats are warranted to further
investigate the potential impact of the gastrointestinal microbiota on metabolic diseases such as diabetes mellitus in cats.

**Behavioral frequency discrimination ability of partially deafened cats using cochlear implants.**


*Benovitski, Y. B., P. J. Blamey, G. D. Rathbone, and J. B. Fallon*

The aim of this study was to determine the effects of cochlear implant (CI) use on behavioral frequency discrimination ability in partially deafened cats. We hypothesized that the additional information provided by the CI would allow subjects to perform better on a frequency discrimination task. Four cats with a high frequency hearing loss induced by ototoxic drugs were first trained on a go/no-go, positive reinforcement, frequency discrimination task and reached asymptotic performance (measured by d’ - detection theory). Reference frequencies (1, 4, and 7 kHz) were systematically rotated (Block design) every 9-11 days to cover the hearing range of the cats while avoiding bias arising from the order of testing. Animals were then implanted with an intracochlear electrode array connected to a CI and speech processor. They then underwent 6 months of continuous performance measurement with the CI turned on, except for one month when the stimulator was turned off. Overall, subjects performed the frequency discrimination task significantly better with their CI turned on than in the CI-off condition (3-way ANOVA, p < 0.001). The analysis showed no dependence on subject (3-way ANOVA, subject x on-off condition, p > 0.5); however, the CI only significantly improved performance for two (1 and 7 kHz) of the three reference frequencies. In this study we were able to show, for the first time, that cats can utilize information provided by a CI in performing a behavioral frequency discrimination task.

**Accuracy of cytology in distinguishing adrenocortical tumors from pheochromocytoma in companion animals.**


**BACKGROUND:** The distinction between adrenocortical tumors and pheochromocytoma can be challenging using clinical findings, diagnostic imaging and laboratory tests. Cytology might be a simple, minimally invasive method to reach a correct diagnosis. **OBJECTIVES:** The purpose of this study was to assess the accuracy of cytology in differentiating cortical from medullary tumors of the adrenal glands in dogs and cats. **METHODS:** Cytologic key features of adrenocortical tumors and pheochromocytoma were defined by one reference author. Cytologic specimens from primary adrenal tumors were submitted to 4 cytopathologists who were asked to classify the tumors based on the previously defined key features without knowledge of previous classification. **RESULTS:** Twenty specimens from histologically confirmed adrenal tumors (Group 1) and 4 specimens from adrenal tumors causing adrenal-dependent Cushing’s syndrome (Group 2) were evaluated by the 4 cytopathologists. Accuracy in differentiating cortical from medullary origin ranged from 90% to 100%, with a Kappa coefficient of agreement between cytopathologists of 0.95. **CONCLUSIONS:** The origin of an adrenal tumor can be easily determined by cytology alone in many cases. However, cytology was not reliable in distinguishing benign from malignant neoplasia. Additional studies are needed to assess possible risks and complications associated with fine-needle biopsy of adrenal tumors in dogs and cats.
Primary immune-mediated thrombocytopenia and immune-mediated neutropenia suspected in a 21-week-old Maine Coon cat.


Best, M. P., and D. R. Fry

CASE REPORT: A 21-week-old Maine Coon cat presented with an acute-onset coagulopathy. Severe concurrent thrombocytopenia and neutropenia were identified on peripheral blood smears and bone marrow cytology supported a peripheral consumptive process. Other than mild superficial haemorrhage, the cat was clinically well and screening for retroviral diseases, abdominal ultrasound examination, thoracic radiography, haematology and biochemistry panels did not identify an underlying disease. There was no historical pharmaceutical or toxicological trigger noted and the cat was from an area without endemic Ehrlichia spp. There was a rapid resolution of both cytopenias following treatment with immunosuppressive doses of prednisolone, though a mild relapse occurred during gradual prednisolone withdrawal and was responsive to a dose increase. CONCLUSIONS: This report describes this combination of diseases for the first time in a cat and presents a younger patient than previously described with feline primary immune-mediated haematological disease.

Clinical evaluation of alfaxalone to induce and maintain anaesthesia in cats undergoing neutering procedures.


Beths, T., G. Touzot-Jourde, G. Musk, and K. Pasloske

This study looked at the use and efficacy of alfaxalone for total intravenous anaesthesia (TIVA) in cats. Following intramuscular medetomidine (20 mug/kg) and morphine (0.3 mg/kg) premedication, anaesthesia was induced and maintained with intravenous alfaxalone. Patients were breathing 100% oxygen. Heart rate (HR), respiratory rate (RR), end-tidal carbon dioxide, oxygen saturation of haemoglobin and indirect arterial blood pressure via Doppler (DAP) were recorded every 5 mins. Thirty-four cats (10 males and 24 females), between the age of 6 and 18 months, and weighing between 1.8 and 5.3 kg, and undergoing neutering procedures were included in this study. The results are presented as median (min, max) values. The time to first spontaneous movement (TS) was >30 mins in 19 cats, of which 12 received atipamezole for reversal of the effects of medetomidine. The TS was 53 (43, 130) mins in these 12 cats and 50 (40, 72) mins in the other seven cats. The body temperature in those 19 cats was significantly lower than the other cats (P = 0.05). The alfaxalone induction dose and maintenance infusion rate were1.7 (0.7, 3.0) mg/kg and 0.18 (0.06, 0.25) mg/kg/min, respectively. The HR, RR and DAP were 145 (68, 235) beats/min, 17 (5, 40) breaths/min and 110 (58, 210) mmHg, respectively. Apnoea was not observed in any cat. In conclusion, alfaxalone TIVA in combination with medetomidine and morphine premedication was effective in feral and domestic cats for the performance of neutering surgery; low body temperature might have resulted in longer recoveries in some cats.

Occurrence of Dipylidium caninum in fleas from client-owned cats and dogs in Europe using a new PCR detection assay.

Ctenocephalides fleas are not only the most prevalent ectoparasites of dogs and cats but also the intermediate host of the cestode Dipylidium caninum. Due to the poor sensitivity of coproscopy to diagnose cat and dog infestation by Dipylidium, few epidemiological data are available on its prevalence among pet populations. A new PCR method was developed to specifically identify D. caninum rDNA inside single fleas. The PCR test was then applied to 5529 fleas of Ctenocephalides genus, 2701 Ctenocephalides felis fleas (1969 collected on 435 cats and 732 on 178 dogs) and 2828 Ctenocephalides canis fleas collected from 396 dogs. Precisely, 4.37% of cats were infected by a flea population infected with D. caninum. Out of the 1969 C. felis from cats, 2.23% were found to be infected with Dipylidium. From the 396 dogs infested with C. canis, 9.11% were infected with the Dipylidium infected fleas, which is significantly higher than the observation made in cats (p=0.03). Moreover, 3.1% of the C. canis fleas were found to be infected with Dipylidium, which is not significantly different than in C. felis. Looking at the number of infected fleas in the positive samples (at least one PCR positive flea in a sample), the infestation rate in samples was varied from 3 to 100% with an average of 19.7% which is in favour of easy and regular Dipylidium reinfestations of both cats and dogs in households. For the first time, the spread of D. caninum between fleas and dogs and cats is confirmed throughout Europe.

Preventive efficacy of a topical combination of fipronil--(S)-methoprene--eprinomectin--praziquantel against ear mite (Otodectes cynotis) infestation of cats through a natural infestation model.


Beugnet, F., E. Bouhsira, L. Halos, and M. Franc

A study based on naturally infested cats was designed to evaluate the effectiveness of a single treatment with a topical formulation containing fipronil, (S)-methoprene, eprinomectin and praziquantel, for the prevention of Otodectes cynotis infestation in cats. Six treated cats and six untreated cats were housed with three chronically Otodectes cynotis-infested cats, respectively. The cats of each group were kept together in a 20-m(2) room for 1 month. Both clinical examination and ear mite counts were conducted on Day 28. All donor cats were confirmed to be chronically infested with Otodectes cynotis on Day 1 and Day 28. From untreated control cats, 129 live mites were recovered on Day 28 and all cats were found to be infested. In the treated group, three cats were found to be infested, with a total of five live mites recovered, the difference between the two groups being significant (p = 0.003). One treatment corresponded to 96% preventive efficacy at Day 28 based on ear mite counts. With regard to cerumen, the clinical score increased significantly for untreated cats between Day -1 and Day 28 (p = 0.00026) and not for treated cats (p = 0.30). The difference in cerumen abundance was significant between untreated and treated cats on Day 28 (p = 0.0035). Concerning the pruritic reflex in at least one ear, all cats were negative at inclusion. All six untreated cats became positive and showed a reflex on Day 28, whereas no treated cat showed ear pruritus (p = 0.00026).

Metronomic chemotherapy in veterinary patients with cancer: rethinking the targets and strategies of chemotherapy.
Cancer chemotherapy in dogs and cats has traditionally involved administration of chemotherapy agents at the maximum tolerated dose. Cytotoxic chemotherapy has an acceptably low risk of serious toxicity, but an obligatory rest period must be included to allow for recovery of drug-sensitive normal cell populations. This rest period can also allow significant recovery of tumor cells. Metronomic chemotherapy is characterized by more frequent administration of lower doses of oral drugs and appears to halt or slow tumor progression through multiple mechanisms. This approach may be at least as effective as conventional chemotherapy with a lower risk of toxicity.

Characterization of kidney injury molecule-1 in cats.

**Bland, S. K., O. Cote, M. E. Clark, J. DeLay, and D. Bienzle**

BACKGROUND: Kidney disease (KD) is common in older cats and presumed to arise from subclinical kidney injuries throughout life. Sensitive markers for detecting kidney injury are lacking. Kidney injury molecule 1 (KIM-1) is a useful biomarker of kidney injury in humans and rodents. HYPOTHESIS/OBJECTIVES: Feline KIM-1 is conserved across species, expressed in kidney, and shed into urine of cats with acute kidney injury (AKI). The objectives were to characterize the feline KIM-1 gene and protein, assess available immunoassays for detecting KIM-1 in urine of cats, and identify KIM-1 expression in kidney sections. ANIMALS: Samples from 36 hospitalized and 7 clinically healthy cats were evaluated. Hospitalized cats were divided into 2 groups based on absence (n = 20) or presence (n = 16) of historical KD. METHODS: Feline KIM-1 genomic and complementary DNA sequences were amplified, sequenced and analyzed to determine the presence of isoforms, exon-intron organization and similarity with orthologous sequences. Presence in urine was evaluated by immunoassay and expression in kidney by immunohistochemistry. RESULTS: Three expressed feline KIM-1 transcript variants comprising 894, 810, and 705 bp were identified in renal tissue. KIM-1 immunoassays yielded positive results in urine of cats with conditions associated with AKI, but not chronic KD. Immunohistochemistry of kidney sections identified KIM-1 in proximal tubular cells of cats with positive urine immunoassay results. CONCLUSIONS AND CLINICAL IMPORTANCE: Kidney injury molecule 1 was expressed in specific segments of the nephron and detected in urine of cats at risk of AKI. Urine KIM-1 immunoassay may be a useful indicator of tubular injury.
opinion practices (control group; 199 cats). The response rate was 67.0% (310 returned: 175 radioiodine, 135 control). Of 135 controls, 72 (53.3%) were unaware of radioiodine as a treatment option. Owners of cats 15 years old and uninsured cats were less likely to pursue radioiodine. Cost of treatment, travel distance, potential human or animal health risks and waiting periods for radioiodine had a low impact on owners’ treatment choice. Owners reported a moderate level of concern about treatment hospitalisation length, which included (158 respondents) the possibility of the cat being unhappy 130 (82.3%), owner missing the cat 102 (64.6%), inappetence 50 (31.6%), other pets missing the cat 32 (20.3%), development of co-morbid disease 28 (17.7%) and side effects 25 (15.8%). Owners assessed their cat’s quality of life on a scale of 1 (very poor) to 10 (excellent), as 4 (4) (median [interquartile range]) pre-radioiodine (134 respondents) and 9 (2) post-radioiodine (131 respondents). Of 132 respondents, 121 (91.7%) were happy with their decision to choose radioiodine. The results of this questionnaire may assist veterinarians in addressing common owner concerns when discussing radioiodine as a treatment option for hyperthyroidism.

**Plasma cardiac troponin I concentration and cardiac death in cats with hypertrophic cardiomyopathy.**


Borgeat, K., K. Sherwood, J. R. Payne, V. Luis Fuentes, and D. J. Connolly

BACKGROUND: The use of cardiac biomarkers to assist in the diagnosis of occult and symptomatic hypertrophic cardiomyopathy (HCM) in cats has been established. There is limited data describing their prognostic utility in cats with HCM. HYPOTHESIS: Circulating concentrations of N-terminal B-type natriuretic peptide (NTproBNP) and cardiac troponin I (cTnI) predict cardiac death in cats with HCM.

ANIMALS: Forty-one cats diagnosed with HCM at a veterinary teaching hospital, between February 2010 and May 2011. METHODS: Prospective investigational study. Plasma samples were collected from cats diagnosed with HCM and concentrations of NTproBNP and cTnI were analyzed at a commercial laboratory. Echocardiographic measurements from the day of blood sampling were recorded. Long-term outcome data were obtained. Associations with time to cardiac death were analyzed using Cox proportional hazards models. RESULTS: When controlling for the presence/absence of heart failure and echocardiographic measures of left atrial size and function, cTnI > 0.7 ng/mL was independently associated with time to cardiac death. In univariable analysis, NTproBNP > 250 pmol/L was associated with cardiac death (P =.023), but this did not remain significant (P =.951) when controlling for the effect of clinical signs or left atrial size/function. CONCLUSIONS AND CLINICAL IMPORTANCE: Plasma concentration of cTnI (cutoff >0.7 ng/mL) is a predictor of cardiac death in cats with HCM that is independent of the presence of heart failure or left atrial dilatation.

**Alpha-mannosidosis - a review of genetic, clinical findings and options of treatment.**


Borgwardt, L., A. M. Lund, and C. I. Dali

Alpha-mannosidosis (OMIM 248500) is a rare, autosomal recessive, multisystemic, progressive lysosomal storage disorder caused by a deficiency of alpha-mannosidase. It has been described in humans, cattle, domestic cats, mice and guinea pigs. In humans, alpha-mannosidosis results in
progressive facial- and skeletal abnormalities, motor impairment, hearing impairment, intellectual disability, recurrent infections and immune deficiency. This review provides detailed information regarding the variability of manifestations and a description of current treatment and treatment under investigation for alpha-mannosidosis. The pathology, genetics and clinical pictures, including impairments in the activity of daily living are discussed.

**Mutations in the 3c and 7b genes of feline coronavirus in spontaneously affected FIP cats.**


*Borschensky, C. M., and M. Reinacher*

Feline infectious peritonitis (FIP) is the most frequent lethal infectious disease in cats. However, understanding of FIP pathogenesis is still incomplete. Mutations in the ORF 3c/ORF 7b genes are proposed to play a role in the occurrence of the fatal FIPV biotype. Here, we investigated 282 tissue specimens from 28 cats that succumbed to FIP. Within one cat, viral sequences from different organs were similar or identical, whereas greater discrepancies were found comparing sequences from various cats. Eleven of the cats exhibited deletions in the 3c gene, resulting in truncated amino acid sequences. The 7b gene was affected by deletions only in one cat. In three of the FIP cats, coronavirus isolates with both intact 3c genes as well as 7b genes of full length could also be detected. Thus, deletions or stop codons in the 3c sequence seem to be a frequent but not compelling feature of FIPVs.

**Correlation of gross urine color with diagnostic findings in male cats with naturally occurring urethral obstruction.**

*J Feline Med Surg (2014)*

*Brabson, T. L., C. P. Bloch, and J. A. Johnson*

Seventy-five male cats with urethral obstruction were prospectively enrolled to evaluate gross urine color at urinary catheter placement for correlation with diagnostic findings. Cats with darker red urine were more likely to be azotemic (serum creatinine concentration >2.0 mg/dl [177 micromol/l]), and urine color correlated well with serum creatinine and serum potassium concentrations. Darker urine color was negatively correlated with urine specific gravity. Urine color was not associated with the presence or absence of lower urinary tract stones on radiographs or ultrasound. Cats with darker red urine at the time of urinary catheter placement are likely to have more significant metabolic derangements and may require more aggressive supportive care.

**Relationship between Serum Symmetric Dimethylarginine Concentration and Glomerular Filtration Rate in Cats.**


*Braff, J., E. Obare, M. Yerramilli, J. Elliott, and M. Yerramilli*

BACKGROUND: Direct measurement of glomerular filtration rate (GFR) is the preferred method to assess renal function in cats, but it is not widely used in the diagnosis of chronic kidney disease (CKD). In cats with CKD, symmetric dimethylarginine (SDMA) has been shown to increase and to correlate with plasma creatinine concentrations. HYPOTHESIS: In cats, reduced GFR corresponds with
increased serum SDMA concentration. ANIMALS: The study group consisted of ten client-owned cats whose GFR had been measured previously. Cats ranged in age from 11.1 to 16.9 years; both azotemic and nonazotemic animals were included. METHODS: Glomerular filtration rate was determined for each cat by plasma iohexol clearance using the three sample slope-intercept method, and serum SDMA concentration was measured by liquid chromatography-mass spectrometry. RESULTS: A linear relationship was observed between GFR and the reciprocal of serum SDMA concentration (R(2) = 0.82, P < .001). A similar relationship was found between GFR and the reciprocal of plasma creatinine concentration (R(2) = 0.81, P < .001). CONCLUSIONS AND CLINICAL IMPORTANCE: Increased serum SDMA concentrations were observed in cats with reduced renal function as determined by direct measurement of GFR. This finding indicates that SDMA could have clinical applications in the diagnosis of CKD in cats.

Detection of Ehrlichia canis in domestic cats in the central-western region of Brazil.


Ehrlichiosis is a worldwide distributed disease caused by different bacteria of the Ehrlichia genus that are transmitted by arthropod vectors. Its occurrence in dogs is considered endemic in several regions of Brazil. Regarding cats, however, few studies have been done and, consequently, there is not enough data available. In order to detect Ehrlichia spp. in cats from the central-western region of Brazil, blood and serum samples were collected from a regional population of 212 individuals originated from the cities of Cuiaba and Varzea Grande. These animals were tested by the Immunofluorescence Assay (IFA) and the Polymerase Chain Reaction (PCR) designed to amplify a 409 bp fragment of the dsb gene. The results obtained show that 88 (41.5%) cats were seropositive by IFA and 20 (9.4%) cats were positive by PCR. The partial DNA sequence obtained from PCR products yielded twenty samples that were found to match perfectly the Ehrlichia canis sequences deposited on GenBank. The natural transmission of Ehrlichia in cats has not been fully established. Furthermore, tick infestation was not observed in the evaluated cats and was not observed any association between age, gender and positivity of cats in both tests. The present study reports the first serological and molecular detection of E. canis in domestic cats located in the endemic area previously mentioned.

The association between landscape and climate and reported tick paralysis cases in dogs and cats in Australia.


Brazier, I., M. Kelman, and M. P. Ward

The aim of this study was to describe the association between landscape and climate factors and the occurrence of tick paralysis cases in dogs and cats reported by veterinarians in Australia. Data were collated based on postcode of residence of the animal and the corresponding landscape (landcover and elevation) and climate (precipitation, temperature) information was derived. During the study period (October 2010-December 2012), a total of 5560 cases (4235 [76%] canine and 1325 [24%] feline cases) were reported from 341 postcodes, mostly along the eastern seaboard of Australia and from the states of New South Wales and Queensland. Significantly more cases were reported from postcodes
which contained areas of broadleaved, evergreen tree coverage (P=0.0019); broadleaved, deciduous open tree coverage (P=0.0416); and water bodies (P=0.0394). Significantly fewer tick paralysis cases were reported from postcodes which contained areas of sparse herbaceous or sparse shrub coverage (P=0.0297) and areas that were cultivated and managed (P=0.0005). No significant (P=0.6998) correlation between number of tick paralysis cases reported per postcode and elevation was found. Strong positive correlations were found between number of cases reported per postcode and the annual minimum (rSP=0.9552, P<0.0001) and maximum (rSP=0.9075; P=0.0001) precipitation. Correlations between reported tick paralysis cases and temperature variables were much weaker than for precipitation, rSP<0.23. For maximum temperature, the strongest correlation between cases was found in winter (rSP=0.1877; P=0.0005) and for minimum temperature in autumn (rSP=0.2289; P<0.0001). Study findings suggest that tick paralysis cases are more likely to occur and be reported in certain eco-climatic zones, such as those with higher rainfall and containing tree cover and areas of water. Veterinarians and pet owners in these zones should be particularly alert for tick paralysis cases to maximize the benefits of early treatment, and to be vigilant to use chemical prophylaxis to reduce the risk of tick parasitism.

Feline lungworm *Oslerus rostratus* (Strongylida: Filaridae) in Italy: first case report and histopathological findings.


Oslerus rostratus syn. Anafilaroides rostratus (Strongylida: Filaroididae) is a metastrongyloid transmitted by snails, which localizes in peri-bronchial tissues and in the lung parenchyma of wild as well as domestic cats. In Europe, this nematode has been reported only on two occasions, being diagnosed in cats from Majorca Island and in northern Spain. Here, we describe a case of *O. rostratus* infection in a necropsied 4-year-old cat in Sicily (southern Italy). At the inspection of lungs, slender and greyish nematodes (four females and two males) were found embedded in the peri-bronchial tissues and in the bronchial walls. Parasites were morphological and molecularly identified as *O. rostratus*, with their 18S sequences being identical among them and showing a high homology (99%) with those available in public databases. At the histology, nematodes were encapsulated in a pseudocystic formation surrounded by an interstitial inflammatory process and fibrous tissue. Lung lesions were mainly represented by peri-luminal fibrosis, hyperplasia and hypertrophy of the bronchial mucosa and glands, respectively. This first record of *O. rostratus* infection from Italy indicates that this parasite should be included in the differential diagnosis of feline of lungworm infection.

Age, Breed Designation, Coat Color, and Coat Pattern Influenced the Length of Stay of Cats at a No-Kill Shelter.

J Appl Anim Welf Sci (2014) 1-12.

Brown, W. P., and K. T. Morgan

Adoption records from the Tompkins County Society for the Prevention of Cruelty to Animals, an open-admission, no-kill shelter in New York State, were examined to determine if various physical attributes influenced the length of stay (LOS) of cats and kittens. Similar reports from other no-kill
Shelters have not been published. LOS averaged 61.2 days for cats and kittens combined and ranged from less than 1 day to 730 days. Based on mixed models that accounted for lack of independence among attributes, younger, lighter-colored cats were generally adopted more quickly than older, more darkly colored cats, but yellow-colored cats had the greatest LOS. Coat color did not influence LOS for kittens. Coat patterning and breed designation influenced LOS in both cats and kittens. Male cats and kittens had a shorter LOS than female cats and kittens, respectively. Studies from traditional shelters also demonstrated the importance of physical characteristics to adopters. Given adopter preferences for companion animals with certain characteristics, methods to reduce the LOS for cats with the longest potential residences at the shelter require continued development.

Assessing risks to non-target species during poison baiting programs for feral cats.


Buckmaster, T., C. R. Dickman, and M. J. Johnston

Poison baiting is used frequently to reduce the impacts of pest species of mammals on agricultural and biodiversity interests. However, baiting may not be appropriate if non-target species are at risk of poisoning. Here we use a desktop decision tree approach to assess the risks to non-target vertebrate species in Australia that arise from using poison baits developed to control feral house cats (Felis catus). These baits are presented in the form of sausages with toxicant implanted in the bait medium within an acid-soluble polymer capsule (hard shell delivery vehicle, or HSDV) that disintegrates after ingestion. Using criteria based on body size, diet and feeding behaviour, we assessed 221 of Australia’s 3,769 native vertebrate species as likely to consume cat-baits, with 47 of these likely to ingest implanted HSDVs too. Carnivorous marsupials were judged most likely to consume both the baits and HSDVs, with some large-bodied and ground-active birds and reptiles also consuming them. If criteria were relaxed, a further 269 species were assessed as possibly able to consume baits and 343 as possibly able to consume HSDVs; most of these consumers were birds. One threatened species, the Tasmanian devil (Sarcophilus harrisii) was judged as definitely able to consume baits with implanted HSDVs, whereas five threatened species of birds and 21 species of threatened mammals were rated as possible consumers. Amphibia were not considered to be at risk. We conclude that most species of native Australian vertebrates would not consume surface-laid baits during feral cat control programs, and that significantly fewer would be exposed to poisoning if HSDVs were employed. However, risks to susceptible species should be quantified in field or pen trials prior to the implementation of a control program, and minimized further by applying baits at times and in places where non-target species have little access.

Natural pet food: a review of natural diets and their impact on canine and feline physiology.


Buff, P. R., R. A. Carter, J. E. Bauer, and J. H. Kersey

The purpose of this review is to clarify the definition of “natural” as it pertains to commercial pet food and to summarize the scientific findings related to natural ingredients in pet foods and natural diets on the impact of pet health and physiology. The term “natural,” when used to market commercial pet foods or pet food ingredients in the United States, has been defined by the Association of American Feed Control Officials and requires, at minimum, that the pet food be preserved with natural
preservatives. However, pet owners may consider natural as something different than the regulatory definition. The natural pet food trend has focused on the inclusion of whole ingredients, including meats, fruits, and vegetables; avoiding ingredients perceived as heavily processed, including refined grains, fiber sources, and byproducts; and feeding according to ancestral or instinctual nutritional philosophies. Current scientific evidence supporting nutritional benefits of natural pet food products is limited to evaluations of dietary macronutrient profiles, fractionation of ingredients, and the processing of ingredients and final product. Domestic cats select a macronutrient profile (52% of ME from protein) similar to the diet of wild cats. Dogs have evolved much differently in their ability to metabolize carbohydrates and select a diet lower in protein (30% of ME from protein) than the diet of wild wolves. The inclusion of whole food ingredients in natural pet foods as opposed to fractionated ingredients may result in higher nutrient concentrations, including phytonutrients. Additionally, the processing of commercial pet food can impact digestibility, nutrient bioavailability, and safety, which are particularly important considerations with new product formats in the natural pet food category. Future opportunities exist to better understand the effect of natural diets on health and nutrition outcomes and to better integrate sustainable practices in the production of natural pet foods.

**Crossbred cats live longer than purebred cats.**


*Cabral, L.*

**Comparison of two techniques for the detection of flea faeces in canine and feline coat brushings.**


*Cadiergues, M. C., C. Cabaret-Mandin, and C. Solatges*

Flea infestation is diagnosed after the detection of either adult parasites or flea faeces in the fur. The latter is generally tested with the wet blotting paper technique (WBPT). However, microscopical examination (MT) of the coat brushing material is sometimes suggested as an alternative. This study aimed to compare the efficiency of the two techniques. In dogs, the entire body was hand-brushed and cats were combed. One half of the collected material was mounted in liquid paraffin on a glass slide and examined microscopically at low magnification. The second half was placed on a blotting paper and sterile water was added. After drying, reddish aureoles were counted. 255 animals (158 dogs and 97 cats) were included. 119 (47%) and 94 (37%) samples were revealed to be positive with WBPT and MT, respectively. 13 cases (5%) were positive with MT only and 38 cases (15%) were positive with WBPT only. 81 cases (32%) were positive and 123 (48%) were negative with both techniques. More positive cases were detected by WBPT than MT (P < 0.001). Amongst the 51 samples which were found positive with a sole technique, infestation was considered low in 43 cases and WBPT detected significantly more positive samples (31) than MT (12), P < 0.01.

**Evaluation of an indirect ELISA using recombinant granule antigen GRA7 for serodiagnosis of Toxoplasma gondii infection in cats.**

J Parasitol (2014)
Cai, Y., Z. Wang, J. Li, N. Li, F. Wei, and Q. Liu

Abstract The precise detection of Toxoplasma gondii infection in cats has important public health significance. In the present study, recombinant granule antigen protein GRA7 was evaluated as a potential diagnostic marker for T. gondii infection in cats by an indirect enzyme-linked immunosorbent assay (ELISA) using the classified serum samples from cats by immunofluorescence assay (IFA) and modified agglutination test (MAT). It showed a perfect agreement (97.2%) between GRA7-ELISA and MAT/IFAT (Kappaappa=0.92; 95% confidence interval [CI], 0.85 to 0.99), and GRA7-ELISA had a sensitivity of 94.9% and a specificity of 97.9%. No significant difference (P>0.05) was observed between the detection results by GRA7- and Toxoplasma lysate antigen (TLA)-based ELISA. Receiver operating characteristic (ROC) analysis showed a relative sensitivity and specificity of 89.7% and 92.5% at the cut-off value of 0.1 for GRA7-ELISA. These data demonstrate that GRA7 is a promising serodiagnostic marker for T. gondii infection in cats.

Pneumonia associated with Salmonella spp. infection in a cat receiving cyclosporine.

Callegari, Palermo, Greco, Corrente, Piseddu, Auriemma, and Zini

Salmonellosis is uncommon in cats, usually affects the gastrointestinal tract or skin, and can be fatal. This report describes a domestic shorthair cat with severe pneumonia caused by Salmonella spp. without accompanying gastrointestinal or skin manifestations, in which previous administration of cyclosporine may have played a permissive role in its development. Clinical and laboratory findings as well as follow-up are described from diagnosis until complete recovery. This unusual presentation serves to alert practitioners to consider Salmonella spp. as a possible cause of lung disease in cats, especially if immunocompromised.

Comparison of the effects of propofol or alfaxalone for anaesthesia induction and maintenance on respiration in cats.
Vet Anaesth Analg (2014)

Campagna, I., A. Schwarz, S. Keller, R. Bettschart-Wolfensberger, and M. Mosing

OBJECTIVE: To compare the effects of propofol and alfaxalone on respiration in cats. STUDY DESIGN: Randomized, ‘blinded’, prospective clinical trial. ANIMALS: Twenty cats undergoing ovariohysterectomy. METHODS: After premedication with medetomidine 0.01 mg kg-1 intramuscularly and meloxicam 0.3 mg kg-1 subcutaneously, the cats were assigned randomly into two groups: group A (n = 10) were administered alfaxalone 5 mg kg-1 minute-1 followed by 10 mg kg-1 hour-1 intravenously (IV) and group P (n = 10) were administered propofol 6 mg kg-1 minute-1 followed by 12 mg kg-1 hour-1 IV for induction and maintenance of anaesthesia, respectively. After endotracheal intubation, the tube was connected to a non-rebreathing system delivering 100% oxygen. The anaesthetic maintenance drug rate was adjusted (+/- 0.5 mg kg-1 hour-1) every 5 minutes according to a scoring sheet based on physiologic variables and clinical signs. If apnoea > 30 seconds, end-tidal carbon dioxide (Pe’CO2) > 7.3 kPa (55 mmHg) or arterial haemoglobin oxygen saturation (SpO2) < 90% occurred, manual ventilation was provided. Methadone was administered postoperatively. Data were analyzed using independent-samples t-tests, Fisher’s exact test, linear mixed-effects models and binomial test. RESULTS: Manual ventilation was required in two and eight...
of the cats in group A and P, respectively (p = 0.02). Two cats in both groups showed apnoea. Pe’CO2 > 7.3 kPa was recorded in zero versus four and SpO2 < 90% in zero versus six cats in groups A and P respectively. Induction and maintenance dose rates (mean +/- SD) were 11.6 +/- 0.3 mg kg⁻¹ and 10.7 +/- 0.8 mg kg⁻¹ hour⁻¹ for alfaxalone and 11.7 +/- 2.7 mg kg⁻¹ and 12.4 +/- 0.5 mg kg⁻¹ hour⁻¹ for propofol. CONCLUSION AND CLINICAL RELEVANCE: Alfaxalone had less adverse influence on respiration than propofol in cats premedicated with medetomidine. Alfaxalone might be better than propofol for induction and maintenance of anaesthesia when artificial ventilation cannot be provided.

Human exposure to rabid free-ranging cats: a continuing public health concern in Pennsylvania.


Rabies in free-ranging cats have been a public health concern in Pennsylvania since raccoon variant rabies first was recognized in the state in the early 1980s. Over the last decade, between 1.5 and 2.5% of cats submitted to Pennsylvania’s state laboratories for rabies testing have been positive. In this report, we describe the extent of rabies in free-ranging cats in Pennsylvania. We also present two examples of human exposure to rabid free-ranging cats that occurred in Pennsylvania during 2010-2011 and the public health actions taken to address rabies exposure in the humans and animals. We then describe the concerns surrounding the unvaccinated and free-ranging cat population in Pennsylvania and possible options in managing this public and animal health problem.

Genetic characterization of Toxoplasma gondii isolates and toxoplasmosis seroprevalence in stray cats of Izmir, Turkey.


Currently, some Toxoplasma gondii genotypes are being associated with serious clinical presentations. A recent report showing the Africa 1 genotype in two local congenital toxoplasmosis cases acquired in Turkey formed the basis of this study because atypical Africa 1 genotype is most frequently detected in animals and patients from sub-Saharan Africa. Since stray cats are considered as the linkage between wild life and urban life in T. gondii transmission, the present study aimed to isolate and characterize T. gondii strains circulating in stray cats of Izmir (Western Turkey). A secondary objective was to determine toxoplasmosis seroprevalence in this cat population. Tissues obtained from 100 deceased stray cats were bioassayed and isolated strains were genotyped using 15 microsatellite markers. In addition, toxoplasmosis seroprevalence was analyzed in 1121 cat sera collected from several large veterinary clinics in Izmir. Among the 22 isolates, 19 were Type II (86.3%), two were Type III (9%) and one was Africa 1 genotype (4.5%). The overall seropositivity rates in cats were 42-48% and 33.4-34.4% according to IFA and ELISA, respectively. Seroprevalence in deceased cats was significantly higher than in healthy cats (P = 0.0033). Finding both the major clonal Type II lineage together with the Type III lineage also found in Middle East, and an atypical genotype, Africa 1 appears consistent with the specific geographic location of Turkey between three continents and raises the possibility of transportation of these strains between continents through trade routes or long distance migratory birds.
In addition, the first large study of toxoplasma seroprevalence in a stray cat population was also reported. The relatively high seropositivity rates and the variety of T. gondii genotypes confirm the local stray cat population as a risk factor for human toxoplasmosis in Izmir.

Factors influencing wound healing complications after wide excision of injection site sarcomas of the trunk of cats.


OBJECTIVE: Wide surgery is the mainstay of the multimodal treatment of injection site sarcomas (ISS) in cats. The aim of the study was to analyze potential factors influencing the development of wound healing complications (WHC) in cats undergoing wide excision of ISS. STUDY DESIGN: Retrospective case series. ANIMALS: Forty-nine cats with ISS located on the trunk underwent wide excision after contrast-enhanced computed tomography planning. METHODS: The prognostic effect of covariates (sex, age, weight, body condition score (BCS), site, clinical dimension (CD), computed tomographic dimension (CTD), histotype, duration of surgery, surgical margin status, local anesthesia) on total, major and minor WHC was evaluated by univariate and bivariate analysis. Cox model was used for total WHC and Fine and Gray model was used for major and minor WHC. The relationship between duration of surgery and clinical and imaging variables was evaluated. RESULTS: The main factor associated to the risk of total and major WHC was surgical time. Based on univariate analysis, pattern of reconstruction, CDT, CD, weight, and BCS were significant prognostic factors for major WHC, but this was not confirmed when adjusted for other clinical variables in bivariate analysis. The duration of surgery was influenced by excision pattern and tumor CTD width. CONCLUSIONS: An increased duration of surgery as the consequence of complex surgical procedures represented the best predictor for the development of WHC.

AAFP and ISFM Guidelines for Diagnosing and Solving House-Soiling Behavior in Cats.


RATIONALE: These Guidelines have been developed by the American Association of Feline Practitioners (AAFP) and the International Society of Feline Medicine (ISFM) as a resource for veterinary practitioners who want to better understand and manage the important clinical condition of house-soiling in their feline patients. The Guidelines offer straightforward, practical solutions that, in most cases, will help veterinarians and cat owners prevent, manage or entirely remEDIATE feline house-soiling behavior. EVIDENCE BASE: The Guidelines include scientifically documented information when it is available. However, because research is often lacking, some recommendations reflect the accumulated clinical experience of the authors.

Effect of GnRH analogs in postnatal domestic cats.

**Carranza, A., M. Faya, M. L. Merlo, P. Batista, and C. Gobello**

The aim of this study was to reproducively assess the clinical and hormonal effects of a GnRH agonist (AG) and an antagonist (AN) administered during the postnatal period in domestic cats. Forty-eight male and female postnatal kittens were randomly assigned to deslorelin acetate 1.6 mg subcutaneous (AG; n = 16), acyline 33 mg/100 g subcutaneous weekly for 3 months (AN; n = 16), or control (CO; n = 16) which remained untreated. The cats were followed up (behavioral observation, physical examination, fecal sexual steroid determinations, mating test, and pregnancy diagnosis) up to puberty. Puberty was delayed (weeks) in the AG animals (62.9 +/- 3.5; P < 0.01) but not in the AN (15.5 +/- 1.7; P > 0.05) when they were compared with CO kittens (13.4 +/- 0.4). Fifteen (15/16) of the AN and CO animals, and only 11 of 16 cats of the AG group were fertile (P > 0.1). No differences were found in body weight (P > 0.1) and measurements (P > 0.1), libido (P > 0.1) and in the appearance of side effects (P > 0.1; except a pyometra in an AG female) among groups. In both AG- and AN-treated males (testosterone; P < 0.01) and females (estradiol-17beta; P < 0.01) fecal hormone concentrations were lower than in CO group during the first five postnatal weeks but not later. It is concluded that the neonatal administration of these AG and AN decreased fecal sexual steroids during the first postnatal weeks causing, the agonists but not the antagonist, a significant, reversible delay in puberty appearance.

**Evaluation of indirect immunofluorescence antibody test and enzyme-linked immunosorbent assay for the diagnosis of infection by Leishmania infantum in clinically normal and sick cats.**

Exp Parasitol (2014)


Cats that live in areas where canine and human leishmaniosis due to Leishmania infantum is endemic may become infected and may develop anti-Leishmania antibodies. In this study 50 clinically normal and 50 cats with cutaneous and/or systemic signs that lived in an endemic area and had been previously examined for infection by L. infantum using PCR in four different tissues were serologically tested for the presence of anti-Leishmania IgG (IFAT and ELISA) and IgM (IFAT). The aim was to compare the results of IFAT, ELISA and PCR and to investigate the possible associations between seropositivity to Leishmania spp and signalment, living conditions, season of sampling, health status of the cats, and seropositivity to other infectious agents. Low concentrations of anti-Leishmania IgG were detected by IFAT in 10% of the cats and by ELISA in 1%, whereas anti-Leishmania IgM were detected by IFAT in 1%. There was disagreement between the results of IFAT and ELISA for anti-Leishmania IgG (P=0.039) and between all serological tests and PCR (P<0.001). The diagnostic sensitivity of all serological tests, using PCR as the gold standard, was very low, but ELISA and IFAT for anti-Leishmania IgM had 100% specificity. The diagnostic sensitivity of all serological tests could not be improved by changing the cut-off values. Seropositivity for Leishmania spp was not associated with signalment, living conditions, season of sampling and health status of the cats or with seropositivity to feline leukemia virus, feline immunodeficiency virus, feline coronavirus, Toxoplasma gondii and Bartonella henselae. In conclusion, because of their low sensitivity and very high specificity two of the evaluated serological tests (ELISA for anti-Leishmania IgG and IFAT for anti-Leishmania IgM) may be useless as population screening tests but valuable for diagnosing feline infection by L. infantum.

**Molecular characterisation and phylogenetic analysis of feline astrovirus in Korean cats.**
Astroviruses (AstVs) are important pathogens associated with enteric diseases in humans and other animals. However, most animal AstVs, including feline astrovirus (FAstV), are poorly understood. The aim of the present study was to investigate the prevalence and association of FAstV with enteric diseases in cats, and to conduct a molecular analysis of FAstVs, in Korea. Eleven faecal samples from 62 hospitalised cats at animal hospitals in the Moran market in South Korea tested positive for FAstV. The prevalence of FAstV was higher in cats <2 months old (25%) than in cats >2 months old (14.3%) (P = 0.31). Diarrhoea and normal faeces were observed in 19% (8/42) and 15% (3/20) of cats with FAstV, respectively (P = 1.00). Amino acid sequences alignment and phylogenetic tree analysis showed that FAstVs, including Korean strains, formed a single clade within the mamastroviruses.

Experimental infection of cats with Afipia felis and various Bartonella species or subspecies.

Based upon prior studies, domestic cats have been shown to be the natural reservoir for Bartonella henselae, Bartonella clarridgeiae and Bartonella koehlerae. However, other Bartonella species, such as Bartonella vinsonii subsp. berkholffii, Bartonella quintana or Bartonella bovis (ex weissii) have been either isolated from or Bartonella DNA sequences PCR amplified and sequenced. In the late 1980s, before B. henselae was confirmed as the etiological agent of cat scratch disease, Afipia felis had been proposed as the causative agent. In order to determine the feline susceptibility to A. felis, B. vinsonii subsp. berkholffii, Bartonella rochalimae, B. quintana or B. bovis, we sought to detect the presence of bacteremia and seroconversion in experimentally-inoculated cats. Most of the cats seroconverted, but only the cats inoculated with B. rochalimae became bacteremic, indicating that cats are not natural hosts of A. felis or the other Bartonella species or subspecies tested in this study.

IMAGING DIAGNOSIS-URINARY BLADDER Duplication in a CAT.
Vet Radiol Ultrasound (2014)
Cook, A. B., C. E. Langston, A. J. Fischetti, and T. A. Donovan

A female kitten presented for chronic, intermittent, antibiotic-responsive urinary incontinence and chronic kidney disease. Abdominal ultrasound identified bilateral pelvic/ureteral dilation and three closely apposed thin-walled fluid-filled structures in the caudal abdomen, extending toward the pelvic inlet. Excretory urography and negative contrast cystography identified contrast medium accumulation from the dilated ureters into two tubular soft tissue masses of the caudal abdomen, with subsequent gradual filling of a more cranially located urinary bladder. A retrograde vaginocystourethrogram identified a normal uterus, normal vagina, and a single urethra continuous with the cranially located urinary bladder. Antemortem diagnosis was suspicious for bilateral ectopic ureteroceles. Postmortem diagnosis, 35 months following initial presentation, determined the fluid-filled masses to have abundant smooth muscle in the wall, including a muscularis mucosa connected by a common ostium, consistent with urinary bladder duplication. Urinary bladder duplication should be included as a differential
diagnosis in cats with these clinical and imaging characteristics. In this case, differentiation of ectopic ureterocele from urinary bladder duplication required histological confirmation.

**Metabolic determinants of body weight after cats were fed a low-carbohydrate high-protein diet or a high-carbohydrate low-protein diet ad libitum for 8 wk.**

*Domest Anim Endocrinol* (2014) **49**:70-79.

*Coradini, M., J. S. Rand, J. M. Morton, and J. M. Rawlings*

Overweight and obese conditions are common in cats and are associated with the development of a number of diseases. Knowledge of metabolic determinants and predictors of weight gain may enable better preventative strategies for obesity in cats. Lean, healthy cats were fed either a low-carbohydrate high-protein diet (n 16) or a high-carbohydrate low-protein (n 16) diet ad libitum for 8 wk. Potential determinants and predictors of final body weight assessed were body fat and lean masses, energy required for maintenance, energy requirements above maintenance for each kilogram of weight gain, insulin sensitivity index, fasting, mean 24-h and peak plasma glucose, insulin, and leptin concentrations, and fasting and mean 24-h serum adiponectin concentrations. In cats fed the low-carbohydrate high-protein diet, after adjusting for initial body weight, those with higher energy requirements for weight gain and higher fasting glucose concentration had higher final body weights (P <= 0.01). Predicted final body weights using initial body weight, fasting glucose and mean 24-h insulin concentrations (partial R(2) 37.3%) were imprecise. An equation using just initial body weight and fasting glucose concentration would be of more practical value, but was marginally less precise. In cats fed the high-carbohydrate low-protein diet, those with lower fasting leptin concentration initially had higher final body weights (P = 0.01). Predicted final body weights using initial body weight, energy requirements for maintenance, total body fat percentage and fasting leptin concentration (partial R(2) 39.2%) were reasonably precise. Further studies are warranted to confirm these findings and to improve the precision of predicted final body weights.

**Forelimb and hindlimb ground reaction forces of walking cats: Assessment and comparison with walking dogs.**


*Corbee, R. J., H. Maas, A. Doornenbal, and H. A. Hazewinkel*

The primary aim of this study was to assess the potential of force plate analysis for describing the stride cycle of the cat. The secondary aim was to define differences in feline and canine locomotion based on force plate characteristics. Ground reaction forces of 24 healthy cats were measured and compared with ground reaction forces of 24 healthy dogs. Force-time waveforms in cats generated by force plate analysis were consistent, as reflected by intra-class correlation coefficients for peak vertical force, peak propulsive force and peak braking force (0.94-0.95, 0.85-0.89 and 0.89-0.90, respectively). Compared with dogs, cats had a higher peak vertical force during the propulsion phase (cat, 3.89 +/- 0.19 N/kg; dog, 3.03 +/- 0.16 N/kg), and a higher hindlimb propulsive force (cat, -1.08 +/- 0.13 N/kg; dog, -0.87 +/- 0.13 N/kg) and hindlimb impulse (cat, -0.18 +/- 0.03 N/kg; dog, -0.14 +/- 0.02 N/kg). Force plate analysis is a valuable tool for the assessment of locomotion in cats, because it can be applied in the clinical setting and provides a non-invasive and objective measurement of locomotion characteristics with high repeatability in cats, as well as information about kinetic characteristics. Differences in force-
time waveforms between cats and dogs can be explained by the more crouched position of cats during stance and their more compliant gait compared with dogs. Feline waveforms of the medio-lateral ground reaction forces also differ between cats and dogs and this can be explained by differences in paw supination-pronation.

**An experimental Toxoplasma gondii dose response challenge model to study therapeutic or vaccine efficacy in cats.**


**Cornelissen, J. B., J. W. van der Giessen, K. Takumi, P. F. Teunis, and H. J. Wisselink**

High numbers of Toxoplasma gondii oocysts in the environment are a risk factor to humans. The environmental contamination might be reduced by vaccinating the definitive host, cats. An experimental challenge model is necessary to quantitatively assess the efficacy of a vaccine or drug treatment. Previous studies have indicated that bradyzoites are highly infectious for cats. To infect cats, tissue cysts were isolated from the brains of mice infected with oocysts of T. gondii M4 strain, and bradyzoites were released by pepsin digestion. Free bradyzoites were counted and graded doses (1000, 100, 50, 10), and 250 intact tissue cysts were inoculated orally into three cats each. Oocysts shed by these five groups of cats were collected from faeces by flotation techniques, counted microscopically and estimated by real time PCR. Additionally, the number of T. gondii in heart, tongue and brains were estimated, and serology for anti T. gondii antibodies was performed. A Beta-Poisson dose-response model was used to estimate the infectivity of single bradyzoites and linear regression was used to determine the relation between inoculated dose and numbers of oocyst shed. We found that real time PCR was more sensitive than microscopic detection of oocysts, and oocysts were detected by PCR in faeces of cats fed 10 bradyzoites but by microscopic examination. Real time PCR may only detect fragments of T. gondii DNA without the presence of oocysts in low doses. Prevalence of tissue cysts of T. gondii in tongue, heart and brains, and anti T. gondii antibody concentrations were all found to depend on the inoculated bradyzoite dose. The combination of the experimental challenge model and the dose response analysis provides a suitable reference for quantifying the potential reduction in human health risk due to a treatment of domestic cats by vaccination or by therapeutic drug application.

**Palatability evaluation study of a new oral formulation of marbofloxacin in cats.**


**Cron, M., C. Zemirline, J. Beranger, and V. Privat**

At a time when antimicrobial resistance is a global concern in human and animal health, it is of primary importance to draw attention to the problem of compliance with antibiotic therapy in animals hard to medicate such as cats. Resistance may develop because of poor patient compliance with the prescribed course of antibiotic therapy. Increasing palatability might enhance administration compliance. We assessed the acceptability of EFEX tablets, a new oral marbofloxacin formulation for cats. The objective of this study was to compare EFEX to two commercial formulations of marbofloxacin: MARBOCYL P palatable tablets and MARBOCYL Vet tablets. Acceptance tests were run in experimental conditions in 24 cats to compare the spontaneous intake and full consumption of the three pharmaceutical products. The results indicated that EFEX was more palatable than MARBOCYL Vet
(0.001 < P < 0.01) and equally comparable with MARBOCYL P in palatability. There was no difference in the short-term adverse effects between the products.

Factors associated with the seroprevalence of leishmaniasis in dogs living around Atlantic Forest fragments.


Canine visceral leishmaniasis is an important zoonosis in Brazil. However, infection patterns are unknown in some scenarios such as rural settlements around Atlantic Forest fragments. Additionally, controversy remains over risk factors, and most identified patterns of infection in dogs have been found in urban areas. We conducted a cross-sectional epidemiological survey to assess the prevalence of leishmaniasis in dogs through three different serological tests, and interviews with owners to assess features of dogs and households around five Atlantic Forest remnants in southeastern Brazil. We used Generalized Linear Mixed Models and Chi-square tests to detect associations between prevalence and variables that might influence Leishmania infection, and a nearest neighbor dispersion analysis to assess clustering in the spatial distribution of seropositive dogs. Our findings showed an average prevalence of 20% (ranging from 10 to 32%) in dogs. Nearly 40% (ranging from 22 to 55%) of households had at least one seropositive dog. Some individual traits of dogs (height, sterilization, long fur, age class) were found to positively influence the prevalence, while some had negative influence (weight, body score, presence of ectoparasites). Environmental and management features (number of cats in the households, dogs with free-ranging behavior) also entered models as negative associations with seropositivity. Strong and consistent negative (protective) influences of the presence of chickens and pigs in dog seropositivity were detected. Spatial clustering of cases was detected in only one of the five study sites. The results showed that different risk factors than those found in urban areas may drive the prevalence of canine leishmaniasis in farm/forest interfaces, and that humans and wildlife risk infection in these areas. Domestic dog population limitation by gonadectomy, legal restriction of dog numbers per household and owner education are of the greatest importance for the control of visceral leishmaniasis in rural zones near forest fragments.

Molecular identity and prevalence of Cryptococcus spp. nasal carriage in asymptomatic feral cats in Italy.


Danesi, P., C. Furnari, A. Granato, A. Schivo, D. Otranto, G. Capelli, and C. Cafarchia

Cryptococcosis is a life-threatening fungal disease that infects humans and animals worldwide. Inhalation of fungal particles from an environmental source can cause primary infection of the respiratory system. As animals can be considered a sentinel for human diseases, the aim of this study was to determine the prevalence and molecular identity of Cryptococcus spp. in the nasal cavity of feral cats. Cats from 162 urban and rural feral cat colonies were sampled over 3 years. Of 766 cats from which nasal swabs were obtained, Cryptococcus spp. were recovered from 95 (12.6%), including 37 C. magnus (4.8%), 16 C. albidus (2.0%), 15 C. carnescens (1.9%), 12 C. neoformans (1.6%), as well as C. oeirensis (n = 3), C. victoriae (n = 3), C. albidosimilis (n = 2), Filobasidium globisporum (n = 2), C.
furiensis (n = 1), C. flavescens (n = 1), C. dimmae (n = 1), C. saitoi (n = 1), and C. wieringae (n = 1) with prevalence <1%. Thirteen Cryptococcus species were identified by polymerase chain reaction and sequencing of internal transcribed spacer amplicons. Statistical analysis did not identify any predisposing factors that contributed to nasal colonization (eg, sex, age, season, or habitat). Results suggest that asymptomatic feral cats may carry C. neoformans and other Cryptococcus species in their sinonasal cavity. Genotyping of the specific cryptococcal isolates provides a better understanding of the epidemiology of these yeasts.

Multilocus sequence typing (MLST) and M13 PCR fingerprinting revealed heterogeneity amongst Cryptococcus species obtained from Italian veterinary isolates.


Danesi, P., C. Firacative, M. Cogliati, D. Otranto, G. Capelli, and W. Meyer

Cryptococcosis represents a fungal disease acquired from the environment with animals serving as host sentinels for human exposure. The aim of this study was to investigate the genetic characteristics of Cryptococcus isolates from veterinary sources (cats, dogs and birds) to understand their epidemiology and the genetic variability of the casual isolates. Mating-type PCR in connection with MLST analysis using the ISHAM consensus MLST scheme for the C. neoformans/C. gattii species complex was used to genotype 17 C. neoformans isolates. In the absence of an MLST typing scheme Cryptococcus adeliensis, C. albicus, C. aureus, C. carnescens, C. lauranti, C. magnus and C. uniguttulatus strains were typed using M13 PCR fingerprinting. All C. neoformans isolates were MATalpha mating type, but hybrids possessed alphaADa and aADalpha mating and serotypes. Two C. neoformans molecular types VNI, VNIV and VNIII and VNII/VNIV hybrids were identified. Amongst the 66 non-C. neoformans strains investigated 55 M13 PCR fingerprinting types were identified. The wide variety of MLST types of C. neoformans and the occurrence of alphaADa and aADalpha hybrids in our study supports the notion of genetic recombination in the area studied. The heterogeneity of the non-C. neoformans isolates remains open to further investigations and should be taken into consideration when identifying emergent pathogens.

Seroprevalence of Toxoplasma gondii in the Iranian general population: a systematic review and meta-analysis.


Daryani, A., S. Sarvi, M. Aarabi, A. Mizani, E. Ahmadpour, A. Shokri, M. T. Rahimi, and M. Sharif

Toxoplasma gondii is one of the most common protozoan parasites with widespread distribution globally. It is the causative agent of Toxoplasma infection, which is prevalent in human and other warm-blooded vertebrates. While T. gondii infection in healthy people is usually asymptomatic, it can lead to serious pathological effects in congenital cases and immunodeficient patients. We sought to identify the seroprevalence rate of Toxoplasma infection in the Iranian general population to develop a comprehensive description of the disease condition in Iran for future use. Electronic databases (PubMed, Google Scholar, Science Direct, and Scopus) and Persian language databases (Magiran, Scientific Information Database [SID], Iran Medex, and Iran Doc) were searched. Furthermore, graduate student dissertations and proceedings of national parasitology congresses were searched manually. Our search resulted in a total of 35 reports published from 1978 to 2012. These include 22
published articles, 1 unpublished study, 8 proceedings from the Iranian conference of parasitology, and 4 graduate student dissertations, resulting in 52,294 individuals and 23,385 IgG seropositive cases. The random errors method was used for this meta-analysis. The result shows that the overall seroprevalence rate of toxoplasmosis is among the general population in Iran was 39.3% (95% CI=33.0%-45.7%). There was no significant difference in the seroprevalence rate between male and female patients. A significant linear trend of increasing overall prevalence by age was noted (P<0.0001). In addition, the data indicates that there are high seroprevalence in groups who have direct contact with cats, consume uncooked meat and raw fruits or vegetables, in farmers and Housewife, individuals who have a low level of education, and live in rural areas. To the best of our knowledge, this is the first systematic review of T. gondii infection seroprevalence in Iran, which shows a high prevalence of Toxoplasma infection (more than one third). We highly recommend further study for the purposes of aiding patient management and developing more efficient diagnostic tests and effective prevention approaches.

Patellar ligament rupture in the cat: repair methods and patient outcomes in seven cases.


The medical records of cats receiving surgical treatment for unilateral patellar ligament rupture between 1999 and 2012 at 12 referral centres in the UK and Ireland were reviewed. Seven cases were identified: six were caused by trauma and one was iatrogenic, occurring as a complication following surgical stabilisation of a tibial fracture. All cases were treated by sutured anastomosis of the ruptured ligament, with six of the repairs protected by a circumpatellar and/or transpatellar loop of suture. The stifle was immobilised by transarticular external skeletal fixation in three cases. No cases required revision surgery. No complications were reported. Final evaluation, performed at a median time of 31 days, determined five patients to have returned to acceptable or good limb function; two cases were lost to follow-up. The data suggest that, in cats, the current surgical techniques extrapolated from their canine counterparts for repair of a completely or partially ruptured patellar ligament are successfully used and result in acceptable limb function.

Carriage of methicillin-resistant staphylococci by healthy companion animals in the US.


Antimicrobial-resistant staphylococci have been associated with wounded or ill companion animals, but little is known about the prevalence of resistant staphylococci among healthy animals. In this study, 276 healthy dogs and cats from veterinary clinics were tested for the presence of antimicrobial-resistant Staphylococcus spp. Isolates were tested for antimicrobial susceptibility and the presence of select resistance genes, and typed using Pulsed-Field Gel Electrophoresis (PFGE). Staphylococcus aureus and Staphylococcus pseudintermedius were also characterized using multilocus sequence typing (MLST), spa typing and SCCmec typing. Approximately 5% (14/276) of the animals were positive by enrichment for five species of staphylococci [Staph. aureus (n = 11), Staph. pseudintermedius (n = 4), Staphylococcus sciuri (n = 6), Staphylococcus simulans (n = 1) and Staphylococcus warneri (n = 1)]. Seventy-eight per cent (18/23) of staphylococci were resistant to oxacillin and also multidrug resistant
(resistance to \( \geq 2 \) antimicrobials). All Staph. aureus isolates were mecA+ and blaZ+, SCCmec type II, spa type t002, ST5 and clonal using PFGE. Staphylococcus pseudintermedius were SCCmec type IV or V, spa type t06 and ST170; two of the isolates were pvl(+). These results suggest that healthy companion animals may be a reservoir of multidrug-resistant staphylococci, which may be transferred to owners and others who handle companion animals. SIGNIFICANCE AND IMPACT OF THE STUDY: In this study, antimicrobial-resistant coagulase-negative and coagulase-positive staphylococci were isolated from various body sites on healthy dogs and cats. Resistance to 14 antimicrobials was observed including resistance to oxacillin; the majority of staphylococci were also multidrug resistant. Results from this study suggest that healthy dogs and cats may act as reservoirs of antimicrobial-resistant bacteria that may be transferred to people by simple interaction with the animals. Such carriage poses an underlying risk of infection, which should be considered during handling of healthy dogs and cats by pet owners and veterinary personnel.

**Recommendations on vaccination for Asian small animal practitioners: a report of the WSAVA Vaccination Guidelines Group.**

*J Small Anim Pract (2014)*


In 2012 and 2013, the World Small Animal Veterinary Association (WSAVA) Vaccination Guidelines Group (VGG) undertook fact-finding visits to several Asian countries, with a view to developing advice for small companion animal practitioners in Asia related to the administration of vaccines to dogs and cats. The VGG met with numerous first opinion practitioners, small animal association leaders, academic veterinarians, government regulators and industry representatives and gathered further information from a survey of almost 700 veterinarians in India, China, Japan and Thailand. Although there were substantial differences in the nature and magnitude of the challenges faced by veterinarians in each country, and also differences in the resources available to meet those challenges, overall, the VGG identified insufficient undergraduate and postgraduate training in small companion animal microbiology, immunology and vaccinology. In most of the countries, there has been little academic research into small animal infectious diseases. This, coupled with insufficient laboratory diagnostic support, has limited the growth of knowledge concerning the prevalence and circulating strains of key infectious agents in most of the countries visited. Asian practitioners continue to recognise clinical infections that are now considered uncommon or rare in western countries. In particular, canine rabies virus infection poses a continuing threat to animal and human health in this region. Both nationally manufactured and international dog and cat vaccines are variably available in the Asian countries, but the product ranges are small and dominated by multi-component vaccines with a licensed duration of immunity (DOI) of only 1 year, or no description of DOI. Asian practitioners are largely unaware of current global trends in small animal vaccinology or of the WSAVA vaccination guidelines. Consequently, most practitioners continue to deliver annual revaccination with both core and non-core vaccines to adult animals, with little understanding that “herd immunity” is more important than frequent revaccination of individual animals within the population. In this paper, the VGG presents the findings of this project and makes key recommendations for the Asian countries. The VGG recommends that (1) Asian veterinary schools review and increase as needed the amount of instruction in small animal vaccinology within their undergraduate curriculum and increase the availability of pertinent postgraduate education for practitioners; (2) national small animal veterinary associations, industry veterinarians and academic experts work together to improve the scientific
evidence base concerning small animal infectious diseases and vaccination in their countries; (3) national small animal veterinary associations take leadership in providing advice to practitioners based on improved local knowledge and global vaccination guidelines; (4) licensing authorities use this enhanced evidence base to inform and support the registration of improved vaccine product ranges for use in their countries, ideally with DOI for core vaccines similar or equal to those of equivalent products available in western countries (i.e. 3 or 4 years). The VGG also endorses the efforts made by Asian governments, non-governmental organisations and veterinary practitioners in working towards the goal of global elimination of canine rabies virus infection. In this paper, the VGG offers both a current pragmatic and future aspirational approach to small animal vaccination in Asia. As part of this project, the VGG delivered continuing education to over 800 Asian practitioners at seven events in four countries. Accompanying this document is a list of 80 frequently asked questions (with answers) that arose during these discussions. The VGG believes that this information will be of particular value to Asian veterinarians as they move towards implementing global trends in small companion animal vaccinology.

**Antibiotics used most commonly to treat animals in Europe.**

*Vet Rec* (2014) **175**:325.

**De Briyne, N., J. Atkinson, L. Pokludova, and S. P. Borriello**

The Heads of Medicines Agencies and the Federation of Veterinarians of Europe undertook a survey to gain an insight into European prescribing of antibiotics for animals, in particular to highlight the diseases for which antibiotics are most commonly said to be prescribed and which different classes, including human critically important antibiotics (CIAs). The survey was completed by 3004 practitioners from 25 European countries. Many older antibiotics (e.g., penicillins, tetracyclines) are cited most frequently as the prescribed classes to treat the main food producing species. The frequency of citation of non-CIAs predominates. CIAs are mostly frequently cited to be prescribed for: urinary diseases in cats (62 per cent), respiratory diseases in cattle (45 per cent), diarrhoea in cattle and pigs (respectively 29 per cent and 34 per cent), locomotion disorders in cattle (31 per cent), postpartum dysgalactia syndrome complex in pigs (31 per cent) and dental disease in dogs (36 per cent). Clear ‘preferences’ between countries can be observed between antibiotic classes. The use of national formularies and guidance helps to drive responsible use of antibiotics and can significantly reduce the extent of use of CIAs. A more widespread introduction of veterinary practice antibiotic prescribing policies and monitoring obedience to these should ensure more widespread compliance with responsible use guidelines.

**Use of surgery and carboplatin in feline malignant mammary gland neoplasms with advanced clinical staging.**


BACKGROUND/AIM: Feline mammary carcinomas (FMCs) are characterized by poor prognosis and little progress has been made in extending patient survival. The aim of the study was to compare overall survival periods of FMCs submitted to different treatment protocols, including surgery and adjuvant chemotherapy. MATERIALS AND METHODS: Analysis of conventional surgical excision
Analysis of single-nucleotide polymorphisms in the APOBEC3H gene of domestic cats (Felis catus) and their association with the susceptibility to feline immunodeficiency virus and feline leukemia virus infections.


Feline immunodeficiency virus (FIV) and feline leukemia virus (FeLV) are widely distributed retroviruses that infect domestic cats (Felis catus). Restriction factors are proteins that have the ability to hamper retroviruses’ replication and are part of the conserved mechanisms of anti-viral immunity of mammals. The APOBEC3 protein family is the most studied class of restriction factors; they are cytidine deaminases that generate hypermutations in provirus DNA during reverse transcription, thus causing hypermutations in the viral genome, hindering virus replication. One of the feline APOBEC3 genes, named APOBEC3H, encodes two proteins (APOBEC3H and APOBEC3CH). In other mammals, APOBEC3H single-nucleotide polymorphisms (SNPs) can alter the stability and cellular localization of the encoded protein, thus influencing its subcellular localization and reducing its anti-viral effect. In cats, the association of APOBEC3H SNPs with susceptibility to retroviral infections was not yet demonstrated. Therefore, this study aimed the investigation on the variability of APOBEC3H and the possible association with FIV/FeLV infections. DNA obtained from whole blood of fifty FIV- and/or FeLV-infected cats and fifty-nine FIV- and/or FeLV-uninfected cats were used as templates to amplify two different regions of the APOBEC3H, with subsequent sequencing and analysis. The first region was highly conserved among all samples, while in the second, six single-nucleotide variation points were identified. One of the SNPs, A65S (A65I), was significantly correlated with the susceptibility to FIV and/or FeLV infections. On the other hand, the haplotype analysis showed that the combination “GGGGCC” was positively correlated with the lack of FIV and/or FeLV infections. Our results indicate that, as previously shown in other mammals, variability of restriction factors may contribute to susceptibility of domestic cats to retroviral infections; however, these results should be confirmed by more extensive analysis and in vitro experiments.

Therapeutic serum phenobarbital concentrations obtained using chronic transdermal administration of phenobarbital in healthy cats.

*J Feline Med Surg (2014)*

Delamaide Gasper, J. A., H. L. Barnes Heller, M. Robertson, and L. A. Trepanier

Seizures are a common cause of neurologic disease, and phenobarbital (PB) is the most commonly used antiepileptic drug. Chronic oral dosing can be challenging for cat owners, leading to poor compliance. The purpose of this study was to determine if the transdermal administration of PB could achieve...
serum PB concentrations of between 15 and 45 mug/ml in healthy cats. Nineteen healthy cats were enrolled in three groups. Transdermal PB in pluronic lecithin organogel (PLO) was applied to the pinnae for 14 days at a dosage of 3 mg/kg q12h in group 1 (n = 6 cats) and 9 mg/kg q12h in group 2 (n = 7 cats). Transdermal PB in Lipoderm Activemax was similarly applied at 9 mg/kg q12h for 14 days in group 3 (n = 6 cats). Steady-state serum PB concentrations were measured at trough, and at 2, 4 and 6 h after the morning dose on day 15. In group 1, median concentrations ranged from 6.0-7.5 mug/ml throughout the day, (observed range 0-11 mug/ml). Group 2 median concentrations were 26.0 mug/ml (observed range 18.0-37.0 mug/ml). For group 3, median concentrations ranged from 15.0-17.0 mug/ml throughout the day (range 5-29 mug/ml). Side effects were mild. One cat was withdrawn from group 2 owing to ataxia and sedation. These results show therapeutic serum PB concentrations can be achieved in cats following chronic transdermal administration of PB in PLO at a dosage of 9 mg/kg q12h. More individual variation was noted using Lipoderm Activemax. Transdermal administration may be an alternative for cats that are difficult to medicate orally.

Influence of dietary protein level on body composition and energy expenditure in calorically restricted overweight cats.
J Anim Physiol Anim Nutr (Berl) (2014)


High-protein (HP) diets help prevent loss of lean mass in calorie-restricted (CR) cats. However, it is not entirely known whether these diets also induce changes of energy expenditure during periods of CR. To investigate this issue, sixteen overweight cats were fed either a high-protein [(HP), 54.2% of metabolizable energy (ME)] or a moderate-protein [(MP), 31.5% of ME] diet at 70% of their maintenance energy intakes for 8 weeks, and energy expenditure, energy intake, body weight and composition, and serum metabolites and hormones were measured. While both groups of cats lost weight at a similar rate, only cats eating the HP diet maintained lean mass during weight loss. Indirect respiration calorimetry measurements revealed that both total and resting energy expenditure (kcal/d) significantly decreased during weight loss for both treatment groups. However, only cats eating the MP diet exhibited significant decreases of total and resting energy expenditures after energy expenditure was normalized for body weight or lean mass. Results from this study suggest that in addition to sparing the loss of lean mass, feeding HP diets to overweight cats in restricted amounts may be beneficial for preventing or minimizing decreases of mass-adjusted energy expenditure during weight loss.

Role of sialic acids in feline enteric coronavirus infections.


To initiate infections, many coronaviruses use sialic acids, either as receptor determinants or as attachment factors helping the virus find its receptor underneath the heavily glycosylated mucus layer. In the present study, the role of sialic acids in serotype I feline enteric coronavirus (FECV) infections was studied in feline intestinal epithelial cell cultures. Treatment of cells with neuraminidase (NA) enhanced infection efficiency, showing that terminal sialic acid residues on the cell surface were not receptor determinants and even hampered efficient virus-receptor engagement. Knowing that NA
treatment of coronaviruses can unmask viral sialic acid binding activity, replication of untreated and NA-treated viruses was compared, showing that NA treatment of the virus enhanced infectivity in untreated cells, but was detrimental in NA-treated cells. By using sialylated compounds as competitive inhibitors, it was demonstrated that sialyllactose (2,6-alpha-linked over 2,3-alpha-linked) notably reduced infectivity of NA-treated viruses, whereas bovine submaxillary mucin inhibited both treated and untreated viruses. In desialylated cells, however, viruses were less prone to competitive inhibition with sialylated compounds. In conclusion, this study demonstrated that FECV had a sialic acid binding capacity, which was partially masked by virus-associated sialic acids, and that attachment to sialylated compounds could facilitate enterocyte infections. However, sialic acid binding was not a prerequisite for the initiation of infection and virus-receptor engagement was even more efficient after desialylation of cells, indicating that FECV requires sialidases for efficient enterocyte infections.

First report of Troglostrongylus brevior in a kitten in Greece.
Diakou, A., A. Di Cesare, T. Aeriniotaki, and D. Traversa
The first case of a natural infestation with Troglostrongylus brevior in a kitten in Greece is described here. A approximately 40-day-old stray cat was referred to a private veterinary clinic with signs of respiratory distress. First stage larvae of a metastrongyloid nematode were observed in the wet mount faecal preparation. Despite an anthelmintic treatment, the respiratory signs worsened and the kitten died 2 days later. The larvae in the faeces were identified morphologically and genetically as T. brevior. The present evidence suggests a vertical or direct infestation of the kitten and a severe pathogenic role of T. brevior in young cats. This report expands the recent published cases of troglostrongyllosis in domestic cats to a wider geographical distribution and opens new questions on the apparent spreading of T. brevior from wild to domestic hosts.

Use of visual and permanent identification for pets by veterinary clinics.
It is estimated that more than 5 million stray dogs and cats enter animal shelters in the USA each year, but less than half are ever reunited with their owners. Lost pets with identification microchips are up to 21 times more likely to be reunited than those without. Finders of lost pets are more likely to consult veterinarians than shelters for assistance, and pet owners look first to veterinarians for advice regarding pet health, protection, and welfare. An online survey of 1086 veterinary clinics in the South-Eastern USA was conducted to evaluate how veterinary clinics functioned as a part of the pet identification network. Scanning and microchip implants were offered by 91% of surveyed clinics and 41% used ‘global’ scanners capable of detecting all currently used microchip brands. Clinics more frequently relied on pet owners to register contact information rather than providing this service for clients (52% vs. 43%, respectively). Even though lost dogs are more likely to be reunited with owners than lost cats, microchips and collars were more likely to be recommended for all dogs (85% and 93%, respectively) than for all cats (67% and 61%, respectively). Only half of clinics that recommended identification collars made them available to their clients. Veterinarians can protect animals, pet owners and the human-animal bond by integrating pet identification into preventive health care.
Feline urinary tract pathogens: prevalence of bacterial species and antimicrobial resistance over a 10-year period.

Vet Rec (2014)


The purpose of this retrospective study was to identify bacterial species in cats with bacterial urinary tract infections (UTIs) and to investigate their antimicrobial susceptibilities over a 10-year period. Three hundred and thirty cultures from 280 cats were included in the study. The mean age of affected cats was 9.9 years; female cats with bacterial UTIs were significantly older than male cats with UTIs. The most common pathogen identified was Escherichia coli (42.3 per cent), followed by Streptococcus species (19.3 per cent), Staphylococcus species (15.6 per cent), Enterococcus species (6.6 per cent) and Micrococccaceae (5.8 per cent). Forty specimens (12.1 per cent) yielded growth of more than one isolate. Streptococcus and Enterococcus isolates were resistant to a significantly higher number of antimicrobial agents than E coli and Staphylococcus species isolates. Applying the formula to select rational antimicrobial therapy, bacterial isolates were most likely to be susceptible to nitrofurantoin, amoxicillin clavulanic acid, enrofloxacin and gentamicin. The antimicrobial impact factor for nitrofurantoin increased significantly over the 10-year period, whereas there was no significant change in antimicrobial impact factors for doxycycline, trimethoprim-sulfamethoxazole, gentamicin, enrofloxacin, cephalothin and amoxicillin clavulanic acid. The detected changes in in vitro antimicrobial efficacy could help to develop hospital-specific guidelines for antimicrobial use to prevent the further development of resistance in feline uropathogens.

Molecular detection of haemotropic Mycoplasma species in urban and rural cats from Portugal.


OBJECTIVES: The aim of the present study was to evaluate the prevalence of haemoplasma infection in cats in Portugal and to assess risk factors for infection. METHODS: Real-time polymerase chain reaction techniques were used to assess 236 urban and rural cats from central and southern Portugal. RESULTS: The overall prevalence of haemoplasma in the target population was 27.1% (64/236), with individual species’ prevalences as follows: 17.8% (42/236) ‘Candidatus Mycoplasma haemominutum’ (CMhm), 14.4% (34/236) Mycoplasma haemofelis (Mhf) and only 5.9% (14/236) ‘Candidatus Mycoplasma turicensis’ (CMt). Multiple infections were detected in 8.1% (19/236) of the samples, with triple and double infections with Mhf and CMhm being most commonly detected (5.9% [14/236] of cats). Haemoplasma infection was significantly higher in shelter cats (P = 0.015) than in cats with other lifestyles (eg, free-roaming/house pet/blood donors). Haemoplasma prevalence was also higher in cats with feline immunodeficiency virus infection (FIV; P = 0.011). Although sex was not significantly associated with haemoplasma infection (P = 0.050), CMt was predominantly found in males (P = 0.032). Also, the presence of haemoplasma multiple infections was statistically associated with being in a shelter (P = 0.021), male (P = 0.057) and with FIV co-infection (P = 0.004). No evidence of an association between haemoplasma infection and geographical location, age or feline leukaemia virus co-infection was found. CONCLUSIONS AND RELEVANCE: The results obtained in our study are
consistent with the documented worldwide prevalence of feline haemoplasma infections, suggesting
that the three main feline haemoplasma species are common in Portugal.

**Life Cycle of Cystoisospora felis (Coccidia: Apicomplexa) in Cats and Mice.**


*Dubey, J. P.*

Cystoisospora felis is a ubiquitous apicomplexan protozoon of cats. The endogenous development of *C. felis* was studied in cats after feeding them infected mice. For this, five newborn cats were killed at 24, 48, 72, 96, and 120 h after having been fed mesenteric lymph nodes and spleens of mice that were inoculated with *C. felis* sporulated sporocysts. Asexual and sexual development occurred in enterocytes throughout the villi of the small intestine. The number of asexual generations was not determined with certainty, but there were different sized merozoites. At 24 h, merogony was seen only in the duodenum and the jejunum. Beginning at 48 h, the entire small intestine was parasitized. At 24 h, meronts contained 1-4 zoites, and at 48 h up to 12 zoites. Beginning with 72 h, the ileum was more heavily parasitized than the jejunum. At 96 and 120 h, meronts contained many zoites in various stages of development; some divided by endodyogeny. The multiplication was asynchronous, thus both immature multinucleated meronts and mature merozoites were seen in the same parasitophorous vacuole. Gametogony occurred between 96 and 120 h, and oocysts were present at 120 h. For the study of the development of *C. felis* in murine tissues, mice were killed from day 1 to 720 d after having been fed 10^5 sporocysts, and their tissues were examined for the parasites microscopically, and by bioassay in cats. The following conclusions were drawn. (1) *Cystoisospora felis* most frequently invaded the mesenteric lymph nodes of mice and remained there for at least 23 mo. (2) It also invaded the spleen, liver, brain, lung, and skeletal muscle of mice, but division was not seen based on microscopical examination. (3) This species could not be passed from mouse to mouse.

**Life Cycle of Hammondia hammondi (Apicomplexa: Sarcocystidae) in Cats.**


*Dubey, J. P., and D. J. Ferguson*

Hammondia hammondi and *Toxoplasma gondii* are feline coccidians that are morphologically, antigenically, and phylogenetically related. Both parasites multiply asexually and sexually in feline intestinal enterocytes, but *H. hammondi* remains confined to enterocytes whereas *T. gondii* also parasitizes extra-intestinal tissues of the cat. Here, we studied multiplication of *H. hammondi* in feline intestine and compared with *T. gondii* cycle. Five parasite-free cats were inoculated orally with tissue cysts and free bradyzoites from skeletal muscles of gamma interferon gene knockout mice and killed at 1, 3, 4, 6, and 7 d later. At 1 and 3 d post inoculation (DPI), numerous individual intracellular bradyzoites were detected in histological sections of small intestine. At 4 DPI only schizonts were found and they were located in enterocyte cytoplasm above the host cell nucleus. At 6 and 7 DPI both schizonts and gamonts were seen and they were located in enterocytes. Ultrastructurally, schizogonic and gametogonic development of *H. hammondi* was similar to *T. gondii*. However, in *H. hammondi* merozoites rhoptries were longer, and coiled and contained more micronemes than in *T. gondii*. Ultrastructural development is illustrated in detail.
Serological evidence of exposure to Ehrlichia canis and Anaplasma phagocytophilum in Central Italian healthy domestic cats.


Ebani, V. V., and F. Bertelloni

The aim of the present survey was to estimate the seroprevalences of Ehrlichia canis and Anaplasma phagocytophilum in the Central Italian feline population. Serum samples of 560 healthy domestic cats were examined by indirect immunofluorescence assay (IFAT), considering an antibody titre of 1:40 as cut-off. Seroprevalences of 6.4% and 4.5% were found for E. canis and A. phagocytophilum, respectively. Adult, mixed breed cats showed seroprevalences higher than younger and purebred subjects, whereas no differences were observed in relation to gender and living conditions.

Outcome of positive-pressure ventilation in dogs and cats with congestive heart failure: 16 cases (1992-2012).


Edwards, T. H., A. Erickson Coleman, B. M. Brainard, T. C. DeFrancesco, B. D. Hansen, B. W. Keene, and A. Koenig

OBJECTIVE: To describe the indications, duration of ventilation, underlying cardiac diseases, and outcome of dogs and cats undergoing positive-pressure ventilation (PPV) for treatment of congestive heart failure (CHF). DESIGN: Two-site retrospective study (1992-2012). SETTING: Two university small animal teaching hospitals. ANIMALS: Six cats and 10 dogs undergoing PPV for CHF. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Medical records were searched to identify patients requiring PPV for treatment of pulmonary edema secondary to CHF. Sixteen animals fulfilled these criteria. Patient signalment, duration of PPV, underlying cardiac disease, arterial or venous blood gas values, pharmacologic therapy before, during, and after PPV, anesthetic drugs, complications, and outcome were recorded. Overall survival to discharge was 62.5% (10/16). Mean (+/-SD) duration of PPV was 30.8 +/- 21.3 hours and average time from presentation for CHF to initiation of PPV was 5.9 +/- 6.4 hours. Azotemia at the time of initiation of ventilation, development of anuria or oliguria, and use of pentobarbital for anesthesia were negatively associated with survival (P = 0.011, P = 0.036, and P = 0.036, respectively). Survival-to-discharge rate was 77% (10/13) for patients treated after 2005 and those not receiving pentobarbital. There was no significant effect attributed to age, sex, weight, species, nature of heart disease, furosemide dose, length of ventilation, use of vasopressors, first-time CHF events, or plasma lactate concentration on survival to discharge. CONCLUSIONS: Dogs and cats requiring PPV for CHF have a good overall prognosis for hospital discharge and require PPV for a relatively short duration. Azotemia, oliguria or anuria, and the use of pentobarbital are negatively associated with outcome.

High levels of Trypanosoma cruzi DNA determined by qPCR and infectiousness to Triatoma infestans support dogs and cats are major sources of parasites for domestic transmission.


Enriquez, G. F., J. Bua, M. M. Orozco, S. Wirth, A. G. Schijman, R. E. Gurtler, and M. V. Cardinal
The competence of reservoir hosts of vector-borne pathogens is directly linked to its capacity to infect the vector. Domestic dogs and cats are major domestic reservoir hosts of Trypanosoma cruzi, and exhibit a much higher infectiousness to triatomines than seropositive humans. We quantified the concentration of T. cruzi DNA in the peripheral blood of naturally-infected dogs and cats (a surrogate of intensity of parasitemia), and evaluated its association with infectiousness to the vector in a high-risk area of the Argentinean Chaco. To measure infectiousness, 44 infected dogs and 15 infected cats were each exposed to xenodiagnosis with 10-20 uninfected, laboratory-reared Triatoma infestans that blood-fed to repletion and were later individually examined for infection by optical microscopy. Parasite DNA concentration (expressed as equivalent amounts of parasite DNA per mL, Pe/mL) was estimated by real-time PCR amplification of the nuclear satellite DNA. Infectiousness increased steeply with parasite DNA concentration both in dogs and cats. Neither the median parasite load nor the mean infectiousness differed significantly between dogs (8.1Pe/mL and 48%) and cats (9.7Pe/mL and 44%), respectively. The infectiousness of dogs was positively and significantly associated with parasite load and an index of the host’s body condition, but not with dog’s age, parasite discrete typing unit and exposure to infected bugs in a random-effects multiple logistic regression model. Real-time PCR was more sensitive and less time-consuming than xenodiagnosis, and in conjunction with the body condition index, may be used to identify highly infectious hosts and implement novel control strategies.

Comparison of preoperative tramadol and pethidine on postoperative pain in cats undergoing ovariohysterectomy.


Background A variety of analgesic agents are available, and which one can be used in dogs and cats is a highly controversial issue, existing however a fear in the use of opiates due to possible adverse effects that these drugs can cause. The aim of this study was to compare the analgesic effect provided by the administration of tramadol or pethidine on early postoperative pain of cats undergoing ovariohysterectomy in a double-blind prospective study. Fourty-two animals were randomly assigned into three groups. Pet received pethidine (6 mg/kg), Tra 2 received tramadol (2 mg/kg) and Tra 4 received tramadol (4 mg/kg); all intramuscularly and associated with acepromazine (0.1 mg/kg). The efficacy of each analgesic regimen was evaluated prior to surgery (baseline - TBL), during surgery and 1, 3 and 6 hours after extubation with subjective pain scale, physiologic parameters, serum concentrations of glucose, cortisol and IL-6.

Results Changes in cardiovascular system were not clinically relevant. There were no significant differences in pain scores (P inverted question mark> inverted question mark0.05) during the study, although the number of rescue analgesia was significantly higher (P inverted question mark< inverted question mark0.05) at Pet group (5/14) than Tra 4 group (0/14), whereas in Tra 2, two animals (2/14) required additional analgesia. The serum cortisol values of Pet group were significantly higher at T1h T3h (P inverted question mark< inverted question mark0.05) and T6h (P inverted question mark< inverted question mark0.01) when compared to baseline (induction), also it was noticed a significant difference among the groups at T6h (Pet values were higher than Tra 2 and Tra 4; P inverted question mark< inverted question mark0.05). Conclusions Tramadol provided adequate analgesia and it was more effective than pethidine to at least six hours for the studied animals. At the higher dose (4 mg/kg) tramadol is probably more effective, since rescue analgesia was not necessary. No significant changes were observed.
physiological parameter that could contraindicate the use of these opioid in described doses, for the feline species.

**Feline mediastinal lymphoma: a retrospective study of signalment, retroviral status, response to chemotherapy and prognostic indicators.**


*Fabrizio, F., A. E. Calam, J. M. Dobson, S. A. Middleton, S. Murphy, S. S. Taylor, A. Schwartz, and A. J. Stell*

Historically, feline mediastinal lymphoma has been associated with young age, positive feline leukaemia virus (FeLV) status, Siamese breed and short survival times. Recent studies following widespread FeLV vaccination in the UK are lacking. The aim of this retrospective multi-institutional study was to re-evaluate the signalment, retroviral status, response to chemotherapy, survival and prognostic indicators in feline mediastinal lymphoma cases in the post-vaccination era. Records of cats with clinical signs associated with a mediastinal mass and cytologically/histologically confirmed lymphoma were reviewed from five UK referral centres (1998-2010). Treatment response, survival and prognostic indicators were assessed in treated cats with follow-up data. Fifty-five cases were reviewed. The median age was 3 years (range, 0.5-12 years); 12 cats (21.8%) were Siamese; and the male to female ratio was 3.2:1.0. Five cats were FeLV-positive and two were feline immunodeficiency-positive. Chemotherapy response and survival was evaluated in 38 cats. Overall response was 94.7%; complete (CR) and partial response (PR) rates did not differ significantly between protocols: COP (cyclophosphamide, vincristine, prednisone) (n = 26, CR 61.5%, PR 34.0%); Madison-Wisconsin (MW) (n = 12, CR 66.7%, PR 25.0%). Overall median survival was 373 days (range, 20-2015 days) (COP 484 days [range, 20-980 days]; MW 211 days [range, 24-2015 days] [P = 0.892]). Cats achieving CR survived longer (980 days vs 42 days for PR; P = 0.032). Age, breed, sex, location (mediastinal vs mediastinal plus other sites), retroviral status and glucocorticoid pretreatment did not affect response or survival. Feline mediastinal lymphoma cases frequently responded to chemotherapy with durable survival times, particularly in cats achieving CR. The prevalence of FeLV-antigenaemic cats was low; males and young Siamese cats appeared to be over-represented.

**Effects of deafness and cochlear implant use on temporal response characteristics in cat primary auditory cortex.**


We have previously shown that neonatal deafness of 7-13 months duration leads to loss of cochleotopy in the primary auditory cortex (AI) that can be reversed by cochlear implant use. Here we describe the effects of a similar duration of deafness and cochlear implant use on temporal processing. Specifically, we compared the temporal resolution of neurons in AI of young adult normal-hearing cats that were acutely deafened and implanted immediately prior to recording with that in three groups of neonatally deafened cats. One group of neonatally deafened cats received no chronic stimulation. The other two groups received up to 8 months of either low- or high-rate (50 or 500 pulses per second per electrode, respectively) stimulation from a clinical cochlear implant, initiated at 10 weeks of age. Deafness of 7-13 months duration had no effect on the duration of post-onset response suppression, latency, latency
jitter, or the stimulus repetition rate at which units responded maximally (best repetition rate), but resulted in a statistically significant reduction in the ability of units to respond to every stimulus in a train (maximum following rate). None of the temporal response characteristics of the low-rate group differed from those in acutely deafened controls. In contrast, high-rate stimulation had diverse effects: it resulted in decreased suppression duration, longer latency and greater jitter relative to all other groups, and an increase in best repetition rate and cut-off rate relative to acutely deafened controls. The minimal effects of moderate-duration deafness on temporal processing in the present study are in contrast to its previously-reported pronounced effects on cochleotopy. Much longer periods of deafness have been reported to result in significant changes in temporal processing, in accord with the fact that duration of deafness is a major factor influencing outcome in human cochlear implantees.

The European wildcats (Felis silvestris silvestris) as reservoir hosts of Troglostrongylus brevior (Strongylida: Crenosomatidae) lungworms.


The increasing reports of Troglostrongylus brevior lungworm in domestic cats from Italy and Spain raised questions on its factual distribution and on the role wildcats play as reservoirs of these parasites. Carcasses of 21 wildcats were collected in natural parks of southern Italy (i.e., Catania, Sicily n=5 and Matera, Basilicata n=16) and biometrically and genetically identified as Felis silvestris silvestris, but two as hybrids. Troglostrongylus brevior and Eucoleus aerophilus lungworms were found in 15 (71.4%) and 7 (33.3%) individuals, respectively, being five (23.8%) co-infected by the two species. Both lungworms showed an aggregated distribution in the host population, assessed by k-index (i.e., 0.69 for T. brevior and 0.42 for E. aerophilus). Although no statistical significant difference was recorded among age, gender and geographical location of wildcats, a larger rate of infection by T. brevior was assessed in yearlings (85.7%) than adults (64.3%). This is the first epidemiological study reporting T. brevior infection in the European wildcat and discusses the potential threat this may represent for the conservation of this endangered species of felids. In addition, given the large frequency of lungworm infection herein recorded, the role of wildcats as reservoir hosts of these parasites to domestic cats is discussed.

Pain management in veterinary patients with cancer.


Fan, T. M.

Pain is a widespread clinical symptom in companion animals with cancer, and its aggressive management should be a priority. Education and skills can be acquired by health care professionals and caregivers to better understand, recognize, and treat cancer-associated pain. The early and rational institution of multimodality analgesic protocols can be highly effective and maximize the chances of improving quality of life in dogs and cats with cancer. This article describes the pathophysiology of pain in companion animals diagnosed with cancer. The foundational causes of cancer-associated pain and treatment strategies for alleviating discomfort in companion animals with cancer are discussed.
Effect of melatonin implants on spermatogenesis in the domestic cat (Felis silvestris catus).

Favre, R. N., M. C. Bonaura, R. Praderio, M. C. Stornelli, R. L. de la Sota, and M. A. Stornelli

The aim of this study was to assess the efficacy of subcutaneous melatonin implants to temporarily and reversibly suppress spermatogenesis in male cats. Tomcats (n = 8) were housed in a conditioned room with alternating long and short 2-month photoperiod cycles to maintain sperm production and quality. Animals were randomly assigned to one of the two treatments. Four animals received a subcutaneous melatonin implant (MEL, 18 mg; Syntex, Argentina), whereas the other four received a subcutaneous placebo implant (PLA, 0 mg; Syntex). Semen samples were collected by electroejaculation every 14 days for 252 days. Sperm parameters were evaluated in all ejaculates, and data were analyzed by ANOVA. Melatonin-implanted cats significantly decreased their sperm quality in all the parameters studied compared with the control group (MEL vs. PLA; least squares means +/- SEM; motility, 71.3 +/- 3.4 vs. 82.1 +/- 3.6; velocity, 3.4 +/- 0.1 vs. 4.6 +/- 0.1; total sperm count, 2.6 +/- 2.2 vs. 19.4 +/- 3.3; acrosome integrity, 48.7 +/- 5.6 vs. 62.8 +/- 5.6; plasma membrane integrity, 52.2 +/- 4.7 vs. 72.9 +/- 5.5; normal sperm morphology, 45.8 +/- 3.3 vs. 63.7 +/- 3.4; P < 0.05). Conversely, volume and serum testosterone concentrations were similar in both groups (volume, 0.15 +/- 0.02; serum testosterone concentrations, 1.1 +/- 0.1; CV 18.9%; P > 0.05). At 91 +/- 7 days after implant insertion, sperm motility decreased 38.5%, velocity 26.5%, total sperm count 82%, acrosome integrity 22%, plasma membrane integrity 30%, and normal sperm morphology decreased 32% of preimplant values. This effect was present until 120 +/- 15 days after implant insertion. After that, seminal parameters started to increase and reached preimplant values at about 140 +/- 7 days after implant insertion. Nevertheless, treated animals conserved the capacity to produce semen during the treatment period. In conclusion, a single subcutaneous melatonin implant effectively and reversibly reduced sperm production and quality in male domestic cats for approximately 120 +/- 15 days without clinically detectable adverse effects.

Measurement of glomerular filtration rate in cats: methods and advantages over routine markers of renal function.

Finch, N.

PRACTICAL RELEVANCE: Routinely used markers of renal function in clinical practice include urea and creatinine. However, these are insensitive markers, particularly in the early stages of kidney disease. Measurement of glomerular filtration rate (GFR) is regarded as the most sensitive index of functioning renal mass. It may be useful for feline patients in varying clinical scenarios; for example, where a more accurate measurement of renal function may aid diagnosis, to enable response to therapeutic interventions to be more closely monitored, or to evaluate renal function prior to the use of nephrotoxic or renally cleared drugs. CLINICAL CHALLENGES: Traditional methods of measuring GFR, such as renal clearance or multisample plasma clearance techniques, are generally impractical for clinical use. Limited sampling and single sample plasma clearance methods using the filtration marker iohexol have been validated in cats. These have the advantages of reduced stress to cats associated with repeated sampling and reduced costs of analysis, and therefore offer greater clinical utility. Attempts to develop an estimated GFR (eGFR) formula similar to that used in human patients have been made in cats, although currently an accurate and reliable formula is not available. AUDIENCE: This review
presents the basis for the theoretical understanding and practical measurement of GFR for any veterinary practitioner wishing to obtain a more accurate and sensitive assessment of renal function than routinely used markers provide. EVIDENCE BASE: The review draws evidence from peer-reviewed publications, the author’s PhD thesis and also clinical experience.

**Esophagostomy feeding tube placement in the dog and cat.**


*Fink, L., M. Jennings, and A. M. Reiter*

**Pathology of articular cartilage and synovial membrane from elbow joints with and without degenerative joint disease in domestic cats.**


*Freire, M., D. Meuten, and D. Lascelles*

The elbow joint is one of the feline appendicular joints most commonly and severely affected by degenerative joint disease. The macroscopic and histopathological lesions of the elbow joints of 30 adult cats were evaluated immediately after euthanasia. Macroscopic evidence of degenerative joint disease was found in 22 of 30 cats (39 elbow joints) (73.33% cats; 65% elbow joints), and macroscopic cartilage erosion ranged from mild fibrillation to complete ulceration of the hyaline cartilage with exposure of the subchondral bone. Distribution of the lesions in the cartilage indicated the presence of medial compartment joint disease (most severe lesions located in the medial coronoid process of the ulna and medial humeral epicondyle). Synovitis scores were mild overall and correlated only weakly with macroscopic cartilage damage. Intra-articular osteochondral fragments either free or attached to the synovium were found in 10 joints. Macroscopic or histologic evidence of a fragmented coronoid process was not found even in those cases with intra-articular osteochondral fragments. Lesions observed in these animals are most consistent with synovial osteochondromatosis secondary to degenerative joint disease. The pathogenesis for the medial compartmentalization of these lesions has not been established, but a fragmented medial coronoid process or osteochondritis dissecans does not appear to play a role.

**Survey to investigate pet ownership and attitudes to pet care in metropolitan Chicago dog and/or cat owners.**


*Freiwald, A., A. Litster, and H. Y. Weng*

The aims of this descriptive cross-sectional study were to investigate dog and cat acquisition and attitudes toward pet care among residents of the Chicago area (zip codes 60600-60660); to compare data obtained from owners of shelter-acquired pets with those of residents who acquired their pets from other sources; to compare data from dog owners with cat owners; and to compare pet health practices among the respondents of different zip code income groups. In-person surveys administered at five pet store locations collected data from 529 respondents, representing 582 dogs and 402 cats owned or
continuously cared for in the past 3 years. Median household income data for represented zip codes was also obtained. Shelters were the most common source of cats (p<0.01) and were the second most common source of dogs. Cats were more likely to have been acquired as strays, while dogs were more likely to have been acquired from friends/family/neighbors, pet stores, breeders or rescue organizations and to be kept as outdoor-only pets (p<0.01). More cats were kept per household than dogs (dogs mean=1.32/household; cats mean=1.78/household; p<0.01). Pet owners were most commonly ‘very likely’ (5 on a 1-5/5 Likert scale) to administer all hypothetical treatments discussed, although cat owners were less likely to spend time training their pet (p=0.05). Cat owners were less likely to have taken their pet to a veterinarian for vaccinations or annual physical exams (p<0.01). Shelter-acquired cats were significantly more likely to have been taken by their owners to the veterinarian for annual exams (p=0.05) than cats obtained as strays. Owners of shelter-acquired pets were at least as willing as other respondents to administer hypothetical treatments and pay >=$1000 for veterinary treatment. Respondents from site #3 lived in zip codes that had relatively lower median household incomes (p<0.01) and were less likely to spend >=$1000 on their pets than those at the four other sites (p<0.01). Over 90% of pet owners from all acquisition categories expressed very high levels of attachment (>=8-10/10 on a Likert scale), except for owners of cats acquired as strays (84.9%) or from the ‘other’ category (75.0%). Survey respondents commonly acquired their pets from shelters and those who did were at least as willing to pay for and provide veterinary care as respondents who owned pets acquired from other sources. The data collected provides a snapshot of the attitudes of survey respondents in the Chicago area toward pet acquisition and care.

Efficacy of passively transferred antibodies in cats with acute viral upper respiratory tract infection.


Friedl, Y., B. Schulz, A. Knebl, C. Helps, U. Truyen, and K. Hartmann

A commercial hyperimmune serum, containing antibodies against feline calicivirus (FCV), feline herpesvirus 1 (FHV-1), and feline panleukopenia virus, is available for treatment of cats with feline upper respiratory tract disease (FURTD), but its efficacy has not been rigorously evaluated in scientific studies. The aim of this randomised, placebo-controlled, double-blind clinical trial was to evaluate the efficacy of passive immunisation in cats with acute viral FURTD caused by FCV and/or FHV-1 infection. All cats received symptomatic treatment during the study period. Hyperimmune serum was administered to one group (n = 22) and an equivalent amount of saline was administered to the control group (n = 20) as placebo, for 3 consecutive days. In the treatment group, cats <=12 weeks old received 2 mL, cats >12 weeks old received 4 mL, subcutaneously once daily and topically into eyes, nostrils, and mouth every 8 h. Clinical signs, including a ‘FURTD score’ and general health status, were recorded daily for 8 days and again on day 21. FCV shedding was determined by quantitative PCR on days 0 and 21. Clinical signs and health status in both groups improved significantly over time (P < 0.001). Cats receiving hyperimmune serum significantly improved in terms of ‘FURTD score’ (P = 0.046) and general health status (P = 0.032) by day 3, while cats in the placebo group only improved significantly by day 7. There was no significant difference in the number of cats shedding FCV between the two groups. Thus, administration of hyperimmune serum led to a more rapid improvement of clinical signs in cats with acute viral FURTD, but by day 7, clinical signs had improved equally in both groups.
Taurine: the comeback of a neutraceutical in the prevention of retinal degenerations.


Taurine is the most abundant amino acid in the retina. In the 1970s, it was thought to be involved in retinal diseases with photoreceptor degeneration, because cats on a taurine-free diet presented photoreceptor loss. However, with the exception of its introduction into baby milk and parenteral nutrition, taurine has not yet been incorporated into any commercial treatment with the aim of slowing photoreceptor degeneration. Our recent discovery that taurine depletion is involved in the retinal toxicity of the antiepileptic drug vigabatrin has returned taurine to the limelight in the field of neuroprotection. However, although the retinal toxicity of vigabatrin principally involves a deleterious effect on photoreceptors, retinal ganglion cells (RGCs) are also affected. These findings led us to investigate the possible role of taurine depletion in retinal diseases with RGC degeneration. The major antioxidant properties of taurine may influence disease processes. In addition, the efficacy of taurine is dependent on its uptake into retinal cells, microvascular endothelial cells and the retinal pigment epithelium. Disturbances of retinal vascular perfusion in these retinal diseases may therefore affect the retinal uptake of taurine, resulting in local depletion. The low plasma taurine concentrations observed in diabetic patients may further enhance such local decreases in taurine concentration. We here review the evidence for a role of taurine in retinal ganglion cell survival and studies suggesting that this compound may be involved in the pathophysiology of glaucoma or diabetic retinopathy. Along with other antioxidant molecules, taurine should therefore be seriously reconsidered as a potential treatment for such retinal diseases.

Evaluation of outcomes and radiation complications in 65 cats with nasal tumours treated with palliative hypofractionated radiotherapy.

Vet J (2014)


Feline nasal tumours (NTs) are locally invasive and occasionally metastasise to distant sites. Although palliative hypofractionated radiotherapy (HRT) is used, its efficacy and long-term complications have not been adequately evaluated. The purpose of this study was to evaluate the efficacy of HRT in treating feline malignant NTs, including monitoring improvement in clinical signs, acute and late complications, and prognosis. The medical records of 65 cats with malignant NTs treated with HRT were included. Overall survival (OS) and progression-free survival (PFS) were calculated using the Kaplan-Meier method. The log-rank test and Cox proportional hazard model were used to evaluate factors that influenced OS and PFS. Clinical signs improved in 86.2% of cats following radiotherapy. Acute complications were observed in 58.5% of cats but were manageable and acceptable. Among late complications, cataract was most frequently observed (20.5%), and atrophy of the entire eyeball and osteochondroma at the irradiation site were each observed in two cats. The median OS and PFS in 65 cats were 432 days and 229 days, respectively. No significant difference between OS of cats with nasal lymphoma and that of cats with other tumours was observed. Despite some limitations due to the retrospective nature of the study, palliative HRT for feline NTs can be considered a useful treatment option because of the high incidence of improvement and more favourable prognosis, although it may...
be preferable not to use the hypofractionated regimen in young cats with lymphoma that are expected to survive for a long period.

A retrospective study of 1,098 blood samples with anemia from adult cats: frequency, classification, and association with serum creatinine concentration.
Furman, E., E. Leidinger, E. H. Hooijberg, N. Bauer, G. Beddies, and A. Moritz
BACKGROUND: Frequency and classification of anemia in terms of regeneration status and erythrocyte indices are not well described in cats. OBJECTIVE: To determine frequency and regenerative status of anemia in samples from adult cats, to assess the sensitivity and specificity of macrocytosis and hypochromasia for detecting regenerative anemia (RA), and to evaluate the association of anemia with increased serum creatinine concentration (SC). STUDY POPULATION: Laboratory records from 30,503 blood samples from cats (2003-2011). METHODS: Clinicopathologic data reviewed retrospectively. Anemia defined as hematocrit (Ht) \(\leq 27\%\), red blood cell count (RBC) \(\leq 5.5 \times 10^{6}/\mu L\) and hemoglobin (Hb) \(\leq 9.0 \text{ g/dL}\). RA defined by manual absolute reticulocyte count \(>50 \times 10^{3}/\mu L\). Macrocytosis was defined as mean corpuscular volume (MCV) \(>55 \text{ fL}\) and hypochromasia as mean corpuscular hemoglobin concentration (MCHC) \(<31 \text{ g/dL}\). Cutoff for increased serum creatinine concentration was 1.6 mg/dL. RESULTS: Overall, 1,098 of 30,503 blood samples (3.6\%) from cats fulfilled criteria for anemia, 633 of 1,098 (57.7\%) classified as nonregenerative (NRA) and 465 of 1,098 (42.3\%) as regenerative. RBC, Ht, and Hb were significantly lower in the RA compared to NRA group (\(P < .05\)). Sensitivity and specificity of the combined high MCV and low MCHC to detect samples with RA were 19.5 and 90.7\%. SC was increased in 572 of the 1,098 anemic samples (52.1\%) and in 11,121 of 29,405 of nonanemic samples (37.8\%). CONCLUSIONS AND CLINICAL IMPORTANCE: Majority of anemic samples were classified as NRA. Anemia was more severe in cats with RA. Erythrocyte indices were not sensitive indicators of RA.

An evaluation of fresh gas flow rates for spontaneously breathing cats and small dogs on the Humphrey ADE semi-closed breathing system.
Vet Anaesth Analg (2014)
Gale, E., K. E. Ticehurst, and S. Zaki
OBJECTIVE: To evaluate the fresh gas flow (FGF) rate requirements for the Humphrey ADE semi-closed breathing system in the Mapleson A mode; to determine the FGF at which rebreathing occurs, and compare the efficiency of this system to the Bain (Mapleson D) system in spontaneously breathing cats and small dogs. STUDY DESIGN: Prospective clinical study. ANIMALS: Twenty-five healthy (ASA score I or II) client-owned cats and dogs (mean +/- SD age 4.7 +/- 5.0 years, and body weight 5.64 +/- 3.26 kg) undergoing elective surgery or minor procedures. METHODS: Anaesthesia was maintained with isoflurane delivered via the Humphrey ADE system in the A mode using an oxygen FGF of 100 mL kg-1 minute-1. The FGF was then reduced incrementally by 5-10 mL kg-1 minute-1 at approximately five-minute intervals, until rebreathing (inspired CO2 >5 mmHg (0.7 kPa)) was observed, after which flow rates were increased. In six animals, once the minimum FGF at which rebreathing occurred was found, the breathing system was changed to the Bain, and the effects of this
FGF delivery examined, before FGF was increased. RESULTS: Rebreathing did not occur at the FGF recommended by the manufacturer for the ADE. The mean +/− SD FGF that resulted in rebreathing was 60 +/− 20 mL kg−1 minute−1. The mean minimum FGF at which rebreathing did not occur with the ADE was 87 +/− 39 mL kg−1 minute−1. This FGF resulted in significant rebreathing (inspired CO2 8.8 +/− 2.6 mmHg (1.2 +/− 0.3 kPa)) on the Bain system. CONCLUSIONS: The FGF rates recommended for the Humphrey ADE are adequate to prevent rebreathing in spontaneously breathing cats and dogs <15 kg. CLINICAL RELEVANCE: The Humphrey ADE system used in the A mode is a more efficient alternative to the Bain system, for maintenance of gaseous anaesthesia in spontaneously breathing cats and small dogs.

**A Novel Mutation in CLCN1 Associated with Feline Myotonia Congenita.**


Myotonia congenita (MC) is a skeletal muscle channelopathy characterized by inability of the muscle to relax following voluntary contraction. Worldwide population prevalence in humans is 1 in 100,000. Studies in mice, dogs, humans and goats confirmed myotonia associated with functional defects in chloride channels and mutations in a skeletal muscle chloride channel (CLCN1). CLCN1 encodes for the most abundant chloride channel in the skeletal muscle cell membrane. Five random bred cats from Winnipeg, Canada with MC were examined. All cats had a protruding tongue, limited range of jaw motion and drooling with prominent neck and proximal limb musculature. All cats had blepharospasm upon palpebral reflex testing and a short-strided gait. Electromyograms demonstrated myotonic discharges at a mean frequency of 300 Hz resembling the sound of a ‘swarm of bees’. Muscle histopathology showed hypertrophy of all fiber types. Direct sequencing of CLCN1 revealed a mutation disrupting a donor splice site downstream of exon 16 in only the affected cats. In vitro translation of the mutated protein predicted a premature truncation and partial lack of the highly conserved CBS1 (cystathionine beta-synthase) domain critical for ion transport activity and one dimerization domain pivotal in channel formation. Genetic screening of the Winnipeg random bred population of the cats’ origin identified carriers of the mutation. A genetic test for population screening is now available and carrier cats from the feral population can be identified.

**Endogenous retroviruses in domestic animals.**


Garcia-Etxebarria, K., M. Sistiaga-Poveda, and B. M. Jugo

Endogenous retroviruses (ERVs) are genomic elements that are present in a wide range of vertebrates. Although the study of ERVs has been carried out mainly in humans and model organisms, recently, domestic animals have become important, and some species have begun to be analyzed to gain further insight into ERVs. Due to the availability of complete genomes and the development of new computer tools, ERVs can now be analyzed from a genome-wide viewpoint. In addition, more experimental work is being carried out to analyze the distribution, expression and interplay of ERVs within a host genome. Cats, cattle, chicken, dogs, horses, pigs and sheep have been scrutinized in this manner, all of which are interesting species in health and economic terms. Furthermore, several studies have noted differences
in the number of endogenous retroviruses and in the variability of these elements among different breeds, as well as their expression in different tissues and the effects of their locations, which, in some cases, are near genes. These findings suggest a complex, intriguing relationship between ERVs and host genomes. In this review, we summarize the most important in silico and experimental findings, discuss their implications and attempt to predict future directions for the study of these genomic elements.

**Personality structure in the domestic cat (Felis silvestris catus), Scottish wildcat (Felis silvestris grampia), clouded leopard (Neofelis nebulosa), snow leopard (Panthera uncia), and African lion (Panthera leo): A comparative study.**


*Gartner, M. C., D. M. Powell, and A. Weiss*

Although the study of nonhuman personality has increased in the last decade, there are still few studies on felid species, and the majority focus on domestic cats. We assessed the structure of personality and its reliability in five felids—domestic cats, clouded leopards, snow leopards, African lions, and previous data on Scottish wildcats—and compared the results. In addition to the benefits of understanding more about this taxon, comparative studies of personality structure have the potential to provide information on evolutionary relationships among closely related species. Each of the species studied was found to have three factors of personality. Scottish wildcats’ factors were labeled Dominance, Agreeableness, and Self Control; domestic cats’ factors were Dominance, Impulsiveness, and Neuroticism; clouded leopards’ factors were Dominance/Impulsiveness, Agreeableness/Openness, and Neuroticism; snow leopards’ factors were Dominance, Impulsiveness/Openness, and Neuroticism; and African lions’ factors were Dominance, Impulsiveness, and Neuroticism. The Neuroticism and Impulsiveness factors were similar, as were two of the Dominance factors. A taxon-level personality structure also showed three similar factors. Age and sex effects are also discussed. (PsycINFO Database Record (c) 2014 APA, all rights reserved).

**Safety of intrathecal administration of cytosine arabinoside and methotrexate in dogs and cats.**

Vet Comp Oncol (2014)

*Genoni, S., V. Palus, S. Eminaga, and G. B. Cherubini*

The objective of the study was to retrospectively evaluate the short-term safety of intrathecal administration of cytosine arabinoside alone or in combination with methotrexate in dogs and cats. One hundred and twelve dogs and eight cats admitted between September 2008 and December 2013, diagnosed with suspected inflammatory (meningoencephalomyelitis of unknown aetiology) or neoplastic disease affecting brain or spinal cord and treated with an intrathecal administration of cytosine arabinoside alone or in combination with methotrexate were included in the study. Recorded information regarding possible adverse events during administration while recovering from anaesthesia and during hospitalization period were evaluated. The results showed that one patient developed generalized tonic-clonic seizure activity after administration of cytosine arabinoside and methotrexate during recovery from anaesthesia, however responded to intravenous administration of diazepam. On the base of our results we can conclude that intrathecal administration of cytosine arabinoside alone or in combination with methotrexate is a safe procedure in dogs and cats.
Histological and dermatoscopic description of sphynx cat skin.
Genovese, D. W., T. L. Johnson, K. E. Lamb, and W. D. Gram

BACKGROUND: Histological and hair coat abnormalities of the alopecic sphynx cat have not been described in detail. The hairless allele (hr) in sphynx cats represents a mutation in the gene for keratin 71, a protein expressed in the inner root sheath of humans and mice. HYPOTHESIS/OBJECTIVES: To describe the histological and dermatoscopic abnormalities of sphynx cat skin. ANIMALS: Skin biopsies were collected from 14 sphynx cats and five cats with normal coats. Dermatoscopic examinations were performed on 11 sphynx cats and six additional control cats. METHODS: Vertical and horizontal sections of skin biopsy samples from sphynx and control cats were reviewed. Dermatoscopic images were compared between sphynx and control cats. RESULTS: Sphynx cat hair follicles were often small, curved and kinked and demonstrated infundibular hyperkeratosis and dilatation. Changes in the inner root sheath of sphynx cats included a poorly defined Henle’s layer in addition to vacuolar-like changes and eosinophilic globules in Huxley’s layer. Dermal papillae in sphynx cat anagen bulbs lacked the normal flame shape and were surrounded by epithelial cells arranged in a disorderly manner. The degree of follicular abnormalities varied between follicles. Follicular density was similar for both sphynx cats and control animals. Sphynx cat hair shafts were misshapen, smaller in diameter and rarely medullated. Dermatoscopy revealed similar hair coat density in sphynx and control cats. CONCLUSIONS AND CLINICAL IMPORTANCE: Sphynx cats demonstrated hair follicle dysplasia, with abnormal shaft production but without a decrease in follicle quantity. Abnormalities in sphynx cat follicles are similar to those in murine KRT71 mutants and suggest abnormal hair shaft keratinization.

A molecular study of hemotropic mycoplasmas (hemoplasmas) in cats in Iran.

BACKGROUND: Three feline hemoplasma species are recognized: Mycoplasma haemofelis, ‘Candidatus Mycoplasma haemominutum’, and ‘Candidatus Mycoplasma turicensis’. These species can cause anemia in cats and have a worldwide distribution. OBJECTIVES: There was no previous information on hemotropic mycoplasma spp in cats in Iran and the Middle East. Accordingly, we investigated the molecular presence, and clinical signs and hematological profile in cats infected with these microorganisms in Iranian cats. METHODS: Polymerase chain reaction (PCR) assays and cytology were performed on 100 blood samples collected from Iranian Shorthair cats. ACBC and case history were also collected for each sample. RESULTS: By PCR, 22 (22%; 14-30%, 95% CI) samples were positive. The prevalence of M haemofelis, ‘Ca M haemominutum’, and ‘Ca M turicensis’ was 63.63% (14/22), 54.54% (12/22), and 18.18% (4/22), respectively. Some double and triple co-infections were also found. Using PCR as the reference method, cytology had poor sensitivity (27%) and reasonable specificity (89.74%). Male cats were at a higher risk of infection (P =.001). Cats older than 8 years were more frequently infected than the younger cats (P =.0018). Lower HCT (P =.018), RBC count (P =.028) and HGB concentration (P =.003) were also associated with hemoplasma PCR-positive status. CONCLUSIONS: Based on this study, the most prevalent feline hemoplasma species in
Iranian cats was M haemofelis, but double and triple co-infections are also documented. Age and sex, as well as reduced RBC parameters, were predisposing factors for hemoplasma infection.

**Cystatin C: a new renal marker and its potential use in small animal medicine.**


Ghys, L., D. Paepe, P. Smets, H. Lefebvre, J. Delanghe, and S. Daminet

The occurrence of chronic kidney disease is underestimated in both human and veterinary medicine. Glomerular filtration rate (GFR) is considered the gold standard for evaluating kidney function. However, GFR assessment is time-consuming and labor-intensive and therefore not routinely used in practice. The commonly used indirect GFR markers, serum creatinine (sCr) and urea, are not sufficiently sensitive or specific to detect early renal dysfunction. Serum cystatin C (sCysC), a proteinase inhibitor, has most of the properties required for an endogenous GFR marker. In human medicine, numerous studies have evaluated its potential use as a GFR marker in several populations. In veterinary medicine, this marker is gaining interest. The measurement is easy, which makes it an interesting parameter for clinical use. This review summarizes current knowledge about cystatin C (CysC) in humans, dogs, and cats, including its history, assays, relationship with GFR, and biological and clinical variations in both human and veterinary medicine.

**Pathological and histological findings associated with the feline lungworm Troglostrongylus brevior.**


Troglostrongylus brevior is a neglected feline lungworm species, which has been increasingly reported in the Mediterranean area, although scant data are available on the respiratory alterations it causes in cats. Therefore, we describe the gross and histological lesions of a 20-week old kitten that succumbed due to the onset of a fulminant respiratory failure. At necropsy, a catarrhal exudate was observed in the airways, along with nematodes in the trachea and bronchi. The lungs were processed for histological examination and serial pulmonary sections were performed. A total of 14 nematodes were collected, being all morphologically and molecularly identified as T. brevior. Lungworms were histologically localized within the bronchial lumen, surrounded by an eosinophilic infiltrate. The presence of T. brevior in the airways has been histologically documented for the first time and its life-threatening potential is discussed.

**A molecular survey of Rickettsia felis in fleas from cats and dogs in Sicily (Southern Italy).**


Giudice, E., S. Di Pietro, A. Alaimo, V. Blanda, R. Lelli, F. Francaviglia, S. Caracappa, and A. Torina

Rickettsia felis, the agent of flea-borne spotted fever, has a cosmopolitan distribution. Its pathogenic role in humans has been demonstrated through molecular and serologic tests in several cases. The cat flea (*Ctenocephalides felis*) is considered the main reservoir and the biological vector. The aim of this
The study was to assess the presence and occurrence of *R. felis* in fleas collected from dogs and cats in various sites of Palermo (Sicily). Between August and October 2012, 134 fleas were collected from 42 animals: 37 fleas from 13 dogs and 97 fleas from 29 cats. Two species of fleas were identified: 132 *Ctenocephalides felis* (98.51%) collected on all animals and only two *C. canis* (1.49%) on one dog. Out of 132 *C. felis*, 34 (25.76%), 12 from dogs (32.43%) and 22 (22.68%) from cats, were positive for *R. felis* DNA by a polymerase chain reaction (PCR), confirmed by sequencing. The only two *C. canis* fleas were negative. About half of examined animals (47.62%, 20/42) were infested with at least one infected flea; in particular 46.15% of dogs (6/13) and 48.28% of cats (14/29). It seems that in the Palermo district there is a peri-domestic cycle, with a relatively high prevalence of *R. felis* infection in the cat flea, an insect widely diffused in home environments and which can frequently bite humans. The results also suggest that *R. felis* should be considered in the human differential diagnosis of any spotted-like fever or febrile illness without a clear source of infection in Sicily, especially if the patient is known to have been exposed to flea bites.

**Quality of life measurement in prospective studies of cancer treatments in dogs and cats.**


Giuffrida, M. A., and S. M. Kerrigan

**BACKGROUND:** Quality of life (QOL) is an important consideration in healthcare decision-making for pets with cancer. To determine the effect of disease and treatment on pet QOL, this important variable should be objectively measured as an outcome in veterinary cancer studies. **OBJECTIVES:** To determine the prevalence and methodology of QOL measurement in a sample of recently published reports of prospective studies evaluating cancer treatments in client-owned dogs and cats; to characterize reporting of QOL outcomes and to identify article characteristics associated with QOL measurement. **METHODS:** English-language reports of prospective studies of cancer treatments in dogs and cats published from 2008 to 2013 were identified using medical research databases combined with a hand-searching strategy. Data pertaining to general article characteristics and QOL measurement were abstracted and summarized. **RESULTS:** Reports of 144 eligible studies were identified. QOL was measured in 16 (11.1%) studies, with 8 (5.6%) reporting the results. All studies that measured QOL reported using unvalidated instruments, or did not report how QOL was assessed. Only 1 study provided sufficient information for QOL measurements to be replicated. Recently published articles (2011-2013) were significantly more likely to report measuring QOL, compared with earlier articles. **CONCLUSIONS:** Quality of life of pets undergoing cancer treatment is largely unreported and cannot be meaningfully compared across treatments or disease states using the existing literature. Reliable, validated instruments are needed to facilitate the measurement and comparison of pet QOL in veterinary cancer research. Consistent reporting practices could improve transparency and interpretation of QOL results.

**Hydroxyethyl starch: A review of pharmacokinetics, pharmacodynamics, current products, and potential clinical risks, benefits, and use.**

*J Vet Emerg Crit Care (San Antonio)* (2014)

Glover, P. A., E. Rudloff, and R. Kirby
OBJECTIVE: To review and summarize the pharmacokinetics and pharmacodynamics of hydroxyethyl starch (HES), as well as reported risks and benefits of HES infusion, and to provide administration and monitoring recommendations for HES use in dogs and cats. DATA SOURCES: Veterinary and human peer-reviewed medical literature, including scientific reviews, clinical and laboratory research articles, and authors’ clinical experience. SUMMARY: HES solutions are the most frequently used synthetic colloid plasma volume expanders in human and veterinary medicine. The majority of research in human medicine has focused on the adverse effects of HES infusion, with emphasis on acute kidney injury and coagulation derangements. The studies often differ in or fail to report factors, such as the type, amount, interval, and concentration of HES administered; the patient population studied; or concurrent fluids administered. Currently, there is no definitive clinical evidence that the reported adverse effects of HES use in human medicine occur in veterinary species. There is little information available on HES administration techniques or simultaneous administration of additional fluids in human and veterinary medicine. The rationale for HES use in small animals has been largely extrapolated from human medical studies and guidelines. A controlled approach to intravenous fluid resuscitation using crystalloid and HES volumes titrated to reach desired resuscitation end point parameters is outlined for small animal practitioners. CONCLUSION: The extrapolation of data from human studies directly to small animals should be done with the knowledge that there may be species variations and different pharmacokinetics with different HES solutions. Veterinary reports indicate that bolus and continuous rate infusions of 6% hetastarch solutions at moderate doses are well tolerated in feline and canine subjects. Further research in domesticated species is necessary to better define and expand the knowledge regarding use of HES solutions in small animal medicine.

Caudal mucogingival lesions secondary to traumatic dental occlusion in 27 cats: Macroscopic and microscopic description, treatment and follow-up.


Gracis, M., E. Molinari, and S. Ferro

The main aim of this retrospective study was to describe clinical and histopathological findings in cats with mucogingival lesions developed at the contact point of the premolar and molar teeth of the opposite quadrant. Cases were retrieved following manual review of the medical records, dental records and photographic documentation of all feline dental patients visited in the period between February 2001 and August 2011. Cats showing different lesions at different times were calculated as multiple cases. A total of 27 cats (31 cases) with 44 lesions (26 proliferations [59%], 11 clefts [25%] and seven foveae [16%]) were included. Mean age at the time of the first visit was 6.6 years. The lesion object of the study was the main reason for presentation in only five cases (16%). Proliferations showed two different histopathological patterns and had characteristics in common with human oral pyogenic granuloma. Successful treatment was achieved in all cases by removing the occlusal contact by dental extraction or coronal reduction, possibly associated with lesion excision. This study underlines the need for a thorough oral examination and evaluation of dental occlusion in all patients. Causes for the development of traumatic occlusion may include an acquired overbite (possibly secondary to selective dental extraction), congenital or post-traumatic malocclusion, abnormal latero-lateral mobility of the mandible, occlusal drift of the premolar and molar teeth, and/or alveolar bone expansion.
Per-endoscopic trans-tympanic traction for the management of feline aural inflammatory polyps: a case review of 37 cats.

Greci, V., E. Vernia, and C. M. Mortellaro

Feline aural inflammatory polyps are benign growths originating from the tympanic cavity or the Eustachian tube. They usually occur in young cats, which present either signs of otitis externa and otitis media, or respiratory signs, depending on the direction of polyp growth. Neurological signs are also reported. Simple traction and ventral bulla osteotomy (VBO) are the most common techniques used for treating this condition in cats; corticosteroids are recommended to reduce risk of recurrence given the inflammatory nature of the disease. The most common complications after treatment are Horner’s syndrome, polyp recurrence and facial nerve paralysis. The aim of this report is to describe the per-endoscopic trans-tympanic traction (PTT) technique for treating feline aural inflammatory polyps and to report the short- and long-term follow-up of this procedure. PTT allowed resolution of the aural inflammatory polyps in 94% of cats during a mean long-term outcome of 19 months. Three cats (8%) developed Horner’s syndrome immediately after the PTT procedure, which resolved within a few weeks, and five cats had polyp recurrence (13.5%). Only two cats had a poor outcome and were diagnosed with chronic otitis media at 22 months, and chronic otitis media and polyp recurrence at 46 months after the PTT procedure, respectively. PTT was shown to be an effective technique for treating aural inflammatory polyps and registered fewer neurological complications (8%) than VBO (57-81%) or simple traction (43%), and a recurrence percentage (13.5%) similar to VBO (0-33%) and much lower than traction alone (57%).

Pharmacokinetics and pharmacodynamics of propofol with or without 2% benzyl alcohol following a single induction dose administered intravenously in cats.

Griffenhagen, G. M., M. L. Rezende, D. L. Gustafson, R. J. Hansen, P. J. Lunghofer, and K. R. Mama

OBJECTIVE: To compare the pharmacokinetics and pharmacodynamics of propofol with or without 2% benzyl alcohol administered intravenously (IV) as a single induction dose in cats. STUDY DESIGN: Prospective experimental study. ANIMALS: Six healthy adult cats, three female intact, three male castrated, weighing 4.8 +/- 1.8 kg. METHODS: Cats received 8 mg kg-1 IV of propofol (P) or propofol with 2% benzyl alcohol (P28) using a randomized crossover design. Venous blood samples were collected at predetermined time points to 24 hours after drug administration to determine drug plasma concentrations. Physiologic and behavioral variables were also recorded. Propofol and benzyl alcohol concentrations were determined using high pressure liquid chromatography with fluorescence detection. Pharmacokinetic parameters were described using a 2-compartment model. Pharmacokinetic and pharmacodynamic parameters were analyzed using repeated measures anova (p < 0.05). RESULTS: Plasma concentrations of benzyl alcohol were below the lower limits of quantification (LLOQ) at all time points for two of the six cats (33%), and by 30 minutes for the remaining four cats. Propofol pharmacokinetics, with or without 2% benzyl alcohol, were characterized by rapid distribution, a long elimination phase, and a large volume of distribution. No differences were noted between treatments with the exception of clearance from the second compartment (CLD2), which was 23.6 and 38.8 mL kg-1 minute-1 in the P and P28 treatments, respectively. Physiologic and behavioral variables were not different between treatments with the exception of heart rate at 4 hours post
administration. CONCLUSIONS AND CLINICAL RELEVANCE: The addition of 2% benzyl alcohol as a preservative minimally altered the pharmacokinetics and pharmacodynamics of propofol 1% emulsion when administered as a single IV bolus in this group of cats. These data support the cautious use of propofol with 2% benzyl alcohol for induction of anesthesia in healthy cats.

Large Outbreak Caused by Methicillin Resistant Staphylococcus pseudintermedius ST71 in a Finnish Veterinary Teaching Hospital - From Outbreak Control to Outbreak Prevention.

Gronthal, T., A. Moodley, S. Nykasenoja, J. Junnila, L. Guardabassi, K. Thomson, and M. Rantala

INTRODUCTION: The purpose of this study was to describe a nosocomial outbreak caused by methicillin resistant Staphylococcus pseudintermedius (MRSP) ST71 SCCmec II-III in dogs and cats at the Veterinary Teaching Hospital of the University of Helsinki in November 2010 - January 2012, and to determine the risk factors for acquiring MRSP. In addition, measures to control the outbreak and current policy for MRSP prevention are presented. METHODS: Data of patients were collected from the hospital patient record software. MRSP surveillance data were acquired from the laboratory information system. Risk factors for MRSP acquisition were analyzed from 55 cases and 213 controls using multivariable logistic regression in a case-control study design. Forty-seven MRSP isolates were analyzed by pulsed field gel electrophoresis and three were further analyzed with multi-locus sequence and SCCmec typing. RESULTS: Sixty-three MRSP cases were identified, including 27 infections. MRSPs from the cases shared a specific multi-drug resistant antibiogram and PFGE-pattern indicated clonal spread. Four risk factors were identified; skin lesion (OR = 6.2; CI95% 2.3-17.0, P = 0.0003), antimicrobial treatment (OR = 3.8, CI95% 1.0-13.9, P = 0.0442), cumulative number of days in the intensive care unit (OR = 1.3, CI95% 1.1-1.6, P = 0.0007) or in the surgery ward (OR = 1.1, CI95% 1.0-1.3, P = 0.0401). Tracing and screening of contact patients, enhanced hand hygiene, cohorting and barrier nursing, as well as cleaning and disinfection were used to control the outbreak. To avoid future outbreaks and spread of MRSP a search-and-isolate policy was implemented. Currently nearly all new MRSP findings are detected in screening targeted to risk patients on admission. CONCLUSION: Multidrug resistant MRSP is capable of causing a large outbreak difficult to control. Skin lesions, antimicrobial treatment and prolonged hospital stay increase the probability of acquiring MRSP. Rigorous control measures were needed to control the outbreak. We recommend the implementation of a search-and-isolate policy to reduce the burden of MRSP.

Clinical trials involving cats: what factors affect owner participation?

Gruen, M. E., K. N. Jiamachello, A. Thomson, and B. D. Lascelles

STUDY RATIONALE: Clinical trials are frequently hindered by difficulties in recruiting eligible participants, increasing the timeline and limiting generalizability of results. In veterinary medicine, where proxy enrollment is required, no studies have detailed what factors influence owner participation in clinical trials involving cats. We aimed to investigate these factors through a survey of owners at first opinion practices. PROTOCOL: The survey was designed using feedback from a pilot study and input from clinical researchers. Owners were asked demographic questions and whether they would, would not, or were unsure about participating in a clinical trial with their cat. They then ranked the
importance and influence of various factors on participation using a five-point Likert-type scale, and incentives from most to least encouraging. A total of 413 surveys were distributed to cat owners at four hospitals, two feline-only and two multi-species; 88.6% were completed. Data for importance and influence factors as well as incentive rankings were analyzed overall, and by hospital type, location and whether owners would consider participating. FINDINGS: The most influential factors were trust in the organization, benefit to the cat and veterinarian recommendation. Importance and influence factors varied by willingness to participate. Ranked incentives were not significantly different across groups, with ‘Free Services’ ranked highest. RELEVANCE: This study provides a first look at what factors influence participation in clinical trials with cats. Given the importance placed in the recommendation of veterinarians, continued work is needed to determine veterinarian-related factors affecting clinical trial participation. The results provide guidance towards improved clinical trial design, promotion and education.

Diagnostic accuracy of the vertebral heart score and other radiographic indices in the detection of cardiac enlargement in cats with different cardiac disorders.

Guglielmini, C., M. Baron Toaldo, H. Poser, G. Menciotti, M. Cipone, A. Cordella, B. Contiero, and A. Diana
A retrospective search was conducted to evaluate the diagnostic accuracy of the vertebral heart score (VHS) and other related radiographic indices in the detection of cardiac enlargement associated with different cardiac disorders in the cat. One hundred and five cats with a complete echocardiographic examination and radiographic examination of the thorax with at least two orthogonal views were enrolled. Eighty-three cats had different cardiac disorders, 72 with left-sided cardiac disorders (LSCD) and 11 with right-sided cardiac disorders; 22 cats were free of cardiovascular abnormalities. Measurements of VHS and cardiac long and short axes on lateral (L) and dorsoventral or ventrodorsal radiographs were obtained. Receiver operating characteristic curves were calculated to evaluate the diagnostic accuracy of each radiographic index in differentiating between cats with cardiac disorders or cats with LSCD and cats without cardiac abnormalities and, among cats with LSCD, between those with no or mild left atrial enlargement (LAE) or those with moderate-to-severe LAE and healthy cats. The L-VHS at the cut-off of 7.9 had high diagnostic accuracy in distinguishing cats with LSCD and moderate-to-severe LAE from healthy cats, but all the other radiographic indices were moderately accurate in distinguishing between cats with overall cardiac disorders or LSCD, either with no or mild LAE and moderate-to-severe LAE, and healthy cats. The considered radiographic indices were also moderately accurate in predicting different degrees of LAE in cats with LSCD. Radiographic indices are reasonably specific, but less sensitive predictors of cardiac enlargement in cats with heart disorders.

Feline mycobacterial infections.
Gunn-Moore, D. A.
Mycobacteria of feline importance include (1) obligate pathogens (tuberculosis), (2) mycobacteria that are difficult to grow, so the environmental niche is unknown (feline leprosy syndrome), and (3) facultative pathogenic opportunistic saprophytes (non-tuberculous mycobacteriosis). Most cats present
with cutaneous disease, although some have systemic involvement. Diagnosis is challenging because there are no pathognomonic histopathological changes and many mycobacteria fail to culture, so molecular diagnostics are required. Treatment can involve extended multidrug therapy and prognosis is variable. This article reviews the microbiology, clinical diagnosis, management and prognosis of feline mycobacterial infections.

**Analgesia for pelvic limb surgery. A review of peripheral nerve blocks and the extradural technique.**


**Gurney, M. A., and E. A. Leece**

**OBJECTIVES:** To describe the anatomy and approaches reported for peripheral nerve blockade (PNB) of the pelvic limb in dogs and cats and to consider the role of PNB in relation to the extradural technique. **DATABASES USED:** This review was conducted using the terms ‘nerve block’, ‘extradural’ ‘dog’ and ‘cat’ entered into Pubmed and Google. Results were filtered manually to narrow the field to pelvic limb nerve blocks. The reference lists of retrieved papers were scrutinized to identify further studies for inclusion. **CONCLUSIONS:** Successful PNB techniques require thorough anatomical knowledge for the establishment of reliable landmarks, puncture sites, the direction and depth of needle insertion, and relevant structures to be avoided. To date, clinical evaluations have been made in subjects undergoing stifle surgery where the sciatic nerve has been blocked in combination with various approaches to the femoral nerve. Currently the bulk of literature examines new approaches to these nerves and each of these is described. To date there are no veterinary studies directly comparing one approach versus another, and therefore one is unable to draw conclusions of superiority. The role of PNB’s versus the extradural technique is discussed.

**Intensive intravenous infusion of insulin in diabetic cats.**


**BACKGROUND:** Remission occurs in 10-50% of cats with diabetes mellitus (DM). It is assumed that intensive treatment improves beta-cell function and increases remission rates. **HYPOTHESIS:** Initial intravenous infusion of insulin that achieves tight glycemic control decreases subsequent insulin requirements and increases remission rate in diabetic cats. **ANIMALS:** Thirty cats with newly diagnosed DM. **METHODS:** Prospective study. Cats were randomly assigned to one of 2 groups. Cats in group 1 (n = 15) received intravenous infusion of insulin with the goal of maintaining blood glucose concentrations at 90-180 mg/dL, for 6 days. Cats in group 2 (n = 15) received subcutaneous injections of insulin glargine (cats <=4 kg: 0.5-1.0 IU, q12h; >4 kg 1.5-2.0 IU, q12h), for 6 days. Thereafter, all cats were treated with subcutaneous injections of insulin glargine and followed up for 6 months. Cats were considered in remission when euglycemia occurred for >/=4 weeks without the administration of insulin. Nonparametric tests were used for statistical analysis. **RESULTS:** In groups 1 and 2, remission was achieved in 10/15 and in 7/14 cats (P = .46), and good metabolic control was achieved in 3/5 and in 1/7 cats (P = .22), respectively. Overall, good metabolic control or remission occurred in 13/15 cats of group 1 and in 8/14 cats of group 2. In group 1, the median insulin dosage given during the 6-month follow-up was significantly lower than in group 2 (group 1: 0.32 IU/kg/day, group 2: 0.51 IU/kg/day; P
CONCLUSIONS AND CLINICAL IMPORTANCE: Initial intravenous infusion of insulin for tight glycemic control in cats with DM decreases insulin requirements during the subsequent 6 months.

Incidence of pyometra in Swedish insured cats.

Theriogenology (2014) 82:114-120.

Hagman, R., B. Strom Holst, L. Moller, and A. Egenvall

Pyometra is a clinically relevant problem in intact female cats and dogs. The etiology is similar in both animal species, with the disease caused by bacterial infection of a progesterone-sensitized uterus. Here, we studied pyometra in cats with the aim to describe the incidence and probability of developing pyometra based on age and breed. The data used were reimbursed claims for veterinary care insurance or life insurance claims or both in cats insured in a Swedish insurance database from 1999 to 2006. The mean incidence rate (IR) for pyometra was about 17 cats per 10,000 cat years at risk (CYAR). Cats with pyometra were diagnosed at a median age of 4 years and a significant breed effect was observed. The breed with the highest IR (433 cats per 10,000 CYAR) was the Sphynx, and other breeds with IR over 60 cats per 10,000 CYAR were Siberian cat, Ocitcat, Korat, Siamese, Ragdoll, Maine coon, and Bengal. Pyometra was more commonly diagnosed with increasing age, with a marked increase in cats older than 7 years. The mean case fatality rate in all cats was 5.7%, which is slightly higher than corresponding reports in dogs of 3% to 4%. Geographical location (urban or rural) did not affect the risk of developing the disease. The present study provides information of incidence and probability of developing pyometra based on age, breed, and urban or rural geographical location. These data may be useful for designing cat breeding programs in high-risk breeds and for future studies of the genetic background of the disease.

Comparison of serum fatty acid concentrations in cats with hypertrophic cardiomyopathy and healthy controls.


Hall, D. J., L. M. Freeman, J. E. Rush, and S. M. Cunningham

n-3 fatty acids have some benefits in humans and dogs with cardiac disease, and plasma n-3 fatty acid concentrations have been shown to be decreased in dogs with congestive heart failure (CHF). However, there are no published studies reporting fatty acid concentrations in cats with cardiac disease. Therefore, the goal of this study was to compare serum fatty acid concentrations in normal cats and cats with hypertrophic cardiomyopathy (HCM), and determine if fatty acid concentrations correlate with left atrial size or the presence of CHF. Serum fatty acid concentrations were measured in normal cats and cats with HCM by gas chromatography. Twenty-three cats with HCM and 20 healthy controls were enrolled. Compared with healthy controls, cats with HCM had higher concentrations of palmitic acid (P = 0.01), docosahexanoic acid (DHA; P = 0.001) and total n-3 fatty acids (P = 0.03), and lower concentrations of linoleic acid (P = 0.03). Among cats with HCM, there were no differences in plasma fatty acid concentrations, and no association between left atrial dimension and fatty acid concentrations. Cats with HCM have some alterations in plasma fatty acids compared with healthy controls. Given the higher plasma concentrations of DHA, DHA supplementation is unlikely to have benefits in terms of correcting a deficiency; however, other effects of DHA or of supplementation of EPA warrant further investigation.
Comparison of serum concentrations of symmetric dimethylarginine and creatinine as kidney function biomarkers in cats with chronic kidney disease.


Hall, J. A., M. Yerramilli, E. Obare, M. Yerramilli, and D. E. Jewell

BACKGROUND: Symmetric dimethylarginine (SDMA) has been shown to be an accurate and precise biomarker for calculating estimated glomerular filtration rate (GFR) in humans, as well as a more sensitive biomarker than serum creatinine concentration (sCr) for assessing renal dysfunction.

OBJECTIVES: The purpose of this retrospective study was to report on the utility of measuring serum SDMA concentrations in cats for detection of chronic kidney disease (CKD) before diagnosis by conventional measurement of sCr.

ANIMALS: Chronic kidney disease cats (n = 21) included those persistently azotemic for >/=3 months (n = 15), nonazotemic cats with GFR >30% decreased from median GFR of normal cats (n = 4), and nonazotemic cats with calcium oxalate kidney stones (n = 2). Healthy geriatric cats (n = 21) were selected from the same colony.

METHODS: Symmetric dimethylarginine concentrations (liquid chromatography-mass spectroscopy) and sCr (enzymatic colorimetry) were determined retrospectively from historical data or banked serum samples in azotemic cats or at the time GFR (iohexol clearance) was measured in nonazotemic cats.

RESULTS: Serum SDMA (r = -0.79) and sCr (r = -0.77) concentrations were significantly correlated to GFR (both P < .0001). Symmetric dimethylarginine became increased before sCr in 17/21 cats (mean, 17.0 months; range, 1.5-48 months). Serum SDMA had higher sensitivity (100%) compared with sCr (17%), but lower specificity (91% versus 100%) and positive predictive value (86% versus 100%).

CONCLUSION AND CLINICAL IMPORTANCE: Using serum SDMA as a biomarker for CKD allows earlier detection of CKD in cats compared with sCr, which may be desirable for initiating renoprotective interventions that slow progression of CKD.

A survey of the prevalence of Lynxacarus radovskyi in cats in Malaysia.

Vet Dermatol (2014)

Han, H. S.

Nucleic acid-based differential diagnostic assays for feline coronavirus.


Han, J. I., S. Y. Kang, K. J. Yoon, and K. J. Na

Feline coronavirus (FCoV) is a pleomorphic, enveloped, positive-sense single-stranded RNA virus. Owing to the differences in its genotype, FCoV belongs to a separate clade along with other viruses, such as transmissible gastroenteritis virus (TGEV) and canine coronavirus (CCoV), which can be isolated from cats. In this study, a PCR assay was developed to differentiate these coronaviruses concurrently. Multiplex differential RT-PCR was performed with primers based on the highly conserved coronavirus membrane protein. Three primer sets were designed: a primer pair (S1 and S2) that can bind to conserved sequences in all target coronaviruses, a CCoV-specific primer (S3), and a TGEV-specific primer (S4). Because of the high sequence homology among FCoV, CCoV, and TGEV,
Feline Abstracts Jul-Oct 2014

a nucleotide preceding the last pair of dissimilar nucleotides in S3 and S4 was substituted with an inosine to allow primer binding. This assay could detect and differentiate FCoV (n=7), CCoV (n=4), and TGEV (n=8) precisely and did not show any cross-reactivity with other pathogens. These results suggest that this molecular approach provides a rapid and reliable way to detect FCoV, especially in feline clinical specimens.

Corticotropin-releasing factor family peptide signaling in feline bladder urothelial cells.

Corticotropin-releasing factor (CRF) plays a central role in the orchestration of behavioral and neuroendocrine responses to stress. The family of CRF-related peptides (CRF and paralogs: urocortin (Ucn)-I, -II, and -III) and associated receptors (CRFR1 and CRFR2) are also expressed in peripheral tissues such as the skin and gastrointestinal tract. Local signaling may exert multiple effects of stress-induced exacerbation of many complex syndromes, including psoriasis and visceral hypersensitivity. Interstitial cystitis/painful bladder syndrome (IC/PBS), a chronic visceral pain syndrome characterized by urinary frequency, urgency, and pelvic pain, is reported to be exacerbated by stress. Functional changes in the epithelial lining of the bladder, a vital blood-urine barrier called the urothelium, may play a role in IC/PBS. This study investigated the expression and functional activity of CRF-related peptides in the urothelium of normal cats and cats with feline interstitial cystitis (FIC), a chronic idiopathic cystitis exhibiting similarities to humans diagnosed with IC/PBS. Western blots analysis showed urothelial (UT) expression of CRFR1 and CRFR2. Enzyme immunoassay revealed release of endogenous ligands (CRF and Ucn) by UT cells in culture. Evidence of functional activation of CRFR1 and CRFR2 by receptor-selective agonists (CRF and UCN3 respectively) was shown by i) the measurement of ATP release using the luciferin-luciferase assay and ii) the use of membrane-impermeant fluorescent dyes (FM dyes) for fluorescence microscopy to assess membrane exocytotic responses in real time. Our findings show evidence of CRF-related peptide signaling in the urothelium. Differences in functional responses between FIC and normal UT indicate that this system is altered in IC/PBS.

The Effect of Chinese rhubarb, Rheum officinale, with and without benazepril on the progression of naturally occurring chronic kidney disease in cats.
Hanzlicek, A. S., C. J. Roof, M. W. Sanderson, and G. F. Grauer

BACKGROUND: Renal fibrosis is common in progressive kidney disease. Transforming growth factors beta (TGF-beta) are important mediators of all types of fibrosis, including renal fibrosis. Chinese rhubarb has been shown to have antifibrotic properties in part because of inhibition of TGF-beta and has slowed the progression of kidney disease in rodent models. HYPOTHESIS: That administration of a Chinese rhubarb supplement will slow the progression of chronic kidney disease (CKD) in cats and the concurrent administration of Chinese rhubarb and benazepril will be more effective than either alone. ANIMALS: Twenty-nine client-owned cats with naturally occurring IRIS Stage 2 or early Stage 3 CKD and without comorbidity such as cancer, urinary tract obstruction, urinary tract infection, poorly controlled hyperthyroidism, or systemic hypertension were enrolled in
the study. METHODS: A randomized, positive-controlled, prospective study was performed. Cats received Chinese rhubarb, benazepril, or both in addition to standard treatment for CKD. Repeated measures ANOVA was used to assess changes in serum creatinine concentration, body weight, hematocrit, urine protein: urine creatinine ratio (UPC), and systemic arterial blood pressure over time between and within treatment groups over an average of 22 months. RESULTS: No significant differences were detected in serum creatinine concentration, body weight, hematocrit, UPC, and systemic arterial pressure over time between or within treatment groups. CONCLUSIONS AND CLINICAL IMPORTANCE: This study failed to detect a significant difference in the progression of CKD in cats treated with Chinese rhubarb, benazepril, or both. Further study in specific subsets of cats with CKD is warranted.

Electroencephalographic features of familial spontaneous epileptic cats.


A feline strain of familial spontaneous epileptic cats (FSECs) with typical limbic seizures was identified in 2010, and have been maintained as a novel animal model of genetic epilepsy. In this study, we characterized the electroencephalographic (EEG) features of FSECs. On scalp EEG under sedation, FSECs showed sporadic, but comparatively frequent interictal discharges dominantly in the uni- or bilateral temporal region. Bemegride activation was performed in order to evaluate the predisposition of epileptogenicity of FSECs. The threshold doses of the first paroxysmal discharge, clinical myoclonus and generalized convulsion in FSECs were significantly lower than those in control cats. Chronic video-intracranial EEG monitoring revealed subclinical or clinical focal seizures with secondarily generalization onset from the unilateral amygdala and/or hippocampus. Clinical generalized seizures were also recorded, but we were unable to detect the onset site. The results of the present study show that FSECs resemble not only feline kindling or the kainic acid model and El mouse, but also human familial or sporadic mesial temporal lobe epilepsy. In addition, our results indicate that FSECs are a natural and valuable model of mesial temporal lobe epilepsy.

Oxidative Modification, Inflammation and Amyloid in the Normal and Diabetic Cat Pancreas.

J Comp Pathol (2014)

Herndon, A. M., M. A. Breshears, and D. McFarlane

The pathogenesis of beta-cell dysfunction leading to pancreatic beta-cell failure seen in type 2 diabetes mellitus is incompletely understood. Pancreatic tissues were collected from nine control cats and nine diabetic cats and labelled immunohistochemically to examine expression of interleukin (IL)-1beta, insulin, islet amyloid polypeptide (IAPP) and 4-hydroxynonenal (4-HNE). Thioflavin-S was used to stain for amyloid. All control cats showed positive labelling for IL-1beta and 4-HNE. Diabetic cats showed varying degrees of inflammation and oxidative modification, owing in large part to the very small amount of islet structure remaining in the typical diabetic cat pancreas. Amyloid deposition was identified in 8/9 diabetic cats and 1/9 control cats. In order to validate these findings, paired biopsy samples taken from an additional group of cats enrolled in a study of obesity and hyperglycaemia (sampling at baseline and after 8-16 weeks of obesity and hyperglycaemia) were labelled for IL-1beta.
and 4-HNE. A similar pattern of labelling was identified in the baseline samples to that seen in control cats. A significant increase in IL-1beta and 4-HNE expression was seen after a period of hyperglycaemia and obesity. Taken together, these findings suggest that while present in normal cats, markers of inflammation and oxidative modification increase very early during the development of disease. Future studies focusing on these earlier time points are needed to understand the factors that function in protection of the islet beta cell and the development of islet pathology in type 2 diabetes mellitus in the cat.

**Medical management and monitoring of the hyperthyroid cat: a survey of UK general practitioners.**


Higgs, P., J. K. Murray, and A. Hibbert

Feline hyperthyroidism is commonly diagnosed in general practice. This study assessed the opinions and experiences of UK general practitioners (GPs) regarding the management of feline hyperthyroidism. This included an evaluation of preferred treatment modalities and the monitoring of medically treated cats in relation to thyroxine (T4) level, co-morbid disease and adverse drug reactions. Six hundred and three GPs completed an online questionnaire comprising 34 questions. Oral medication was the most commonly preferred treatment option (65.7% of respondents), followed by thyroidectomy (27.5%) and then radioiodine (5.5%). When cost of treatment was eliminated as a consideration factor, significantly more respondents selected radioiodine (40.5%, P <0.001). Concerning target total T4 levels during medical management, 48.4% aimed for the lower half of the reference interval (RI), 32.3% anywhere within RI, 13.1% within the top half of RI and 0.5% above the RI; 3.4% evaluated efficacy by physical assessment only. In the presence of chronic kidney disease (CKD) respondents were significantly more likely to target total T4 levels within the upper half of the RI (40.3%) or above it (9.8%) when compared with targets for routine cases (P <0.001). Assessment for unmasking of CKD after initiating treatment or for hypertension was not consistently performed. Variability in monitoring strategies may result in CKD and hypertension remaining undetected, inadequate suppression of T4 levels in cats with concurrent CKD and delayed recognition of potentially significant haematological abnormalities.

**The pharmacokinetics of methimazole in a novel lipophilic formulation administered transdermally to healthy cats.**


Hill, K. E., M. A. Gieseg, J. Bridges, and J. P. Chambers

AIM: To determine the pharmacokinetics of a novel lipophilic formulation of transdermal methimazole compared to oral carbimazole. METHODS: Healthy cats received 5 mg carbimazole orally every 12 hours for 13 treatments (n=6), then received transdermal methimazole (n=5) at a dose of 5 mg, then 10 mg, once daily on the pinna for 7 days, with 21 days between treatments. Concentrations of methimazole in serum over 24 hours and at 148 hours were determined by high performance liquid chromatography. RESULTS: Concentrations of methimazole in serum for the first 24 hours were not reliably detected in all cats treated with 5 mg methimazole transdermally, while for those receiving 5 mg carbimazole orally and 10 mg methimazole transdermally all cats had detectable concentrations of
methimazole in serum. The maximum concentration and area under the curve were lower in cats receiving 10 mg methimazole transdermally (108 (SD 25) ng/mL and 2544 (SD 216) mg-hour/mL, respectively) than those receiving 5 mg oral carbimazole (355 (SD 113) ng/mL and 31,866 (SD 439) ng-hour/mL, respectively) (p<0.05). The time at maximal concentration and elimination half-life were longer for 10 mg transdermal methimazole (5.2 (SD 1.1) hours and 13 (SD 3) hours, respectively) compared to 5 mg oral carbimazole (2.1 (SD 1.6) hours and 5.1 (SD 1.2) hours, respectively). At 148 hours, mean concentrations of methimazole in serum were higher in cats receiving 10 mg methimazole transdermally (506 (SD 165) ng/mL) than for 5 mg oral carbimazole (255 (SD 28) ng/mL) or 5 mg transdermally (204 (SD 76) ng/mL). The mean relative bioavailability of 10 mg transdermal methimazole compared to oral carbimazole was 48 (min 43, max 55)%. CONCLUSION: Transdermal methimazole at a dose of 10 mg administered to the pinnae of healthy cats once daily in a novel lipophilic formulation has half the relative bioavailability compared to 5 mg oral carbimazole. CLINICAL RELEVANCE: Transdermal methimazole can be absorbed from the skin of healthy cats.

A retrospective histopathological survey on canine and feline liver diseases at the University of Tokyo between 2006 and 2012.


Hirose, N., K. Uchida, H. Kanemoto, K. Ohno, J. K. Chambers, and H. Nakayama

To determine the incidence of hepatic diseases in dogs and cats in Japan, a retrospective study was performed using data of 463 canine and 71 feline liver biopsies at the Veterinary Medical Center of the University of Tokyo. The most common canine hepatic disease was microvascular dysplasia (MVD) and occupied 29.4% of all diagnoses. This terminology might contain “real” MVD and primary portal vein hypoplasia, because these two conditions were difficult to be clearly distinguished histopathologically. Parenchymal and interstitial hepatitis and primary hepatic tumors accounted for 23.5% and 21.0% of the diagnoses, respectively. Parenchymal and interstitial hepatitis occupied 34.1% of non-proliferative canine hepatic diseases, while hepatocellular adenoma and carcinoma were 26.6% and 24.5% of proliferative hepatic diseases, respectively. Breed-specificity was seen in MVD for Yorkshire terrier, Papillon and Toy poodle, in hepatitis for Doberman pinscher and Labrador retriever, in cholangiohepatitis for American cocker spaniel, Miniature schnauzer and Pomeranian, in hepatocellular adenoma for Golden retriever and Shiba and in hepatocellular carcinoma for Shih Tzu. The most common feline liver disease was parenchymal and interstitial hepatitis (45.1% of all diagnoses). Among feline hepatitis, neutrophilic cholangiohepatitis (23.9%), lymphocytic cholangiohepatitis (14.1%) and chronic hepatitis (5.6%) were recorded. Adult polycystic liver disease was 5.6%. Among proliferative diseases in the feline liver (11.3% of the all), lymphoma (4.2%) and primary epithelial tumors (4.2%) including hepatocellular carcinoma, cholangiocellular adenoma and cholangiocellular carcinoma were observed. Hepatic degeneration was 14.1%, and MVD was 12.7%, respectively.

Evaluation of facial expression in acute pain in cats.

J Small Anim Pract (2014)

Holden, E., G. Calvo, M. Collins, A. Bell, J. Reid, E. M. Scott, and A. M. Nolan
OBJECTIVES: To describe the development of a facial expression tool differentiating pain-free cats from those in acute pain. METHODS: Observers shown facial images from painful and pain-free cats were asked to identify if they were in pain or not. From facial images, anatomical landmarks were identified and distances between these were mapped. Selected distances underwent statistical analysis to identify features discriminating pain-free and painful cats. Additionally, thumbnail photographs were reviewed by two experts to identify discriminating facial features between the groups. RESULTS: Observers (n = 68) had difficulty in identifying pain-free from painful cats, with only 13% of observers being able to discriminate more than 80% of painful cats. Analysis of 78 facial landmarks and 80 distances identified six significant factors differentiating pain-free and painful faces including ear position and areas around the mouth/muzzle. Standardised mouth and ear distances when combined showed excellent discrimination properties, correctly differentiating pain-free and painful cats in 98% of cases. Expert review supported these findings and a cartoon-type picture scale was developed from thumbnail images. CLINICAL SIGNIFICANCE: Initial investigation into facial features of painful and pain-free cats suggests potentially good discrimination properties of facial images. Further testing is required for development of a clinical tool.


Hopper, K., S. E. Epstein, P. H. Kass, and M. S. Mellema

OBJECTIVE: To compare the diagnostic performance of the traditional approach to acid-base analysis with the Stewart approach and a semiquantitative approach. DESIGN: Prospective cohort study. SETTING: University teaching hospital. ANIMALS: A total number of 84 dogs and 14 cats presenting to a university teaching hospital emergency room. PROCEDURES: All dogs and cats in which venous blood samples for acid-base, lactate, and serum biochemical analysis were all collected within 60 minutes of each other, over a 5-month enrollment period. Acid-base analysis was performed using the traditional approach, Stewart approach, and a semiquantitative approach. RESULTS: Traditional acid-base analysis identified respiratory acid-base abnormalities in 14/98 animals and metabolic acid-base abnormalities in 67/98. A mixed disorder of metabolic acidosis and respiratory alkalosis was most common occurring in 29/98 patients. The Stewart approach identified metabolic abnormalities in 82/98 patients; strong ion difference abnormalities were evident in 68/98 cases; an increased strong ion gap acidosis was identified in 49/98 cases; and changes in the quantity of weak acids in 25/98 cases. The semiquantitative approach identified abnormalities in all cases evaluated. Of the 14 patients with a primary respiratory acid-base abnormality, the Stewart approach identified metabolic abnormalities in 9 and the semiquantitative approach found abnormalities in all animals. CONCLUSIONS AND CLINICAL RELEVANCE: The physicochemical approaches diagnosed more acid-base abnormalities in this population than the traditional approach although many of the abnormalities identified were small and of unknown clinical relevance. The physicochemical approaches may provide greater insight as to the underlying etiology of abnormalities, which maybe of particular relevance to cases with changes in albumin and/or phosphorus concentration.

OBJECTIVE: To compare the diagnostic performance of the anion gap (AG) with 2 physicochemical approaches to identify unmeasured anions. DESIGN: Prospective cohort study. SETTING: University teaching hospital. ANIMALS: Eighty-four dogs and 14 cats presenting to a university teaching hospital emergency room. INTERVENTIONS: All dogs and cats in which venous blood samples for acid-base, lactate, and serum biochemical analysis were all collected within 60 minutes of each other, over a 5-month enrollment period. Unmeasured anions were quantified using each of three approaches: the anion gap (AG), strong ion gap (SIG), and a semiquantitative approach (XA). MEASUREMENTS AND MAIN RESULTS: An increased AG metabolic acidosis was evident in 34/98 of cases. The Stewart approach identified an increased SIG acidosis in 49/98 of cases. There was a strong correlation between SIG and AG (r = 0.89; P < 0.001). The semiquantitative approach identified increased unmeasured anions in 68/98 of cases. There was a moderate correlation between AG and XA (r = 0.68; P < 0.001) and a slightly stronger correlation between SIG and XA (r = 0.75; P < 0.001). Plasma lactate concentrations and AG were poorly correlated (r = 0.22; P = 0.029) and there was no correlation between lactate concentrations and BE (r = 0.19; P = 0.069). CONCLUSIONS: Unmeasured anions occurred commonly in this sample of small animal emergency room patients and physiochemical approaches identified more animals with unmeasured anions than the traditional AG calculation. Further studies are needed to determine if the results of the physicochemical approach improves clinical management and warrants the associated increases in cost and complexity.

**Rickettsia felis in Ctenocephalides felis felis from five geographic regions of Brazil.**


_Horta, M. C., M. Ogrzewalska, M. C. Azevedo, F. B. Costa, F. Ferreira, and M. B. Labruna_

This study evaluated rickettsial infection in 701 Ctenocephalides felis felis fleas that were collected from dogs and cats in 31 municipalities, encompassing all regions and major biomes of Brazil. A total of 268 (38.2%) fleas from 30 municipalities were polymerase chain reaction (PCR) positive for the rickettsial gltA gene. The PCR products from 44 fleas, consisting of at least 1 PCR-positive flea from each of 30 municipalities, generated DNA sequences identical to Rickettsia felis. Rickettsial prevalence was highly variable among 30 municipalities, with values ranging from 2.9% to 100%. Significantly higher infection rates by R. felis were associated with the Pampa biome (southern Brazil), and the temperate climate that prevails in southern Brazil. In contrast, lowest R. felis-infection rates were significantly associated with the Caatinga biome, and its semiarid climate. Further studies should evaluate the effect of temperature and moisture on the R. felis infection in Ctenocephalides fleas world widely.

**Evaluation of a novel feline AB blood typing device.**


_Hourani, L., C. Weingart, and B. Kohn_

This prospective study evaluated a novel immunochromatographic (IC) blood typing test for the AB blood group system. Typing was conducted comparatively on ethylenediamine tetra-acetic acid-
anticoagulated blood samples from 89 sick and 16 healthy cats with the IC test, as well as two tests as reference methods, a tube agglutination and a gel column test. The samples were between 0 and 10 days old (median 3 days) and were tested for haemolysis and agglutination; the packed cell volume ranged from 0.07 to 0.57 l/l (median 0.40 l/l). The reference methods agreed with each other in 100% of the test runs. Of the 85 samples tested as blood type A by the two reference methods, 80 were correctly identified by the IC test, four were misidentified as AB and one was rated inconclusive. All B samples were correctly typed. Two of the three AB samples were correctly identified by the IC test and one was rated inconclusive. The sample quality had no influence on test performance. Of 30 repeats, 28 were readable and showed agreement in 27 cases. The agreement of the IC test with the control methods was 96.1% for the 103 conclusive tests, and it showed high sensitivity and specificity for A and B antigen detection. It is suggested that AB results be reconfirmed with a laboratory method and that a ‘back-typing’ be performed with plasma from B samples to detect the presence of alloantibodies. Given its very good performance and ease of use, the IC test can be recommended for clinical settings.

**Bovine lactoferrin and piroxicam as an adjunct treatment for lymphocytic-plasmacytic gingivitis stomatitis in cats.**


Feline lymphocytic-plasmacytic gingivitis/stomatitis (LPGS) or caudal stomatitis is an inflammatory disease that causes painfully erosive lesions and proliferations of the oral mucosa. The disease is difficult to cure and can affect cats at an early age, resulting in lifetime therapy. In this study, a new treatment using a combination of bovine lactoferrin (bLf) oral spray and oral piroxicam was investigated using a randomized double-blinded clinical trial in 13 cats with caudal stomatitis. Oral lesion grading and scoring of clinical signs were conducted during and after the trial to assess treatment outcome. Oral mucosal biopsies were used to evaluate histological changes during and after treatment. Clinical signs were significantly improved in 77% of the cats. In a 4-week study, clinical signs were considerably ameliorated by oral piroxicam during the first 2 weeks. In a 12-week study, the combined bLf oral spray and piroxicam, when compared with piroxicam alone, exhibited an enhanced effect that reduced the severity of the oral lesions (P = 0.059), while also significantly improving clinical signs (P <0.05), quality of life (P <0.05), and weight gain (P <0.05). The remission of oral inflammation was closely correlated with the decreased number of macrophages (OR = 4.719, P < 0.05). There was no detectable influence on liver or kidney function during a 12-week assessment. It was concluded that combining oral bLf spray and piroxicam was safe and might be used to decrease the clinical signs of caudal stomatitis in cats.

**Tramadol toxicity in a cat: case report and literature review of serotonin syndrome.**


**Indrawirawan, Y., and T. McAlees**

OVERVIEW: Tramadol toxicity has not previously been reported in a cat. **CASE SUMMARY:** This report describes the clinical signs, diagnosis and treatment of tramadol toxicity, manifesting as serotonin syndrome, in a cat in Australia. **PRACTICAL RELEVANCE:** For any cat with suspicion of serotonin syndrome, in particular secondary to tramadol overdose, it is recommended that
decontamination, monitoring and supportive care are instituted as soon as clinical signs develop. Prolonged hospitalisation may be required in the event of a severe overdose. LITERATURE REVIEW: The literature relating to the pharmacology of tramadol and tramadol overdose, clinical manifestations of tramadol overdose, and serotonin syndrome in cats, humans and dogs is reviewed. Recommended treatment for tramadol overdose and serotonin syndrome is also discussed.

**Gastrointestinal perforation associated with endoscopy in cats and dogs.**


*Irom, S., R. Sherding, S. Johnson, and P. Stromberg*

Gastrointestinal endoscopy is a minimally invasive diagnostic tool for cats and dogs with signs of gastrointestinal disease. This retrospective study examined the case records of six cats and one dog diagnosed with perforation secondary to gastrointestinal endoscopy. Gastrointestinal perforation occurred in 1.6% of cats and 0.1% of dogs that underwent endoscopy during the 17 yr study period (from 1993 to 2010). It can be difficult to predict what animals are at risk for gastrointestinal perforation but possible risk factors suggested by this study include small intestinal infiltrative disease in cats and preexisting gastrointestinal ulceration in both cats and dogs. Overall, gastrointestinal endoscopy is associated with a low rate of gastrointestinal perforation.

**A nationwide survey of ixodid tick species recovered from domestic dogs and cats in Japan in 2011.**


*Iwakami, S., Y. Ichikawa, and H. Inokuma*

A nationwide survey of ixodid ticks was performed in 2011, during which a total of 4237 and 298 ticks were recovered from 1162 dogs and 136 cats, respectively. Haemaphysalis longicornis was the most frequently found tick species on canine hosts (739 dogs), followed by *H. flava* (166), *Ixodes ovatus* (139), and *Rhipicephalus sanguineus sensu lato* (70). *H. hystricis*, *H. japonica*, *H. megaspinosa*, *H. formosensis*, *H. campanulata*, *H. ias*, *I. nipponensis*, *I. persulcatus*, and *Amblyomma testudinarium* were also recovered. *H. longicornis* was also the most frequently found species on feline hosts (52 cats), followed by *I. ovatus* (34), *A. testudinarium* (19), and *H. flava* (12). *H. hystricis*, *H. japonica*, *H. megaspinosa*, *I. nipponensis*, *I. persulcatus*, *I. granulatus* and *R. sanguineus sensu lato* were also recovered from cats. The three major species of ticks found on dogs and cats, *H. longicornis*, *H. flava*, and *I. ovatus*, displayed a wide geographical distribution, with specimens found throughout northern and southern Japan. *R. sanguineus sensu lato* was primarily recovered in Okinawa, but was also found in Kanagawa, Wakayama, Hiroshima, and Yamaguchi Prefectures. *A. testudinarium* was mainly distributed throughout western Japan, but small numbers were also recovered from Gunma and Shizuoka Prefectures. *H. longicornis* was more frequently found on dogs in rural areas than those in urban or suburban areas. Exposure to woodland environments was significantly associated with *H. flava* and *I. ovatus* in dogs. Dogs in urban or suburban areas encountered *R. sanguineus sensu lato* more often than other tick species. Most of the cats surveyed in the present study were from rural areas. In the present study, *H. hystricis* and *R. sanguineus sensu lato* were found on cats for the first time in Japan.
Molecular survey of Babesia gibsoni using Haemaphysalis longicornis collected from dogs and cats in Japan.


Iwakami, S., Y. Ichikawa, and H. Inokuma

A nationwide survey of Babesia gibsoni using Haemaphysalis longicornis collected from dogs and cats in Japan was conducted using molecular methods. A total of 1,341 H. longicornis, including 305 females, 14 males, 332 nymphs and 690 larvae (153 pools) from 44 prefectures, were examined by B. gibsoni-targeted PCR. Partial sequence analysis revealed that 12 of 13 positive samples sequenced, including samples from Tottori, Hiroshima, Yamaguchi, Tokushima, Ehime and Oita prefectures (all in western Japan), were identical to B. gibsoni, and 1 sample from Kyoto Prefecture was most closely related to a Babesia species recently detected from feral raccoons in Hokkaido. H. longicornis is a candidate for transmission vector tick of the new Babesia species.

Comparison of whole blood and plasma colloid osmotic pressure in healthy cats.


Jackson, M. L., M. E. Kerl, B. Tynan, and F. A. Mann

OBJECTIVE: To establish reference intervals for whole blood and plasma colloid osmotic pressure (COP) in healthy cats between the ages of 1 and 10 years using a cage-side colloid osmometer. DESIGN: Prospective, observational study. SETTINGS: University veterinary teaching hospital. ANIMALS: Sixty-three healthy cats. INTERVENTIONS: Phlebotomy. MEASUREMENTS AND MAIN RESULTS: Whole blood COP mean was 24.4 (+/-2.78) mmHg and plasma COP mean was 24.3 (+/-2.59) mmHg. Reference interval for our study population of feline whole blood COP was 18.9 to 30.4 mmHg, and for our study population of feline plasma COP was 18.3 to 30.8 mmHg. Difference of paired whole blood COP and plasma COP was +0.23 +/- 1.68 mmHg (P = 0.32). There was no significant difference when comparing COP from neutered male and neutered female cats. Total protein and albumin were significantly correlated with whole blood COP (total protein to whole blood COP P < 0.0001, r = 0.53; albumin to whole blood COP P <0.0001, r = 0.68) and plasma COP (total protein to plasma COP P = 0.0025, r = 0.41; albumin to plasma COP P < 0.0001, r = 0.66). CONCLUSIONS: No significant difference was found between mean whole blood and plasma COP in this study population of cats. Even though not statistically significant, evaluation of paired whole blood COP and plasma COP did reveal a slight difference; therefore, it seems prudent to maintain sample consistency for serial evaluations in cats.

Study of the effect on shelter cat intakes and euthanasia from a shelter neuter return project of 10,080 cats from March 2010 to June 2014.


Johnson, K. L., and J. Cicirelli

Cat impoundments were increasing at the municipal San Jose animal shelter in 2009, despite long-term successful low cost sterilization programs and attempts to lower the euthanasia rate of treatable-rehabilitatable impounds beginning in 2008. San Jose Animal Care and Services implemented a new strategy designed to control overall feral cat reproduction by altering and returning feral cats entering
the shelter system, rather than euthanizing the cats. The purpose of this case study was to determine how the program affected the shelter cat intakes over time. In just over four years, 10,080 individual healthy adult feral cats, out of 11,423 impounded at the shelter during this time frame, were altered and returned to their site of capture. Included in the 11,423 cats were 862 cats impounded from one to four additional times for a total of 958 (9.5%) recaptures of the previously altered 10,080 cats. The remaining 385 healthy feral cats were euthanized at the shelter from March 2010 to June 2014. Four years into the program, researchers observed cat and kitten impounds decreased 29.1%; euthanasia decreased from over 70% of intakes in 2009, to 23% in 2014. Euthanasia in the shelter for Upper Respiratory Disease decreased 99%; dead cat pick up off the streets declined 20%. Dog impounds did not similarly decline over the four years. No other laws or program changes were implemented since the beginning of the program.

Surveillance of diarrhoea in small animal practice through the Small Animal Veterinary Surveillance Network (SAVSNET).


Using the Small Animal Veterinary Surveillance Network (SAVSNET), a national small animal disease-surveillance scheme, information on gastrointestinal disease was collected for a total of 76 days between 10 May 2010 and 8 August 2011 from 16,223 consultations (including data from 9115 individual dogs and 3462 individual cats) from 42 premises belonging to 19 UK veterinary practices. During that period, 7% of dogs and 3% of cats presented with diarrhoea. Adult dogs had a higher proportional morbidity of diarrhoea (PMD) than adult cats (P <0.001). This difference was not observed in animals <1 year old. Younger animals in both species had higher PMDs than adult animals (P < 0.001). Neutering was associated with reduced PMD in young male dogs. In adult dogs, miniature Schnauzers had the highest PMD. Most animals with diarrhoea (51%) presented having been ill for 2-4 days, but a history of vomiting or haemorrhagic diarrhoea was associated with a shorter time to presentation. The most common treatments employed were dietary modification (66% of dogs; 63% of cats) and antibacterials (63% of dogs; 49% of cats). There was variability in PMD between different practices. The SAVNET methodology facilitates rapid collection of cross-sectional data regarding diarrhoea, a recognised sentinel for infectious disease, and characterises data that could benchmark clinical practice and support the development of evidence-based medicine.

Association between feline immunodeficiency virus (FIV) plasma viral RNA load, concentration of acute phase proteins and disease severity.


Kann, R. K., J. M. Seddon, M. T. Kyaw-Tanner, J. Henning, and J. Meers

Veterinarians have few tools to predict the rate of disease progression in FIV-infected cats. In contrast, in HIV infection, plasma viral RNA load and acute phase protein concentrations are commonly used as predictors of disease progression. This study evaluated these predictors in cats naturally infected with FIV. In older cats (>5 years), log10 FIV RNA load was higher in the terminal stages of disease compared to the asymptomatic stage. There was a significant association between log10 FIV RNA load
and both log10 serum amyloid A concentration and age in unwell FIV-infected cats. This study suggests that viral RNA load and serum amyloid A warrant further investigation as predictors of disease status and prognosis in FIV-infected cats.

**Effects of photoperiod on food intake, activity and metabolic rate in adult neutered male cats.**


With the continued rise in feline obesity, novel weight management strategies are needed. To date, strategies aimed at altering physical activity, an important factor in weight maintenance, have been lacking. Photoperiod is known to cause physiological changes in seasonal mammals, including changes in body weight (BW) and reproductive status. Thus, our objective was to determine the effect of increased photoperiod (longer days) on voluntary physical activity levels, resting metabolic rate (RMR), food intake required to maintain BW, and fasting serum leptin and ghrelin concentrations in adult cats. Eleven healthy, adult, neutered, male domestic shorthair cats were used in a randomized crossover design study. During two 12-week periods, cats were exposed to either a short-day (SD) photoperiod of 8 h light: 16 h dark or a long-day (LD) photoperiod of 16 h light: 8 h dark. Cats were fed a commercial diet to maintain baseline BW. In addition to daily food intake and twice-weekly BW, RMR (via indirect calorimetry), body composition (via dual-energy X-ray absorptiometry (DEXA)) and physical activity (via Actical activity monitors) were measured at week 0 and 12 of each period. Fasting serum leptin and ghrelin concentrations were measured at week 0, 6 and 12 of each period. Average hourly physical activity was greater (p = 0.008) in LD vs. SD cats (3770 vs. 3129 activity counts/h), which was primarily due to increased (p < 0.001) dark period activity (1188 vs. 710 activity counts/h). This corresponded to higher (p < 0.0001) daily metabolizable energy intake (mean over 12-week period: 196 vs. 187 kcal/day), and increased (p = 0.048) RMR in LD cats (9.02 vs. 8.37 kcal/h). Body composition, serum leptin and serum ghrelin were not altered by photoperiod. More research is needed to determine potential mechanisms by which these physiological changes occurred and how they may apply to weight management strategies.

**Genetic diversity in Enterocytozoon bieneusi isolates from dogs and cats in China: host specificity and public health implications.**


To explore the genetic diversity, host specificity, and zoonotic potential of Enterocytozoon bieneusi, feces from 348 stray and pet dogs and 96 pet cats from different locations in China were examined by internal transcribed spacer (ITS)-based PCR. E. bieneusi was detected in 15.5% of the dogs, including 20.5% of stray dogs and 11.7% of pet dogs, and in 11.5% of the pet cats. Higher infection rates were recorded in the >2-year and the 1- to 2-year age groups in dogs and cats, respectively. Altogether, 24 genotypes, including 11 known and 13 new, were detected in 65 infected animals. In 54 positive dogs, 18 genotypes, 9 known (PtEbIX, O, D, CM1, EbpA, Peru8, type IV, EbpC, and PigEBITS5) and 9 new (CD1 to CD9), were found. In contrast, 8 genotypes, 4 known (D, BEB6, I, and PtEbIX) and 4 new (CC1 to CC4), were identified in 11 infected cats. The dominant genotype in dogs was PtEbIX (26/54). Phylogenetic analysis revealed that 8 known genotypes (D, Peru8, type IV, CM1, EbpC, PigEBITS5,
O, and EbpA) and 7 new genotypes (CD1 to CD4 and CC2 to CC4) were the members of zoonotic group 1, whereas genotypes CD7, CD8, and CD9 together with PtEbIX belonged to the dog-specific group, and genotypes CD6 and CC1 were placed in group 2 with BEB6 and I. Conversely, genotype CD5 clustered with CM4 without belonging to any previous groups. We conclude that zoonotic genotypes are common in dogs and cats, as are host-specific genotypes in dogs.

**Preliminary Study of Interaction of Clarithromycin with Tacrolimus in Cats.**


Katayama, M., T. Ushio, S. Shimamura, Y. Okamura, and Y. Uzuka

Tacrolimus (Tac) is a core immunosuppressive drug in human organ transplantation. In feline kidney transplantation, however, the cost of Tac therapy is a significant obstacle. Clarithromycin (CLM) increases the blood trough level of Tac, effectively reducing the Tac dosage in human transplant patients. The interaction between CLM and Tac in cats has not been reported. In this study, the effect of multiple CLM dosing on the pharmacokinetics of Tac in three healthy cats was investigated. The treatments included Tac at 0.3 mg/kg and Tac at 0.3 mg/kg + multiple-dose CLM at 10 mg/kg. Co-administration of CLM and Tac resulted in significant increases in the oral bioavailability of Tac. These preliminary findings suggest that administration of multiple doses of CLM may decrease the required Tac dosage in Tac-based immunosuppressive therapy used as an alternative to the classic cyclosporine-based protocol for feline renal transplantation.

**In vitro efficacy of cefovecin against anaerobic bacteria isolated from subgingival plaque of dogs and cats with periodontal disease.**


Periodontal disease is a common disease of dogs and cats often requiring antimicrobial treatment as an adjunct to mechanical debridement. However, correct compliance with oral antimicrobial therapy in companion animals is often difficult. Cefovecin is a recently introduced veterinary cephalosporin that has demonstrated prolonged concentrations in extracellular fluid, allowing for dosing intervals of up to 14 days. Subgingival samples were collected from the oral cavity of 29 dogs and eight cats exhibiting grade 2 or grade 3 periodontal disease. Samples were cultivated on Wilkin Chalgrens agar and incubated in an anaerobic chamber for seven days. Selected anaerobic bacteria were isolated and identified to species level using 16S rRNA gene sequence analysis. Minimum inhibitory concentrations were determined for cefovecin and six additional antimicrobials using the agar dilution methodology recommended by the Clinical and Laboratory Standards Institute. The 65 clinical isolates were identified as Porphyromonas gulae (n = 45), Porphyromonas crevioricanis (n = 12), Porphyromonas macacae (n = 1), Porphyromonas cangingivalis (n = 1) Fusobacterium nucleatum (n = 2), Fusobacterium russii (n = 1) and Solobacterium moorei (n = 3). This is the first report of S. moorei being isolated from companion animals with periodontal disease. All isolates were highly susceptible to cefovecin, with a MIC90 of <=0.125 μg/ml. Conversely, different resistance rates to ampicillin, amoxycillin and erythromycin between isolates were detected. Cefovecin is thus shown to be effective in vitro against anaerobic bacteria isolated from dogs and cats with periodontal disease.
The pharmacokinetics and in vitro/ex vivo cyclooxygenase selectivity of parecoxib and its active metabolite valdecoxib in cats.


Kim, T. W., C. Vercelli, A. Briganti, G. Re, and M. Giorgi

Parecoxib (PX) is an injectable prodrug of valdecoxib (VX, which is a selective cyclo-oxygenase-2 (COX-2)) inhibitor licensed for humans. The aim of the present study was to evaluate pharmacokinetics and in vitro/ex vivo cyclooxygenase selectivity of PX and VX in cats. In a whole blood in vitro study, PX did not affect either COX enzymes whereas VX revealed a COX-2 selective inhibitory effect in feline whole blood. The IC50 values of VX for COX-2 and COX-1 were 0.45 and 38.6 microM, respectively. Six male cats were treated with 2.5 mg/kg of PX by intramuscular injection. PX was rapidly converted to VX with a relatively short half-life of 0.4 h. VX achieved peak plasma concentration (2.79 +/- 1.59 microg/mL) at 7 h following PX injection. The mean residence times for PX and VX were 0.43 +/- 0.15 and 5.94 +/- 0.88 h, respectively. In the ex vivo study, PX showed a COX-2 inhibition rate of about 70% in samples taken at 1, 2, 4 and 10 h after injection, with a significant difference compared to the control. In contrast, COX-1 was slightly inhibited, ranging from 0.7% to 9.7% of the control inhibition rate without any significant difference for 24 h after PX administration. The preliminary findings of the present research appear promising and encourage further studies to investigate whether PX can be successfully used in feline medicine.

Use of brachial plexus blockade and medetomidine-ketamine-isoflurane anaesthesia for repair of radio-ulna fracture in an adult cheetah (acinonyx jubatus).


Background Regional anaesthetic techniques have been used in combination with systemic analgesics during small animal surgery to provide multimodal analgesia. Brachial plexus nerves block using local anaesthetics provides analgesia of the thoracic limb through desensitization of the nerves that provide sensory and motor innervation. This has been shown to reduce intra-operative anesthetic requirements and provide postoperative pain relief. Decreasing the doses of general anaesthetics allows more stable cardiopulmonary function during anaesthesia and the development of less side effects. The present case reports a successful use of brachial plexus blockade to supplement medetomidine-ketamine-isoflurane anaesthesia for repair of radio-ulna fracture in an adult cheetah (acinonyx jubatus). Case presentation An adult male Cheetah weighing about 65 kg was presented with a history of leg carrying lameness of the left forelimb sustained following a car accident a week earlier. Clinical examination under general anaesthesia revealed slight dehydration and a swelling with a wound on the caudo-medial aspect of the left radio-ulna region. Crepitation was present on manipulation and radiography confirmed a complete transverse radio-ulna fracture of the left forelimb, which required open reduction and internal fixation. Brachial plexus blockade using lignocaine hydrochloride was used to supplement medetomidine-ketamine-isoflurane anaesthesia for the surgical procedure. Isoflurane anaesthesia was maintained at 0.5 - 2.0% throughout the surgical procedure, which was uneventful. Temperature and cardiopulmonary parameters remained stable intra-operatively. Limb paralysis extended for 5 hours post-operatively, suggesting prolonged anaesthesia. Conclusion To the researchers inverted question mark knowledge, this is the first reported case of the use of brachial plexus blockade to supplement general
anaesthesia to facilitate forelimb surgery in an adult cheetah. The use of brachial plexus block with a light plane of general anaesthesia proved to be successful. Brachial plexus block had a sparing effect on isoflurane anaesthesia as evidenced by the concentration used for maintenance of anaesthesia and the stability of the cardiopulmonary function. Moreover, absence of autonomic cardiopulmonary reactions to the surgical manipulation may be attributed to the efficacy of brachial plexus block. This anaesthesia protocol is therefore recommended for surgeries of the forelimb in wild cats.

**Efficacy, acceptability and tolerability of the new oral phosphate binder Lenziaren(R) in healthy cats fed a standard diet.**


*King, J. N., H. L. Erasmus, P. C. Delpero, I. Bester, and W. Seewald*

**Background**

The efficacy, acceptability and tolerability of the new oral phosphate binder Lenziaren(R) (SBR759) were evaluated in a randomized parallel-group design study in 36 healthy cats (n =6 per group). Five groups were fed once daily with a commercial diet containing 0.2% phosphorus (inverted question mark standard diet inverted question mark) into which was mixed Lenziaren(R) at 0.25, 0.5, 1.0 or 2.0 g/day or no treatment (control group) daily for 30 days. A sixth group was fed a commercial diet containing lower amounts (0.12%) of phosphorus (inverted question mark renal diet inverted question mark) and no treatment.

**Results**

When compared to the control group, Lenziaren(R) produced significant dose-related reductions in urine phosphate concentrations, urine phosphate excretion and fractional urinary phosphate excretion. Significant effects versus the control group were observed at the 0.5, 1.0 and 2.0 g/day dosages. Lenziaren(R) was well tolerated and was associated with higher food consumption and serum iron concentrations versus the control. When compared to the control group, the renal diet was associated with significantly lower urine phosphate concentrations and loss of body weight. Lenziaren(R) had similar effects on urine phosphate concentrations compared to the renal diet, but was not associated with loss of body weight.

**Conclusions**

Lenziaren(R) was effective as an oral phosphate binder in cats fed with a standard diet containing 0.2% phosphorus. The acceptability and tolerability were good. Dosages of 0.5-1.0 g/cat per day are recommended for clinical testing in cats fed with a standard diet.

**Therapeutic efficacy of Broadline(R) against notoedric mange in cats.**


*Knaus, M., B. Capari, and M. Visser*

The efficacy of a novel topical combination of fipronil 8.3 % w/v, (S)-methoprene 10 % w/v, eprinomectin 0.4 % w/v, and praziquantel 8.3 % w/v (Broadline(R), Merial) was evaluated in 18 cats naturally infested by Notoedres cati in a controlled, blinded clinical efficacy study. Cats were blocked on pretreatment bodyweight and randomly allocated to two groups of nine cats each. One group served as control (untreated) and one group was treated once topically with Broadline(R) according to the label instructions. Skin scrapings (three scrapings per animal per occasion) were collected prior to treatment and every other week for 8 weeks thereafter and examined for live N. cati mites. In addition, lesions were evaluated at each sampling to monitor the clinical recovery. Based on live mite counts, efficacy against N. cati of a single topical administration with Broadline(R) was >99 %, and all treated
cats recovered from clinical signs of notoedric mange. No treatment-related adverse events were observed.

**Prevalence of Biofilms on Surgical Suture Segments in Wounds of Dogs, Cats, and Horses.**

*Vet Pathol (2014)*

*Konig, L., R. Klopfleisch, O. Kershaw, and A. D. Gruber*

The formation of biofilms on surgical implants is thought to play a major role in chronic infection and wound-healing disorders and has been rarely described in veterinary medicine. Due to poor and unreliable results from bacterial culturing, histology may be an economic tool for the detection of biofilms. In this study, the prevalence of biofilms on surgical suture materials and swabs with chronic wound-healing complications in dogs, cats, and horses was assessed by histologic examination using hematoxylin and eosin, Gram, and Giemsa stains, as well as periodic acid-Schiff reaction. Of the 91 tissue samples with intralional suture material or swab residues associated with inflammation, only 2 contained bacterial colonies arranged in an extracellular polymeric matrix consistent with a biofilm. The results of this study suggest that biofilms on suture material may occur in veterinary medicine.

**Molecular identification of Cryptosporidium spp. in seagulls, pigeons, dogs, and cats in Thailand.**


Zoonotic Cryptosporidium spp., particularly C. meleagridis, C. canis, and C. felis, are enteric protozoa responsible for major public health concerns around the world. To determine the spread of this parasite in Thailand, we conducted molecular identification of Cryptosporidium spp. from animal samples around the country, by collecting and investigating the feces of seagulls (Chroicocephalus brunnicephalus and Chroicocephalus ridibundus), domestic pigeons (Columba livia domestica), dogs, and cats. Seagull and pigeon samples were collected at the seaside and on the riverside to evaluate their potential for waterborne transmission. Ten pigeon samples were combined into one set, and a total of seven sets were collected. Seventy seagull samples were combined into one set, and a total of 13 sets were collected. In addition, 111 dog samples were collected from cattle farms, and 95 dog and 80 cat samples were collected from a temple. We identified C. meleagridis in pigeons, Cryptosporidium avian genotype III in seagulls, C. canis in dogs, and C. felis in cats. In the temple, the prevalence was 2.1% (2/95) for dogs and 2.5% (2/80) for cats. No Cryptosporidium was found in dog samples from cattle farms. These are the first findings of C. meleagridis in domestic pigeons, and Cryptosporidium avian genotype III in seagulls. Our study invites further molecular epidemiological investigations of Cryptosporidium in these animals and their environment to evaluate the public health risk in Thailand.

**Association between oral health status and retrovirus test results in cats.**


*Kornya, M. R., S. E. Little, M. A. Scherk, W. C. Sears, and D. Bienzle*
OBJECTIVE: To determine associations between oral health status and seropositivity for FIV or FeLV in cats. DESIGN: Cross-sectional survey. ANIMALS: 5,179 cats. PROCEDURES: Veterinarians at veterinary clinics and animal shelters completed online training on oral conditions in cats and then scored oral health status of cats with no known history of vaccination against FIV. Age, sex, and results of an ELISA for retroviruses were recorded. Results were analyzed by means of standard logistic regression with binary outcome. RESULTS: Of 5,179 cats, 237 (4.6%) and 186 (3.6%) were seropositive for FIV and FeLV, respectively, and of these, 12 (0.2%) were seropositive for FIV and FeLV. Of all 5,179 cats, 1,073 (20.7%) had gingivitis, 576 (11.1%) had periodontitis, 203 (3.9%) had stomatitis, and 252 (4.9%) had other oral conditions (overall oral disease prevalence, 2,104/5,179 [40.6%]). Across all age categories, inflammatory oral disease was associated with a significantly higher risk of a positive test result for FIV, compared with the seropositivity risk associated with other oral diseases or no oral disease. Stomatitis was most highly associated with risk of FIV seropositivity. Cats with any oral inflammatory disease were more likely than orally healthy cats to have a positive test result for FeLV. Increasing age was associated with a higher prevalence of oral disease in retrovirus-seronegative cats. CONCLUSIONS AND CLINICAL RELEVANCE: Inflammatory oral disease was associated with an increased risk of seropositivity for retroviruses in naturally infected cats. Therefore, retroviral status of cats with oral inflammatory disease should be determined and appropriate management initiated.

Corneal grafting for the treatment of feline corneal sequestrum: a retrospective study of 18 eyes (13 cats).

Vet Ophthalmol (2014)

Laguna, F., M. Leiva, D. Costa, R. Lacerda, and T. Pena Gimenez

OBJECTIVE: To determine the clinical outcome of corneal grafting for the treatment of feline corneal sequestrum (FCS). ANIMAL STUDIED: Domestic cats. PROCEDURES: A review of the medical records of cats that underwent keratoplasty as a treatment of FCS at the VTH-UAB, from 2002 to 2012, was carried out. RESULTS: Thirteen cats (18 eyes) of different breed, age, and gender were included. Persian cats were overrepresented (12/13; 92%). There were nine males and four females, of a mean age of 3.4 years (0.7-7.1). Ipsilateral chronic corneal ulceration was reported as the most common concurrent ocular disease (6/18; 33%). Keratoplasty was performed bilaterally in 5 cats (5/13; 38%) and unilaterally in 8 (8/13; 62%). Lamellar keratoplasty was performed in 17 eyes (17/18; 95%) and full-thickness keratoplasty in 1 (1/18; 5%). Mean graft size was 8.3 mm (4-11.5). Fresh homologous graft was performed in 2 eyes (2/18; 11%) and frozen graft in 16 (16/18; 89%). Of the latter group, homologous graft was performed in 6 eyes (6/16; 37.5%) and heterologous in 10 (10/16; 62.5%). In all the cats, postoperative treatment included topical antibiotics, corticosteroids, cycloplegics, and 0.2% cyclosporine A. Median follow-up time was 18.2 months, and main postoperative complications were diffuse mild epithelial pigment formation (2/18; 11%), graft malacia (1/18; 5%), and sequestrum recurrence (1/18; 5%). Mean epithelial healing time was 19.2 days. Good visual outcome was achieved in all the eyes (100%), the majority of them having faint or mild corneal opacity (15/18; 83%). CONCLUSIONS: Keratoplasty is an effective surgical treatment for FCS. The donor tissue provides excellent tectonic support to the affected corneas, with good visual and cosmetic outcome.

DIAGNOSTIC ACCURACY OF TESTS BASED ON RADIOLOGIC MEASUREMENTS OF DOGS AND CATS: A SYSTEMATIC REVIEW.
A systematic review of diagnostic tests based on radiologic measurements of structures in dogs and cats was done in order to reach generalizable conclusions about the value of making such measurements. Literature search was done using the ISI Web of KnowledgeSM for studies in the subject category Veterinary sciences. Studies were eligible for inclusion that employed length, angle, area or volume measurements from radiographic, ultrasonographic, CT or MR images of dogs or cats as a diagnostic test for a naturally occurring condition, compared the results of imaging with a reference standard, included at least 10 subjects, and sufficient data that a 2 x 2 table of results could be constructed. Quality of studies was assessed using the QUADAS-2 tool. Twenty-six studies were found describing 40 tests that satisfied the inclusion criteria. Tests were radiographic in 22 (55%) instances and ultrasonographic in 18 (45%). Quality of studies was generally low, with a risk of bias in patient selection in 92% studies, performance of the index test in 73% studies, and patient flow in 42% studies. Median (range) number of subjects was 64 (20-305), sensitivity was 77% (38-99%), specificity was 82% (50-99%), positive likelihood ratio was 4.1 (1-103), and negative likelihood ratio was 0.29 (0.01-1). Two studies that compared accuracy of radiographic measurements to subjective image interpretation alone found no difference. Evidence is weak that radiologic measurements of structures in dogs and cats are useful for diagnosis, hence measurements should not be emphasized as a basis for diagnosis in either teaching or clinical imaging reports.

Cardiac troponin I and T as prognostic markers in cats with hypertrophic cardiomyopathy.


Langhorn, R., I. Tarnow, J. L. Willesen, M. Kjelgaard-Hansen, I. M. Skovgaard, and J. Koch

BACKGROUND: Myocardial injury detected by cardiac troponin I and T (cTnI and cTnT) in cardiac disease is associated with increased risk of death in humans and dogs. HYPOTHESIS: Presence of myocardial injury predicts long-term death in cats with hypertrophic cardiomyopathy (HCM), and ongoing myocardial injury reflects change in left ventricular wall thickness over time. ANIMALS: Thirty-six cats with primary HCM. METHODS: Prospective cohort study. Cats with HCM were included consecutively and examined every 6 months. Echocardiography, ECG, blood pressure, and serum cTnI and cTnT were evaluated at each visit. Cox proportional hazards regression analysis was performed to evaluate prognostic potential of serum troponin concentrations at admission and subsequent examinations. Correlations were used to examine associations between troponin concentrations and cardiac hypertrophy. RESULTS: Troponin concentrations at admission were median [range] 0.14 [0.004-1.02] ng/mL for cTnI, and 13 [13-79.5] ng/L for cTnT. Both were prognostic for death (P =.032 and.026) as were the last available concentrations of each (P =.016 and.003). The final cTnT concentration was a significant predictor of death even when adjusting for the admission concentration (P =.043). In a model containing both markers, only cTnT remained significant (P =.043). Left ventricular free wall thickness at end-diastole (LVFWd) at admission was correlated with cTnI at admission (r = 0.35, P =.035), however no significant correlations (r = 0.2-0.31, P =.074-.26) were found between changes in troponin concentrations and left ventricular thickness over time. CONCLUSIONS AND CLINICAL IMPORTANCE: Myocardial injury is part of the pathophysiology leading to disease progression and death. Low sensitivities and specificities prevent outcome prediction in individual cats.
Effect of ciclosporin and methylprednisolone acetate on cats previously infected with feline herpesvirus 1.


Lappin, M. R., and L. M. Roycroft

Feline herpesvirus 1 (FHV-1) is a common ocular and respiratory pathogen of cats that can be associated with recurrent clinical signs of disease. Ciclosporin (cyclosporine) is commonly administered per os (PO) for the treatment of a number of inflammatory diseases in cats. A number of client-owned cats administered cyclosporine A (CsA) PO to block renal transplant rejection have developed clinical signs of upper respiratory tract disease that may have been from activated FHV-1. In this study, cats experimentally inoculated with FHV-1 several months previously were administered methylprednisolone acetate intramuscularly, CsA PO or a placebo PO. While clinical signs of activated FHV-1 occurred in some cats, disease was mild and self-limited in most cats. There was no vomiting, diarrhea, inappetence, weight loss, polydipsia, polyuria or polyphagia recognized.

Feline respiratory disease: What is the role of Mycoplasma species?


Lee-Fowler, T.

PRACTICAL RELEVANCE: Non-hemotropic Mycoplasma species are frequently implicated in cases of respiratory disease, and also conjunctivitis, in cats. CLINICAL CHALLENGES: Mycoplasma species are considered commensal bacteria of the conjunctiva and the upper respiratory tract of cats, and hence their role as a primary pathogen is difficult to determine. These organisms certainly appear to play a significant role as a secondary pathogen in the upper airways, and there is increasing evidence that in some animals they may represent a primary infection. However, mycoplasmas have not been found in the lower airways of clinically healthy cats - suggesting that, when present, they likely represent a pathologic process. Diagnostic challenges exist as well; Mycoplasma species are not typically identified via cytology due to their small size, and culture of these organisms requires special media and handling. Although PCR has improved identification and allowed for speciation, conflicting culture and PCR results can create a dilemma regarding the clinical relevance of infection. EVIDENCE BASE: This article draws on original research and case reports to provide information about the role of Mycoplasma species in the feline upper and lower respiratory tract, diagnostic methods and associated challenges, and treatment options. AUDIENCE: The goal is to provide small animal practitioners with a current and organized review of the often-conflicting literature regarding the role of Mycoplasma species in feline respiratory infections.

Inflammatory joint disease in cats: Diagnostic approach and treatment.


Lemetayer, J., and S. Taylor

PRACTICAL RELEVANCE: Osteoarthritis, a degenerative non-inflammatory joint disease, is common in cats, usually causing gradual changes in behavior and lifestyle rather than severe lameness. Inflammatory arthritis occurs much less frequently and is nearly always associated with debilitating
lameness. It may have an infectious or immune-mediated cause - but, unlike the canine disease, is
much more likely to be infectious in origin. CLINICAL CHALLENGES: Cats with inflammatory joint
disease are presented for evaluation of lethargy, anorexia, reluctance to walk or fever. Synovial fluid
collection and analysis is required to confirm joint inflammation, but this is a procedure many
veterinarians are not comfortable performing in cats. Once inflammatory arthritis is confirmed,
extensive testing is required to diagnose infectious causes and determine appropriate treatment.
Immune-mediated polyarthritis can be treated with immunosuppressive drugs only after all infectious
possibilities are eliminated. Radiographs are used to characterize the arthritis as erosive or nonerosive,
but radiographic changes in cats are often subtle compared with those described in canine rheumatoid-
like arthritis. AUDIENCE: This review, aimed at all veterinarians who treat cats, describes the general
clinical approach to feline joint disease, the collection and analysis of synovial fluid, and the diagnosis
and management of inflammatory joint diseases affecting cats. The diagnostic approach to an unusual
case of erosive polyarthritis is discussed in the Case Notes. EVIDENCE BASE: To date, the veterinary
literature on inflammatory joint disease in cats has been limited to older reviews of immune-mediated
disorders and multiple single case reports or small case series describing infectious disorders. This
article offers a current comprehensive review of these disorders.


Lenchner, I., I. Aroch, G. Segev, E. Kelmer, and Y. Bruchim

OBJECTIVE: To describe the clinical signs, clinicopathologic abnormalities, treatment, complications
and outcome, and to identify risk factors for death in cats envenomed by Vipera palaestinae (Vp).
DESIGN: Retrospective study. SETTING: Veterinary teaching hospital. ANIMALS: Eighteen client-
owned cats envenomed by Vp. INTERVENTIONS: None. MEASUREMENTS AND MAIN
RESULTS: All envenomations occurred during the hot season (May to October), mostly in young (<4
years, 66%) domestic shorthair, outdoor or indoor-outdoor cats. Clinical signs included tachypnea
(>40/min, 100%), lameness (78%), depression (71%), fang penetration marks (55%), hypothermia
(<37.5 degrees C, 43%), hematoma at the envenomation site (27%), tachycardia (>220/min, 20%), and
bradycardia (<140/min, 20%). Hematologic abnormalities included thrombocytopenia (89%),
hemocoagulation (33%), and leukocytosis (33%). The activated partial thromboplastin and
prothrombin times were prolonged in 100% and in 93% of the cats at presentation to a veterinarian, and
remained prolonged 12-24 hours later in 92% and in 77% of the cats, respectively. Cats displayed
increased serum creatine kinase activity (100%) and hyperglycemia (89%). Four cats (22%) did not
survive. Median hospitalization time was 2 days. Variables associated with death included lower body
weight (P = 0.01), lower initial rectal temperature (P = 0.02), lower initial hematocrit (P < 0.001) and
12-24 hours later (P = 0.001), and lower total plasma protein at 12-24 hours following presentation (P =
0.001). There was no association between death and administration of antivenom (10 mL/cat), fresh
frozen plasma, or corticosteroids. CONCLUSIONS: Cats are at least as susceptible as dogs to Vp
envenomation. Lower body weight, rectal temperature, and hematocrit at presentation were associated
with nonsurvival.

Evaluation of low-dose metronomic (LDM) cyclophosphamide toxicity in cats with malignant
neoplasia.
Leo, C., A. Stell, J. Borrego, E. Martinez de Merlo, K. Ruess-Melzer, and A. Lara-Garcia

Oral administration of low-dose cyclophosphamide in pets with spontaneously occurring malignant neoplasms has become a common practice in veterinary medicine. The purpose of this retrospective study was to investigate toxicity events in cats with spontaneous malignancies receiving cyclophosphamide as a metronomic therapy for at least 1 month. The number and severity of clinical, haematological and biochemical adverse events were recorded according to the Veterinary Cooperative Oncology Group’s Common Terminology Criteria for Adverse Events v1.1 classification scheme. Twenty-four cats were enrolled in the study with a total number of 27 neoplasms: 13 sarcomas, 12 carcinomas, one melanoma and one neuroendocrine tumour. Seventeen cats presented with macroscopic disease, while seven had microscopic disease. Seven cats (29%) had metastasis either to the regional lymph nodes and/or distant sites at the time of study enrolment. Additional medications, administered concurrently, included non-steroidal anti-inflammatory drugs (17), toceranib (4) and thalidomide (7). Four cats showed grade I gastrointestinal toxicity during the first month of treatment, which was controlled with antiemetics. Overall, 2/24 cats (8%) showed grade I haematological toxicities and 1/24 (4%) showed grade I renal toxicity in the first 4 weeks. Median follow-up for all cats was 30 days (range 30-360 days). For the 15 cats with follow-up longer than 1 month the only additional toxicities observed were two grade III and one grade II azotaemia that occurred after 2 months of therapy. Low-dose cyclophosphamide seems to be a well-tolerated option for cats bearing primary or metastatic tumours. Evaluation of toxicity after long-term administration is still needed.

Contrast videofluoroscopic assessment of dysphagic cats.


Levine, J. S., R. E. Pollard, and S. L. Marks

The diagnostic utility of contrast-enhanced videofluoroscopic esophagography in dysphagic cats has been rarely studied relative to dogs. Current literature regarding feline dysphagia typically consists of individual case reports or small case series. This retrospective study analyzed the imaging findings in 11 cats undergoing 15 videofluoroscopic swallow studies. Hiatal hernia (n = 5), esophageal stricture (n = 3), and esophageal dysmotility (n = 7) were the most common diagnoses (some cats having more than 1 diagnosis) in dysphagic cats that underwent videofluoroscopic swallow studies. Esophageal dysmotility appeared to be associated with a higher percentage of swallows from which no peristaltic waves were generated. Oropharyngeal and cricopharyngeal causes of dysphagia were not identified in any cat and quantitative assessment of the swallowing reflex (pharyngeal constriction ratio = 0.17 +/- 0.09; time to maximum pharyngeal contraction = 0.13 +/- 0.02 s; time to proximal esophageal sphincter opening = 0.07 +/- 0.02 s; time to proximal esophageal sphincter closed = 0.23 +/- 0.05 s; time to opening of the epiglottis = 0.27 +/- 0.04 s) was similar to quantitative swallowing parameters previously reported in healthy dogs. In conclusion, videofluoroscopy is a diagnostic tool that can identify esophageal abnormalities that are not readily apparent on survey radiographs. Limitations include the potential need for multiple studies, and the possibility of poor compliance in the feline patient. Results of this study are intended to help veterinarians define a prioritized differential diagnosis list for dysphagic cats.
Effect of high-impact targeted trap-neuter-return and adoption of community cats on cat intake to a shelter.


Levy, J. K., N. M. Isaza, and K. C. Scott

Approximately 2-3 million cats enter animal shelters annually in the United States. A large proportion of these are unowned community cats that have no one to reclaim them and may be too unsocialized for adoption. More than half of impounded cats are euthanased due to shelter crowding, shelter-acquired disease or feral behavior. Trap-neuter-return (TNR), an alternative to shelter impoundment, improves cat welfare and reduces the size of cat colonies, but has been regarded as too impractical to reduce cat populations on a larger scale or to limit shelter cat intake. The aim of this study was to assess the effect of TNR concentrated in a region of historically high cat impoundments in a Florida community. A 2-year program was implemented to capture and neuter at least 50% of the estimated community cats in a single 11.9 km² zip code area, followed by return to the neighborhood or adoption. Trends in shelter cat intake from the target zip code were compared to the rest of the county. A total of 2366 cats, representing approximately 54% of the projected community cat population in the targeted area, were captured for the TNR program over the 2-year study period. After 2 years, per capita shelter intake was 3.5-fold higher and per capita shelter euthanasia was 17.5-fold higher in the non-target area than in the target area. Shelter cat impoundment from the target area where 60 cats/1000 residents were neutered annually decreased by 66% during the 2-year study period, compared to a decrease of 12% in the non-target area, where only 12 cats/1000 residents were neutered annually. High-impact TNR combined with the adoption of socialized cats and nuisance resolution counseling for residents is an effective tool for reducing shelter cat intake.

Assessment of post-operative pain in cats: a case study on veterinary students of Universiti Putra Malaysia.


Lim, M. Y., H. C. Chen, and M. A. Omar

The ability to assess and control pain is listed as one of the desired Day One competencies among veterinary graduates. As such, a study was conducted to examine the current status and effectiveness of a video-based training module on the attitude toward and knowledge of pain assessment in cats among fourth- and final-year veterinary students of Universiti Putra Malaysia (UPM) in January of 2013. A total of 92 students participated in this study, resulting in a response rate of 60.1%. Upon completion of a pre-training survey, the respondents undertook an interactive video-based presentation, followed by a post-training survey. The majority of the students (96.7%) agreed on the importance of pain management. Before the training, many (76.1%) disagreed that they had received adequate training, while 53.3% were not confident in their pain-recognition skills. After training, their knowledge and confidence in pain assessment increased. Responses to the survey were not associated with differences in gender, level of study, or field of interest. Students were found to have mistaken some physiologic parameters as good pain indicators after ovariohysterectomy. Their assessment of three standardized video cases revealed that they could recognize prominent signs of pain but failed to identify changes in behavior that were more subtle. Refinement to the training module is required to address the above deficiencies.
Functional assessment of expiratory flow pattern in feline lower airway disease.


Feline lower airway disease (FLAD) is a chronic respiratory disease of which there is a lack of information on functional assessment in current veterinary medicine. The purposes of this study were to investigate expiratory pattern and evaluate the diagnostic utility of functional parameters in cats with FLAD. Thirty-three client-owned cats (23 FLAD cats and 10 control cats) were studied. Under quiet tidal breathing, pseudo-tidal breathing flow-volume loop (pTBFVL) was obtained from a barometric whole body plethysmography (BWBP) device. There were significant differences in the shapes of expiratory, but not inspiratory, curves between FLAD and control cats. The incidence of the presence of concave expiratory curve indicating lower airway obstruction was 74% in FLAD cats. To assess the diagnostic utility of pTBFVL indices in cats with FLAD, area under the receiver-operator curve was 0.86 for PEF/EF50 (peak expiratory flow divided by expiratory flow at end expiratory volume plus 50% tidal volume); a cuff-off value of PEF/EF50 >1.51 distinguished normal from FLAD (73.9% sensitivity, 100% specificity). There were no significant differences in traditionally measured BWBP parameters (ie, enhanced pause) between cats with and without FLAD in the present study. In conclusion, underlying change on expiratory flow pattern during natural tidal breathing existed in FLAD cats, and selected pTBFVL indices were useful in discriminating FLAD from normal cats. Tidal breathing pattern depicted by pseudoflow-pseudovolume loops from a BWBP system could be a non-invasive tool for functional assessment in client-owned cats.

Transmission of feline immunodeficiency virus (FIV) among cohabiting cats in two cat rescue shelters.


Litster, A. L.

Conflicting accounts have been published in the veterinary literature regarding transmission of feline immunodeficiency virus (FIV) between cohabiting cats in mixed households, and the mechanics of possible casual transmission, if it occurs, are poorly understood. Similarly, there are conflicting reports of vertical transmission of FIV. The aim of the present study was to document the FIV serological status of cats taken into two rescue shelters. At rescue shelter 1 (Rescue 1), cats cohabited in a multi-cat household of FIV-negative and naturally-infected, FIV-positive cats. A study was performed that combined a retrospective review of records of FIV serological status at intake (Test 1) and prospective FIV serological testing (Tests 2 and 3). Retrospective records were analyzed at rescue shelter 2 (Rescue 2), where FIV-positive queens with litters of nursing kittens were taken into the shelter, before being rehomed. FIV serology was performed on all kittens after weaning. Initial test results (Test 1) for 138 cohabiting cats from Rescue 1 showed that there were 130 FIV-negative cats and eight FIV-positive cats (six male neutered and two female spayed). A second test (Test 2), performed in 45 of the FIV-negative and five of the FIV-positive cats at median 28 months after Test 1 (range, 1 month to 8.8 years) showed that results were unchanged. Similarly, a third test (Test 3), performed in four of the original FeLV-negative cats and one remaining FIV-positive cat at median 38 months after Test 1 (range, 4 months to 4 years), also showed that results were unchanged. These results show a lack of evidence of FIV transmission, despite years of exposure to naturally-infected, FIV-positive cats in a
mixed household. At Rescue 2, records were available from five FIV-positive queens with 19 kittens. All 19 kittens tested FIV-negative, suggesting that vertical transmission had not occurred.

**Identification and characterization of dermatophyte species and strains with PCR amplification.**


*Liu, G., C. He, and H. Zhang*

The aim of the present study was to use two polymerase chain reaction (PCR) methods, with (GACA)4 and non-transcribed spacer (NTS) as primers, to identify and characterize dermatophyte isolates from dogs and cats to a species and strain level. A total of 45 isolates from nine dermatophyte species were collected from pet dogs and cats and subjected to PCR amplification with the microsatellite primer (GACA)4. Dermatophyte strains of three of the same species collected from four cities were subjected to PCR amplification with the NTS primer set. These two PCR methods were applied to identify and characterize the dermatophyte isolates to a species and strain level. Regional differences among the strain specificities were also examined. The results from PCR with (GACA)4 demonstrated that strains from the same species produced similar PCR product band patterns. In addition, these patterns differed among species, indicating that (GACA)4 primer-based PCR was able to distinguish between the various dermatophyte species. By contrast, dermatophyte isolates and/or strains within the same species revealed various band patterns with NTS-based PCR. In addition, the results indicated that regional differences contributed to the variations in PCR product band patterns. Therefore, the results of the present study indicate that the NTS-based PCR method is efficient in distinguishing dermatophytes to the strain level, while a combination of (GACA)4 and NTS primer-based PCR methods is able to clarify dermatophyte isolates to a species and strain level. The present study provides information concerning the identification of pathogenic fungi and the epidemiological characteristics of fungal skin diseases.

**Clinical use of deslorelin (GnRH agonist) in companion animals: a review.**


*Lucas, X.*

Over the years, many contraceptive medications have been developed for companion animals, but many secondary adverse effects have limited their use. A major advancement was achieved with the use of gonadotropin-releasing hormone (GnRH) analogues, mainly GnRH agonists, which mimic the effects of native GnRH. The development of effective low-dose, slow-release implants with potent agonists such as deslorelin (Suprelorin(R), Virbac) have allowed their use to become widespread in recent years, with many potential benefits in companion animals. While the major application of deslorelin was initially male contraception, due to its two differing actions, either the stimulation of oestrus or the sterilization of fertility, its use has been increasing in the bitch as well. The aim of this study is to review the applications of deslorelin GnRH agonist implants in companion animal, such as dogs, cats and some exotic pets.

**Antimicrobial susceptibility in bacterial isolates from Norwegian cats with lower urinary tract disease.**
Lund, H. S., G. Skogtun, H. Sorum, and A. V. Eggertsdottir

Studies of feline lower urinary tract disease (FLUTD) among Norwegian cats have shown higher prevalences of bacterial cystitis than most previously published reports. The aims of the present study were to identify bacterial isolates obtained from the urine of Norwegian cats with FLUTD and their susceptibility to antimicrobial agents. Eighty-two bacterial isolates from 72 urine cultures obtained from 71 different cats were included. Escherichia coli, Staphylococcus species, Enterococcus species and Streptococcus species were the most frequently detected. The percentages of isolates susceptible to the included antimicrobial agents were as follows: enrofloxacin - 92%; trimethoprim/sulfonamide - 91%; nitrofurantoin - 89%; tetracycline - 78%; amoxicillin - 73%; amoxicillin/clavulanic acid - 72%; trimethoprim - 68%; amoxicillin - 58%; cephalaxin - 51%; spiramycin - 39%; penicillin - 34%; fusidic acid - 34%; lincomycin - 27%. Although several tendencies towards increasing antimicrobial resistance were detected among the isolates included, the species of bacteria isolated and their patterns of antimicrobial resistance were, in general, in concurrence with the existing literature. Thus, the results do not fully explain the higher prevalence of bacterial cystitis found in Norwegian cats. Moreover, additional explanatory factors beside the inclusion of primary accession cases rather than referred cases were not found.

A comparison of low dose tiletamine-zolazepam or acepromazine combined with methadone for pre-anaesthetic medication in cats.

Mair, A., H. Kloeppel, and K. Ticehurst

OBJECTIVE: To compare the level of sedation, cardiorespiratory changes, and quality of recovery in cats receiving methadone plus either low dose tiletamine-zolazepam or acepromazine for premedication prior to general anaesthesia for neutering. STUDY DESIGN: Prospective, randomized, blinded clinical study. ANIMALS: Twenty cats 0.54 +/- 0.12 years-old (mean +/- SD), weighing 3.17 +/- 0.65 kg (10 male and 10 female). METHODS: Cats were allocated randomly to receive intramuscularly either 0.03 mg kg(-1) acepromazine (ACE) or 3 mg kg(-1) tiletamine-zolazepam (TZ), both regimens combined with 0.2 mg kg(-1) methadone for premedication. Sedation was assessed 25 minutes after premedication using a visual analogue scale (VAS) and a simple descriptive scale (SDS). Anaesthesia was induced with alfaxalone and maintained with isoflurane. Physiological parameters were recorded at 1, 3 and 5 minutes post-endotracheal intubation. Recovery from cessation of isoflurane was timed and quality assessed using a SDS and a VAS. Data was analysed with Mann-Whitney U-test, students t-test, anova or ordinal logistic regression as relevant. Significance was taken as p < 0.05. RESULTS: Sedation was more pronounced in TZ than ACE as indicated by higher VAS (67 +/- 21 versus 13 +/- 5) and SDS scores [4 (1-4) versus 1 (0-1)]. Following sedation, Heart (HR) and respiratory (fR) rates did not differ between groups. After anaesthetic induction, at times 1, 3 and 5 HR, systolic arterial pressure and end tidal carbon dioxide were significantly higher and fR was significantly lower in TZ than ACE. Recovery quality was similar between groups. In both groups, times to extubation, head lift and sternal recumbency were similar, but time (minutes) until standing was significantly longer in TZ (31 +/- 16) than ACE (18 +/- 11). CONCLUSION AND CLINICAL RELEVANCE: Low dose tiletamine-zolazepam combined with methadone provided superior sedation to ACE. Recovery quality was similar, although time to standing was longer.
Indwelling double pigtail ureteral stent combined or not with surgery for feline ureterolithiasis: complications and outcome in 15 cases.


Ureteral obstruction secondary to ureterolithiasis in cats is a challenging situation. Ureteral stenting has recently been introduced to prevent complications that often occurred after ureterotomy or other invasive surgeries. The purpose of this study is to describe the stenting technique and perioperative difficulties, as well as long-term outcome and complications with ureteral stenting in 12 cats with ureteroliths. Fifteen 2.5 Fr soft double pigtail multi-fenestrated ureteral stents were placed in an anterograde fashion under open surgical approaches and with fluoroscopic guidance in 12 cats. Nine cats received a unilateral stent and three received bilateral stents. Ureterotomy or ureteral resection and end-to-end anastomosis were performed in three and four cases, respectively. In six cats, papillotomy was performed to facilitate dilator and stent placement. All cats recovered well from the surgical procedure, except one cat, which died during the anaesthesia recovery period. Postoperative complications included dysuria (three cases, diagnosed at 15 days, 1 month and 3 months, respectively), urinary tract infection (one case, 1 month after surgery), stent migration requiring stent replacement (one case, 19 months after surgery) and stent obstruction requiring stent removal (three cases with previously end-to-end anastomosis between 2 and 8 months after surgery). Nine cats (75%) were alive at a mean follow-up of 453 +/- 194 (123-720) days. The median survival time was >415 days. Stent placement appeared to be a valuable and safe option for treating ureteral obstruction in cats. However, periodic and long-term monitoring of stents is warranted.

Improving the diagnosis, treatment, and biology patterns of feline mammary intraepithelial lesions: a potential model for human breast masses with evidence from epidemiologic and cytohistopathologic studies.

Tumour Biol (2014)


In this study, the frequency of different types of mammary masses and their relationship with cytohistopathologic changes was investigated and data on history, macroscopic description, clinical examination and treatment were collected. To determine the prevalence and types of cytohistopathologic changes, mammary glands from 12 female cats were evaluated. The mean age of cats at the time of diagnosis was 11.5 +/- 1.9 years (range 4-14 years), the mean gross size of the masses was 3.1 +/- 2.4 cm, 4/12 (33.3 %) masses were <=3.0 cm in diameter, and the maximum diameter of the largest mass had a median of 5 cm, with a range of diameter of 6 x 5 x 4 cm. Moreover, the preferential localization of mammary masses was the abdominal lobes (%50) and thoracic lobes (%33.3), and inguinal lobes (%16.7 of cases). Furthermore, two cases of the inguinal masses affected the caudo-inguinal lobe, six cases caudo-abdominal lobe, and thoracic masses were found in four cases. Eventually, six cases (%50) of masses were found in the right mammary lobes and six cases (%50) in the left mammary lobes. The majority of the masses revealed elastic (%50 of cases), hard (%25 of cases), or soft (%25 of cases) consistency. In the present study, according to the criteria of the
veterinary and the medical WHO classification system, of the 12 cats with the cytohistopathological features of six (50 %) cases qualified abscess, 3 (25 %) cases as cystic hyperplasia and 3 (25 %) cases were called situ carcinoma. Whereas, all hyperplastic lesions (case nos. 7-9 and ranging in size from, 1 to >4 cm3) and carcinomas in situ lesions (case nos. 10-12 and ranging in size from, 1 to >3 cm3) were found incidentally upon routine cytohistology. Other lesions were observed grossly and removed either at surgery (case nos. 1-6). Finally, the cats were treated with unilateral lumpectomy (3 cases) and also, nine (75 %) cases had subsequent drainage, 3 (25 %) of which showed cystic hyperplasia and 6 (50 %) showed abscess on subsequent histopathological evaluation. Therefore, a correct diagnosis must be established quickly, and treatment must be instituted rapidly when alteration is noted in the mammary glands.

**Comparison of intranasal and intramuscular ketamine-midazolam combination in cats.**

Vet Anaesthes Analg (2014)

*Marjani, M., V. Akbarinejad, and M. Bagheri*

**OBJECTIVE:** The aim of the present study was to compare intranasal (INS) and intramuscular (IM) routes of administration of a ketamine-midazolam combination in cats. **STUDY DESIGN:** Randomized block design. **ANIMALS:** Twelve healthy mixed breed cats (six males and six females). **METHODS:** The drug combination was ketamine (14 mg kg⁻¹) and midazolam (0.5 mg kg⁻¹). In the IM group, drugs were injected into quadratus femoris muscle; in the INS group, the combination dropped equally into the two nostrils. Pulse and respiratory rates, peripheral haemoglobin oxygen saturation (SpO₂) and rectal temperature were monitored before and at intervals after drug administration. Time to onset and duration of sedation and, during recovery to head up, sternal recumbency and recovery were recorded. **RESULTS:** There were no significant differences between the groups in any time measured except for recovery to sternal recumbency, where time was lower in the INS than in the IM (p = 0.034). Respiratory rate was greater in the INS than in the IM group (p = 0.029), but there was no difference between groups in other physiological parameters. In both groups SpO₂ was low before and fell further during sedation. **CONCLUSIONS:** The results substantiated that INS ketamine-midazolam can produce effective sedation in cats. **CLINICAL RELEVANCE:** Intranasal (INS) administration of ketamine-midazolam is atraumatic, and its use may avoid the pain of injection of ketamine combinations when this drug is used to induce sedation in cats.

**Familial cardiomyopathy in Norwegian Forest cats.**


*Marz, I., L. J. Wilkie, N. Harrington, J. R. Payne, R. A. Muzzi, J. Haggstrom, K. Smith, and V. Luis Fuentes*

Norwegian Forest cats (NFCs) are often listed as a breed predisposed to cardiomyopathy, but the characteristics of cardiomyopathy in this breed have not been described. The aim of this preliminary study was to report the features of NFC cardiomyopathy based on prospective echocardiographic screening of affected family groups; necropsy findings; and open-source breed screening databases. Prospective examination of 53 NFCs revealed no murmur or left ventricular (LV) outflow tract obstruction in any screened cat, though mild LV hypertrophy (defined as diastolic LV wall thickness ≥5.5mm) was present in 13/53 cats (25%). Gross pathology results and histopathological sections
were analysed in eight NFCs, six of which had died of a cardiac cause. Myocyte hypertrophy, myofibre disarray and interstitial fibrosis typical of hypertrophic cardiomyopathy were present in 7/8 cats, but endomyocardial fibrosis suggestive of restrictive cardiomyopathy was also present in the same cats. Pedigree data analysis from 871 NFCs was supportive of a familial cardiomyopathy in this breed.

**Partial carpal arthrodesis using a medially applied mini-plate in three cats with carpometacarpal hyperextension injury.**

*J Feline Med Surg (2014)*

*Mathis, K. R., and K. Voss*

Hyperextension injury to the feline carpus usually results in disruption of the palmar ligament support at the level of the carpometacarpal joint. Treatment options include pancarpal or partial carpal arthrodesis. Partial carpal arthrodesis preserves range of motion of the antebrachio-carpal joint, and pronation and supination of the forearm. The surgical technique and three cases of partial carpal arthrodesis using medially applied mini-plates are described. Partial carpal arthrodesis of the feline carpus using medially applied mini-plates may be a safe and effective treatment for hyperextension injury to the carpometacarpal joints.

**Conjunctival lymphoma: immunophenotype and outcome in five dogs and three cats.**


Conjunctival lymphoma is well documented in the medical literature, but veterinary reports are few. We report five cases of canine lymphoma, and three of feline in which the presenting sign was conjunctival involvement. All animals were in apparently good health at the time of presentation, and attended the referring clinic because of conjunctival disease. One dog showed generalized lymphadenopathy at presentation, although the ocular lesion was the reason for consultation, but all other patients were well with no detectable disease beyond the eye. All cats were presented for their ocular disease. All dogs were confirmed to have T-cell tumors, although the histological appearance of these was variable. In contrast, all cats had B-cell tumors. Referring clinicians and owners were contacted for follow-up information. Three dogs had been euthanased within 6 months of diagnosis for deterioration of general health. The remaining two were alive and showed no signs of systemic disease. Two cats had good survival following diagnosis, the other died of lesions that may not be related.

**Treatment of chronically FIV-infected cats with suberoylanilide hydroxamic acid.**


*McDonnel, S. J., M. L. Liepnieks, and B. G. Murphy*

Feline immunodeficiency virus (FIV) is a naturally-occurring, large animal model of lentiviral-induced immunodeficiency syndrome, and has been used as a model of HIV pathogenesis and therapeutic interventions. HIV reservoirs in the form of latent virus remain the primary roadblock to viral eradication and cure, and FIV has been previously established an animal model of lentiviral latency. The goal of this study was to determine whether administration of the histone deacetylase inhibitor
(HDACi) suberoylanilide hydroxamic acid (SAHA) to aviremic, chronically FIV-infected cats would induce latent viral reactivation in vivo. A proof-of-concept experiment in a Transwell co-culture system demonstrated the ability of SAHA to reactivate latent virus which was replication competent and able to infect naive cells. Oral SAHA (250mg/m(2)) was administered with food to four asymptomatic, experimentally FIV-infected cats and one uninfected control cat, and a limited pharmacokinetic and pharmacodynamic analysis was performed. A statistically significant increase in cell-associated FIV RNA was detected in the cat with the greatest serum SAHA exposure, and cell-free viral RNA was detected at one time point in the three cats that achieved the highest levels of SAHA in serum. Interestingly, there was a significant decrease in viral DNA burden at 2h post drug administration in the same three cats. Though the sample size is small and the drug response was modest, this study provides evidence that in vivo treatment of FIV-infected cats with the HDACi SAHA can induce viral transcriptional reactivation, which may be dependent upon the concentration of SAHA achieved in blood. Importantly, alternative putative antilatency therapy drugs, and multimodal drug combinations, could be studied in this in vivo system. The FIV/cat model provides a unique opportunity to test novel therapeutic interventions aimed at eradicating latent virus in vivo.

**Prevalence of upper respiratory pathogens in four management models for unowned cats in the Southeast United States.**


Upper respiratory infection (URI) is a pervasive problem in cats and impacts the capacity and cost of sheltering programs. This study determined the pattern of respiratory pathogens in cats with and without clinical signs of URI in four different models for managing unowned cats, namely, (1) short-term animal shelters (STS), (2) long-term sanctuaries (LTS), (3) home-based foster care programs (FCP), and (4) trap-neuter-return programs for community cats (TNR). Conjunctival and oropharyngeal swabs from 543 cats, approximately half of which showed clinical signs of URI, were tested for feline herpes virus-1 (FHV), feline calicivirus (FCV), Chlamydia felis, Bordetella bronchiseptica, Mycoplasma felis, and canine influenza virus by real-time PCR. FHV (59%, 41%) and B. bronchiseptica (33%, 24%) were more prevalent in both clinically affected and nonclinical cats, respectively, in STS than other management models. FCV (67%, 51%) and M. felis (84%, 86%) were more prevalent in LTS than any other management model. Clinically affected cats in FCP were more likely to carry FHV (23%, 6%), C. felis (24%, 10%), or M. felis (58%, 38%) than were nonclinical cats. Clinically affected cats in TNR were more likely to carry FCV (55%, 36%) or C. felis (23%, 4%) than were nonclinical cats. The prevalence of individual pathogens varied between different management models, but the majority of the cats in each model carried one or more respiratory pathogens regardless of clinical signs. Both confined and free-roaming cats are at risk of developing infectious respiratory disease and their health should be protected by strategic vaccination, appropriate antibiotic therapy, effective biosecurity, feline stress mitigation, and alternatives to high-density confinement.

**Epidermolysis bullosa in animals: a review.**

_Vet Dermatol_ (2014)
Medeiros, G. X., and F. Riet-Correa

Epidermolysis bullosa (EB) is a hereditary mechanobullous disease of animals and humans, characterized by an extreme fragility of the skin and mucous membranes. The main feature of EB in humans and animals is the formation of blisters and erosions in response to minor mechanical trauma. Epidermolysis bullosa is caused by mutations in the genes that code for structural proteins of the cytoskeleton of the basal keratinocytes or of the basement membrane zone. Based on the ultrastructural levels of tissue separation, EB is divided into the following three broad categories: epidermolysis bullosa simplex, junctional epidermolysis bullosa and dystrophic epidermolysis bullosa. Human types of EB are divided into several subtypes based on their ultrastructural changes and the mode of inheritance; subtypes are not fully established in animals. In humans, it is estimated that EB affects one in 17,000 live births; the frequency of EB in different animals species is not known. In all animal species, except in buffalo with epidermolysis bullosa simplex, multifocal ulcers are observed on the gums, hard and soft palates, mucosa of the lips, cheek mucosa and dorsum of the tongue. Dystrophic or absent nails, a frequent sign seen in human patients with EB, corresponds to the deformities and sloughing of the hooves in ungulates and to dystrophy or atrophy of the claws in dogs and cats. This review covers aspects of the molecular biology, diagnosis, classification, clinical signs and pathology of EB reported in animals.

Feline cutaneous mast cell tumours: a UK-based study comparing signalment and histological features with long-term outcomes.

Melville, K., K. C. Smith, and M. J. Dobromylskyj

Feline cutaneous mast cell tumours (MCTs) are the second most common skin tumour in cats, but unlike in dogs, there is currently no histological grading system for this type of tumour. This study recorded the signalment and anatomical location from a total of 287 records from MCTs submitted to a UK commercial diagnostic laboratory. Questionnaires to submitting practices were used to obtain follow-up data, and the histological features of 86 tumours were evaluated from 69 cats with a known outcome. Twelve of the 69 cats (17.4%) died of MCTs, with significantly lower survival times. The median age of cats presenting with MCTs was 11 years (range 5 months-19 years), with no sex or neutered status predilection. Some pedigree breeds were more susceptible to MCTs, particularly the Siamese, Burmese, Russian Blue and Ragdoll. The head was the most common site in younger cats, compared to the trunk in older cats. The number of tumours had no effect on survival. A new subcategory of well-differentiated MCTs with prominent multinucleated cells is described, and three of the five cats with this novel form died from MCT-related disease. There was an association between mitotic index and survival time. However, there was no significant association between histological type and survival.

Evaluation of an in-house dot enzyme-linked immunosorbent assay to detect antibodies against feline panleukopenia virus.

Mende, K., B. Stuetzer, U. Truyen, and K. Hartmann

Measuring antibody titres to determine a cat’s immunity to core diseases instead of just administering annual vaccinations has not been established in Germany so far. An in-house test kit for the detection of antibodies against feline panleukopenia virus (FPV), feline herpesvirus-1 and feline calicivirus-- the ImmunoComb Feline VacciCheck--is now available in several European countries. The aim of this study was to assess the quality of the ImmunoComb Feline VacciCheck to determine antibodies by comparing it to a gold standard. The test is aimed for use in practice to assist decision-making when performing an individual health assessment to see whether a cat is potentially unprotected against FPV and requires FPV vaccination. Sera from 347 cats were included in the study. For antibody detection, haemagglutination inhibition (HI) was performed as gold standard. Sensitivity, specificity and positive and negative predictive values of the ImmunoComb Feline VacciCheck were determined for three different HI titre cut-off points (1:20, 1:40, 1:80). In comparison to the HI, the ImmunoComb Feline VacciCheck showed a sensitivity of 79%, 83% and 87%, an specificity of 89%, 86% and 81%, respectively. Specificity of the ImmunoComb Feline VacciCheck, which was considered the most important parameter, was acceptable in comparison to HI. Especially when considering an antibody titre of 1:20 sufficient for protection (eg, in an adult animal), the ImmunoComb Feline VacciCheck can be recommended for use in veterinary practice.

Proportion of and risk factors for open fractures of the appendicular skeleton in dogs and cats.


Millard, R. P., and H. Y. Weng

OBJECTIVE: To evaluate the proportion of and risk factors for open fractures of the appendicular skeleton in dogs and cats that were a result of acute trauma. DESIGN: Cross-sectional and case-control study. ANIMALS: 84,629 dogs and 26,675 cats. PROCEDURES: Dogs and cats examined at Purdue University Veterinary Teaching Hospital from January 1993 through February 2013 were identified; the proportion of open fractures was estimated from the medical records. Additionally, all incident cases of open (77 dogs and 33 cats) and closed (469 dogs and 80 cats) fractures between January 1993 and February 2013 and a random sample of nonfracture patients (722 dogs and 330 cats) in 2010 were used to assess risk factors for open appendicular fractures. RESULTS: Proportion of open fractures for the 20-year period was 0.09% (95% confidence interval [CI], 0.07% to 0.11%) in dogs and 0.12% (95% CI, 0.09% to 0.17%) in cats. Seventy-seven of 546 (14.1%) and 33 of 113 (29.2%) traumatic fractures were classified as open in dogs and cats, respectively. Comminuted fractures were more likely than other configurations to be open in dogs (OR, 5.9; 95% CI, 2.9 to 12.2) and cats (OR, 3.5; 95% CI, 1.0 to 12.0). Vehicle-related trauma was a significant risk factor for open fractures in dogs (OR, 13.8; 95% CI, 3.1 to 61.8). CONCLUSIONS AND CLINICAL RELEVANCE: The proportion of incident open fractures in dogs and cats was low. Age, body weight, affected bone or bone segment, fracture configuration, and method of trauma were associated with an open fracture.

Prognostic Value of Histologic Grading for Feline Mammary Carcinoma: A Retrospective Survival Analysis.

Vet Pathol (2014)

Mills, S. W., K. M. Musil, J. L. Davies, S. Hendrick, C. Duncan, M. L. Jackson, B. Kidney, H. Philibert, B. K. Wobeser, and E. Simko
Feline mammary carcinoma is highly malignant and generally associated with a poor prognosis, although studies suggest the range of survival times in affected cats is broad. Histologic grading of these tumors is achieved using the Elston and Ellis system, originally developed for human breast cancer. In cats, however, classification using this method has variable prognostic value. Therefore, objectives of this study were (1) to evaluate the Elston and Ellis grading system for feline mammary carcinoma in a predominantly spayed population and (2) to determine whether modification of this system or development of a novel system improved the prognostic value of histologic grading. Survey data and histologic features for 108 carcinomas from 97 cats were analyzed with respect to overall survival. Elston and Ellis grading failed to correlate significantly with overall survival. Using multivariable analysis, lymphovascular invasion, nuclear form, and mitotic count each demonstrated independent prognostic significance (P = .008, <.001, and .004, respectively). Modifications of the Elston and Ellis system and a novel grading system were proposed based on these results; all showed significant correlation with overall survival (P < .001). Median survival times were 27, 29, or 31 months for grade I; 14, 12, or 14 months for grade II; and 13, 5, or 8 months for grade III carcinomas using the mitotic-modified Elston and Ellis, the revised Elston and Ellis, or the novel grading system, respectively. Based on this retrospective study, adoption of the species-specific systems as proposed here may improve the prognostic value of histologic grading for feline mammary carcinoma.

Ultrasonographic biometry of the normal eye of the Persian cat.


Mirshahi, A., S. H. Shafigh, and M. Azizzadeh

OBJECTIVE: To describe the normal ultrasonographic biometry of the Persian cat’s eyes using B-mode ultrasonography. METHODS: In a cross-sectional study, 20 healthy Persian cats with no history of previous ophthalmic disease were examined. Ocular biometry of the left and right eyes was measured using B-mode ultrasonography. Comparison of the average measurements between left and right eyes and between vertical and horizontal planes was performed using paired-sample t test. Correlation of ocular parameters with sex, age, head circumference and eye colour was evaluated. RESULTS: Mean +/- standard deviation (SD) measurements of the ocular structures of anterior chamber, lens thickness, vitreous chamber and anterior to posterior dimension of the globe in 40 eyes were 4.1 +/- 0.7, 7.7 +/- 0.5, 8.2 +/- 0.4 and 20.7 +/- 1.0 mm, respectively. No significant difference was found between the ocular biometry of the left and right eyes or the horizontal and vertical planes. Of the ocular parameters, the following had a significant positive correlation with head circumference: axial globe length, anterior chamber and lens thickness. The vitreous body had a positive correlation with age. CONCLUSIONS: Regarding the breed predisposition of Persian cats to ocular problems, the present study provides baseline information for further clinical investigations of ocular abnormalities using B-mode ultrasonography.

Alveolar macrophages are the main target cells in feline calicivirus-associated pneumonia.


Feline calicivirus (FCV) is a pathogen of felids and one of the most common causative agents of feline upper respiratory disease (URD). Reports of natural FCV pneumonia in the course of respiratory tract infections are sparse. Therefore, knowledge on the pathogenesis of FCV-induced lung lesions comes only from experimental studies. The aim of the present study was to assess the type and extent of pulmonary involvement in natural respiratory FCV infections of domestic cats and to identify the viral target cells in the lung. For this purpose, histology, immunohistochemistry and RNA-in situ hybridisation for FCV and relevant cell markers were performed on diagnostic post-mortem specimens collected after fatal URD, virulent systemic FCV or other conditions. All groups of cats exhibited similar acute pathological changes, dominated by multifocal desquamation of activated alveolar macrophages (AM) and occasional type II pneumocytes with fibrin exudation, consistent with diffuse alveolar damage (DAD). In fatal cases, this was generally seen without evidence of epithelial regeneration. In cats without clinical respiratory signs, type II pneumocyte hyperplasia was present alongside the other changes, consistent with the post-damage proliferative phase of DAD. FCV infected and replicated in AM and, to a lesser extent, type II pneumocytes. This study shows that lung involvement is an infrequent but important feature of FCV-induced URD. AM are the main viral target cell and pulmonary replication site, and their infection is associated with desquamation and activation, as well as death via apoptosis.

**Epidemiology of the eye worm Thelazia callipaeda in cats from southern Switzerland.**

Vet Parasitol (2014) **203**:287-293.

*Motta, B., F. Nageli, C. Nageli, F. Solari-Basano, B. Schiessl, P. Deplazes, and M. Schnyder*

Thelazia callipaeda is a spiruroid nematode of dogs, cats and wild carnivores transmitted by zoophilic drosophilid Phortica flies and found in an increasing number of European countries. In cats the disease is diagnosed sporadically. This study presents an epidemiological investigation of feline thelaziosis, performed in southern Ticino, Switzerland, an endemic area for *T. callipaeda*. Between January 2009 and July 2011 2171 cats, having outdoor access and presenting for various reasons, were examined by in-depth eye examinations, and clinical and anamnestic data were collected. The overall prevalence of *T. callipaeda* in the study area was 0.8% (17/2171 cats, 95% confidence interval: 0.5-1.3%). Among cats showing ocular illness, the prevalence was 9.2% (11/120, CI: 4.7-15.8%). Cats with eye worms had no international travel history and were significantly more often diagnosed between June and December than during other months. With one exception, one single eye per cat was infested, each harboring between 1 and 10 eye worms (arithmetic mean: 2.8 per cat). One cat presented with conjunctivitis and ulcers, seven with conjunctivitis only and 3 with a mildly increased lacrimation, while 6 cats were asymptomatic. Significantly more male than female cats had eye worms and cats older than one year were overrepresented. No pure-bred cats were infested. This study confirms the establishment of this potentially zoonotic parasite in cats from the study area. Due to the clinical relevance and pain caused by the infestations, increased disease awareness and in depth eye examination for the detection of *T. callipaeda* in cats are recommended, even in absence of obvious clinical signs, in order to initiate appropriate anthelmintic treatment.

**Echocardiographic findings in 11 cats with acromegaly.**


*Myers, J. A., K. F. Lunn, and J. M. Bright*
BACKGROUND: Information regarding cardiac changes in domestic cats with acromegaly is limited.
HYPOTHESIS/OBJECTIVES: The objective of this study was to describe the echocardiographic findings in cats with acromegaly. ANIMALS: Eighteen cats diagnosed with acromegaly at Colorado State University between 2008 and 2012. Of these 18 cats, 11 had echocardiography performed.
METHODS: A retrospective review of medical records was made to identify cats with acromegaly that also had echocardiography performed. RESULTS: Of the 11 cats identified, 7 had left ventricular concentric hypertrophy, 6 had left atrial enlargement, and 7 had evidence of abnormal diastolic function. All 11 cats had evidence of structural or functional cardiac disease. CONCLUSIONS AND CLINICAL IMPORTANCE: Cardiovascular abnormalities frequently are present in cats with acromegaly, and a complete cardiac evaluation should be considered in these patients.

Animal models of disease: classification and etiology of diabetes in dogs and cats.
Nelson, R. W., and C. E. Reusch
Diabetes mellitus is a common disease in dogs and cats. The most common form of diabetes in dogs resembles type 1 diabetes in humans. Studies suggest that genetics, an immune-mediated component, and environmental factors are involved in the development of diabetes in dogs. A variant of gestational diabetes also occurs in dogs. The most common form of diabetes in cats resembles type 2 diabetes in humans. A major risk factor in cats is obesity. Obese cats have altered expression of several insulin signaling genes and glucose transporters and are leptin resistant. Cats also form amyloid deposits within the islets of the pancreas and develop glucotoxicity when exposed to prolonged hyperglycemia. This review will briefly summarize our current knowledge about the etiology of diabetes in dogs and cats and illustrate the similarities among dogs, cats, and humans.

Management of endemic Microsporum canis dermatophytosis in an open admission shelter: a field study.
Newbury, S., K. Moriello, K. Coyner, A. Trimmer, and D. Kunder
Endemic Microsporum canis dermatophytosis was identified in a large, open admission, private, no-kill shelter that admitted >1200 cats per year. Fungal culture (FC) screening revealed that 166/210 (79%) and 38/99 (38%) cats in the non-public and public area were culture positive, respectively. However, pending screening FC results, the 99 cats in the public area were treated with once-weekly lime sulfur rinses and monitored with once-weekly FC. Cats in the non-public area were not treated. When FC results were available, cats were separated into low-risk (n = 61) and high-risk (n = 38) groups based upon the presence or absence of skin lesions. Low-risk cats continued to receive once-weekly topical lime sulfur and rapidly achieved culture-negative status. High-risk cats were divided into two groups based upon the number of colony-forming units/plate (low or high). All 38 cats were treated with twice-weekly lime sulfur and oral terbinafine and within 6-7 weeks only 5/38 cats were still FC-positive. These cats were moved to a separate room. Dermatophytosis was eradicated within 5 months; eradication was prolonged owing to reintroduction of disease into the remaining room of cats under treatment from three kittens returning from foster care. Continued admissions and adoptions were
possible by the institution of intake procedures that specifically included careful Wood’s lamp examination to identify high-risk cats and use of a ‘clean break strategy’.

Gastrointestinal parasites in rural dogs and cats in Selangor and Pahang states in Peninsular Malaysia.


To estimate the current prevalence of gastrointestinal (GI) parasites in dogs and cats, a total of 105 fresh faecal samples were collected from rural areas in Peninsular Malaysia. Each faecal sample was examined for the presence of GI parasites by microscopic examination after formalin-ether concentration technique and for protozoa, trichrome and Ziehl-Neelsen staining were employed. The overall prevalence of GI parasitic infection was 88.6% (95% CI = 82.5-94.7) in which 88.3% of dogs and 89.3% of cats were infected with at least one parasites species, respectively. There were 14 different GI parasites species (nematodes, cestodes and protozoa) detected, including Ancylostoma spp. (62.9%), Toxocara spp. (32.4%), Trichuris vulpis (21.0%), Spirometra spp. (9.5%), Toxascaris leonina (5.7%), Dipylidium caninum (4.8%), Ascaris spp. (2.9%), Hymenolepis diminuta (1.0%) and others. General prevalence of GI parasites showed a significant difference between helminth (84.4%) and protozoa (34.3%) infections. Monoparasitism (38.1%) was less frequent than polyparasitism (46.7%). As several of these GI parasites are recognized as zoonotic agents, the results of this investigation revealed that local populations may be exposed to a broad spectrum of zoonotic agents by means of environmental contamination with dogs and cats faeces and this information should be used to mitigate public health risks. Prevention and control measures have to be taken in order to reduce the prevalence rates especially in socioeconomically disadvantaged communities where animals live in close proximity to people, poor levels of hygiene and overcrowding together with a lack in veterinary attention and zoonotic awareness.

Evaluation of factors associated with work-related injuries to veterinary technicians certified in Minnesota.


Nordgren, L. D., S. G. Gerberich, B. H. Alexander, T. R. Church, J. B. Bender, and A. D. Ryan

OBJECTIVE: To evaluate the magnitude and consequences of work-related injuries and associated factors among veterinary technicians certified in Minnesota. DESIGN: Cross-sectional survey. SAMPLE: 1,427 certified veterinary technicians (CVTs). PROCEDURES: Surveys were used to collect data on demographics, personal characteristics, injury occurrences in the 12 months prior to survey completion, and injury consequences. Annual injury rates were estimated on the basis of demographic and work-related characteristics. Risk of injury associated with various factors was estimated by calculation of incidence rate ratios, controlling for multiple factors. RESULTS: 465 of 873 eligible CVTs reported 1,827 injury events (total and bite injury rates, 237 and 78 injuries/100 persons/y). Primary injury sources were cats and dogs, and most injuries occurred during animal restraint or treatment. Self-reported most severe injuries involved bites; cuts, lacerations, or scratches; bruises or contusions; and abrasions. Injury consequences included treatment and restricted work
activity. Risk of work-related injury was lower for CVTs who worked < 40 h/wk than for those who worked >/= 40 h/wk. The risk was higher for CVTs working in small animal or mixed mostly small animal facilities and lower for those working in mixed large and small animal facilities, commercial or industry operations, and government or regulatory facilities, compared with CVTs in colleges or universities. Handling 4 to > 6 (vs < 4) animal species during the 12 months prior to the survey and belief that injuries are not preventable were also associated with higher risk of injury. CONCLUSIONS AND CLINICAL RELEVANCE: Several factors associated with the risk of work-related injury among CVTs were identified. Beyond these risk factors, investigation of additional exposures is integral to relevant intervention strategies.

Patent ductus arteriosus in an adult cat with pulmonary hypertension and right-sided congestive heart failure: hemodynamic evaluation and clinical outcome following ductal closure.

Novo-Matos, J., K. Hurter, R. Bektas, P. Grest, and T. Glaus

Right-sided congestive heart failure (CHF) developed secondary to severe pulmonary hypertension (PH) in an 8-year-old cat with a left-to-right shunting patent ductus arteriosus (PDA). Vascular reactivity was tested prior to shunt ligation by treatment with oxygen and sildenafil. This treatment was associated with a significant decrease in pulmonary artery pressure as assessed by echocardiography. Subsequently surgical shunt ligation was planned. During thoracotomy, digital occlusion of the PDA was performed for 10 min with simultaneous catheter measurement of right ventricular pressure, which did not increase. Permanent shunt ligation resulted in a complete and sustained clinical recovery. A lung biopsy sample obtained during thoracotomy demonstrated histopathological arterial changes typical of PH. Cats can develop clinically severe PH and right-sided CHF secondary to a left-to-right PDA even at an advanced age. Assuming there is evidence of pulmonary reactivity, PDA occlusion might be tolerated and can potentially produce long-term clinical benefits.

Prevalence of disorders recorded in cats attending primary-care veterinary practices in England.
Vet J (2014)

O’Neill, D. G., D. B. Church, P. D. McGreevy, P. C. Thomson, and D. C. Brodbelt

Improved understanding of absolute and relative prevalence values for common feline disorders could support clinicians when listing differential diagnoses and also assist prioritisation of breeding, research and health control strategies. This study aimed to analyse primary-care veterinary clinical data within the VetCompass project to estimate the prevalence of the most common disorders recorded in cats in England and to evaluate associations with purebred status. It was hypothesised that common disorders would be more prevalent in purebred than in crossbred cats. From a study population of 142,576 cats attending 91 clinics across Central and South-East England from 1 September 2009 to 15 January 2014, a random sample of 3584 was selected for detailed clinical review to extract information on all disorders recorded. The most prevalent diagnosis-level disorders were periodontal disease (n = 499; prevalence, 13.9%, 95% confidence intervals [CI], 12.5-15.4), flea infestation (n = 285; prevalence, 8.0%; 95% CI, 7.0-8.9) and obesity (n = 239; prevalence, 6.7%; 95% CI, 5.7-7.6). The most prevalent disorder groups recorded were dental conditions (n = 540; prevalence, 15.1%, 95% CI, 13.6-16.6), traumatic injury (n = 463; prevalence, 12.9%; 95% CI, 11.6-14.3) and dermatological disorders (n =
Feline Abstracts Jul-Oct 2014

373; prevalence, 10.4%; 95% CI, 9.2-11.7). Crossbred cats had a higher prevalence of abscesses (excluding cat bite abscesses) ($P = 0.009$) and hyperthyroidism ($P = 0.002$) among the 20 most common disorders recorded. Purebreds had a higher prevalence for coat disorders ($P < 0.001$). Veterinarians could use these results to focus their diagnostic and prophylactic efforts towards the most prevalent feline disorders. The study did not show an increased prevalence of common disorders in purebred cats compared with crossbred cats. Primary-care veterinary clinical data were versatile and useful for demographic and clinical feline studies.

**Pain assessment in cats undergoing ovariohysterectomy by midline or lateral celiotomy through use of a previously validated multidimensional composite pain scale.**


*Oliveira, J. P., R. Mencalha, C. A. Sousa, M. Abidu-Figueiredo, and F. Jorge Sda*

PURPOSE: To assess pain in the immediate postoperative period in cats submitted into two different celiotomy techniques for ovariohysterectomy. METHODS: Fourteen healthy female cats up to three years old with a mean weight 2.75kg, without breed specification, were used in this double blind experiment. The animals were randomly assigned to two treatments: I- ovariohysterectomy by lateral approach (LA) or II - by midline approach (MA). The anesthesia consisted of acepromazine (0.1 mg.kg-1) and midazolam (0.25mg.kg-1) followed isoflurane vaporization to induce and maintain hypnosis. A bolus of fentanyl (5mug.kg-1) was administered intravenously to provide intraoperative analgesia. After surgery, pain scores were assessed through a multidimensional composite pain scale at four different times. RESULTS: Generally all factors related to psychomotor changes and pain expression showed higher scores in cats neutered by LA, but only psychomotor changes and total pain score presented statistical differences ($p<0.05$). The animals that underwent lateral celiotomy showed higher pain scores, at 1, 4 and 6 hours after surgery. CONCLUSIONS: Multidimensional analgesic scales were highly reliable. There was a tendency for the cats neutered by lateral approach to suffer more postoperative pain, including requiring a large number of analgesic rescues.

**Review of gunshot injuries in cats and dogs and utility of a triage scoring system to predict short-term outcome: 37 cases (2003-2008).**


*Olsen, L. E., E. M. Streeter, and R. R. DeCook*

OBJECTIVE: To describe the signalment, wound characteristics, and treatment of gunshot injuries in cats and dogs in urban and rural environments, and to evaluate the utility of the animal trauma triage (ATT) score as an early predictor of survival to discharge from the hospital. DESIGN: Retrospective case series. ANIMALS: 29 dogs and 8 cats. PROCEDURES: Medical records of cats and dogs evaluated for gunshot wounds from 2003 and 2008 at a private urban referral practice in Cedar Rapids, Iowa, and an urban veterinary teaching hospital in Ames, Iowa, were reviewed. Information collected included signalment, chief reason for evaluation, circumstance of the injury, general physical examination findings, wound characteristics, treatments provided, cost of care, survival to discharge from the hospital (yes vs no), and duration of hospital stay. For each animal, ATT scores were calculated and evaluated as a prognostic tool. RESULTS: 37 animals met study inclusion criteria. Animals with higher ATT scores had a greater likelihood of poor outcome following gunshot injury.
Animals with higher ATT scores, classified as low (< 4.5) or high (> 4.5), were found to have a longer duration of stay, classified as zero (0 days), short (1 to 3 days), or long (> 3 days). Young male dogs generally considered working breeds were overrepresented (29/37 [78.4%]). A preference for low-velocity, low-kinetic-energy firearms was identified (19/37 [52%]). The most numerous wounds were those inflicted to the limbs (12/37 [32.4%]), during low-visibility hours or hunting excursions. Calculated ATT scores on admission were higher in animals requiring blood products or surgical procedures and in nonsurvivors. CONCLUSIONS AND CLINICAL RELEVANCE: Results of the present study suggested that regional preferences in breed ownership and firearm choice are responsible for variation in gunshot injury characteristics and management in animals sustaining injuries in rural and urban settings in Iowa. In cats and dogs, calculation of an ATT score may provide a useful predictor of the need for surgery or blood products, duration of stay, and likelihood of survival to discharge from the hospital.

A morphological and immunohistochemical study of the effects of prednisolone or ursodeoxycholic acid on liver histology in feline lymphocytic cholangitis.


Feline lymphocytic cholangitis (LC) has been commonly treated with prednisolone, and more recently with ursodeoxycholic acid (UDCA). Previously, we found that prednisolone treatment resulted in a statistically longer survival time than treatment with UDCA. In order to explain this difference, we compared the effects of prednisolone and UDCA treatment on hepatic tissue by evaluating consecutive liver biopsies. Archival serial biopsy materials from cats with LC treated with prednisolone (n = 5) or UDCA (n = 4) were evaluated. We employed haematoxylin and eosin staining to evaluate inflammation, and reticulin staining for fibrosis. Immunohistochemical stainings for Ki-67, K19 (Cytokeratin 19) and alpha-smooth muscle actin were used to evaluate cell type-specific proliferation and activation of hepatic stellate cells. Inflammation decreased more in the group treated with prednisolone, while the number of cholangiocytes, progenitor cells and fibroblasts did not differ between the treatment groups. Additionally, no difference was found for the amount of fibrosis in both treatment groups.

Total dietary fiber composition of diets used for management of obesity and diabetes mellitus in cats.


OBJECTIVE: To determine total dietary fiber (TDF) composition of feline diets used for management of obesity and diabetes mellitus. DESIGN: Cross-sectional survey. SAMPLE: Dry veterinary (n = 10), canned veterinary (12), and canned over-the-counter (3) feline diets. PROCEDURES: Percentage of TDF as insoluble dietary fiber (IDF), high-molecular-weight soluble dietary fiber (HMWSDF), and low-molecular-weight soluble dietary fiber (LMWSDF) was determined. RESULTS: Median measured TDF concentration was greater than reported maximum crude fiber content in dry and canned diets. Median TDF (dry-matter) concentration in dry and canned diets was 12.2% (range, 8.11% to 27.16%) and 13.8% (range, 4.7% to 27.9%), respectively. Dry and canned diets, and diets with and without a
source of oligosaccharides in the ingredient list, were not different in energy density or concentrations of TDF, IDF, HMWSDF, or LMWSDF. Similarly, loaf-type (n = 11) and gravy-type (4) canned diets differed only in LMWSDF concentration. Disparities in TDF concentrations among products existed despite a lack of differences among groups. Limited differences in TDF concentration and dietary fiber composition were detected when diets were compared on the basis of carbohydrate concentration. Diets labeled for management of obesity were higher in TDF concentration and lower in energy density than diets for management of diabetes mellitus. CONCLUSIONS AND CLINICAL RELEVANCE: Diets provided a range of TDF concentrations with variable concentrations of IDF, HMWSDF, and LMWSDF. Crude fiber concentration was not a reliable indicator of TDF concentration or dietary fiber composition. Because carbohydrate content is calculated as a difference, results suggested that use of crude fiber content would cause overestimation of both carbohydrate and energy content of diets.

**Relationship between rate of infection and markers of inflammation/immunity in Holy Birman cats with feline coronavirus.**

Paltrinieri, S., G. Rossi, and A. Giordano  
The aim of this study was to assess whether Holy Birman cats (HB) have a peculiar immune profile and a higher rate of infection by feline coronaviruses (FCoV). Leucocyte and lymphocyte subsets, antibody titers, alpha1-acid glycoprotein (AGP), globulin fractions, IL-4, IL-12 and IFN-gamma in blood and fecal FCoV excretion were determined in HB (n = 75) and in cats from other breeds (n = 94). Significantly higher CD4/CD8 ratio, IFN-gamma concentration and IL12/IL4 ratio and significantly lower IL-4 concentration and proportion of shedders were found in HB than in other breeds. No other differences were found. In conclusion, this study did not provide evidence of peculiar immune profiles in HB, except for a prevalent Th1 profile, that may explain why in our caseload the rate of shedders was lower in HB than in other breeds.

**Identification of a natural recombination in the F and H genes of feline morbillivirus.**

Feline morbillivirus (FmoPV) has recently been identified in Hong Kong and Japan. FmoPV is considered to belong to the genus Morbillivirus, in the family Paramyxoviridae. In this study, the complete nucleotide sequences of three strains of FmoPV detected in cats in Japan were determined. Among the six genes in FmoPV; N, P/V/C, M, F, H and L, the P gene showed the highest polymorphism in the nucleotide and putative amino acid sequences among the FmoPV strains. There was no geographical association in terms of the FmoPV phylogeny; however, from extensive phylogenetic and recombination analyses, we found that one Japanese FmoPV strain, MiJP003, was a probable recombinant between two virus strains in the independent lineages found in Japan and Hong Kong, respectively. The recombination was considered to have occurred within the F and H genes. Such recombination is thought to be involved in the evolution of FmoPV.
Determination of Age by Pulp Cavity/Tooth Width Ratio Using Dental Radiography in Cats.

Park, K., J. Ahn, S. Kang, E. Lee, S. Kim, S. Park, S. Park, H. Noh, and K. Seo

The purpose of this study was to identify the effect of age on the ratio of pulp cavity/tooth width (P/T ratio) in healthy cats. The dental radiographs of 32 cats (16 males, 16 females) were generated with a digital dental X-ray unit under general anesthesia. Standardized measurement of the canine teeth was achieved by drawing a line on the radiograph perpendicular to the cemento-enamel junction of the tooth. There was an inversely proportional correlation between the chronological age and the P/T ratio. Moreover, a strong squared Pearson correlation (gamma(2) = 0.92) was revealed in the curved regression model. In terms of the cats’ sex and breeds, no significant difference in the P/T ratio was found. These results suggest that determination of age by P/T ratio could be clinically useful in estimating the chronological age of unknown-aged cats.

Liver and kidney concentrations of strontium, barium, cadmium, copper, zinc, manganese, chromium, antimony, selenium and lead in cats.

Passlack, N., B. Mainzer, M. Lahrssen-Wiederholt, H. Schafft, R. Palavinskas, A. Breithaupt, and J. Zentek

BACKGROUND: In order to provide new knowledge on the storage of strontium (Sr), barium (Ba), cadmium (Cd), copper (Cu), zinc (Zn), manganese (Mn), chromium (Cr), antimony (Sb), selenium (Se) and lead (Pb) in the feline organism, we measured the concentrations of these elements in the liver, renal cortex and renal medulla, evaluating also the impact of age, sex or the occurrence of a chronic kidney disease (CKD). The element concentrations in the tissues of 47 cats (22 male; 25 female; aged between 2 months and 18 years) were measured using inductively coupled plasma mass spectrometry. RESULTS: Cu, Zn and Mn were the highest in the liver, followed by the renal cortex and the renal medulla. The Cd concentrations were lower in the renal medulla compared to the renal cortex and the liver, and Sr was higher in the renal medulla compared to the liver. The Se concentrations in the cortex of the kidneys were higher than in the medulla of the kidneys and in the liver. Higher Cd concentrations were measured in the renal medulla of female cats, while no further gender-related differences were observed. Except for Cr, Sb and Se, age-dependencies were detected for the storage of all elements. The occurrence of a CKD also affected the storage of the elements, with lower concentrations of Ba (renal medulla), Zn (renal cortex; renal medulla) and Mn (liver; renal medulla), but higher Cd concentrations (liver; renal cortex) in diseased cats. CONCLUSIONS: In conclusion, the present results provide new information on the accumulation of specific elements in the feline liver and kidneys, demonstrating a dependency on age and an impaired kidney function, but not on the sex of the animals.

Short term effects of increasing dietary salt concentrations on urine composition in healthy cats.

Passlack, N., H. Burmeier, T. Brenten, K. Neumann, and J. Zentek
High dietary salt (NaCl) concentrations are assumed to be beneficial in preventing the formation of calcium oxalate (CaOx) uroliths in cats, since increased water intake and urine volume have been observed subsequent to intake. In human beings, dietary NaCl restriction is recommended for the prevention of CaOx urolith formation, since high NaCl intake is associated with increased urinary Ca excretion. The aim of the present study was to clarify the role of dietary NaCl in the formation of CaOx uroliths in cats. Eight cats received four diets that differed in Na and Cl concentrations (0.38-1.43% Na and 0.56-2.52% Cl dry matter, DM). Each feeding period consisted of a 21 day adaptation period, followed by a 7 day sampling period for urine collection. Higher dietary NaCl concentrations were associated with increased urine volume and renal Na excretion. Urinary Ca concentration was constant, but renal Ca excretion increased from 0.62 to 1.05 mg/kg bodyweight (BW)/day with higher dietary NaCl concentrations (P <= 0.05). Urinary oxalate (Ox), citrate, P and K concentrations decreased when NaCl intake was high (P <= 0.05), and urinary pH was low in all groups (6.33-6.45; P > 0.05). Relative supersaturation of CaOx in the urine was unaffected by dietary NaCl concentrations. In conclusion, the present study demonstrated several beneficial effects of high dietary NaCl intake over a relatively short time period. In particular, urinary Ca concentration remained unchanged because of increased urine volume. Decreased urinary Ox concentrations might help to prevent the formation of CaOx uroliths, but this should be verified in future studies in diseased or predisposed cats.

An update on feline infectious peritonitis: virology and immunopathogenesis.


Pedersen, N. C.

Feline infectious peritonitis (FIP) continues to be one of the most researched infectious diseases of cats. The relatively high mortality of FIP, especially for younger cats from catteries and shelters, should be reason enough to stimulate such intense interest. However, it is the complexity of the disease and the grudging manner in which it yields its secrets that most fascinate researchers. Feline leukemia virus infection was conquered in less than two decades and the mysteries of feline immunodeficiency virus were largely unraveled in several years. After a half century, FIP remains one of the last important infections of cats for which we have no single diagnostic test, no vaccine and no definitive explanations for how virus and host interact to cause disease. How can a ubiquitous and largely non-pathogenic enteric coronavirus transform into a highly lethal pathogen? What are the interactions between host and virus that determine both disease form (wet or dry) and outcome (death or resistance)? Why is it so difficult, and perhaps impossible, to develop a vaccine for FIP? What role do genetics play in disease susceptibility? This review will explore research conducted over the last 5 years that attempts to answer these and other questions. Although much has been learned about FIP in the last 5 years, the ultimate answers remain for yet more studies.

The influence of age and genetics on natural resistance to experimentally induced feline infectious peritonitis.

Vet Immunol Immunopathol (2014)

Pedersen, N. C., H. Liu, B. Gandolfi, and L. A. Lyons

Naturally occurring feline infectious peritonitis (FIP) is usually fatal, giving the impression that immunity to the FIP virus (FIPV) is extremely poor. This impression may be incorrect, because not all
cats experimentally exposed to FIPV develop FIP. There is also a belief that the incidence of FIP may be affected by a number of host, virus, and environmental cofactors. However, the contribution of these cofactors to immunity and disease incidence has not been determined. The present study followed 111 random-bred specific pathogen free (SPF) cats that were obtained from a single research breeding colony and experimentally infected with FIPV. The cats were from several studies conducted over the past 5 years, and as a result, some of them had prior exposure to feline enteric coronavirus (FECV) or avirulent FIPVs. The cats were housed under optimized conditions of nutrition, husbandry, and quarantine to eliminate most of the cofactors implicated in FIPV infection outcome and were uniformly challenge exposed to the same field strain of serotype 1 FIPV. Forty of the 111 (36%) cats survived their initial challenge exposure to a Type I cat-passaged field strains of FIPV. Six of these 40 survivors succumbed to FIP to a second or third challenge exposure, suggesting that immunity was not always sustained. Exposure to non-FIP-inducing feline coronaviruses prior to challenge with virulent FIPV did not significantly affect FIP incidence but did accelerate the disease course in some cats. There were no significant differences in FIP incidence between males and females, but resistance increased significantly between 6 months and 1 or more years of age. Genetic testing was done on 107 of the 111 infected cats. Multidimensional scaling (MDS) segregated the 107 cats into three distinct families based primarily on a common sire(s), and resistant and susceptible cats were equally distributed within each family. Genome-wide association studies (GWAS) on 73 cats that died of FIP after one or more exposures (cases) and 34 cats that survived (controls) demonstrated four significant associations after 100k permutations. When these same cats were analyzed using a sib-pair transmission test, three of the four associations were confirmed although not with genome-wide significance. GWAS was then done on three different age groups of cases to take into account age-related resistance, and different associations were observed. The only common and strong association identified between the various GWAS case configurations was for the 34.7-45.8Mb region of chromosome A3. No obvious candidate genes were present in this region.

Differential pharmacokinetics and pharmacokinetic/pharmacodynamic modelling of robenacoxib and ketoprofen in a feline model of inflammation.


Pelligand, L., J. N. King, V. Hormazabal, P. L. Toutain, J. Elliott, and P. Lees

Robenacoxib and ketoprofen are acidic nonsteroidal anti-inflammatory drugs (NSAIDs). Both are licensed for once daily administration in the cat, despite having short blood half-lives. This study reports the pharmacokinetic/pharmacodynamic (PK/PD) modelling of each drug in a feline model of inflammation. Eight cats were enrolled in a randomized, controlled, three-period cross-over study. In each period, sterile inflammation was induced by the injection of carrageenan into a subcutaneously implanted tissue cage, immediately before the subcutaneous injection of robenacoxib (2 mg/kg), ketoprofen (2 mg/kg) or placebo. Blood samples were taken for the determination of drug and serum thromboxane (Tx)B2 concentrations (measuring COX-1 activity). Tissue cage exudate samples were obtained for drug and prostaglandin (PG)E2 concentrations (measuring COX-2 activity). Individual animal pharmacokinetic and pharmacodynamic parameters for COX-1 and COX-2 inhibition were generated by PK/PD modelling. S(+) ketoprofen clearance scaled by bioavailability (CL/F) was 0.114 L/kg/h (elimination half-life = 1.62 h). For robenacoxib, blood CL/F was 0.684 L/kg/h (elimination half-life = 1.13 h). Exudate elimination half-lives were 25.9 and 41.5 h for S(+) ketoprofen and robenacoxib, respectively. Both drugs reduced exudate PGE2 concentration significantly between 6
and 36 h. Ketoprofen significantly suppressed (>97%) serum TxB2 between 4 min and 24 h, whereas suppression was mild and transient with robenacoxib. In vivo IC50 COX-1/IC50 COX-2 ratios were 66.9:1 for robenacoxib and 1:107 for S(+) ketoprofen. The carboxylic acid nature of both drugs may contribute to the prolonged COX-2 inhibition in exudate, despite short half-lives in blood.

**Dietary management of feline endocrine disease.**

*Peterson, M. E., and L. Eirmann*

When treating cats with endocrine disease, most veterinarians concentrate on medical or surgical treatments that can be used to manage or cure the disease. Dietary issues are frequently ignored or not properly addressed. However, nutritional support can play an integral role in the successful management of feline endocrine diseases. Furthermore, because most cats with endocrine disease are senior or geriatric, they may also have concurrent health conditions that warrant dietary intervention. This article discusses recommendations for nutritional support of the 2 most common endocrine problems of cats seen in clinical practice: hyperthyroidism and diabetes mellitus.

**Cytologic and immunocytochemical characterization of feline progressive histiocytosis.**


BACKGROUND: Feline Progressive Histiocytosis (FPH) is a cutaneous dendritic cell neoplasm characterized by slow progression and spread to internal organs in the terminal stage. FPH is often misdiagnosed as an inflammatory reaction and has not been fully characterized from a cytologic diagnostic perspective. OBJECTIVES: The purpose of the study was to characterize the cytologic and immunocytochemical aspects useful for FPH diagnosis. METHODS: Fine-needle aspiration cytologic samples of 5 cases of FPH confirmed by skin biopsy and necropsy were evaluated. Immunocytochemistry with antibodies recognizing CD1a, CD1c, CD3, CD11b, CD18, CD21, and MHCII was performed on air-dried, acetone-fixed smears. E-cadherin expression was assessed on paraffin-embedded skin biopsies. Transmission electron microscopy (TEM) was performed in one case. RESULTS: Main cytologic findings on variably cellular samples were characterized by single to cohesive large, round to polygonal cells with intermediate to low N/C ratio, abundant clear homogeneous cytoplasm, and round to oval nuclei with rare bi- to multinucleated atypical cells, associated with low numbers of small lymphocytes and/or neutrophils. Neoplastic cells expressed CD1a, CD1c, CD11b, CD18, and MHCII. Anti-CD3 antibodies identified reactive T cells admixed with the neoplastic cells. E-cadherin expression was observed in all but one case. TEM failed to identify Birbeck granules in one case. CONCLUSIONS: FPH is a distinctive neoplastic lesion composed of nonphagocytizing histiocytes variably admixed with neutrophils and small mature lymphocytes. Immunocytochemical analysis with CD1 is mandatory to confirm a dendritic cell origin. Immunocytochemistry and cytomorphology allowed the specific and rapid diagnosis of FPH on cytologic samples.
Effect of Laparotomy on the Swallow-Breathing Relationship in the Cat.

Lung (2014)

Pitts, T., M. J. Rose, I. Poliacek, J. Condrey, P. W. Davenport, and D. C. Bolser

Swallow occurs predominantly in the expiratory phase (E) of breathing. This phase preference is thought to contribute to airway protection by limiting the passage of material through the pharyngeal airway with little or no inspiratory (I) airflow. This phase preference is attributed to central interactions between the swallow and breathing pattern generators. We speculated that changes in peripheral mechanical factors would influence the respiratory phase preference for swallow initiation. We induced swallowing in anesthetized spontaneously breathing cats by injection of water into the oropharynx. In animals with intact abdomens, 83 % of swallows were initiated during E, 7 % during I, 7 % during E-I phase transition, and 3 % during I-E transition. In animals with open anterior midline laparotomy, only 38 % of swallows were initiated during E, 33 % during I, 17 % during the E-I transition, and 12 % during I-E. The results support an important role for feedback from somatic and/or visceral thoraco-abdominal mechanoreceptors for swallow-breathing coordination after laparotomy.

Pharmacokinetics of oral transmucosal and intramuscular dexmedetomidine combined with buprenorphine in cats.

J Vet Pharmacol Ther (2014)

Porters, N., H. de Rooster, T. Bosmans, K. Baert, M. Cherlet, S. Croubels, P. De Backer, and I. Polis

Plasma concentrations and pharmacokinetics of dexmedetomidine and buprenorphine after oral transmucosal (OTM) and intramuscular (i.m.) administration of their combination in healthy adult cats were compared. According to a crossover protocol (1-month washout), a combination of dexmedetomidine (40 μg/kg) and buprenorphine (20 μg/kg) was given OTM (buccal cavity) or i.m. (quadriceps muscle) in six female neutered cats. Plasma samples were collected through a jugular catheter during a 24-h period. Plasma dexmedetomidine and buprenorphine concentrations were determined by liquid chromatography-tandem mass spectrometry. Plasma concentration-time data were fitted to compartmental models. For dexmedetomidine and buprenorphine, the area under the plasma concentration-time curve (AUC) and the maximum plasma concentrations (Cmax) were significantly lower following OTM than following i.m. administration. For buprenorphine, time to reach Cmax was also significantly longer after OTM administration than after i.m. injection. Data suggested that dexmedetomidine (40 μg/kg) combined with buprenorphine (20 μg/kg) is not as well absorbed from the buccal mucosa site as from the intramuscular injection site.

Prepubertal gonadectomy in cats: different injectable anaesthetic combinations and comparison with gonadectomy at traditional age.


Anaesthetic and analgesic effects of three different injectable anaesthetic combinations for prepubertal gonadectomy (PPG) in cats were studied. One anaesthetic protocol was compared with a similar one for gonadectomy at traditional age (TAG). Kittens were randomly assigned to PPG or TAG. For PPG, three different protocols were compared: (1) intramuscular (IM) administration of 60 μg/kg
Feline Abstracts Jul-Oct 2014

dexmedetomidine plus 20 μg/kg buprenorphine followed by an IM injection of the anaesthetic agent (20 mg/kg ketamine) (DB-IM protocol); (2) oral transmucosal (OTM) administration of 80 μg/kg dexmedetomidine plus 20 μg/kg buprenorphine followed by an IM injection of 20 mg/kg ketamine combined with 20 μg/kg dexmedetomidine (DB-OTM protocol); (3) IM injection of a 40 μg/kg medetomidine-20 μg/kg buprenorphine-20 mg/kg ketamine combination (MBK-IM protocol). For TAG, a DB-IM protocol was used, but with different doses for dexmedetomidine (40 μg/kg) and ketamine (5 mg/kg). All cats (PPG and TAG) received a non-steroidal anti-inflammatory before surgery. Anaesthetic and analgesic effects were assessed pre- and postoperatively (until 6 h).

Cumulative logit, linear and logistic regression models were used for statistical analysis. Compared with the DB-OTM protocol, the DB-IM and MBK-IM protocols provided better anaesthesia with fewer adverse effects in PPG cats. Postoperative pain was not significantly different between anaesthetic protocols. PPG and TAG cats anaesthetised with the two DB-IM protocols differed significantly only for sedation and pain scores, but sedation and pain scores were generally low. Although there were no anaesthesia-related mortalities in the present study and all anaesthetic protocols for PPG in cats provided a surgical plane of anaesthesia and analgesia up to 6 h postoperatively, our findings were in favour of the intramuscular (DB-IM and MBK-IM) protocols.

**Prepubertal gonadectomy in cats: different surgical techniques and comparison with gonadectomy at traditional age.**


Porters, N., I. Polis, C. Moons, L. Duchateau, K. Goethals, S. Huyghe, and H. de Roos

Feasibility, surgical time and complications of different surgical techniques for prepubertal gonadectomy (PPG; 8-12 weeks of age) in cats were studied and compared to gonadectomy at traditional age (TAG; 6-8 months of age). Kittens were randomly assigned to PPG or TAG. Ovarian pedicle haemostasis for PPG was achieved by ligatures (n=47), vascular clips (n=50), bipolar electrocoagulation (n=50), or pedicle tie (n=50); for TAG (n=34) ligatures were used. In male cats, PPG consisted of closed castration by spermatic cord knot (n=92) or ligature (n=91) while TAG (n=34) was an open castration by spermatic cord knot. A linear (surgical time) and a logistic regression (complications) model were designed. Significance was set at 0.05. For female PPG, clips and coagulation were the fastest procedures; placement of ligatures was most time-consuming. In male PPG, knot placement was significantly faster than ligation. In both sexes, very few intraoperative or wound complications were observed, irrespective of the surgical technique used. Surgical times in females (ligatures) as well as in males (knot) were significantly shorter for PPG than for TAG. PPG was as safe as TAG, yet took less time to perform and did not result in a greater rate of postoperative complications.

**Corneal collagen cross-linking as treatment for infectious and noninfectious corneal melting in cats and dogs: results of a prospective, nonrandomized, controlled trial.**


OBJECTIVE: UV-A/Riboflavin cross-linking of corneal collagen fibers (CXL) is a highly promising therapy for corneal melting in humans. A prospective interventional, nonrandomized, controlled study...
was conducted to compare the stabilizing effect of CXL treatment on melting keratitis in dogs and cats and the complication rate of CXL to those of standardized intensive medical treatment.

PROCEDURES: Forty-nine eyes with melting keratitis were included in the study between October 2009 and October 2012. All eyes were treated according to the same medical treatment protocol. Nineteen eyes were CXL-treated, and 30 eyes were not. Follow-up included slit-lamp examination, fluorescein staining, ulcer size measurement, stromal stability evaluation, photographic documentation, and documentation of complications. RESULTS: Five of 19 eyes in the CXL group and 9/30 eyes in the control group required rescue stabilization due to continued melting. Seven of the nine control group corneas stabilized after rescue CXL treatment. At initial presentation, the ulcers in the canine CXL group were significantly deeper and larger than in the control group. Ulcer deepening during follow-up was more pronounced in the canine control group than in the canine CXL group. CXL treatment-related complications were not observed. CONCLUSIONS: Based on the similar failure rates in the control and CXL treatment groups despite the poorer initial situation in the CXL group, the tendency for the ulcers in the control group to deepen and the stabilization of all corneas receiving CXL rescue treatment, we believe that CXL has its place as an adjunctive therapy for melting keratitis in veterinary ophthalmology.

Pancreatic surgical biopsy in 24 dogs and 19 cats: postoperative complications and clinical relevance of histological findings.
J Small Anim Pract (2014)
Pratschke, K. M., J. Ryan, A. McAlinden, and G. McLauchlan

OBJECTIVE: To assess the immediate postoperative complications associated with pancreatic biopsy in dogs and cats and review the clinical relevance of biopsy findings. METHODS: Retrospective review of clinical records from two referral institutions for cases undergoing pancreatic biopsy between 2000 and 2013. RESULTS: Twenty-four dogs and 19 cats that had surgical pancreatic biopsy had sufficient detail in their clinical records and fulfilled the inclusion criteria. Postoperative complications were seen in 10 cases of which 5 were suggestive of post-surgical pancreatitis. Two patients were euthanased within 10 days of surgery because of the underlying disease; neither suffered postoperative complications. Pancreatic pathology was found in 19 cases, 7 cases showed no change other than benign pancreatic nodular hyperplasia, and no abnormalities were seen in 18 cases. CLINICAL SIGNIFICANCE: Complications may be encountered following surgical pancreatic biopsy, although the risk should be minimal with good surgical technique. Pancreatic biopsy may provide a useful contribution to case management but it is not clear whether a negative pancreatic biopsy should be used to rule out pancreatic disease. Dogs were more likely to have no significant pathology found on pancreatic biopsy than cats, where chronic pancreatitis was the most common finding.

Pratt, C. L., E. L. Reineke, and K. J. Drobatz

OBJECTIVE: To characterize clinical signs, diagnostic test results, foreign body location, treatment, and outcome for dogs and cats with sewing needle foreign bodies. DESIGN: Retrospective case series. ANIMALS: 65 dogs and cats with sewing needle foreign bodies. PROCEDURES: Medical records of
27 dogs and 38 cats examined because of sewing needle foreign bodies from January 2000 to February 2012 were reviewed for signalment, medical history, physical examination findings, diagnostic test results, interval from witnessed exposure and radiographic imaging to definitive treatment, definitive treatment, sewing needle location, complications, and outcome. RESULTS: 7 (10.8%) animals had sewing needles in extragastrointestinal locations that were not causing clinical signs. The remaining 58 (89.2%) animals had known sewing needle exposure or acute clinical signs associated with ingestion. The esophageal and gastric regions were the most common location for a sewing needle (10/21 [47.6%] dogs; 19/37 [51.4%] cats), followed by the oropharynx (7/21 [33.3%] dogs; 11/37 [29.7%] cats) and small and large intestines (4/21 [19.0%] dogs; 7/37 [18.9%] cats). Gastrointestinal perforation was detected in 10 of 58 (17.2%) animals (5/21 [23.8%] dogs; 5/37 [13.5%] cats). Sewing needles in the esophagus and stomach were successfully removed endoscopically in 8 of 9 dogs and 18 of 19 cats.

Survival rate was 98.1% (51/52) for animals receiving definitive treatment. CONCLUSIONS AND CLINICAL RELEVANCE: Endoscopic removal of ingested sewing needles was highly successful and should be recommended to prevent gastrointestinal tract perforation and associated morbidity. Prognosis for dogs and cats receiving definitive treatment for sewing needle foreign body ingestion was excellent.

Concurrent diseases in hyperthyroid cats undergoing assessment prior to radioiodine treatment.


Puig, J., I. Cattin, and M. Seth

Hyperthyroidism is a common endocrinopathy of geriatric cats, which are also prone to various other diseases. This retrospective study examined the prevalence and type of non-renal concurrent diseases present in cats referred for radioiodine assessment that were believed to have no other comorbidities at the time of referral. Ninety-four cats were included and analysed. Seventeen cases (18%) were identified as having concurrent disorders, with alimentary lymphoma (n = 5) and chronic enteropathy (n = 4) as the two most common comorbid diseases. The eosinophil count, total bilirubin and total calcium were significantly higher in the concurrent disease group, although the differences are unlikely to be clinically useful. The results support the utility of careful and individual assessment for all hyperthyroid cats prior to receiving radioiodine.

Chronic use of maropitant for the management of vomiting and inappetence in cats with chronic kidney disease: a blinded placebo-controlled clinical trial.


Quimby, J. M., W. T. Brock, K. Moses, D. Bolotin, and K. Patricelli

OBJECTIVES: Maropitant is commonly used for acute vomiting. A pharmacokinetic and toxicity study in cats indicated that longer term usage appears safe. The aim of this study was to assess the efficacy of maropitant for management of chronic vomiting and inappetence associated with feline chronic kidney disease (CKD). METHODS: Forty-one cats with stable International Renal Interest Society Stage II or III CKD, no known concurrent illness, and a complaint of chronic vomiting and inappetence attributed to CKD were enrolled in a randomized, placebo-controlled, blinded clinical study. A complete blood count, serum biochemistry, urinalysis, urine culture, T4 and blood pressure were required for entry. Maropitant was administered at a dose of 4 mg orally (median 1.1 mg/kg,
range 0.6-2.9 mg/kg) daily for 2 weeks. Owners kept daily logs of vomiting incidence, appetite and activity scores. Physical examination, weight, body condition score and serum biochemistry were performed before and after the trial period. Mann-Whitney statistics were used to compare treatment groups.

RESULTS: Thirty-three cats successfully completed the trial: 21 cats received the drug (nine Stage II cats, 12 Stage III cats) and 12 cats received placebo (seven Stage II cats, five Stage III cats). There was a statistically significant decrease in vomiting in cats with CKD that received maropitant (P <0.01). Cats that received maropitant did not have statistically significant differences in appetite scores, activity scores, weight or serum creatinine compared with placebo.

CONCLUSIONS AND RELEVANCE: Maropitant was demonstrated to palliate vomiting associated with CKD, and may be helpful in the nutritional management of cats with CKD.

Oral, subcutaneous, and intravenous pharmacokinetics of ondansetron in healthy cats.
Quimby, J. M., R. C. Lake, R. J. Hansen, P. J. Lunghofer, and D. L. Gustafson

Ondansetron is a 5-HT3 receptor antagonist that is an effective anti-emetic in cats. The purpose of this study was to evaluate the pharmacokinetics of ondansetron in healthy cats. Six cats with normal complete blood count, serum biochemistry, and urinalysis received 2 mg oral (mean 0.43 mg/kg), subcutaneous (mean 0.4 mg/kg), and intravenous (mean 0.4 mg/kg) ondansetron in a cross-over manner with a 5-day wash out. Serum was collected prior to, and at 0.25, 0.5, 1, 2, 4, 8, 12, 18, and 24 h after administration of ondansetron. Ondansetron concentrations were measured using liquid chromatography coupled to tandem mass spectrometry. Noncompartmental pharmacokinetic modeling and dose interval modeling were performed. Repeated measures anova was used to compare parameters between administration routes. Bioavailability of ondansetron was 32% (oral) and 75% (subcutaneous). Calculated elimination half-life of ondansetron was 1.84 +/- 0.58 h (intravenous), 1.18 +/- 0.27 h (oral) and 3.17 +/- 0.53 h (subcutaneous). The calculated elimination half-life of subcutaneous ondansetron was significantly longer (P < 0.05) than oral or intravenous administration. Subcutaneous administration of ondansetron to healthy cats is more bioavailable and results in a more prolonged exposure than oral administration. This information will aid management of emesis in feline patients.

Effect of pre-cardiac and adult stages of Dirofilaria immitis in pulmonary disease of cats: CBC, bronchial lavage cytology, serology, radiographs, CT images, bronchial reactivity, and histopathology.
Vet Parasitol (2014)

A controlled, blind study was conducted to define the initial inflammatory response and lung damage associated with the death of precardiac stages of Dirofilaria immitis in cats as compared to adult heartworm infections and normal cats. Three groups of six cats each were used: UU: uninfected untreated controls; PreS I: infected with 100 D. immitis L3 by subcutaneous injection and treated topically with selamectin 32 and 2 days pre-infection and once monthly for 8 months); IU: infected with 100 D. immitis L3 and left untreated. Peripheral blood, serum, bronchial lavage, and thoracic
radiographic images were collected from all cats on Days 0, 70, 110, 168, and 240. CT images were acquired on Days 0, 110, and 240. Cats were euthanized, and necropsies were conducted on Day 240 to determine the presence of heartworms. Bronchial rings were collected for in vitro reactivity. Lung, heart, brain, kidney, and liver tissues were collected for histopathology. Results were compared for changes within each group. Pearson and Spearman correlations were performed for association between histologic, radiographic, serologic, hematologic and bronchoalveolar lavage (BAL) results. Infected cats treated with selamectin did not develop radiographically evident changes throughout the study, were heartworm antibody negative, and were free of adult heartworms and worm fragments at necropsy. Histologic lung scores and CT analysis were not significantly different between PreS I cats and UU controls. Subtle alveolar myofibrosis was noted in isolated areas of several PreS I cats and an eosinophilic BAL cytology was noted on Days 75 and 120. Bronchial ring reactivity was blunted in IU cats but was normal in PreS I and UU cats. The IU cats became antibody positive, and five cats developed adult heartworms. All cats with heartworms were antigen positive at one time point; but one cat was antibody positive, antigen negative, with viable adult females at necropsy. The CT revealed early involvement of all pulmonary arteries and a random pattern of parenchymal disease with severe lesions immediately adjacent to normal areas. Analysis of CT 3D reconstruction and Hounsfield units demonstrated lung disease consistent with restrictive pulmonary fibrosis with an interstitial infiltrate, absence of air trapping, and decrease in total lung volume in Group IU as compared to Groups UU and PreS I. The clinical implications of this study are that cats pretreated with selamectin 1 month before *D. immitis* L3 infection did not become serologically positive and did not develop pulmonary arterial hypertrophy and myofibrosis.

**Assessment of five formulae to predict post-transfusion packed cell volume in cats.**


*Reed, N., I. Espadas, S. M. Lalor, and C. Kisielewicz*

This retrospective study aimed to identify the most accurate formula for estimating the increase in packed cell volume (PCV) after whole blood transfusion of cats, as several formulae have been reported but not validated. Forty cats, of varying breeds and gender, were included from two referral institutions after database searches over a 13 year period. Five formulae were used to calculate an estimated post-transfusion PCV based on the re-working of formulae for determining the volume of donor blood to be transfused; three formulae were derived from those previously reported in the feline literature and two from human paediatric medicine, where a similar mean blood volume has been described. Cats were subdivided into two groups, the first consisting of 17 cats with non-regenerative anaemia and the second consisting of 23 cats with ongoing losses such as haemolysis and haemorrhage; it was hypothesised that formulae could be more accurate for group 1 cats, whereas formulae applied to group 2 cats could have overestimated the post-transfusion PCV. Bland-Altman analysis was performed for all cats to compare the actual increase in PCV with the calculated increase for the five formulae. Formula 1 (PCV % increase = volume of blood transfused in ml/2 x bodyweight in kg) performed best overall and is easy to calculate; however, no single formula was highly accurate at predicting the PCV increase after whole blood transfusion in cats and, owing to the wide confidence intervals, these formulae should be applied judiciously in the clinical setting.

**Case-control study of the effects of pimobendan on survival time in cats with hypertrophic cardiomyopathy and congestive heart failure.**
OBJECTIVE: To assess survival time and adverse events related to the administration of pimobendan to cats with congestive heart failure (CHF) secondary to hypertrophic cardiomyopathy (HCM) or hypertrophic obstructive cardiomyopathy (HOCM). DESIGN: Retrospective case-control study. ANIMALS: 27 cats receiving treatment with pimobendan and 27 cats receiving treatment without pimobendan. PROCEDURES: Medical records between 2003 and 2013 were reviewed. All cats with HCM or HOCM treated with a regimen that included pimobendan (case cats) were identified. Control cats (cats with CHF treated during the same period with a regimen that did not include pimobendan) were selected by matching to case cats on the basis of age, sex, body weight, type of cardiomyopathy, and manifestation of CHF. Data collected included signalment, physical examination findings, echocardiographic data, serum biochemical values, and survival time from initial diagnosis of CHF. Kaplan-Meier survival curves were constructed and compared by means of a log rank test. RESULTS: Cats receiving pimobendan had a significant benefit in survival time. Median survival time of case cats receiving pimobendan was 626 days, whereas median survival time for control cats not receiving pimobendan was 103 days. No significant differences were detected for any other variable. CONCLUSIONS AND CLINICAL RELEVANCE: The addition of pimobendan to traditional treatment for CHF may provide a substantial clinical benefit in survival time for HCM-affected cats with CHF and possibly HOCM-affected cats with CHF.

Open wide: blindness in cats after the use of mouth gags.
Reiter, A. M.

Plasma exogenous creatinine clearance in clinically healthy cats: Comparison with urinary exogenous creatinine clearance, tentative reference intervals and indexation to bodyweight.

Glomerular filtration rate (GFR) is considered to be the best indicator of overall kidney function. The major objectives of this study were to compare plasma exogenous creatinine clearance (PECC) with a reference method, to establish reference intervals (RIs) for PECC and to assess the effects of indexation of GFR to bodyweight (BW) in cats. PECC was compared with urinary clearance of exogenous creatinine (UECC) in six clinically healthy domestic shorthair cats (experiment 1). Tentative RIs were determined according to current guidelines and the effects of indexation to BW and of covariables on GFR were assessed in 43 clinically healthy cats of various breeds (experiment 2). PECC was 15% higher than UECC (P <0.01), but the two estimates were strongly correlated (r(2)=0.97, P = 0.001). RIs for PECC were 6.4-21.3 mL/min or 1.2-4.9 mL/min/kg. The absolute (i.e. non-indexed) GFR value was not dependent on BW. Thus, indexation of GFR to BW in cats would not standardize the GFR value,
but could introduce bias in clinical interpretation. Significant effects of breed, plasma protein concentration and plasma albumin concentration on GFR were demonstrated. Plasma concentrations of urea and creatinine, when assessed separately, were also weakly correlated with GFR in healthy cats. These combined findings contribute to a better understanding of renal function assessment in cats.

**Routine plasma biochemistry analytes in clinically healthy cats: within-day variations and effects of a standard meal.**

*J Feline Med Surg (2014)*

Reynolds, B. S., C. Brosse, E. Jeunesse, D. Concordet, and H. P. Lefebvre

Limited information is available on pre-analytical variations in plasma analytes in cats. The objectives of this study were to assess the effects of the time of sampling and a standard meal on plasma analytes in healthy cats. Eight healthy, adult, fasted cats underwent blood sampling every 2 h from 8 am to 8 pm twice at a 12 day interval. On the days of sampling, four cats were kept fasted and the others were fed just after the first sample, in a crossover design. Plasma glucose, urea, creatinine, sodium, potassium, chloride, CO2, calcium, phosphate, proteins, albumin, cholesterol and triglycerides, alanine aminotransferase and alkaline phosphatase were assayed on each sample. Effects of time of sampling and meal on plasma biochemistry results were tested using a general linear model. Diurnal variations in tested plasma analytes in fasted cats were negligible except for urea and creatinine, which gave noticeably higher plasma concentrations in the afternoon than in the morning. Observed postprandial variations were of some importance for phosphate and creatinine and of indisputable clinical relevance for CO2 and urea.

**Effects of intramuscular sedation with alfaxalone and butorphanol on echocardiographic measurements in healthy cats.**

*J Feline Med Surg (2014)*


OBJECTIVES: To evaluate the effects of intramuscular (IM) injections of alfaxalone combined with butorphanol on echocardiographic (ECG) measurements in cats. METHODS: Client-owned adult domestic shorthair cats younger than 5 years of age were recruited. All cats that were considered healthy on the basis of physical examination, blood work, urinalysis, blood pressure measurement and baseline ECG underwent a second ECG under sedation. Cats were sedated with two separate IM injections of butorphanol at 0.2 mg/kg and alfaxalone at 2 mg/kg. ECG variables were analysed using a linear mixed model, and sedation scores were analysed using an ordinal mixed logistic model. The significance level was set at alpha = 0.05 and adjusted at alpha = 0.0017 for multiple comparisons of the ECG measurements. RESULTS: Ten healthy cats were included. Sedation was uneventful, and recovery was smooth and quick for all cats. The mean duration of lateral recumbency was 36.3 +/- 4.37 mins. Reduction in heart rate following sedation approached statistical significance (P = 0.002). The thickness of the interventricular septum, the thickness of the left ventricular free wall, and the left ventricular internal dimensions in diastole and systole were not affected by the sedation. The changes in left atrium/aortic ratio and shortening fraction were statistically significant. Although the peak velocity of early diastolic transmitral flow (E) and late diastolic transmitral flow (A), the peak early diastolic (Ea) mitral valve annulus velocity, and the peak late diastolic (Aa) mitral valve annulus

- 109 -
velocity changed after sedation, the ratios E/A, E/Ea and Ea/Aa were not significantly different before or after sedation. CONCLUSIONS AND RELEVANCE: IM injections of alfaxalone and butorphanol induced rapid, deep and short-lasting sedation. The mean differences after sedation were not clinically significant for most echocardiographic measurements.

Clinicopathologic characterization of oral pyogenic granuloma in 8 cats.

Riehl, J., C. M. Bell, M. E. Constantaras, C. J. Snyder, C. J. Charlier, and J. W. Soukup

This case series characterizes the clinicopathologic features and treatment of oral pyogenic granuloma in 8 cats. The cats reported here were patients originating from collaborative efforts at an academic clinical teaching hospital and a specialty dentistry/oral surgery referral practice. Although the initial biopsy results were variable, in all cases the diagnosis reflected an inflammatory process. A second clinicopathologic evaluation of these cases determined that all lesions were consistent with oral pyogenic granuloma. The location of the lesion was consistent among all cats within the present study. Lesions developed at the vestibular mucogingival tissues of the mandibular first molar teeth. We propose that malocclusion and secondary traumatic contact of the ipsilateral maxillary fourth premolar tooth with the mandibular soft tissues is a possible contributing factor in the etiopathogenic mechanism.

Factors affecting urine specific gravity in apparently healthy cats presenting to first-opinion practice for routine evaluation.

Rishniw, M., and R. Bicalho

Evidence suggests that apparently healthy cats presenting for routine evaluation should have a randomly sampled urine specific gravity (USG) >1.035. A USG <1.035 might reflect inappropriate concentrating ability warranting further investigation. We measured the USG of 1040 apparently healthy cats presenting to first-opinion practice in an observational study, using either in-clinic refractometers or measurements provided by reference laboratories, and examined factors that might affect USG. In-clinic refractometers were calibrated using distilled water (specific gravity = 1.000). The USG was >1.030 in 91% of cats and >1.035 in 88% of cats; 121 adult cats (>/>=6 months old) and five young cats (<6 months old) had USGs of <1.035. Of these 126 cats, a pathological cause was identified in 27 adult cats - of these, 26 were >9 years old - but no young cats. No cause was identified in 43 adult cats, and further investigation was not pursued in 51 adult cats. Factors that affected USG included age, diet type, sex, fasting status, drinking avidity, refractometer type, and the interaction between sex and diet - increasing dietary moisture content lowered USG only in female cats. Most factors minimally affected USG. The odds of having a USG <1.035 without apparent pathology included age and dietary moisture content. Drinking avidity decreased with increasing dietary moisture content. Our results show that most apparently healthy cats presenting to first-opinion practice should have a USG >1.035. Dietary management strategies to lower USG might be less effective than anticipated, and warrant monitoring of USG to determine efficacy. Older cats with USG <1.035 are more likely to have pathological causes identified, although clinicians are more likely to examine these
cats for possible pathology. A lack of stringent refractometer calibration could have caused some errors in estimates of USG by some observers, but would be unlikely to alter markedly the findings.

**Capturing the complexity of first opinion small animal consultations using direct observation.**

*Vet Rec (2014)*

*Robinson, N. J., M. L. Brennan, M. Cobb, and R. S. Dean*

Various different methods are currently being used to capture data from small animal consultations. The aim of this study was to develop a tool to record detailed data from consultations by direct observation. A second aim was to investigate the complexity of the consultation by examining the number of problems discussed per patient. A data collection tool was developed and used during direct observation of small animal consultations in eight practices. Data were recorded on consultation type, patient signalment and number of problems discussed. During 16 weeks of data collection, 1901 patients were presented. Up to eight problems were discussed for some patients; more problems were discussed during preventive medicine consultations than during first consultations (P<0.001) or revisits (P<0.001). Fewer problems were discussed for rabbits than cats (P<0.001) or dogs (P<0.001). Age was positively correlated with discussion of specific health problems and negatively correlated with discussion of preventive medicine. Consultations are complex with multiple problems frequently discussed, suggesting comorbidity may be common. Future research utilising practice data should consider how much of this complexity needs to be captured, and use appropriate methods accordingly. The findings here have implications for directing research and education as well as application in veterinary practice.

**Comparison of two copro-parasitological techniques for the detection of Platynosomum sp. infection in cats.**


*Rocha, N. O., R. W. Portela, S. S. Camargo, W. R. Souza, G. C. Carvalho, and T. C. Bahiense*

Platynosomum sp. is the etiologic agent of platynosomiasis, a hepatic disease that affects domestic cats. The parasite develops in the bile ducts and gallbladder, causing severe hepato-biliary disease. Considering the importance of the disease and the increase in the number of households with cats, the aim of this study was to compare two different techniques for the detection of the parasite’s eggs and to assess the frequency of Platynosomum sp. infection in cats. Forty fecal samples from cats of different ages, from an animal shelter in the city of Salvador, Bahia State, Brazil, were subjected to two different techniques: a centrifugal fecal flotation procedure in Sheather’s sugar solution and centrifugal sedimentation in formalin-ether solution. Positive results were found for 12.5% of the samples using the centrifugal fecal flotation assay, whereas all samples were negative when employing the centrifugal sedimentation test. The results suggest that this parasite can be found infecting cats in Salvador city and that centrifugal fecal flotation in sugar solution can be a more suitable detection of the parasite’s eggs at fecal samples. Therefore, platynosomiasis must be included in the diseases to be studied routinely in domestic felids.
Dietary supplementation of propionylated starch to domestic cats provides propionic acid as gluconeogenic substrate potentially sparing the amino acid valine.


Rochus, K., A. Cools, G. P. Janssens, L. Vanhaecke, B. Wuyts, T. Lockett, J. M. Clarke, V. Fievez, and M. Hesta

In strict carnivorous domestic cats, a metabolic competition arises between the need to use amino acids for gluconeogenesis and for protein synthesis both in health and disease. The present study investigated the amino acid-sparing potential of propionic acid in cats using dietary propionylated starch (HAMSP) supplementation. A total of thirty cats were fed a homemade diet, supplemented with either HAMSP, acetylated starch (HAMSA) or celite (Control) for three adaptation weeks. Propionylated starch was hypothesised to provide propionic acid as an alternative gluconeogenic substrate to amino acids, whereas acetic acid from HAMSA would not provide any gluconeogenic benefit. Post-adaptation, a 5-d total faecal collection was carried out to calculate apparent protein digestibility coefficients. Fresh faecal and blood samples were collected to analyse fermentation endproducts and metabolites. The apparent protein digestibility coefficients did not differ between supplements (P = 0.372) and were not affected by the protein intake level (P = 0.808). Faecal propionic acid concentrations were higher in HAMSP than in HAMSA (P = 0.018) and Control (P = 0.003) groups, whereas concentrations of ammonia (P = 0.007) were higher in HAMSA than in HAMSP cats. Tendencies for or higher propionylcarnitine concentrations were observed in HAMSP compared with HAMSA (P = 0.090) and Control (P = 0.037) groups, and for tiglyl + 3-methylcrotonylcarnitine concentrations in HAMSP as compared with Control (P = 0.028) cats. Methylmalonylcarnitine concentrations did not differ between groups (P = 0.740), but were negatively correlated with the protein intake level (r = -0.459, P = 0.016).

These results suggest that HAMSP cats showed more saccharolytic fermentation patterns than those supplemented with HAMSA, as well as signs of sparing of valine in cats with a sufficient protein intake.

Characterization of an avirulent FCV strain with a broad serum cross-neutralization profile and protection against challenge of a highly virulent vs feline calicivirus.


Rong, S., D. Lowery, K. Floyd-Hawkins, and V. King

Highly virulent, systemic strains of Feline calicivirus (vs FCV) have been described in recent years. These vs FCV isolates cause severe edema, cutaneous ulcers, lameness and other upper respiratory and oral clinical signs typically associated with FCV infection in cats. Vs FCV isolates can cause high mortality even in cats vaccinated with currently available commercial vaccines. This study reports identification and characterization of an avirulent FCV strain (FCV 21). This strain offers a broader serum cross-neutralization profile in comparison with the commonly used vaccine strain (FCV F9), as tested with two separate viral panels of FCV isolates. The first viral panel consists of 45 FCV strains isolated around 1993. The second viral panel consists of 26 FCV strains with most isolated around 2003. The potential of using this strain as a vaccine, in a 3-way (FCV+FHV+FPV) or 4-way (FCV+FHV+FPV+FCp) format, was tested by using a highly virulent vs FCV strain (FCV-33585) as a challenge virus. The mortality induced by this vs FCV in unvaccinated control cats was 78% (7 out of 9 cats). The mortality decreased to 44% (4 out of 9 cats) in cats vaccinated with a 4-way vaccine containing FCV F9. However, when this novel FCV vaccine strain (FCV 21) was used, either in
combination with FCV F9 or by itself, the mortality decreased to 0% (0 out of 10 cats). The 3-way vaccine (FCV+FHV+FPV) that contained both FCV 21 and FCV F9 also had mortality of 0% (0 out of 10 cats). The clinical scores, as calculated taking into consideration the frequency and severity of various clinical signs, correlated with mortality data. The results suggested this FCV vaccine has the potential to be broadly protective against newly emergent FCV isolates, including complete protection against challenge with a highly virulent vs FCV 33585.

Complications associated with corrective surgery for patellar luxation in 85 feline surgical cases.


Rutherford, L., S. J. Langley-Hobbs, R. J. Whitelock, and G. I. Arthurs

The objective was to review surgical techniques and postoperative complications of surgical correction for patellar luxation (PL) in cats. A retrospective study evaluating 85 surgeries in 71 cats was performed. The records from four referral centres were searched for cats with surgical management of PL. Signalment, history, PL grade and direction, corrective surgical techniques and outcome were retrieved. Binary logistic regression analysis was used to interrogate relationships between case features, surgical correction methods and outcomes. The outcomes were classified as minor and major complications (requiring revision surgery), including continued PL (reluxation). Postoperative complications occurred in 26% of cases; 20% had major complications, including 5% patellar reluxation, and 6% had minor complications. Cats with previous ipsilateral femoral fracture were significantly more likely to suffer complications, including minor (P = 0.02, odds ratio = 12.67), major (P = 0.03, OR = 7.2) and patellar reluxation (P = 0.01, OR = 19.25). Minor complications were significantly more likely with grade 4 PL (P = 0.03, OR = 8.5). Major complications were significantly more likely with tibial tuberosity transposition (TTT; P = 0.03, OR = 5.57). Patellar reluxation was significantly more likely if stifle surgery had been performed previously (P = 0.05, OR = 8.00). The presence of bilateral PL, hip dysplasia, grade 1, 2 or 3 PL, corrective surgery using an anti-rotational suture or femoral sulcoplasty did not influence complications. Complications were more likely for grade 4 PL, previous ipsilateral femoral fracture, if TTT was performed and for cases with previous stifle surgery. This information allows consideration of risks and complicating factors.

Feline ischemic myelopathy and encephalopathy secondary to hyaline arteriopathy in five cats.


Rylander, H., S. Eminaga, V. Palus, H. Steinberg, A. Caine, B. A. Summers, J. Gehrke, C. West, P. R. Fox, T. Donovan, and G. B. Cherubini

Five cats presented with acute-onset neurological signs. Magnetic resonance imaging in four cats showed a T2-weighted hyperintense spinal cord lesion that was mildly contrast-enhancing in three cats. Owing to inflammatory cerebrospinal fluid changes three cats were treated with immunosuppression. One cat was treated with antibiotics. All cats improved initially, but were eventually euthanased owing to the recurrence of neurological signs. Histopathology in all cats showed hyaline degeneration of the ventral spinal artery, basilar artery or associated branches with aneurysmal dilation, thrombosis and ischemic degeneration and necrosis of the spinal cord and brain. Two cats also had similar vascular changes in meningeal vessels. Vascular hyaline degeneration resulting in vascular aneurysmal dilation...
and thrombosis should be a differential diagnosis in cats presenting with acute central nervous system signs.

**Palliative radiation therapy outcomes for cats with oral squamous cell carcinoma (1999-2005).**

*Sabhlok, A., and R. Ayl*

Squamous cell carcinoma (SCC) accounts for approximately 10% of all feline tumors. The purpose of this retrospective study was to describe outcomes for a group of cats with oral SCC that were treated with palliative radiation therapy. Fifty-four cats met the inclusion criteria of nonresectable, oral SCC treated with coarse fractionated megavoltage (MeV) radiation therapy. Radiation therapy for all cats was delivered with a 6 MeV linear accelerator. Total radiation doses of 24 Gray to 40 Gray were administered in three to four fractions, once-per-week over 4 to 5 weeks. Concurrent chemotherapy protocols varied and were administered at the discretion of the clinician and client. Forty-nine patients completed the planned treatment protocols. Overall mean and median survival times for cats completing the planned treatment protocols were 127 and 92 days (n = 49). Mean and median survival times of cats receiving palliative radiation therapy alone were 157 and 113 days (n = 12). Mean and median survival times of patients receiving both radiation therapy and chemotherapy were 116 and 80 days (n = 37). Patients with sublingual tumors had a median survival time of 135 days (n = 15), compared to mandibular tumors that had a median survival time of 80 days (n = 26). For the majority of patients that completed the planned treatment protocol (65%), owners reported a subjectively improved quality of life. Findings from this uncontrolled study supported the use of palliative radiation therapy for cats with nonresectable oral squamous cell carcinoma.

**Genetic diversity of feline morbilliviruses isolated in Japan.**

*Sakaguchi, S., S. Nakagawa, R. Yoshikawa, C. Kuwahara, H. Hagiwara, K. Asai, K. Kawakami, Y. Yamamoto, M. Ogawa, and T. Miyazawa*

Feline morbillivirus (FmoPV) is an emerging virus in domestic cats and considered to be associated with tubulointerstitial nephritis. Although FmoPV was first described in China in 2012, there has been no report of the isolation of this virus in other countries. In this report, we describe the isolation and characterization of FmoPV from domestic cats in Japan. By using reverse transcription (RT)-PCR, we found that three of 13 urine samples from cats brought to veterinary hospitals were positive for FmoPV. FmoPV strains SS1 to SS3 were isolated from the RT-PCR-positive urine samples. Crandell-Rees feline kidney (CRFK) cells exposed to FmoPV showed cytopathic effects with syncytia formation, and FmoPV N protein was detected by indirect immunofluorescence assays. In addition, pleomorphic virus particles with apparent glycoprotein envelope spikes were observed by electron microscopy. By sequence analysis of FmoPV H and L genes, we found that FmoPVs showed genetic diversity; however, signatures of positive selection were not identified.

**Feline Chronic Kidney Disease Is Associated With Upregulation of Transglutaminase 2: A Collagen Cross-Linking Enzyme.**
Sanchez-Lara, A. C., J. Elliott, H. M. Syme, C. A. Brown, and J. L. Haylor

Chronic kidney disease is a major cause of morbidity and mortality in cats. Transglutaminase 2 (TG2) is a calcium-dependent enzyme proposed to mediate tubulointerstitial fibrosis in the kidney by cross-linking collagen fibrils. Postmortem kidney tissue was obtained from primary renal azotemic (n = 10) and nonazotemic (n = 5) cats (14 domestic short hair, 1 Burmese; aged 9-23.7 years). Extracellular matrix protein deposition was determined by Masson’s trichrome staining and collagen immunofluorescence. Total kidney transglutaminase (TG) enzyme activity and TG2 protein were measured in tissue homogenates by putrescine incorporation and Western blotting. Extracellular TG enzyme activity and TG2 protein were determined in situ by immunofluorescence, quantified by multiphase image analysis. Results were compared using the unpaired Student’s t-test with Welch’s correction. Elevated plasma creatinine, urea, and phosphate concentrations were associated with tubulointerstitial fibrosis but not glomerular fibrosis. Kidney homogenates from azotemic cats showed a 3-fold higher total TG enzyme activity and TG2 protein compared with kidneys from nonazotemic cats. Immunofluorescent studies performed in situ confirmed a 3-fold higher extracellular TG enzyme activity and TG2 protein in cats with azotemia. Tubulointerstitial TG2 showed a positive linear correlation with both renal function and tubulointerstitial fibrosis. In conclusion, for cats with azotemia, both filtration failure and tubulointerstitial fibrosis were associated with the upregulation of TG2, a collagen cross-linking enzyme and the major isoform of transglutaminase in the kidney. TG2 may provide a new therapeutic target for drugs designed to slow the progression of feline chronic kidney disease.

Radiographic and echocardiographic assessment of left atrial size in 100 cats with acute left-sided congestive heart failure.


Schober, K. E., E. Wetli, and W. T. Drost

The aims of this study were to evaluate left atrial size in cats with acute left-sided congestive heart failure. We hypothesized that left atrial size as determined by thoracic radiography can be normal in cats with acute left-sided congestive heart failure. One hundred cats with acute left-sided congestive heart failure in which thoracic radiography and echocardiography were performed within 12 h were identified. Left atrial size was evaluated using right lateral and ventrodorsal radiographs. Measurements were compared to two-dimensional echocardiographic variables of left atrial size and left ventricular size. On echocardiography, left atrial enlargement was observed in 96% cats (subjective assessment) whereas maximum left atrial dimension was increased (>15.7 mm) in 93% cats. On radiographs left atrial enlargement (subjective assessment) was found in 48% (lateral view), 53% (ventrodorsal view), and 64% (any view) of cats whereas left atrial enlargement was absent in 36% of cats in both views. Agreement between both methods of left atrial size estimation was poor (Cohen’s kappa 0.17). Receiver operating characteristic curve analysis identified a maximum echocardiographic left atrial dimension of approximately 20 mm as the best compromise (Youden index) between sensitivity and specificity in the prediction of radiographic left atrial enlargement. Left atrial enlargement as assessed by thoracic radiography may be absent in a clinically relevant number of cats with congestive heart failure. Therefore, normal left atrial size on thoracic radiographs does not rule out presence of left-sided congestive heart failure in cats with clinical signs of respiratory distress.
Comparative study of Microsporum canis isolates by DNA fingerprinting.


Shafiee, S., A. R. Khosravi, and I. Ashrafi Tamai

Microsporum canis is a zoophilic fungus and it is an important agent of dermatophytosis. Cats act as important reservoirs. Clinically, it is too difficult to differentiate dermatophytosis caused by various species, also this fungus loses its morphological characteristics easily because of subculture; so using of rapid and accurate laboratory techniques for identifying the dermatophytes is important, therefore, RAPD-PCR was applied for the differentiation of the isolates. In this study, 10 M. canis isolates were detected in cats, dog, human, fox and rabbit at the Mycology Research Center, Faculty of Veterinary Medicine, University of Tehran. For running the RAPD-PCR, PCR set system and three random primers OPU 15, OPU 13 and OPA 04 were used. Then phylogenetic tree and similarity coefficient table were drawn. The results showed that there were some common bands between M. canis isolates. There were some specific bands for each isolates, as well. Our study showed, despite the typical morphology of the whole isolates, they were placed in different branches in molecular typing.

Cardiopulmonary Effects of Laparoscopic Ovariectomy of Variable Duration in Cats.

Vet Surg (2014)

Shih, A. C., J. B. Case, J. G. Coisman, N. M. Isaza, D. Amora-Junior, and H. W. Maisenbacher

OBJECTIVE: To evaluate the cardiopulmonary effects of low-pressure (6 mmHg) peritoneal insufflation of varying duration in healthy cats during ovariectomy (OVE). STUDY DESIGN: Prospective, randomized study. ANIMALS: Female cats (n = 24). METHODS: After anesthesia induction, cats had short (Short LAP; n = 8) or long duration (Long LAP; n = 8) laparoscopic ovariectomy, or Open OVE (Open; n = 8) for comparison. Hemodynamic and pulmonary measurements were recorded after induction of anesthesia (T0), 5 minutes after abdominal insufflation had reached 6 mmHg of pressure (T1), after the 2nd ovary had been resected (T2), after abdominal decompression (T3), and at the end of anesthesia, after abdominal closure (T4). Hemodynamic and pulmonary variables were compared between groups. RESULTS: Low-pressure abdominal insufflation caused cardiopulmonary changes in cats. At T1 and T2, Long LAP and Short LAP caused a significant change in PvCO2 and RC when compared with Open. During T3, RC was lower only in Long LAP. At T2, there was decrease in SV, but not CO for Long LAP when compared with Open. CONCLUSIONS: Duration of insufflation was associated with worsening of negative cardiopulmonary effects; however, these effects were reversible and resolved by the end of the procedure.

Post-operative complications and owner satisfaction following partial caudectomies: 22 cases (2008 to 2013).


Simons, M. C., R. Ben-Amotz, and C. Popovitch

OBJECTIVES: To report complications and owner satisfaction for dogs and cats following partial caudectomy. METHODS: Medical records of dogs and cats (n = 22) that underwent partial caudectomy between 2008 and 2013 were retrospectively reviewed. Signalment, reason for amputation, level of
amputation, and complications were recorded. Owners were contacted via telephone to obtain follow-up data. RESULTS: The most common reason for partial caudectomy was tail wounds (16 of 22; 72.7%). Complications were typically minor incisional crusting (4 of 20; 20%). Major complications (3 of 20; 15%) included prolonged healing after partial incisional dehiscence, continued self-trauma requiring revision surgery, and severe inflammation with ulceration requiring revision surgery. The majority of owners surveyed (10 of 12; 83.3%) were satisfied with the post-operative outcome and would recommend this procedure if warranted. CLINICAL SIGNIFICANCE: Partial caudectomy is well tolerated in both dogs and cats with no loss of function. Pet owners did not perceive any behavioural changes following partial caudectomy. However, in cases of continued self-mutilation and/or incisional dehiscence, revision procedures may be required.

**Effect of acarbose on postprandial blood glucose concentrations in healthy cats fed low and high carbohydrate diets.**


Singh, R., J. S. Rand, M. Coradini, and J. M. Morton

OBJECTIVES: Feeding a low carbohydrate diet is recommended for diabetic cats; however, some cats may require diets containing moderate-to-high carbohydrate and may benefit from the use of therapeutic agents to improve glycemic control. The aim of the study was to determine the effect of the alpha-glucosidase inhibitor acarbose on postprandial plasma glucose concentration when combined with commercially available feline diets high and low in carbohydrate. METHODS: Twelve healthy, adult, non-obese, neutered cats were enrolled. Plasma glucose concentrations were assessed over 24 h after feeding high and low carbohydrate diets, with and without acarbose, during single and multiple meal tests, in a crossover study. Commercially available feline diets were used, which were high and low in carbohydrate (providing 51% and 7% of metabolizable energy, respectively). RESULTS: In cats fed the high carbohydrate diet as a single meal, mean 24 h glucose concentrations were lower when acarbose was administered. Mean glucose concentrations were lower in the first 12 h when acarbose was given once daily, whereas no significant difference was observed in mean results from 12-24 h. Acarbose had little effect in cats eating multiple meals. Compared with consumption of the high carbohydrate diet with acarbose, lower mean 24 h and peak glucose concentrations were achieved by feeding the low carbohydrate diet alone. CONCLUSIONS AND RELEVANCE: In healthy cats meal-fed diets of similar composition to the diets used in this study, acarbose has minimal effect when a low carbohydrate diet is fed but reduces postprandial glucose concentrations over 24 h when a high carbohydrate diet is fed. However, mean glucose concentrations over 24 h are still higher when a high carbohydrate diet with acarbose is fed relative to the low carbohydrate diet without acarbose. Future studies in diabetic cats are warranted to confirm these findings.

**New broad-spectrum beta-lactamases emerging among Enterobacteriaceae from healthy cats and dogs: a public health concern?**


Smet, A., R. Vaes, K. Praud, B. Doublet, S. Daminet, A. Cloeckaert, and F. Haesebrouck
A study on Borna disease virus infection in domestic cats in Japan.


Borna disease virus (BDV) infection causes neurological disease in cats. Here, we report BDV infection in 199 hospitalized domestic cats in the Tokyo area. BDV infection was evaluated by detection of plasma antibodies against BDV-p24 or -p40. BDV-specific antibodies were detected in 54 cats (27.1%). Interestingly, the percentage of seropositive cats was not significantly different among the three clinical groups, i.e., healthy (29.8%), neurologically asymptomatic disease (22.2%) and neurological disease (33.3%). The specific antibodies were present even in cats aged below one year. The seropositive ratio was constant, irrespective of age and sampling season. The present study suggests that additional factors are required for onset of Borna disease in naturally infected cats and that BDV is transmitted through vertical routes in cats.

Guidelines for vaccination of dogs and cats in Korea.


Song, W. J., H. T. Kim, H. S. Yoo, and H. Y. Youn

This guideline contains the recommended vaccination schedules of dogs and cats from World Small Animal Veterinary Association (WSAVA) and American Animal Hospital Association (AAHA). In 2010, WSAVA published guidelines for the vaccination of dogs and cats. And, in 2011, AAHA also published guidelines for vaccination of dogs. In Korea, there is no published guideline for vaccination of dogs and cats yet. Therefore, the plane of vaccination also reports the present situation of vaccination schedule of dogs and cats in Korean animal hospitals.

Clinical and haematological responses of feline blood donors anaesthetised with a tiletamine and zolazepam combination.


This prospective study investigated the effect on clinical and haematological variables of the anaesthetic combination of tiletamine and zolazepam in feline blood donors. Blood (10 ml/kg bodyweight to a maximum volume of 60 ml) was collected from the jugular vein of 31 owned healthy cats anaesthetised with 2.5 mg/kg of tiletamine and 2.5 mg/kg of zolazepam intramuscularly. Rectal temperature (RT), systolic arterial pressure (SAP), mean arterial pressure (MAP), diastolic arterial pressure (DAP), heart rate (HR) and complete blood count (including red blood cells [RBC], haemoglobin [HB], haematocrit [HT], platelet [PLT] count, white blood cells [WBC], lymphocyte, neutrophils, eosinophils, monocytes and basophils count were evaluated pre- and postdonation. Significant decreases in SAP (P <0.01) after blood donation (mean change in RT -0.7 degrees C). Significant increases in SAP (P = 0.03), MAP (P <0.01) and DAP (P <0.01) occurred after blood donation (mean increase 13 mmHg, 12 mmHg and 11 mmHg, respectively). Although RBC, HT, HB, WBC, PLT, neutrophil and monocyte counts decreased, and HR, lymphocytes, eosinophils and basophils counts...
increased after blood donation this change was not statistically significant. Mean time from pre- to postdonation evaluation was 39 +/- 11 mins (range 24-76 mins). None of the cats had evidence of pallor or collapse after recovery from anaesthesia. The collection of blood at 10 ml/kg bodyweight to a maximum volume of 60 ml in healthy cats using a low dose tiletamine and zolazepam anaesthetic appears to be well tolerated by feline blood donors.

Molecular study on selected vector-borne infections in urban stray colony cats in northern Italy.

Feline vector-borne diseases can be caused by a range of pathogens transmitted by arthropods. Many of these infections have zoonotic implications, and stray cats are potential sentinels for human and pet health. This study investigated the prevalence of selected vector-borne infections in stray colony cats in Milan. Blood samples from 260 stray cats were evaluated, using conventional polymerase chain reaction tests (cPCRs), for the presence of DNA associated with Rickettsia species, Anaplasma phagocytophilum and Ehrlichia species. Positive cPCR results occurred in 127/260 subjects (48.9%; 95% confidence interval [CI] = 40.7-58.1), with a prevalence of 31.9% (83/260, 95% CI = 25.4-39.6) for Rickettsia species, 17.7% (46/260, 95% CI= 13.0-23.6) for A phagocytophilum, and 5.4% (14/260, 95% CI = 2.9-9.0) for Ehrlichia species. There was no statistical association between a positive PCR test for vector-borne infections surveyed and colony location, age, gender, body condition score or complete blood count abnormalities, nor feline immunodeficiency virus, feline leukaemia virus or Toxoplasma gondii status. The only variable linked to positive PCR results was detection of signs of ocular infection and PCR positivity for Rickettsia species (P = 0.04, odds ratio [OR] = 2.2, 95% CI = 1.1-4.4, P = 0.02). There is a significant prevalence of vector-borne infections with zoonotic potential in urban stray cats in Milan. Thus, dogs and pet cats with outdoor access should be monitored and treated for ectoparasites on a regular basis to minimise risks of disease and the potential transmission of zoonotic agents to people.

Development and analytical validation of an enzyme-linked immunosorbent assay for the measurement of feline tumor necrosis factor alpha in serum.
Steiner, J. M., P. G. Xenoulis, V. M. Schwierk, and J. S. Suchodolski

BACKGROUND: The role of tumor necrosis factor alpha (TNF-alpha), a cytokine shown to play a crucial role in human Crohn’s disease patients, has not been documented in cats with chronic enteropathies. Also, currently, no validated assay for measurement of TNF-alpha in cats is available. OBJECTIVES: The objective of this study was to develop and analytically validate an enzyme-linked immunosorbent assay (ELISA) for the quantification of TNF-alpha in serum from cats. METHODS: A sandwich ELISA was developed and analytically validated by assessment of detection limit, linearity, accuracy, precision, and reproducibility. A control range for serum fTNF-alpha concentration in healthy cats was established. In addition, serum concentrations of fTNF-alpha in 39 cats with chronic enteropathies were compared with those in 20 healthy cats. RESULTS: The detection limit of the assay was 38.4 ng/L. Observed-to-expected ratios for serial dilutions of 4 serum samples ranged from 75.1%
to 111.9%. Observed-to-expected ratios for spiking recovery for 4 serum samples ranged from 91.3% to 129.7%. Coefficients of variation for intra- and inter-assay variability ranged from 3.9% to 7.6% and from 7.8% to 12.5%, respectively. The control range of the assay was < 38.4-223.5 ng/L. Serum concentrations of feline TNF-alpha were significantly higher in cats with chronic enteropathies and diarrhea than in cats with chronic enteropathies without diarrhea, or in healthy control cats.

CONCLUSIONS: The ELISA described here was suitable for the quantification of fTNF-alpha in feline serum and should facilitate research into the importance of TNF-alpha in cats with chronic enteropathies.

Clinical Presentation and Outcome of Cats with Circumcaval Ureters Associated with a Ureteral Obstruction.

Steinhaus, J., A. C. Berent, C. Weisse, A. Eatroff, T. Donovan, J. Haddad, and D. Bagley

BACKGROUND: Circumcaval ureters (CU) are a rare embryological malformation resulting in ventral displacement of the caudal vena cava, which crosses the ureter, potentially causing a ureteral stricture. OBJECTIVES: To evaluate cats with obstructed CU(s) and report the presenting signs, diagnostics, treatment(s), and outcomes. Cats with obstructed CU(s) were compared to ureterally obstructed cats without CU(s). ANIMALS: 193 cats; 22 circumcaval obstructed (Group 1); 106 non-circumcaval obstructed (Group 2); 65 non-obstructed necropsy cases (Group 3). METHODS: Retrospective study, review of medical records for cats treated for benign ureteral obstructions from AMC and University of Pennsylvania between 2009 and 2013. Inclusion criteria: surgical treatment of benign ureteral obstruction, complete medical record including radiographic, ultrasonographic, biochemistry, and surgical findings. RESULTS: Seventeen percent (22/128) of obstructed cats had a CU (80% right-sided) compared to 14% (9/65) non-obstructed necropsy cats (89% right-sided). Clinical presentation, radiographic findings, and creatinine were not statistically different between Groups 1 and 2. Strictures were a statistically more common (40%) cause of ureteral obstruction in Group 1 compared to Group 2 (17%) (P = .01). The MST for Groups 1 and 2 after ureteral decompression was 923 and 762 days, respectively (P = .62), with the MST for death secondary to kidney disease in both groups being >1,442 days. Re-obstruction was the most common complication in Group 1 (24%) occurring more commonly in ureters of cats treated with a ureteral stent(s) (44%) compared to the subcutaneous ureteral bypass (SUB) device (8%) (P = .01). CONCLUSIONS AND CLINICAL IMPORTANCE: Ureteral obstructions in cats with a CU(s) have a similar outcome to those cats with a ureteral obstruction and normal ureteral anatomy. Long-term prognosis is good for benign ureteral obstructions treated with a double pigtail stent or a SUB device. The SUB device re-obstructed less commonly than the ureteral stent, especially when a ureteral stricture was present.

Feline hyperthyroidism reported in primary-care veterinary practices in England: prevalence, associated factors and spatial distribution.


Feline hyperthyroidism is a commonly diagnosed endocrinopathy that can have a substantial deleterious impact on the welfare of affected cats. This study aimed to estimate the prevalence,
associated factors and geographical distribution for feline hyperthyroidism in England, using primary-care veterinary practice clinical data from the VetCompass Animal Surveillance Project. Prevalence was estimated from the overall cat cohort. Associated factor analysis used an age-matched, nested, case-control design with multivariable logistic regression. There were 2,276 cases of feline hyperthyroidism identified from 95,629 cats attending 84 practices from September 2009 to December 2011. Cases were aged 6-25 years. 3.7 per cent of cases and 9.9 per cent of controls were purebred, 56.4 per cent of cases and 56.5 per cent of controls were female, and 88.1 per cent of cases and 86.0 per cent of controls were neutered. The apparent prevalence was 2.4 per cent (95% CI 2.3 to 2.5 per cent) overall, and 8.7 per cent (95% CI 8.3 to 9.0 per cent) in cats aged 10 years or above. Burmese (OR 0.15, 95% CI 0.07 to 0.32, P<0.0001), Persian (OR 0.17, 95% CI 0.08 to 0.33, P<0.0001), Siamese (OR 0.4, 95% CI 0.21 to 0.75, P=0.004) and purebred cats overall (OR 0.33, 95% CI 0.25 to 0.42, P<0.0001) had lower odds of feline hyperthyroidism than non-purebred cats. Insured cats had increased odds (OR 1.78, 95% CI 1.56 to 2.03, P<0.001). There was little evidence of spatial variation. This study highlights feline hyperthyroidism as a high-prevalence disease in England, and reports reduced odds of diagnosis in certain breeds and purebred cats overall.

Ocular manifestations of feline viral diseases.

Stiles, J.

Feline viral diseases are common and cats can be presented with a variety of clinical manifestations. Ocular disease associated with viral pathogens is not unusual, particularly with viruses causing upper respiratory tract disease in cats, such as feline herpesvirus type 1 and feline calicivirus. These agents mainly cause ocular surface disease. Other viruses, such as feline immunodeficiency virus and feline coronavirus, can cause uveitis, while feline leukemia virus can induce ocular lymphosarcoma. This review covers the most common viral pathogens of cats that cause ocular manifestations, the specific features of the ocular diseases caused by these viruses and therapeutic recommendations.

Feline parvovirus infection and associated diseases.

Stuetzer, B., and K. Hartmann

Feline panleukopenia, caused by the single-stranded DNA virus feline parvovirus (FPV), is a highly contagious and often lethal disease of cats and other Felidae. FPV, but also canine parvovirus (CPV) can be isolated from both healthy and diseased cats. In Germany, CPV was detected in only approximately 10% of feline samples, but in Southeast Asia, reports estimated that up to approximately 80% of diseased cats were infected with CPV. Infection spreads rapidly, especially in cells with high mitotic activity, such as bone marrow, lymphoid tissue and intestinal crypt cells. Anorexia, vomiting, diarrhoea, neutropenia and lymphopenia are common in clinically affected cases. In utero or neonatal infection can result in cerebellar hypoplasia. Depending on the severity of clinical signs, mortality ranges from 25 to 100%. Effective vaccination and thorough disinfection are of the utmost importance in the prevention of disease transmission in multi-cat households and animal shelters. If clinical signs develop, supportive treatment should be commenced. The efficacy of feline recombinant interferon and FPV antibodies has not been clearly demonstrated. Commercially available vaccines should induce
protective immunity when administered according to current guidelines. Recent studies suggest that in some kittens, maternally derived antibodies (MDA) can persist for much longer than has been previously recognised. FPV serum antibody tests are available, but protection status needs to be interpreted with caution in kittens with MDA and a negative titre in adult cats does not necessarily denote lack of protection.

**Histologic characterization of the cat middle ear: in sickness and in health.**


*Sula, M. M., B. L. Njaa, and M. E. Payton*

The purpose of this study was to establish microscopic normal in the middle ear of the cat while concurrently characterizing gross and microscopic lesions reflecting spontaneous otitis media. Both ears from 50 cats were examined grossly and processed for histologic examination of the external, middle, and internal ear on a single slide. Gross lesions of the middle ear were present in 14 of 100 (14%) and included turbid fluid, frank pus, hemorrhage, and fibrous thickening of the auricular mucoperiosteum. Histologically, 48 of 100 (48%) ears had evidence of ongoing or previous inflammatory middle ear disease, including proteinaceous fluid; vascular ectasia; expansion of the auricular mucoperiosteum by neutrophils, lymphocytes, and macrophages; cholesterol clefts; hemorrhage; fibrin; granulation tissue; membranous pseudo-glands; fibrosis; proliferation and/or osteolysis of the tympanic and septum bullae. Histologic lesions were identified in 34 of 100 ears (34%) lacking gross evidence of disease. Ears were classified histologically as either normal (52/100 [52%]) or diseased (48/100 [48%]). Diseased ears were further classified as mild to moderate (37/100 [37%]) or severely (11/100 [11%]) affected. Internal ear involvement was present in 11 of 100 (11%) ears. Histologic evidence of middle ear disease in cats is far greater than gross lesions or clinical literature suggests; further investigation and correlation of clinical and histologic disease are warranted. With minimal additional preparation, diagnostic specimens may be readily prepared and evaluated for this integral sensing organ.

**Pradofloxacin: a novel veterinary fluoroquinolone for treatment of bacterial infections in cats.**


*Sykes, J. E., and J. M. Blondeau*

Pradofloxacin is a novel third-generation oral veterinary fluoroquinolone with activity against Gram-positive aerobic bacteria and anaerobes (lower minimum inhibitory concentrations in vitro). It also has activity against other bacterial species, including Bartonella henselae, Pasteurella multocida, Bordetella bronchiseptica, extra-intestinal Escherichia coli, and some mycobacterial species. This review focuses on the current knowledge of the mechanism of action, adverse effects, clinical applications, and pharmacokinetic/pharmacodynamic properties of pradofloxacin in cats.

**Annotated features of domestic cat - Felis catus genome.**


BACKGROUND: Domestic cats enjoy an extensive veterinary medical surveillance which has described nearly 250 genetic diseases analogous to human disorders. Feline infectious agents offer powerful natural models of deadly human diseases, which include feline immunodeficiency virus, feline sarcoma virus and feline leukemia virus. A rich veterinary literature of feline disease pathogenesis and the demonstration of a highly conserved ancestral mammal genome organization make the cat genome annotation a highly informative resource that facilitates multifaceted research endeavors. FINDINGS: Here we report a preliminary annotation of the whole genome sequence of Cinnamon, a domestic cat living in Columbia (MO, USA), bisulfite sequencing of Boris, a male cat from St. Petersburg (Russia), and light 30x sequencing of Sylvester, a European wildcat progenitor of cat domestication. The annotation includes 21,865 protein-coding genes identified by a comparative approach, 217 loci of endogenous retrovirus-like elements, repetitive elements which comprise about 55.7% of the whole genome, 99,494 new SNVs, 8,355 new indels, 743,326 evolutionary constrained elements, and 3,182 microRNA homologues. The methylation sites study shows that 10.5% of cat genome cytosines are methylated. An assisted assembly of a European wildcat, Felis silvestris silvestris, was performed; variants between F. silvestris and F. catus genomes were derived and compared to F. catus. CONCLUSIONS: The presented genome annotation extends beyond earlier ones by closing gaps of sequence that were unavoidable with previous low-coverage shotgun genome sequencing. The assembly and its annotation offer an important resource for connecting the rich veterinary and natural history of cats to genome discovery.

Emergence of pathogenic coronaviruses in cats by homologous recombination between feline and canine coronaviruses.


Type II feline coronavirus (FCoV) emerged via double recombination between type I FCoV and type II canine coronavirus (CCoV). In this study, two type I FCoVs, three type II FCoVs and ten type II CCoVs were genetically compared. The results showed that three Japanese type II FCoVs, M91-267, KUK-H/L and Tokyo/cat/130627, also emerged by homologous recombination between type I FCoV and type II CCoV and their parent viruses were genetically different from one another. In addition, the 3’-terminal recombination sites of M91-267, KUK-H/L and Tokyo/cat/130627 were different from one another within the genes encoding membrane and spike proteins, and the 5’-terminal recombination sites were also located at different regions of ORF1. These results indicate that at least three Japanese type II FCoVs emerged independently. Sera from a cat experimentally infected with type I FCoV was unable to neutralize type II CCoV infection, indicating that cats persistently infected with type I FCoV may be superinfected with type II CCoV. Our previous study reported that few Japanese cats have antibody against type II FCoV. All of these observations suggest that type II FCoV emerged inside the cat body and is unable to readily spread among cats, indicating that these recombination events for emergence of pathogenic coronaviruses occur frequently.

Tackling feline infectious peritonitis via reverse genetics.
Bioengineered (2014) 5
Thiel, V., H. J. Thiel, and G. Tekes

Feline infectious peritonitis (FIP) is caused by feline coronaviruses (FCoVs) and represents one of the most important lethal infectious diseases of cats. To date, there is no efficacious prevention and treatment, and our limited knowledge on FIP pathogenesis is mainly based on analysis of experiments with field isolates. In a recent study, we reported a promising approach to study FIP pathogenesis using reverse genetics. We generated a set of recombinant FCoVs and investigated their pathogenicity in vivo. The set included the type I FCoV strain Black, a type I FCoV strain Black with restored accessory gene 7b, two chimeric type I/type II FCoVs and the highly pathogenic type II FCoV strain 79-1146. All recombinant FCoVs and the reference strain isolates were found to establish productive infections in cats. While none of the type I FCoVs and chimeric FCoVs induced FIP, the recombinant type II FCoV strain 79-1146 was as pathogenic as the parental isolate. Interestingly, an intact ORF 3c was confirmed to be restored in all viruses (re)isolated from FIP-diseased animals.

Relationship Between Degenerative Joint Disease, Pain, and Bartonella spp. Seroreactivity in Domesticated Cats.


BACKGROUND: Recently, a potential association was identified between Bartonella exposure and arthritides in mammalian species other than cats. HYPOTHESIS/OBJECTIVES: We hypothesized that Bartonella exposure is associated with more severe degenerative joint disease (DJD) and a greater burden of DJD-associated pain in client-owned cats. ANIMALS: Ninety-four client-owned cats (6 months to 20 years old), ranging from clinically unaffected to severely lame because of DJD. METHODS: Using physical examination and radiography, pain and radiographic scores were assigned to each part of the bony skeleton. Sera were tested for Bartonella henselae, B. koehlerae, and B. vinsonii subsp. berkhoffii (genotypes I, II, and III) antibodies using immunofluorescence antibody assays. Variables were categorized and logistic regression used to explore associations. RESULTS: Seropositivity to Bartonella was identified in 33 (35.1%) cats. After multivariate analysis controlling for age, total DJD score (OR, 0.51; 95% CI, 0.26-0.97; P = .042), appendicular pain score (OR, 0.33; 95% CI, 0.17-0.65; P = .0011), and total pain score (OR, 0.35; 95% CI, 0.17-0.72; P = .0045) were significantly inversely associated with Bartonella seroreactivity status, indicating that cats with higher DJD and pain scores were less likely to be Bartonella seropositive. CONCLUSIONS AND CLINICAL IMPORTANCE: Based upon this preliminary study, Bartonella spp. seropositivity was associated with decreased severity of DJD and decreased DJD-associated pain in cats. Additional studies are needed to verify these findings, and if verified, to explore potential mechanisms.

The urban risk and migration risk factors for schizophrenia: Are cats the answer?

Torrey, E. F., and R. H. Yolken

Being born in and/or raised in an urban area is a proven risk factor for developing schizophrenia. Migrating from countries such as Jamaica or Morocco to countries such as England or the Netherlands is also a proven risk factor for developing schizophrenia. The transmission of Toxoplasma gondii oocysts to children is reviewed and proposed as a partial explanation for both of these risk factors.
Hypercobalamaemia is associated with hepatic and neoplastic disease in cats: a cross sectional study.

Trehy, M. R., A. J. German, P. Silvestrini, G. Serrano, and D. J. Batchelor

BACKGROUND: When increased serum cobalamin concentrations are encountered clinically they are usually attributed to parenteral supplementation, dietary factors, or otherwise ignored. However, recently, hypercobalamaemia has been associated with numerous diseases in humans, most notably neoplastic and hepatic disorders. The aim of this retrospective, observational, cross-sectional study was to determine the significance of increased cobalamin in cats. RESULTS: In total, 237 records were retrieved and 174 cats, of various ages and sexes met the inclusion criteria. A total of 42 cats had increased serum cobalamin concentration, and had not received prior supplementation. Multiple logistic regression analysis revealed that increased serum cobalamin concentration was positively related to pedigree breed (pedigree breeds more likely to have increased cobalamin concentration, odds ratio [OR] 4.24, 95% CI 1.78-10.15, P = 0.001), to having liver disease (OR 9.91, 95% CI 3.54-27.68), and to having a solid neoplasm (OR 8.54, 95% CI 1.10-66.45). CONCLUSIONS: The results of the current study suggest that increased serum cobalamin concentrations should not be ignored in cats with no history of supplementation, and investigation for underlying hepatic or neoplastic disease is warranted.

Concurrent diseases and conditions in cats with renal infarcts.
Valeika, S.

Monoparesis in association with feline pulmonary carcinoma: a literature review with 3 new cases.
van Stee, L., S. Boston, A. Singh, F. Park, D. Richardson, A. Abrams-Ogg, and A. Vince

We describe 3 cases of cats that were presented with a sudden onset of monoparesis as a result of arterial thromboembolism without evidence of cardiovascular disease that were subsequently diagnosed with a primary pulmonary carcinoma. Arterial tumor thromboemboli due to pulmonary carcinoma should be considered as a differential diagnosis in cases of lameness or paresis in older cats. We theorize that large tumor emboli may obstruct peripheral arteries leading to acute monoparesis.

Computed tomographic findings in 44 dogs and 10 cats with grass seed foreign bodies.
Vansteenkiste, D. P., K. C. Lee, and C. R. Lamb
OBJECTIVE: To supplement recent reports of computed tomographic (CT) findings in dogs and cats with grass seed foreign bodies. METHODS: Retrospective review of cases that had CT scan and subsequent retrieval of a grass seed during the same period of hospitalisation from a site included in the scan. RESULTS: Records of 44 dogs and 10 cats were reviewed. Most were presented in the months July to December. Median duration of clinical signs was 4 weeks (range 2 days to 2 years). The most frequent clinical signs were soft tissue swelling (30% cases), coughing (28%), sneezing (28%) and discharge (26%). Grass seeds were retrieved from the thorax (35% cases), nasal cavity (31%), ear (7%), other sites in the head and neck (22%), sublumbar muscles (2%) and pelvic limb (2%). The grass seed was visible in CT images in 10 (19%) cases. Secondary lesions were visible in CT images of 52 (96%) cases, including collection of exudate (37%), abscess (24%), enlarged lymph nodes (22%) and pulmonary consolidation (20%). CT images appeared normal in 4% animals. CLINICAL SIGNIFICANCE: Grass seeds within the respiratory tract are frequently visible in CT images, but in general CT appears to be more useful for localisation of secondary lesions than as a method of definite diagnosis.

Risk factors for MRSA infection in companion animals: Results from a case-control study within Germany.


Increasing numbers of companion animals suffering from infections with methicillin-resistant Staphylococcus aureus (MRSA) have been reported in the recent past. These infections are of particular concern because of the limited treatment options for MRSA and their transferability to humans. Since MRSA lineages isolated from infected companion animals often mirror typical human epidemic strains circulating in the same region, successful strategies to combat MRSA need strong and coordinated efforts from both, the human and the veterinary field according to the “One Health” concept. Hence, to identify potential risk factors related to MRSA infections in dogs, cats and horses, a case-control study was conducted, including data on 106 MRSA-infected animal patients as cases and 102 MSSA-infected animals as controls, originating from 155 different veterinary settings within Germany. Demographic data on animal patients, patient history and administration of antibiotics as well as practice/clinic specific parameters were assessed as putative risk factors. Multivariable logistic regression identified the following variables as risk factors for MRSA infection compared to MSSA infection: number of employees working at the veterinary setting (n>10; p<0.001), antibiotic treatment prior to sampling (systemic: p=0.002; local: p=0.049, both: p=0.011) and surgical site infection (p<0.001). Spa typing revealed predominantly clonal complexes well-known for hospital-associated lineages spreading in human health-care settings in Germany (CC5 and CC22) for isolates of dog and cat origin. CC398-MRSA dominated among equine isolates, a CC that was described as a nosocomial pathogen in equine clinical settings before. The identified risk factors and genotyping results are in accordance with numerous study outcomes from the field of human medicine and point towards reasonable problems with nosocomial spread of MRSA, especially within companion animal veterinary clinics. To define targeted infection control strategies against nosocomial pathogens, it is important to accomplish intervention studies addressing routes of transmission in companion animal veterinary settings.
Sedative, hematologic and hemostatic effects of dexmedetomidine-butorphanol alone or in combination with ketamine in cats.


Acute stress induced by physical restraint can interfere with the validity of laboratory findings. Sedation could minimize such stress. However, it is not known whether sedation can affect hematologic and hemostatic parameters in cats. The purpose of this study was to evaluate hematologic and hemostatic parameters in domestic cats subjected to physical restraint in addition to one of two sedation protocols. In total, 50 cats were subjected to physical restraint and were then randomly divided into two groups of 25 animals, receiving dexmedetomidine (5 microg/kg) and butorphanol (0.3 mg/kg; DB group) or dexmedetomidine (5 microg/kg), butorphanol (0.3 mg/kg) and ketamine (3 mg/kg; DBK group). The cats were assessed for acute stress, sedation level, onset of sedation and duration of sedation. Blood samples were collected after handling and after sedation. The complete blood count (CBC), platelet count, buccal mucosal bleeding time (BMBT), whole-blood clotting time, prothrombin time (PT), activated partial thromboplastin time (aPTT) and thrombin time (TT) were determined for each sample, before and after chemical restraint. No statistically significant differences were found in the hematologic parameters. Certain hemostatic parameters (PT, aPTT and TT) were higher in the DB group (P <0.05). The onset of sedation was similar in the two groups, and the duration of sedation was longer in the DBK group. Both sedation protocols were effective for short-duration chemical restraint for blood collection from the studied cats, and no clinically relevant effects on hematologic or hemostatic parameters were detected.

Evaluation of the perioperative analgesic efficacy of buprenorphine, compared with butorphanol, in cats.


Warne, L. N., T. Beths, M. Holm, J. E. Carter, and S. H. Bauquier

OBJECTIVE: To compare the analgesic effects of buprenorphine and butorphanol in domestic cats.

DESIGN: 2-phase positive-controlled randomized masked clinical trial. ANIMALS: 39 healthy female cats (10 in phase 1 and 29 in phase 2). PROCEDURES: Cats admitted for ovariohysterectomy received buprenorphine (4 in phase 1; 14 in phase 2) or butorphanol (6 in phase 1; 15 in phase 2). In phase 1, cats were premedicated with buprenorphine (0.02 mg/kg [0.009 mg/lb], IM) or butorphanol (0.4 mg/kg [0.18 mg/lb], IM), in combination with medetomidine. Anesthesia was induced with propofol (IV) and maintained with isoflurane in oxygen. After extubation, medetomidine was antagonized with atipamezole. A validated multidimensional composite scale was used to assess signs of pain after surgery starting 20 minutes after extubation and continuing for up to 360 minutes, and pain score comparisons were made between the 2 groups. Phase 2 proceeded similar to phase 1 with the following addition: during wound closure, cats from the butorphanol and buprenorphine groups received butorphanol (0.02 mg/kg [0.009 mg/lb], IM) or buprenorphine (0.4 mg/kg [0.18 mg/lb], IM), respectively. RESULTS: Phase 1 of the study was stopped after 10 cats were ovariohysterectomized because 9 of 10 cats required rescue analgesia at the first evaluation. In phase 2, at the first pain evaluation, pain scores from the buprenorphine group were lower, and all cats from the butorphanol group required rescue analgesia. None of the cats from the buprenorphine group required rescue analgesia at any time. CONCLUSIONS
AND CLINICAL RELEVANCE: Buprenorphine (0.02 mg/kg, IM) given before surgery and during wound closure provided adequate analgesia for 6 hours following ovariohysterectomy in cats, whereas butorphanol did not.

**Borna disease virus infection in cats.**
Vet J (2014) **201**:142-149.
*Wensman, J. J., K. H. Jaderlund, B. S. Holst, and M. Berg*

Bornaviruses are known to cause neurological disorders in a number of animal species. Avian Bornavirus (ABV) causes proventricular dilatation disease (PDD) in birds and Borna disease virus (BDV) causes Borna disease in horses and sheep. BDV also causes staggering disease in cats, characterised by ataxia, behavioural changes and loss of postural reactions. BDV-infection markers in cats have been reported throughout the world. This review summarizes the current knowledge of Borna disease viruses in cats, including etiological agent, clinical signs, pathogenesis, epidemiology and diagnostics, with comparisons to Bornavirus infections in other species.

**Effect on renal function of restoration of euthyroidism in hyperthyroid cats with iatrogenic hypothyroidism.**
*Williams, T. L., J. Elliott, and H. M. Syme*

BACKGROUND: Iatrogenic hypothyroidism is associated with an increased incidence of azotemia after treatment of hyperthyroidism, and decreased survival time in azotemic hyperthyroid cats.

HYPOTHESIS: Restoration of euthyroidism will decrease plasma creatinine concentrations.

ANIMALS: Nineteen client-owned, methimazole- or carbimazole-treated, hyperthyroid cats with documented iatrogenic hypothyroidism (based on subnormal plasma total thyroxine concentrations [TT4] and increased plasma thyroid-stimulating hormone concentrations). METHODS: Prospective interventional study. Doses of antithyroid medication were reduced until euthyroidism was restored (TT4 10-40 nmol/L). Plasma creatinine concentration and selected other clinicopathologic variables were evaluated before and after restoration of euthyroidism and compared by nonparametric statistics. Data are presented as median [25th, 75th percentile]. RESULTS: Restoration of euthyroidism was associated with a significant decrease in plasma creatinine concentrations (2.61 [1.90, 3.26] mg/dL versus 2.07 [1.42, 2.82] mg/dL; P <.001) and body weight (4.03 [3.59, 4.53] kg versus 3.89 [3.34, 4.18] kg; P =.019), and a significant increase in packed cell volume (30 [28, 39]% versus 34 [29, 39]%; P =.038), heart rate (174 [163, 201] bpm versus 190 [164, 202] bpm; P =.009), and plasma alkaline phosphatase activity (26.6 [17.0, 33.0] IU/L versus 38.0 [23.5, 46.5] IU/L; P <.001). CONCLUSIONS AND CLINICAL IMPORTANCE: Restoration of euthyroidism in medically treated hyperthyroid cats with iatrogenic hypothyroidism causes a reduction in plasma creatinine concentrations, and thus might improve renal function; however, this could be influenced by concurrent changes in body weight.

**Associations between ‘valentine’ heart shape, atrial enlargement and cardiomyopathy in cats.**
*Winter, M. D., R. F. Giglio, C. R. Berry, D. J. Reese, H. W. Maisenbacher, and J. A. Hernandez*
‘Valentine’ heart shape is a common qualifier used in veterinary radiology to describe a cardiac silhouette with focal enlargement at the level of the base of the heart in feline patients. Anecdotally, this sign has been thought to be related to biatrial enlargement and also to hypertrophic cardiomyopathy (HCM). However, to our knowledge, there has been no study performed to assess the association between cardiac chamber enlargement and cardiac disease with the ‘valentine’-shaped heart. The aim of this study was to verify the association between the ‘valentine’ heart shape observed in ventrodorsal thoracic radiographs and the presence of singular or combined cardiac chamber enlargement, and also the presence and type of cardiomyopathy (CM) in cats. A search of the database of the Small Animal Veterinary Hospital of the University of Florida for cats with a radiology report of thoracic radiographs that contained the words ‘valentine’ and ‘biatrial’, and echocardiography performed within 1 week, was undertaken; 41 cases met the inclusion criteria. Eighty-two percent of the cats of the study sample had some form of CM. The ‘valentine’ heart shape was associated with biatrial enlargement in 41% of the patients in our study sample that had some form of CM and just 8% of cases diagnosed with HCM, suggesting that the ‘valentine’ heart shape has a low association with HCM or biatrial enlargement; however, it should be considered a sign of feline CM.

Management of feline distal tibial fractures using a hybrid external skeletal fixator.


Witte, P. G., M. A. Bush, and H. W. Scott

OBJECTIVE: To document the results of management of feline distal tibial fractures with circular-linear hybrid external skeletal fixators. METHODS: Retrospective examination of case records and radiographs of cats with distal tibial fractures managed with hybrid external skeletal fixators. Signalment, pre-operative fracture conformation, post-operative fracture reduction, implant complications, time to tibial and fibular fracture healing and time to hybrid external skeletal fixators removal were analysed. RESULTS: Case records of eight cats were reviewed and included three closed fractures and five type 1 open fractures. Post-operative fracture reduction was considered appropriate in all cases. Healing of five tibial fractures was complete and hybrid external skeletal fixators were removed within a mean of 13 weeks. Healing of the fibular fracture was complete within a mean of 12.1 weeks. Three tibial fractures demonstrated non-union and were revised after a mean duration of 24 weeks. All three non-union fractures were open on presentation. CLINICAL SIGNIFICANCE: Feline distal tibial fractures may be managed with hybrid external skeletal fixators, however, non-union still occurs. In this study type I open feline distal tibial fractures appeared more likely to develop non-union.

Comparison of digital radiography, ultrasonography, and positive contrast vaginourethrography for determining reproductive status of female cats.


Woodland, M., L. Pack, P. Rist, and B. Crane

It is not always possible to identify female cats that have undergone previous ovariohysterectomy based on physical examination alone. An easy, cost-effective method for screening female cats for reproductive status would be helpful for avoiding unnecessary exploratory laparotomies. The purpose of this prospective study was to compare diagnostic sensitivities of digital radiography, ultrasonography, and positive contrast vaginourethrography for determining reproductive status in
female cats. Sixty-seven recently euthanized female cats of unknown medical history and reproductive status were randomly selected and included in the study. Digital abdominal radiography, digital abdominal radiography with compression, abdominal ultrasonography, and positive contrast vaginourethrography were performed in sequence by a board-certified veterinary radiologist and a second-year radiology resident. Immediately following diagnostic imaging procedures, necropsy was performed. Ultrasonography of the uterus had the highest sensitivity (86%) for determining reproductive status of all the imaging modalities tested. The specificity was 88%, and the positive predictive value and negative predictive value were 96% and 68%, respectively. The calculated sensitivities and specificities of other modalities were as follows: digital radiographs (28%, 100%), digital compression radiographs (58%, 100%), and vaginourethrography (32%, 100%). Based on McNemar’s test statistic, there was a significant difference in the sensitivity of ultrasound compared to digital radiographs (P <= 0.05), compression radiographs (P <= 0.05), and vaginourethrogram (P <= 0.05). Findings from the current study indicated that ultrasonography is a sensitive diagnostic test for determining reproductive status in female cats. Although more readily available in private practice and shelters, digital radiography and vaginourethrography are not reliable predictors of reproductive status.

**Post-transplant malignant neoplasia associated with cyclosporine-based immunotherapy: prevalence, risk factors and survival in feline renal transplant recipients.**
Vet Comp Oncol (2014)

*Wormser, C., A. Mariano, E. S. Holmes, L. R. Aronson, and S. W. Volk*

The study objective was to compare the prevalence of malignant neoplasia in feline renal transplant recipients (n = 111) with a control population of cats that did not receive transplantation (n = 142); and to determine whether the development of post-transplant malignant neoplasia (PTMN) affects long-term survival. Twenty-five (22.5%) renal transplant recipients were diagnosed with PTMN, and of those 14 (56%) were diagnosed with lymphoma. The overall survival time in cats that developed PTMN following renal transplantation (median 646 days, IQR 433-1620 days) was not significantly different from the survival time in cats that did not develop PTMN (median 728 days, IQR 201-1942 days), although median survival after diagnosis of PTMN was only 13 days. Six control cats (4.2%) were diagnosed with malignant neoplasia. Compared to the control population, transplant cats had a 6.6 times higher odds of developing malignant neoplasia and a 6.7 times higher odds of developing lymphoma.

**Biochemical survey of free-roaming cats (Felis catus) in New York City presented to a trap-neuter-return program.**

*Wycislo, K. L., S. L. Connolly, M. R. Slater, and K. V. Makolinski*

Free-roaming cats in New York, NY, USA, that presented to a trap-neuter-return program were surveyed for biochemical data. One hundred and one cats had blood collected for a plasma biochemistry panel after the induction of surgical anesthesia. Reference intervals for 18 analytes were generated for the sample population, along with age-specific reference intervals when statistically appropriate. Age groups (juveniles and adults) differed in 10 of the 18 analytes measured, including protein levels and albumin/globulin ratio, aspartate aminotransferase, alkaline phosphatase, creatine...
kinase, creatinine, phosphorus, calcium and potassium. No differences were found between males and females. This is the first report of biochemical reference intervals for a group of free-roaming cats within the USA.

**Prepubertal neutering of cats: three key points.**

*Vet Rec* (2014) **175**:221-222.

*Yates, D., and J. Yeates*

**Faecal virome of cats in an animal shelter.**


*Zhang, W., L. Li, X. Deng, B. Kapusinszky, P. A. Pesavento, and E. Delwart*

We describe the metagenomics-derived feline enteric virome in the faeces of 25 cats from a single shelter in California. More than 90% of the recognizable viral reads were related to mammalian viruses and the rest to bacterial viruses. Eight viral families were detected: Astroviridae, Coronaviridae, Parvoviridae, Circoviridae, Herpesviridae, Anelloviridae, Caliciviridae and Piciornaviridae. Six previously known viruses were also identified: feline coronavirus type 1, felid herpes 1, feline calicivirus, feline norovirus, feline panleukopenia virus and picobirnavirus. Novel species of astroviruses and bocaviruses, and the first genome of a cyclovirus in a feline were characterized. The RNA-dependent RNA polymerase region from four highly divergent partial viral genomes in the order Picornavirales were sequenced. The detection of such a diverse collection of viruses shed within a single shelter suggested that such animals experience robust viral exposures. This study increases our understanding of the viral diversity in cats, facilitating future evaluation of their pathogenic and zoonotic potentials.

**Corpora lutea of pregnant and pseudopregnant domestic cats reveal similar steroidogenic capacities during the luteal life span.**


*Zschockelt, L., O. Amelkina, M. J. Siemieniuch, S. Koster, K. Jewgenow, and B. C. Braun*

In domestic cats, luteal phases of pregnancy and pseudopregnancy (non-pregnant luteal phase) differ in the course and level of plasma progesterone (P4). Therefore, we assumed differences in luteal steroidogenic capacities. Here we present a comprehensive analysis of intraluteal steroid biogenesis in the domestic cat. We quantitatively measured relative mRNA levels of steroidogenic acute regulatory protein (STAR), cytochrome P450 oxidases (CYP), hydroxysteroid dehydrogenases (HSD), steroid reductase (SRD) and enzymes involved in sulfoconjugation of steroids, i.e. sulfotransferase (SULT) and sulfatase (STS). Protein expression was analysed by Western Blot for HSD3B. Additionally, intraluteal steroid contents were determined. During the pseudopregnant luteal phase, expression of STAR (p=0.005), HSD3B1 (p<0.0001), CYP19A1 (p<0.0001) and HSD17B7 (p=0.008) decreased from formation of the corpus luteum (CL) onwards. HSD3B protein expression was highest in the development/maintenance stage of CL and declined during the subsequent luteal phase of pregnancy...
and pseudopregnancy. This was in accordance with decreasing intraluteal levels of P4, oestrogens and androgens. In contrast, expression of SRD5A1 (p<0.001) increased with progression through stages of the pseudopregnant CL, being indicative of P4 metabolism via an alternate pathway to dihydrotestosterone (DHT). Compared to the formation stage, expression of SULT1E1 was higher in all other luteal stages of pseudopregnancy (p=0.004), implying a potential sulfoconjugation of oestrogens. Expression of CYP11A1 and CYP17A1 was unaffected by the luteal stage (p>0.05), suggesting a permanent capacity of cat CL to convert progestogens via androgen and oestrogen pathways. In general, mRNA expression profiles of steroidogenic enzymes during the pregnant luteal phase reflected the pseudopregnancy profiles. Intraluteal oestrogen (p<0.0001) and androgen (p=0.008) levels were higher in the formation stage compared to the following luteal stages of pseudopregnancy. Concentrations of P4 were higher in the development/maintenance compared to the regression stages (p=0.01). We conclude that cat CL of the same histomorphological stage are characterised by identical steroidogenic capacities independently of an on-going pregnancy.