Small Animal Article Summaries – FELINE MEDICINE & SURGERY

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The International Society of Feline Medicine (ISFM) was established in 1996 as the veterinary focus for the work of the charity and, together with the American Society of Feline Practitioners, it publishes the Journal of Feline Medicine and Surgery.

**OBJECTIVES:** The aim of this study was to optimise dexmedetomidine and alfaxalone dosing, for intramuscular administration with butorphanol, to perform minor surgeries in cats. **METHODS:** Initially, cats were assigned to one of five groups, each composed of six animals and receiving, in addition to 0.3 mg/kg butorphanol intramuscularly, one of the following: (A) 0.005 mg/kg dexmedetomidine, 2 mg/kg alfaxalone; (B) 0.008 mg/kg dexmedetomidine, 1.5 mg/kg alfaxalone; (C) 0.012 mg/kg dexmedetomidine, 1 mg/kg alfaxalone; (D) 0.005 mg/kg dexmedetomidine, 1 mg/kg alfaxalone; and (E) 0.012 mg/kg dexmedetomidine, 2 mg/kg alfaxalone. Thereafter, a modified ‘direct search’ method, conducted in a stepwise manner, was used to optimise drug dosing. The quality of anaesthesia was evaluated on the basis of composite scores (one for anaesthesia and one for recovery), visual analogue scales and the propofol requirement to suppress spontaneous movements. The medians or means of these variables were used to rank the treatments; ‘unsatisfactory’ and ‘promising’ combinations were identified to calculate, through the equation first described by Berenbaum in 1990, new dexmedetomidine and alfaxalone doses to be tested in the next step. At each step, five combinations (one new plus the best previous four) were tested. **RESULTS:** None of the tested combinations resulted in adverse effects. Four steps and 120 animals were necessary to identify the optimal drug combination (0.014 mg/kg dexmedetomidine, 2.5 mg/kg alfaxalone and 0.3 mg/kg butorphanol). **CONCLUSIONS AND RELEVANCE:** The investigated drug mixture, at the doses found with the optimisation method, is suitable for cats undergoing minor clinical procedures.


**OBJECTIVES:** The aim of this study was to determine the plasma pharmacokinetic profile, tissue concentrations and urine elimination of cefazolin in cats under surgical conditions after a single intravenous dose of 20 mg/kg. **METHODS:** Intravenous cefazolin (20 mg/kg) was administered to nine young mixed-breed cats 30 mins before they underwent surgical procedures (ovariectomy or orchiectomy). After antibiotic administration, samples from blood, some tissues and urine were taken. Cefazolin concentrations were determined in all biological matrices and pharmacokinetic parameters were estimated. **RESULTS:** Initial plasma concentrations were high (Cp(0), 134.80 ± 40.54 µg/ml), with fast and moderately wide distribution (T½(d) 0.16 ± 0.15 h; V(d[ss]) 0.29 ± 0.10 l/kg) and rapid elimination (ClB, 0.21 ± 0.06 l/h/kg; t½, 1.18 ± 0.27 h; mean residence time, 1.42 ± 0.36 h). Thirty to 60 mins after intravenous administration, cefazolin tissue concentrations ranged from 9.24 µg/ml (subcutaneous tissue) to 26.44 µg/ml (ovary). The tissue/plasma concentration ratio ranged from 0.18 (muscle) to 0.58 (ovary). Cefazolin urine concentrations were high with 84.2% of the administered dose being eliminated in the first 6 h postadministration. **CONCLUSIONS AND RELEVANCE:** Cefazolin plasma concentrations remained above a minimum inhibitory concentration of ≤2 µg/ml up to 4 h in all the studied cats. This suggests that a single intravenous dose of 20 mg/kg cefazolin would be adequate for perioperative prophylactic use in cats.

animal health and wildlife conservation.

Piroplasmids are tick-borne protozoan parasites that infect blood cells (erythrocytes, lymphocytes or other leukocytes) or endothelial cells of numerous wild and domestic vertebrates worldwide. They cause severe disease in livestock, dogs, cats, wild mammals and, occasionally, in humans. Piroplasmid infections are prevalent in wild carnivores worldwide although there is limited information about their clinical and epidemiological importance. There are currently nine recognized species of Babesia, two of Theileria, two of Cytauxzoon and one of Rangelia infecting captive and wild carnivores, including members of Canidae, Felidae, Mustelidae, Procyonidae, Ursidae, Viverridae, Hyaenidae and Herpestidae in the Americas, Eurasia and Africa. However, the number of piroplasmid species is likely higher than currently accepted due to the reported existence of DNA sequences that may correspond to new species and the lack of studies on many host species and biogeographical areas. Indeed, many species have been recognized in the last few years with the advancement of molecular analyses. Disease and mortality have been documented in some wild carnivores, whereas other species appear to act as natural, subclinical reservoirs. Various factors (e.g. unnatural hosts, stress due to captivity, habitat degradation, climate fluctuation or immunosuppression) have been associated with disease susceptibility to piroplasmid infections in some species in captivity. We aimed to review the current knowledge on the epidemiology of piroplasmid infections in wild carnivores and associated tick vectors. Emphasis is given to the role of wild carnivores as reservoirs of clinical piroplasmosis for domestic dogs and cats, and to the importance of piroplasmids as disease agents for endangered carnivores.


Neutralisation-based seroprevalence of Toscana virus and Sandfly fever Sicilian virus in dogs and cats from Portugal.

Sandfly-borne phleboviruses are endemic in the Mediterranean basin. However, levels of exposure of human and animal populations are poorly known. Recent data from Portugal indicate that Toscana virus (Sandfly fever Naples species) is present and causes human infection and diseases; in contrast there is scarce data for Sandfly fever Sicilian virus (SFSV) which has neither been isolated nor detected by molecular tests and for which there is only limited serological data. A total of 1,160 dogs and 189 cats of southern Portugal were tested for neutralising antibodies against Toscana virus (TOSV) and Sandfly fever Sicilian virus (SFSV), two viruses belonging to distinct serocomplexes in the Mediterranean area. Our data showed that (i) TOSV and SFSV are infecting dogs at 6.8% and 50.8%, respectively, (ii) and that cats are moderately infected with TOSV (3.7%). For TOSV our findings are in line with previous results obtained with less stringent serological assays. Our results for SFSV in dogs clearly indicate that the virus is circulating heavily and suggest that human populations are exposed to infection. Although the presence of SFSV was suggested by haemagglutination inhibition in 4/1690 human sera in 1974, this is the first time that SFSV is shown to circulate so intensively in Portugal. Future studies are needed to isolate strains of SFSV in Portugal from dogs, humans and sandflies collected in high prevalence regions. As dogs are good sentinel, their role as reservoir in the natural cycle should also be considered.


Effect of pretreatment with hydromorphone or buprenorphine on thermal antinociception induced by fentanyl in awake cats.
OBJECTIVES: The aim of this study was to determine the effect of pretreatment with hydromorphone or buprenorphine on thermal antinociception induced by fentanyl in cats. METHODS: Seven healthy cats received five different treatments consisting of two drugs. Drug 1 was administered intravenously 1 h before drug 2. Drug 2 was given as an intravenous loading dose followed by an infusion for 4 h. The drug combinations used were: buprenorphine 20 µg/kg followed by fentanyl (BF; 7 µg/kg, 7 µg/kg/h), buprenorphine 20 µg/kg followed by 0.9% saline solution (B), hydromorphone 0.07 mg/kg followed by 0.9% saline solution (H), hydromorphone 0.07 mg/kg followed by fentanyl (HF; 7 µg/kg, 7 µg/kg/h) and 0.9% saline solution followed by fentanyl (F; 7 µg/kg, 7 µg/kg/h). Thermal thresholds were obtained prior to treatment and at predetermined times up to 7 h after drug 1. RESULTS: Thermal thresholds were significantly higher than baseline in all treatment groups as follows: H from 0.25 to 2.50 h; B from 0.25 to 2.50 h; F from 1.25 to 5.50 h; HF from 0.25 to 5.50 h and BF from 0.25 to 5.25 h. Thermal thresholds were significantly higher in HF and BF than in F treatment before the fentanyl infusion was commenced (from 0.25 to 1.00 h). During the fentanyl infusion thermal thresholds in BF compared with F were lower at 1.75 h and from 2.50 to 3.50 h. After the constant rate infusion of fentanyl was started, thermal thresholds were significantly lower in HF compared with F at one time point (3 h). CONCLUSIONS AND RELEVANCE: Pretreatment with buprenorphine did partially inhibit the antinociceptive action of fentanyl. Hydromorphone did inhibit the antinociceptive action of fentanyl at one single time point in cats.

Evaluation of supervised machine-learning algorithms to distinguish between inflammatory bowel disease and alimentary lymphoma in cats.
Inflammatory bowel disease (IBD) and alimentary lymphoma (ALA) are common gastrointestinal diseases in cats. The very similar clinical signs and histopathologic features of these diseases make the distinction between them diagnostically challenging. We tested the use of supervised machine-learning algorithms to differentiate between the 2 diseases using data generated from noninvasive diagnostic tests. Three prediction models were developed using 3 machine-learning algorithms: naive Bayes, decision trees, and artificial neural networks. The models were trained and tested on data from complete blood count (CBC) and serum chemistry (SC) results for the following 3 groups of client-owned cats: normal, inflammatory bowel disease (IBD), or alimentary lymphoma (ALA). Naive Bayes and artificial neural networks achieved higher classification accuracy (sensitivities of 70.8% and 69.2%, respectively) than the decision tree algorithm (63%, p < 0.0001). The areas under the receiver-operating characteristic curve for classifying cases into the 3 categories was 83% by naive Bayes, 79% by decision tree, and 82% by artificial neural networks. Prediction models using machine learning provided a method for distinguishing between ALA-IBD, ALA-normal, and IBD-normal. The naive Bayes and artificial neural networks classifiers used 10 and 4 of the CBC and SC variables, respectively, to outperform the C4.5 decision tree, which used 5 CBC and SC variables in classifying cats into the 3 classes. These models can provide another noninvasive diagnostic tool to assist clinicians with differentiating between IBD and ALA, and between diseased and nondiseased cats.

Development of Obesity: Mechanisms and Physiology.
Normal adult animals living in nonstressful environments that receive nutritionally sound diets balance their energy expenditure with their energy intake over the long-term. Most knowledge of mechanisms
underlying the precise balance of energy is derived from research on rodent models and human correlates. This knowledge is believed applicable and pertinent for understanding causes of obesity in dogs and cats. The roles of satiation and adiposity feedback, cognitive input, energy expenditure, and physical activity are reviewed. Dietary and environmental factors especially relevant to promotion of overweight body condition are reviewed. These include dietary fat and palatability, inactive and stressful lifestyle, and obesogenic effects of neutering.


The prevalence of Dirofilaria repens in cats, healthy dogs and dogs with concurrent babesiosis in an expansion zone in central Europe.

BACKGROUND: Dirofilaria repens is a mosquito-transmitted, filarial nematode parasitizing dogs, cats and other carnivores. Recently, this parasite has spread in central Europe, including Poland. The aim of the present study was to estimate the prevalence of D. repens in cats and dogs in different regions of the country and to investigate the occurrence and consequences of co-infection with another fast-spreading vector-borne parasite, Babesia canis. RESULTS: In the period 2013-2015, 147 blood samples from cats from central Poland and 257 blood samples from dogs from central, northern, southern and western Poland were collected. Prevalence of D. repens was determined by amplification and sequencing of the 12S rDNA gene fragment. Among dogs, 94 samples originated from clinically healthy dogs from central Poland (Masovia) and 58 samples originated from dogs that were infected with B. canis. Prevalence of D. repens was compared between these two groups of dogs. For the first time D. repens was identified in a cat from central Europe (0.7 % [95 % CL: 0-4.1 %]). The DNA of the filarial endosymbiotic bacterium Wolbachia was detected in two cats (1.4 % [95 % CL: 0-5.5 %]). In dogs, the parasite was detected only in samples from central Poland (Masovia) (local prevalence = 38 % [95 % CL: 25.9-51.8 %]). Prevalence of D. repens was significantly higher in dogs with babesiosis (90 % [95 % CL: 81.6-94.5 %]). Co-infections of D. repens and B. canis were confirmed by sequencing in 30 dogs with babesiosis, but no co-infections were identified in healthy dogs from Masovia. Statistical analyses of blood parameters revealed that dogs with co-infections suffered more severe anemia and thrombocytopenia, but presented milder changes in biochemical parameters (i.e. less elevated concentration of alkaline phosphatase [ALP] and serum urea) suggesting lower risk of hepatic or renal failure in comparison to dogs infected only with B. canis. CONCLUSIONS: These findings are important due to the spread of dirofilariosis and babesiosis in central Europe, as microfilaraemic dogs seem to be more prone to babesiosis. The possible protective effect of the nematode infection against hepatic or renal failure in canine babesiosis and its mechanisms require further investigations.


Feline Calcium Oxalate Urolithiasis: Risk factors and rational treatment approaches.

PRACTICAL RELEVANCE: Uroliths occur commonly in the bladder and/or urethra of cats and can be lifethreatening if urethral obstruction occurs. Calcium oxalate accounts for 40-50% of urocystoliths and these stones are not amenable to medical dissolution; therefore, removal by surgery or minimally invasive techniques is required if uroliths must be treated. Medical protocols for prevention involve decreasing urine saturation for minerals that form uroliths. ETIOPATHOGENESIS: Formation of uroliths is not a disease, but rather a complication of several disorders. Some disorders can be identified and corrected (such as infection-induced struvite urolith formation); others can be identified but not corrected (such as idiopathic hypercalcemia). In most cats with calcium oxalate urolith formation the
underlying etiopathogenesis is not known. A common denominator of all these disorders is that they can from time to time create oversaturation of urine with one or more crystal precursors, resulting in formation of crystals. BASIC CONCEPTS: In order to develop rational and effective approaches to treatment, abnormalities that promote urolith formation must be identified, with the goal of eliminating or modifying them. It is important, therefore, to understand several basic concepts associated with urolithiasis and the factors that promote urolith formation that may be modified with medical treatment; for example, the state of urinary saturation, modifiers of crystal formation, potential for multiple crystal types, and presence of bacterial infection or urinary obstruction.


**Determination of gestational time and prediction of parturition in dogs and cats: an update.**

Accurate prediction of delivery date in canine and feline allows a better management of parturition, reducing the loss of neonates. This review evaluates the most common methods adopted to accurately predict the day of delivery: determination of ovulation and hormonal assays, first appearance of embryonic/foetal structures using ultrasound or radiography, echographic measurement of extra-foetal and foetal structures, or evaluation of foetal flux and heart rate. Determination of ovulation and hormonal assays at the time of breeding and close to pregnancy term is widely used to predict parturition in dogs (Concannon et al. American Journal of Veterinary Research 44, 1983, 1819; Hayer et al. Journal of Reproduction and Fertility, Suppl. 47, 1993, 93; Hase et al. Journal of Veterinary Medical Science, 62, 2000, 243; Kutzler et al. Theriogenology, 60, 2003a, 1187). In cats, some studies have been carried out, but no hormonal parameters for accurate prediction of parturition have been described so far (Buff et al. Journal of Reproduction and Fertility, Suppl. 57, 2001, 187; De Haas van Dorsser et al. Biology of Reproduction, 74, 2006, 1090; DiGangi et al. Journal of the American Veterinary Medical Association, 237, 2010, 1267; Dehnhard et al. Theriogenology, 77, 2012, 1088).


**Genetic Mapping of Pathogenesis Determinants in Toxoplasma gondii.**

Toxoplasma gondii is a widespread parasite of warm-blooded vertebrates that also causes opportunistic infections in humans. Rodents are a natural host for asexually replicating forms, whereas cats serve as the definitive host for sexual development. The laboratory mouse provides a model to study pathogenesis. Strains of T. gondii are globally diverse, with more than 16 distinct haplogroups clustered into 6 major clades. Forward genetic analysis of genetic crosses between different lineages has been used to define the molecular basis of acute virulence in the mouse. These studies have identified a family of secretory serine/threonine rhoptry kinases that target innate immune pathways to protect intracellular parasites from destruction. Rhoptry kinases target immunity-related GTPases, a family of immune effectors that is expanded in rodents. Similar forward genetic studies may be useful to define the basis of pathogenesis in other hosts, including humans, where infections of different strains present with variable clinical severity.


**Characteristics of cats sterilized through a subsidized, reduced-cost spay-neuter program in Massachusetts and of owners who had cats sterilized through this program.**

OBJECTIVE To determine characteristics of cats sterilized through a subsidized, reduced-cost spay-neuter program in Massachusetts and of owners who had their cats sterilized through this program.

DESIGN Cross-sectional anonymous survey and telephone interviews.

SAMPLE 1,188 (anonymous surveys) and 99 (telephone interviews) cat owners. PROCEDURE Owners who had a cat sterilized at clinics held between January 2006 and December 2008 were invited to complete anonymous surveys. Semistructured telephone interviews were conducted with owners who had a cat sterilized during clinics held in 2009. RESULTS Most cats had never been seen by a veterinarian previously; “too expensive” was the most common reason for this. Total annual household income was significantly associated with the number of times the cat had been examined by a veterinarian and reason why the cat had not been spayed or neutered previously. Most cats were acquired through informal means and without actively being sought, and there was often a time lag between acquisition and sterilization. Undesirable behavior and avoiding pregnancy were primary motivations for neutering and spaying, respectively. Nearly half of owners who indicated they would have had their cat sterilized through a private veterinarian if the clinic had not been available stated that the surgery would have been delayed because of cost. CONCLUSIONS AND CLINICAL RELEVANCE Findings suggested that spay-neuter decisions were related to owner income and procedure cost, that elimination of the reduced-cost spay-neuter program would likely have exacerbated the spay-delay problem, and that gradations of financial need should be considered when evaluating relationships between income and spay-neuter decisions.


**Drug exposure and clinical effect of transdermal mirtazapine in healthy young cats: a pilot study.**

OBJECTIVES: The objective was to measure drug exposure and clinical effects after administration of transdermal mirtazapine (TMZ) in healthy cats. METHODS: Phase I: seven healthy research cats received (1) 3.75 mg and 7.5 mg TMZ once aurally with 48 h serum sampling (serum samples were
obtained via jugular catheter at 0, 0.5, 1, 2, 5, 9, 12, 24, 36 and 48 h); (2) 7.5 mg TMZ and placebo daily aurally for 6 days then 48 h serum sampling; (3) 1.88 mg mirtazapine orally once with serum sampling at 1, 4 and 8 h. Phase II: 20 client-owned cats were enrolled in a randomized, double-blind, placebo-controlled, three-way crossover clinical effect study. Treatments consisted of 6 days of aural 7.5 mg TMZ or placebo gel at home, and 1.88 mg mirtazapine orally once in the clinic. Owners documented appetite, rate of food ingestion, begging activity and vocalization daily at home. On day 6, food consumed, activity and vocalization were documented in hospital, and trough and peak serum mirtazapine levels were obtained. Serum mirtazapine and gel concentrations were measured using liquid chromatography/tandem mass spectrometry. RESULTS: Phase I: administration of TMZ achieved measurable serum mirtazapine concentrations. Area under the curve0-48 of multidose 7.5 mg TMZ was significantly higher than single-dose 1.88 mg oral mirtazapine (OMZ) (P = 0.02). Phase II: client-owned cats administered TMZ had a significant increase in appetite (P = 0.003), rate of food ingestion (P = 0.002), activity (P = 0.002), begging (P = 0.002) and vocalization (P = 0.002) at home. In hospital there was a significant increase in food ingested with both TMZ and OMZ compared with placebo (P <0.05). Gel concentrations ranged from 87% to 119% of target dose. CONCLUSIONS AND RELEVANCE: TMZ 7.5 mg daily achieves measurable serum concentrations and produces significant appetite stimulation despite variance in compounded gel concentrations, but side effects denote a lower dose is indicated.

Prevalence and Risk Factors of Colonization with Staphylococcus aureus in Healthy Pet Cats Kept in the City Households.
Staphylococcus aureus, especially methicillin-resistant S. aureus (MRSA), is a significant pathogen in both human medicine and veterinary medicine. The importance of pets as reservoirs of human infections is still poorly understood. This article provides detailed information of a cross-sectional study of a S. aureus colonization in clinically healthy indoor cats. The study systematically assessed a number of different anatomical locations for the S. aureus colonization and the influence of a range of potential risk factors on the value of the final S. aureus colonization rate. The incidence rates observed for cats with at least one site positive for S. aureus or MRSA were 17.5% and 6.63%, respectively. The following risk factors were identified: one or more owners working in the healthcare industry (human or veterinary); dogs being kept with the cat under investigation; treatment of the cat under investigation with antibiotics or chemotherapeutics during the previous year. In conclusion, this study revealed a higher prevalence of MRSA than what has previously been reported in healthy pets. A combination of anatomical locations from which the samples were collected had a major influence on the final value of the S. aureus colonization rate.

Factors Influencing the Relationship Between the Dose of Amlodipine Required for Blood Pressure Control and Change in Blood Pressure in Hypertensive Cats.
BACKGROUND: Hypertension is a common problem in elderly cats. In most cats, systolic blood pressure (SBP) of <160 mmHg is achieved in response to amlodipine besylate at either 0.625 or 1.25 mg q24h. The individual cat factors determining dose requirement dose have not been explored. AIMS: To determine whether individual cat factors influence the dose of amlodipine required to achieve adequate blood pressure control and to determine whether factors other than the prescribed dose of
drug alter the achieved plasma amlodipine concentrations. METHODS: Fifty-nine hypertensive cats that required 0.625 mg (A) and 41 cats that required 1.25 mg (B) amlodipine to reach a target SBP of <160 mmHg were identified, and plasma amlodipine concentrations were determined. Comparisons were made between groups, and multivariable linear regression models were performed to investigate predictors of antihypertensive response. RESULTS: Cats that required a greater dose of amlodipine had significantly higher SBP at diagnosis of hypertension (A: (median [25th, 75th percentile]) 182 [175,192] mmHg; B: 207 [194,217] mmHg, P <.001), but comparable blood pressure was achieved after treatment. Plasma amlodipine concentrations were directly related to the dose of amlodipine administered. At diagnosis, cats in group B had significantly lower plasma potassium concentration (A: 4.1 [3.8,4.5]; B: 3.8 [3.6,4.2] mEq/L, P <.01). Weight did not differ between groups. The decrease in SBP was directly and independently associated with the SBP at diagnosis and the plasma amlodipine concentration. CONCLUSIONS AND CLINICAL IMPORTANCE: Cats with higher blood pressure at diagnosis might require a greater dose of amlodipine to control their blood pressure adequately. Differences in amlodipine pharmacokinetics between cats do not seem to play a role in the antihypertensive response.


AAV-mediated gene delivery attenuates neuroinflammation in feline Sandhoff disease.

Sandhoff disease (SD) is a lysosomal storage disorder characterized by the absence of hydrolytic enzyme β-N-acetylhexosaminidase (Hex), which results in storage of GM2 ganglioside in neurons and unremitting neurodegeneration. Neuron loss initially affects fine motor skills, but rapidly progresses to loss of all body faculties, a vegetative state, and death by five years of age in humans. A well-established feline model of SD allows characterization of the disease in a large animal model and provides a means to test the safety and efficacy of therapeutic interventions before initiating clinical trials. In this study, we demonstrate a robust central nervous system (CNS) inflammatory response in feline SD, primarily marked by expansion and activation of the microglial cell population. Quantification of major histocompatibility complex II (MHC-II) labeling revealed significant up-regulation throughout the CNS with areas rich in white matter most severely affected. Expression of the leukocyte chemokine macrophage inflammatory protein-1 alpha (MIP-1α) was also up-regulated in the brain. SD cats were treated with intracranial delivery of adeno-associated viral (AAV) vectors expressing feline Hex, with a study endpoint 16weeks post treatment. AAV-mediated gene delivery repressed the expansion and activation of microglia and normalized MHC-II and MIP-1α levels. These data reiterate the profound inflammatory response in SD and show that neuroinflammation is abrogated after AAV-mediated restoration of enzymatic activity.


Comparison of genotypes of Toxoplasma gondii in domestic cats from Australia with latent infection or clinical toxoplasmosis.

Whether Toxoplasma gondii genotype is associated with disease severity in naturally occurring toxoplasmosis in domestic cats is unknown. The aim of this study was to compare genotypes of T. gondii in latently infected cats with those in cats with clinical toxoplasmosis. Results of a PCR targeting the B1 gene to detect T. gondii DNA were positive in tissue samples from 11 of 17 (65%)
seropositive cats tested including four with clinical toxoplasmosis and seven with latent infections, as determined by serology, histologic findings and immunohistochemistry. Three of the four cats with clinical toxoplasmosis were immunosuppressed. Complete genotyping was performed in seven cats using PCR-RFLP at 12 loci (SAG1, 5’SAG2 and 3’SAG2, altSAG2, SAG3, BTUB, GRA6, c22-8, c29-2, L358, PK1 and Apico) and direct sequencing of the multi-copy B1 gene. Partial genotyping using six loci was performed in one cat with latent infection. T. gondii type II (ToxoDB genotype #3) was determined in four cats with clinical toxoplasmosis and three cats with latent toxoplasmosis. Novel T. gondii B1 gene polymorphisms were detected in two strains (at nucleotide positions 233, 366 and 595) and a B1 gene polymorphism unique to Australia was identified in another (guanine/adenine at nucleotide position 378). One cat was co-infected with two or more type-II like strains at 3’SAG2. The results of this study suggest that the infecting T. gondii genotype, based on these 12 loci, is not a determinant of clinical disease in cats naturally infected with T. gondii and type II strains are prevalent in Australia.

Quantifying and comparing the pattern of thalamic and cortical projections to the posterior auditory field in hearing and deaf cats.

Following sensory loss, compensatory crossmodal reorganization occurs such that the remaining modalities are functionally enhanced. For example, behavioral evidence suggests that peripheral visual localization is better in deaf than in normal hearing animals, and that this enhancement is mediated by recruitment of the posterior auditory field (PAF), an area that is typically involved in localization of sounds in normal hearing animals. To characterize the anatomical changes that underlie this phenomenon, we identified the thalamic and cortical projections to the PAF in hearing cats and those with early- and late-onset deafness. The retrograde tracer biotinylated dextran amine was deposited in the PAF unilaterally, to label cortical and thalamic afferents. Following early deafness, there was a significant decrease in callosal projections from the contralateral PAF. Late-deaf animals showed small-scale changes in projections from one visual cortical area, the posterior ectosylvian field (EPp), and the multisensory zone (MZ). With the exception of these minor differences, connectivity to the PAF was largely similar between groups, with the principle projections arising from the primary auditory cortex (A1) and the ventral division of the medial geniculate body (MGBv). This absence of large-scale connectional change suggests that the functional reorganization that follows sensory loss results from changes in synaptic strength and/or unmasking of subthreshold intermodal connections. J. Comp. Neurol. 524:3042-3063, 2016. © 2016 Wiley Periodicals, Inc.

More or less: spontaneous quantity discrimination in the domestic cat.

We examined spontaneous quantity discrimination in untrained domestic cats in three food choice experiments. In Experiment 1, we presented the cats with two different quantities of food in eight numerical combinations. Overall, the subjects chose the larger quantity more often than the smaller one, and significantly so when the ratio between the quantities was less than 0.5. In Experiment 2, we presented the cats with two pieces of food in four different size combinations. Again, subjects chose the larger piece above chance, although not in the combination where the largest item was presented. In Experiment 3, a subset of the cats was presented multiple times with two different quantities of food, which were hidden from view. In this case, the cats did not choose the larger quantity more often than the smaller one, suggesting that in the present experiments they mainly used visual cues when
comparing quantities. We conclude that domestic cats are capable of spontaneously discriminating quantities when faced with different numbers or sizes of food items, and we suggest why they may not always be motivated to choose the larger quantity. In doing so, we highlight the advantages of testing spontaneous choice behavior, which is more likely to reflect animals’ everyday manner of responding than is the case when training them in order to test their absolute limits of performance which may not always coincide with their daily needs.

Prevalence and risk factors associated with endoparasitosis of dogs and cats in Espírito Santo, Brazil.
The objective of this study was to determine the prevalence and risk factors for the occurrence of endoparasitosis in dogs and cats in Espírito Santo, Brazil. For the study, 345 dogs and 160 cats were examined. Faecal samples from the animals were collected, and owners were interviewed about their handling of their animals. For the diagnosis of the infections, the Willis-Molley, simple centrifugal flotation and formalin-ether sedimentation techniques were performed. The data found in the tests were tabulated and analysed with a chi-square test (p <0.05), and calculation of odds ratios (OR) with confidence intervals of 95% were then performed to determine the association between the variables and the outcome of stool examinations. The prevalence of parasites was 59% for dogs and 54% for cats. The genus Ancylostoma was the most prevalent (45%). Supplying filtered water, not feeding raw foods, standardisation of a defecation site and cleaning up the faeces reduced the chances of developing intestinal parasites. An increased frequency of deworming was also shown to be a protective factor; specifically animals which received anthelmintic more than once a year had a lower predisposition for intestinal parasites.

An online survey of dietary and phosphate binder practices of owners of cats with chronic kidney disease.
OBJECTIVES: The objective of this study was to learn about owner experiences of chronic kidney disease (CKD), focusing on use of therapeutic renal diets (TRDs) and intestinal phosphate binders (IPBs). METHODS: An online survey was promoted to UK-based cat owners. RESULTS: In total, 859 owners participated. Most cats (n = 620; 72.18%) had two or more clinical signs at the time of their CKD diagnosis. Most common were polydipsia (n = 462; 53.78%) and weight loss (n = 426; 49.59%). In 94 cats (10.94%) CKD was only diagnosed as a result of wellness screening. In total, 371 participants (43.19%) reported that their cat’s blood pressure had been measured; 100 of these (26.95% of those where blood pressure had been measured) subsequently received anti-hypertensive medication. In total, 90.80% of all participating owners had received a recommendation to feed a TRD. Five hundred and seventy-one owners (66.47%) reported that they were feeding a TRD as a component of their cat’s diet. The most common reason for not feeding a TRD was that the cat did not like it (n = 123; 59.13%). Where a veterinary recommendation to feed a TRD had been received, 564 owners (72.31%) reported feeding a TRD as a component of their cat’s diet vs seven owners (7.04%) who had not received a veterinary recommendation to feed a TRD. IPBs had been recommended to 321 owners (37.81%) and for 72 owners (8.38%) the recommendation came from a source other than a veterinary professional. Where used, IPBs were commonly added to a TRD (n = 136; 49.28%) and were generally accepted within 4 weeks (n = 178; 73.86%). CONCLUSIONS AND RELEVANCE: Awareness of
TRDs was high but much lower for IPBs. A veterinary recommendation to feed a TRD was associated with higher compliance.


**Impact of Obesity on Cardiopulmonary Disease.**

Although there are known detrimental effects of obesity on the heart and lungs, few data exist showing obesity as risk factor for cardiopulmonary disorders in dogs and cats. It is probable that increased abdominal fat is detrimental as it is in humans, and there is evidence of negative effects of increased intrathoracic fat. As well as physical effects of fat, increased inflammatory mediators and neurohormonal effects of obesity likely contribute to cardiopulmonary disorders. Weight loss in overweight individuals improves cardiac parameters and exercise tolerance. Obesity in patients with obstructive airway disorders is recognized to increase disease severity.


**Development of a Larval Bioassay Method Using 96-Well Microtiter Plates for Evaluation of Susceptibility of the Cat Fleas (Siphonaptera: Pulicidae) to Insecticides.**

Cat fleas (Ctenocephalides felis (Bouché)) are a common flea species mostly found on cats and dogs. They not only cause discomfort to pets and their owners but also act as important vectors for human and pet zoonoses. Over the past 15 yr, the control of cat fleas on pets has been revolutionized through the use of various treatments. At present, fipronil and imidacloprid are used for flea control in Taiwan and are available in spot-on and spray formulations. Outside Taiwan, spinosad in tablet form is also available. In this study, we examined the effects of the aforementioned three insecticides on laboratory-reared and field-collected cat flea larvae. We developed a new technique for detecting flea susceptibility using a single larval bioassay with 96-well microtiter plates via contact and oral applications. Compared to the lab strain, the field strain exhibited lower susceptibility to fipronil, with the latter showing resistance levels two to four times higher than that of the former. By contrast, no difference in susceptibility was found between the two strains when tested with spinosad and imidacloprid. Our new technique was found to be stable, standardized, more efficient, convenient, and reproducible when compared to present techniques.


**Epidemiological, clinical, and echocardiographic features and survival times of dogs and cats with tetralogy of Fallot: 31 cases (2003-2014).**

OBJECTIVE To characterize the epidemiological, clinical, and echocardiographic features of dogs and cats with tetralogy of Fallot (TOF) and determine their survival times. DESIGN Retrospective case series. ANIMALS 15 dogs and 16 cats with a diagnosis of TOF as determined via echocardiography. PROCEDURES Medical records of dogs and cats were reviewed to extract information on signalment, clinical status at the time of TOF diagnosis, echocardiographic findings, and any outcome data. RESULTS The most common canine breeds were terrier types (n = 7). Most animals (28/31 [90%]) had clinical signs of TOF at the time of diagnosis, including cyanosis (16/31 [52%]). Pulmonic stenosis was characterized by a variable systolic Doppler-derived pressure gradient (median [range], 108 mm Hg [26 to 255 mm Hg]). Most ventricular septal defects were large, with a median (range) ratio of the
diameter of the ventricular septal defect to that of the aorta of 0.60 (0.18 to 1.15). Median age at cardiac-related death was 23.4 months, with no significant difference between dogs and cats. Median survival time from TOF diagnosis to cardiac-related death was briefer for animals with no or low-grade heart murmur (3.4 months) than for those with higher-grade heart murmur (16.4 months). After adjustment for age and sex, having a lack of or a low- to mild-grade systolic heart murmur was significantly associated with a briefer survival time. CONCLUSIONS AND CLINICAL RELEVANCE With a few exceptions, cardiac-related death occurred predominantly in young adult dogs and cats with TOF, and most animals had severe clinical signs at the time of TOF diagnosis.

Chow, D. W., and H. D. Westermeyer (2016) Vet Ophthalmol 19:357-366. Retrospective evaluation of corneal reconstruction using ACell Vet™ alone in dogs and cats: 82 cases. OBJECTIVES: To retrospectively evaluate the complications, graft clarity, and outcomes associated with the use of commercially available porcine urinary bladder submucosa (ACell Vet™) alone for corneal reconstruction in dogs and cats. PROCEDURES: Dogs or cats receiving an ACell Vet™ graft for corneal reconstruction due to severe ulcerative keratitis or after a keratectomy to remove a corneal sequestrum were included. All received a single layer of ACell Vet™, bandage contact lens, and temporary tarsorrhaphy. Bandage contact lens and temporary tarsorrhaphy were removed after graft vascularization or epithelialization. Topical steroids, cyclosporine, tacrolimus were started after epithelialization. Based on their last examination, outcomes were categorized into five groups based on the presence of corneal vessels, appearance of the scar, and the ability to visualize the posterior and/or the anterior segment through the grafted area. RESULTS: There were 82 eyes included in the study, with 68 eyes with sufficient follow-up time for final assessment. Scarring was minimal in 47 eyes, moderate but not enough to obscure visualization of the posterior segment in 12, and severe in nine. There were five eyes that developed phthisis bulbi, glaucoma or were enucleated and nine that were lost to follow up. Graft dehiscence occurred in 19 eyes. Twelve healed without additional surgical intervention while three required a second graft, two became phthisical, and two were enucleated. CONCLUSIONS AND CLINICAL RELEVANCE: Corneal reconstruction with ACell Vet™ alone is a viable alternative and results in minimal scarring and complications in cats. In dogs, scarring is more pronounced than in cats and graft dehiscence rate is higher compared to conventional techniques.

Churchill, J., and E. Ward (2016) Vet Clin North Am Small Anim Pract 46:899-911. Communicating with Pet Owners About Obesity: Roles of the Veterinary Health Care Team. Obesity continues to be the most prevalent nutritional problem of dogs and cats as well as one of the most frustrating conditions to treat successfully. Educating and assigning roles to all members of the health care team will improve staff engagement and the consistency and effectiveness of nutritional counseling for preventive care and weight loss treatment plans. Excellent communication skills can be used to assess the client’s ability to change and implement a weight loss plan at the right time in the right way to achieve better adherence and improve patient health.

Clark, D. L., and R. A. Clark (2016) Exp Eye Res 153:23-26. Neutral point testing of color vision in the domestic cat. Despite extensive study, the basic nature of feline spectral sensitivity is still unresolved. Most electrophysiological studies have demonstrated two photopic receptors within the cat’s retina, one most
sensitive to longer wavelengths near 560 nm and the other most sensitive to shorter wavelengths near 460 nm, providing the neuroretinal basis for dichromatic vision. A few studies, however, have detected a third photopic receptor most sensitive to medium wavelengths between 500 and 520 nm, overlapping in spectrally sensitivity with the feline scotopic receptor, that potentially could allow trichromatic vision. Indeed, one behavioral study has demonstrated trichromatic vision in cats, but a flaw within its experimental design raises the possibility that achromatic intensity cues might have allowed the accurate identification of medium wavelength targets. This study tested for a spectral neutral point in the domestic cat using a two-choice discrimination task. The positive targets were created using monochromatic light from various single wavelength light emitting diodes (LEDs) combined with a white light of variable intensity, while the negative targets were created using white light of variable intensity. Trials were performed with varying intensities of positive and negative targets, from brighter positive targets to brighter negative targets, to eliminate achromatic intensity cues. Two cats with prior experience with two-choice discrimination tasks, one male and one female, successfully discriminated monochromatic light from 456 nm to 497 nm and from 510 nm to 524 nm, but both failed to discriminate monochromatic light at 505 nm over multiple trials. These results provide strong evidence that cats are dichromatic with a neutral point near 505 nm. This neutral point is nearly identical to the neutral point of the human deuteranope, making feline vision a more accurate a model for red-green colorblind individuals than normal trichromats.


Metabolic Effects of Obesity and Its Interaction with Endocrine Diseases. Obesity in pet dogs and cats is a significant problem in developed countries, and seems to be increasing in prevalence. Excess body fat has adverse metabolic consequences, including insulin resistance, altered adipokine secretion, changes in metabolic rate, abnormal lipid metabolism, and fat accumulation in visceral organs. Obese cats are predisposed to endocrine and metabolic disorders such as diabetes and hepatic lipidosis. A connection likely also exists between obesity and diabetes mellitus in dogs. No system has been developed to identify obese pets at greatest risk for development of obesity-associated metabolic diseases, and further study in this area is needed.


OBJECTIVES: The aim of this study was to retrospectively describe clinical, radiographic and therapeutic features of feline lungworm infection. METHODS: Medical records of cats with lungworm diagnosis, thoracic radiography and without concurrent diseases between 2013 and 2015 were reviewed. Collection of data included physical examination, haematology, serum biochemistry, therapy with a variety of anthelmintics and outcomes. RESULTS: Thirty-seven records were recovered and 26 were included in the study. Single infections by Aelurostrongylus abstrusus (n = 15), Troglostrongylus brevior (n = 3) and Capillaria aerophila (n = 1) and co-infections by T brevior/A abstrusus (n = 6) and T brevior/C aerophila (n = 1) were diagnosed. The most common respiratory signs were coughing (n = 12), increased vesicular sounds (n = 10), dyspnoea (n = 9), such as laboured breathing, orthopnoea or open-mouth breathing, and tachypnoea (n = 6). Two cats were subclinically infected. The most common laboratory abnormality was anaemia (n = 7). Radiographic patterns recorded were interstitial (n = 24), bronchial (n = 21), alveolar (n = 10) and vascular (n = 2). Twenty-five cats had a complete
recovery within 2-6 weeks of therapy. One kitten died 7 days after the diagnosis. CONCLUSIONS AND RELEVANCE: Lungworms should always be included in the differential diagnosis in cats living in endemic areas and presenting with respiratory signs and radiographic abnormalities. A copromicroscopic examination should be considered as the first diagnostic step for all cats at risk of lungworm infections. In most cases, timely therapy with a variety of anthelmintics guarantees recovery.


The effect of storage on ammonia, cytokine, and chemokine concentrations in feline whole blood.
OBJECTIVE: To determine if the concentrations of ammonia and inflammatory mediators in feline stored whole blood (SWB) increase with duration of storage. DESIGN: Prospective ex vivo study. SETTING: University Teaching Hospital. ANIMALS: Thirteen cats, recruited from the hospital feline donor pool, deemed healthy based on the predonation donor screening process. INTERVENTIONS: One unit (30 mL) of whole blood was collected from 13 unique blood donor cats, anticoagulated with citrate-phosphate-dextrose, and stored at 4°C. Concentrations of ammonia, interleukin (IL) 6, and IL-10 were measured in 5 units weekly for 4 weeks. Presence of chemokine ligand (CXCL) 8 was measured weekly in 8 other units in the same manner. MEASUREMENTS AND MAIN RESULTS: The ammonia concentration increased nonlinearly with duration of storage, from a median of 48 µmol/L (range 25-74 µmol/L) on day 0 and 417 µmol/L (324-457 µmol/L) on day 28. IL-6 and IL-10 concentrations were below the lower limits of detection of the assay used (IL-6 < 31.2 pg/mL and IL-10 < 125 pg/mL). CXCL-8 was detected in 4 of 8 SWB units at all time points. CONCLUSIONS AND CLINICAL IMPORTANCE: Ammonia concentration increases with storage time in feline SWB. The clinical significance of this finding is yet to be determined. The presence of the proinflammatory chemokine CXCL-8 in feline SWB warrants further research to determine whether it can incite an inflammatory response in the recipient. Further research evaluating the epidemiology of transfusion reactions in cats should evaluate the effect of unit age, and should include the possible impact of the presence of CXCL-8.


Food puzzles for cats: Feeding for physical and emotional wellbeing.
PRACTICAL RELEVANCE: Many pet cats are kept indoors for a variety of reasons (eg, safety, health, avoidance of wildlife predation) in conditions that are perhaps the least natural to them. Indoor housing has been associated with health issues, such as chronic lower urinary tract signs, and development of problem behaviors, which can cause weakening of the human-animal bond and lead to euthanasia of the cat. Environmental enrichment may mitigate the effects of these problems and one approach is to take advantage of cats’ natural instinct to work for their food. AIM: In this article we aim to equip veterinary professionals with the tools to assist clients in the use of food puzzles for their cats as a way to support feline physical health and emotional wellbeing. We outline different types of food puzzles, and explain how to introduce them to cats and how to troubleshoot challenges with their use. EVIDENCE BASE: The effect of food puzzles on cats is a relatively new area of study, so as well as reviewing the existing empirical evidence, we provide case studies from our veterinary and behavioral practices showing health and behavioral benefits resulting from their use.

Internal hemipelvectomy for treatment of obstipation secondary to pelvic malunion in 3 cats.

Pelvic fractures are a common injury in cats, and both surgical and conservative management approaches have been described. One of the major complications of pelvic fractures managed conservatively is narrowing of the pelvic canal. Severe pelvic canal narrowing can result in constipation and subsequent megacolon. The purpose of this case series is to describe the long-term outcome for 3 cats with obstipation treated with internal hemipelvectomy because of megacolon secondary to pelvic canal narrowing after conservative management. All cats had a good functional outcome of the affected limb. Two cats required ongoing medical management for recurrent constipation. Overall, internal hemipelvectomy offers good long-term limb function; however, its success in relieving clinical signs of constipation requires additional research.


Perianesthetic Mortality in Domestic Animals: A Retrospective Study of Postmortem Lesions and Review of Autopsy Procedures.

Autopsy of animals that die in the perianesthetic period allows identification of anesthetic and surgical complications as well as preexisting disease conditions that may have contributed to mortality. In most studies to date investigating perianesthetic mortality in animals, inclusion of autopsy data is very limited. This retrospective study evaluated autopsy findings in 221 cases of perianesthetic death submitted to a veterinary diagnostic laboratory from primary care and referral hospitals. Canine (n = 105; 48%) and feline (n = 90; 41%) cases predominated in the study, involving elective (71%) and emergency (19%) procedures. The clinical history provided to the pathologist was considered incomplete in 42 of 221 cases (19%), but this history was considered essential for evaluating the circumstances of perianesthetic death. Disease had been recognized clinically in 69 of 221 animals (31%). Death occurred in the premedication or sedation (n = 19; 9%), induction (n = 22; 11%), or maintenance (n = 73; 35%) phases or in the 24 hours postanesthesia (n = 93 animals; 45%). Lesions indicative of significant natural disease were present in 130 of 221 animals (59%), mainly involving the heart, upper respiratory tract, or lungs. Surgical or anesthesia-associated complications were identified in 10 of 221 cases (5%). No lesions were evident in 80 of 221 animals (36%), the majority of which were young, healthy, and undergoing elective surgical procedures. Lesions resulting from cardiopulmonary resuscitation were identified in 75 of 221 animals (34%). Investigation of perianesthetic death cases should be done with knowledge of prior clinical findings and antemortem surgical and medical procedures; the autopsy should particularly focus on the cardiovascular and respiratory system, including techniques to identify pneumothorax and venous air embolism.
Prevalence of clinicopathological changes in healthy middle-aged dogs and cats presenting to veterinary practices for routine procedures.

OBJECTIVE: The objective of the present study was to investigate the frequency of abnormal clinicopathological parameters in a population of client-owned clinically healthy middle-aged dogs and cats. MATERIALS AND METHODS: Biochemical and haematological profiles, urinalysis and total T4 were measured in clinically healthy middle-aged dogs (age, 5-8 years) and cats (age, 6-9 years) presenting to veterinary practices for routine procedures. RESULTS: Of the 406 dogs, only 55 had no abnormalities identified in the testing panel. Most changes were minor or considered artifactual; however, changes that were diagnostic of significant disease or warranting additional evaluation were identified in 25 dogs (6.2%). Of the 130 cats, only 26 had no abnormalities identified in the testing panel. Most changes were minor or considered artifactual; however, changes diagnostic of significant disease or warranting additional evaluation were identified in 25 cats (19.2%). Significant abnormalities included anaemia, inflammation and evidence of liver, kidney and pancreatic disease. CONCLUSION: Biochemical and haematological testing as part of regular preventive health checks may facilitate early detection of diseases before they present clinically, allowing earlier intervention and better health outcomes.
healthy cats and to evaluate the clinicopathologic effects of various plasma RVX concentrations within target therapeutic ranges established for people. **DESIGN:** Prospective randomized cross-over study performed between July 2013 and November 2014. **SETTING:** Veterinary university teaching hospital. **ANIMALS:** Six healthy adult domestic shorthair cats (3 males, 3 females). **INTERVENTIONS:** Cats were treated with oral RVX at single, fixed doses (1.25, 2.5, 5 mg PO), q 12 h for 3 days (1.25 mg); q 24 h for 7 days (2.5 mg); and q 24 h for 28 days (1.25 mg). Blood samples were collected for complete blood count, blood chemistry, and RVX anticoagulant activity based on prolongation of dilute prothrombin time, activated partial thromboplastin time (aPTT), activated Factor X (FXa) inhibition (anti-Xa activity [aXa]) and high-pressure liquid chromatography tandem mass spectrometry determination of drug concentration. **MEASUREMENTS AND MAIN RESULTS:** Treated cats had no signs of hemorrhage or clinicopathologic off-target adverse effects. There were dose-dependent prolongations of coagulation times and increase in aXa, with peak effect at 3 hours postadministration. There was a direct correlation between plasma RVX concentration and dilute prothrombin time and aXa. Coagulation parameters returned to baseline by 24 hours after the last dose. **CONCLUSIONS:** Oral RVX was well tolerated by healthy cats with predictable pharmacokinetics and anticoagulant effects. Clinical studies of RVX are warranted in cats with heart disease.

**Defining the local nerve blocks for feline distal thoracic limb surgery: a cadaveric study.**  
**OBJECTIVES:** Though controversial, onychectomy remains a commonly performed distal thoracic limb surgical procedure in cats. Peripheral nerve block techniques have been proposed in cats undergoing onychectomy but evidence of efficacy is lacking. Preliminary tests of the described technique using cadavers resulted in incomplete staining of nerves. The aim of this study was to develop nerve block methods based on cadaveric dissections and test these methods with cadaveric dye injections. **METHODS:** Ten pairs of feline thoracic limbs (n = 20) were dissected and superficial branches of the radial nerve (RSbr nn.), median nerve (M n.), dorsal branch of ulnar nerve (UDbr n.), superficial branch of palmar branch of ulnar nerve (UPbrS n.) and deep branch of palmar branch of ulnar nerve (UPbrDp n.) were identified. Based on these dissections, a four-point block was developed and tested using dye injections in another six pairs of feline thoracic limbs (n = 12). Using a 25 G × 5/8 inch needle and 1 ml syringe, 0.07 ml/kg methylene blue was injected at the site of the RSbr nn., 0.04 ml/kg at the injection site of the UDbr n., 0.08 ml/kg at the injection site of the M n. and UPbrS n., and 0.01 ml/kg at the injection site of the UPbrDp n. The length and circumference of each nerve that was stained was measured. **RESULTS:** Positive staining of all nerves was observed in 12/12 limbs. The lengths stained for RSbr nn., M n., UDbr n., UPbrS n. and UPbrDp n. were 34.9 ± 5.3, 26.4 ± 4.8, 29.2 ± 4.0, 39.1 ± 4.3 and 17.5 ± 3.3 mm, respectively. The nerve circumferences stained were 93.8 ± 15.5, 95.8 ± 9.7, 100 ± 0.0, 100 ± 0.0 and 93.8 ± 15.5%, respectively. **CONCLUSIONS AND RELEVANCE:** This described four-point injection method may be an effective perioperative analgesia technique for feline distal thoracic limb procedures.

**Density and distribution of feline conjunctival goblet cells.**  
**OBJECTIVES:** The objective of this study was to examine the density and distribution of goblet cells (GCs) in the feline conjunctiva and to investigate a potential effect of age and sex on GC density (GCD). **METHODS:** Thirty-nine eyes of 21 cats euthanased for reasons unrelated to this study were used. Fixed upper and lower eyelid and bulbar conjunctiva were divided into nasal and temporal
regions. The third eyelid was excised and investigated separately. Samples were embedded in paraffin wax; sections were stained with periodic acid-Schiff reaction and analysed with light microscopy. To determine the topographic distribution of GCs, each region was subdivided into the marginal, palpebral and bulbar zone. In each zone 200 epithelial cells, including GCs, were counted. Goblet cell index was defined as a percentage of the epithelial cells. RESULTS: The palpebral zone of both eyelids contained significantly (P <0.001) more GCs (27.5-32.0%) than the marginal or bulbar areas. The highest GCD was found in the nasal palpebral zone of the upper eyelid (32.0%). Marginal and bulbar sites contained fewer numbers of GCs (2.6-10.0%). The lowest GCD was detected in the nasal bulbar zone of the lower eyelid (2.6%). Overall the nasal region contained significantly (P = 0.036) more GCs than the temporal region, but there was no significant difference in GCD between the upper and lower eyelids. Correlation analysis did not show any effect of age or sex on GC counts. CONCLUSIONS AND RELEVANCE: GCD in the palpebral zones and on the anterior surface of the third eyelid was highest; the lowest density was found in the bulbar zones of the lower eyelid and in the marginal zones of both eyelids. Overall, higher GCD was found in the cat than in other species. Age and sex have no effect on GCD.

Falkenö, U., A. Hillström, C. von Brömssen, and E. M. Strage (2016) J Vet Diagn Invest 28:699-704. Biological variation of 20 analytes measured in serum from clinically healthy domestic cats. The applications of data on biological variation include assessment of the utility of population-based reference intervals, evaluation of the significance of change in serial results, and setting of analytical quality specifications. We investigated the biological variation of 19 biochemistry analytes and total T4, measured in serum from 7 clinically healthy domestic cats sampled once weekly for 5 weeks. Samples were frozen and analyzed in random order in the same analytical run. Results were analyzed for outliers, and the components of variance, subsequently generated by restricted maximum likelihood, were used to determine within-subject and between-subject variation (CVI and CVG, respectively), as well as analytical variation (CVA) for each analyte. Indices of individuality, reference change values, and analytical performance goals were calculated. The smallest CVI and CVG were found for calcium, chloride, and sodium, whereas the largest values were calculated for bile acids. Nine analytes (albumin, alkaline phosphatase, alanine aminotransferase, aspartate aminotransferase, cholesterol, creatinine, phosphate [phosphorus], total protein, total T4) demonstrated high individuality, indicating limited utility of population-based reference intervals. Individuality was low, and population-based reference intervals were thereby considered appropriate for 5 analytes (bile acids, calcium, fructosamine, glucose, potassium). The intermediate individuality observed for 4 analytes (creatine kinase, iron, magnesium, urea) indicated that population-based reference intervals should be used with caution.


CHRONIC KIDNEY DISEASE.
Measurement of glomerular filtration rate (GFR) via gamma camera uptake of 99mTc-diethylenetriaminepentaacetic acid is a standard method for quantifying renal function. Aims of this retrospective, observer agreement study were to determine intra- and interobserver variation in GFR values for cats with chronic kidney disease and to determine whether renal insufficiency classification changed between observers. Guideline cut-points were established for the difference in repeated GFRs to differentiate changes caused by therapeutic effect vs. inherent variation. Included cats had a diagnosis of chronic kidney disease and had undergone GFR examinations between the years of 2010 and 2013. Twenty-nine GFR studies were sampled. Each study was read twice, 6 months apart, by two veterinary radiologists and one radiology resident. Modified Bland-Altman plots were used to investigate differences between readings 1 and 2 by observer and between pairs of observers by reading. Reliability of clinical classification was assessed through comparisons between readings and observers. Measurements were not systematically different between readings for the experienced observers but were higher in reading 1 than reading 2 for the inexperienced observer. Measurements were not systematically different between the experienced observers in reading 1 or between any two observers in reading 2. Reliability for GFR measurements was high among experienced observers; variations in GFR measurements rarely led to differences in clinical classification. Results suggested that, for experienced observers, changes in GFR values following treatment in cats with chronic kidney disease between -0.4 and 0.4 mL/min/kg may be due to inherent variability rather than treatment effect.

Clinical improvement in feline herpesvirus 1 infected cats by oral low dose of interleukin-12 plus interferon-gamma.
Feline herpesvirus 1 (FHV-1) is a widespread cat pathogen inducing rhinitis, conjunctivitis and corneal ulcers. To alleviate acute FHV-1-induced disease, antiviral agents are used often with antibiotics. But sometimes, these treatments, as well as conventional doses of cytokines have moderate efficacy and/or collateral effects. Herein we have investigated the effects of low dose interleukin (IL)–12 plus interferon (IFN)-gamma, prepared by Sequential Kinetic Activated (SKA), on the treatment of FHV-1 infection. Twenty-five, unvaccinated FHV-1-positive cats were recruited into a prospective, randomized, placebo-controlled, double-blinded clinical trial. Fifteen cats were treated for 6 months with oral low doses of SKA IL-12 plus IFN-gamma and 10 cats were treated with placebo. At 1, 6 and 12 months (follow-up) after the beginning of treatment, clinical assessment, PCR assay and blood count were carried out. At follow-up, in treated group, we observed significant (p<0.05) improvements in clinical signs and PCR became negative in 12/15 cats (80%). In placebo, 10/10 cats were PCR-positive, with improvements (30%) or worsening (70%) in clinical signs. Blood values were normal in both groups. Our results show that the low dose therapy, based on activated solutions of IL-12 plus IFN-gamma, represents a novel approach to treat FHV-1 infection in cats.

Development and initial validation of the Cat HEalth and Wellbeing (CHEW) Questionnaire: a generic health-related quality of life instrument for cats.
OBJECTIVES: The aims of the study were to define factors that owners consider relevant to the health-related quality of life (HRQoL) of cats, to develop an instrument based on this information, and to
evaluate the validity and reliability of the final instrument (the Cat HEalth and Wellbeing [CHEW] Questionnaire). METHODS: Psychometric research techniques and guidance from the US Food and Drug Administration on outcome measures were used to develop a valid and reliable instrument. Fifty-four cat owners and caregivers participated in the qualitative research, while 1303 cat owners were included in the quantitative validation phase (development dataset, n = 648; validation dataset, n = 655). A random subset of cat owners (n = 391) also participated in test-retest evaluation. Qualitative research was used to generate a draft instrument, which was then subjected to quantitative validation techniques. These included item reduction, domain identification, data quality assessment, and exploratory and confirmatory analysis to develop a final instrument, which underwent confirmatory reliability and validity assessment. RESULTS: A draft instrument with 11 domains and 100 items based on qualitative research underwent online quantitative validation testing which refined the instrument to eight domains and 33 items. Confirmatory reliability and validity assessment showed that the final instrument had good validity, was able to discriminate between cats by age and overall health status, and demonstrated good internal and test-retest reliability. CONCLUSIONS AND RELEVANCE: The CHEW Questionnaire was developed and validated. Additional research is needed to verify its ability to differentiate cats with and without disease, and to assess its potential as a screening tool.


Evaluation of Weight Loss Over Time in Cats with Chronic Kidney Disease.

BACKGROUND: Thin body condition and weight loss are common in cats with chronic kidney disease (CKD). However, the time course and progression of weight loss before and after diagnosis have not been thoroughly evaluated. HYPOTHESIS/OBJECTIVES: To describe weight loss in cats with CKD before and after diagnosis and its relationship to survival. ANIMALS: A total of 569 cats (55.5% females and 44.5% males) with CKD from 6 US veterinary practices for which International Renal Interest Society (IRIS) stage, age, date of CKD diagnosis, and at least two body weight measurements were available. METHODS: Body weight measurements were analyzed by time windows and polynomial growth curve analysis. Survival analysis was performed by Kaplan-Meier curves and log-rank tests. RESULTS: Median age at diagnosis was 14.9 years (range, 5.0-22.8 years). Cats were categorized at diagnosis as IRIS stage 1 (n = 34 [6%]), stage 2 (n = 345 [61%]), stage 3 (n = 141 [25%]), and stage 4 (n = 49 [9%]). Median body weight at diagnosis was 4.2 kg (range, 1.6-9.9 kg). Cats lost a median of 8.9% of body weight in the 12 months before diagnosis, but weight loss was already present 3 years before diagnosis and accelerated after diagnosis of CKD. Cats <4.2 kg at the time of diagnosis had significantly shorter survival time compared to cats ≥4.2 kg at diagnosis (P <.0001). CONCLUSIONS AND CLINICAL IMPORTANCE: Weight loss can be detected in cats before diagnosis of CKD, accelerates after diagnosis, and is associated with shorter survival. Tracking body weight may help clinicians in earlier diagnosis of CKD.


Postobstructive diuresis in cats with naturally occurring lower urinary tract obstruction: incidence, severity and association with laboratory parameters on admission.

OBJECTIVES: The objectives of this retrospective study were to investigate the actual incidence of postobstructive diuresis after relief of urethral obstruction in cats, as well as to identify changes in blood and urine parameters that might be associated with postobstructive diuresis (POD), and to assess
the impact of fluid therapy. METHODS: The medical records of 57 male cats with urethral obstruction that were treated with an indwelling urinary catheter were retrospectively analysed. Absolute urine output in ml/kg/h every 4 h and the incidence of cats with polyuria (urine volume >2 ml/kg/h) at any time point over a 48 h period after the re-establishment of urine flow were investigated. In addition, postobstructive diuresis in relation to fluid therapy (PODFR) was defined as urine output greater than the administered amount of intravenous fluids on at least two subsequent time points. Polyuria and PODFR were investigated for their association with blood and urine laboratory parameters. RESULTS: After 4 h, 74.1% (40/54) of the cats had polyuria, with a urine output of >2 ml/kg/h. Metabolic acidosis was present in 46.2% of the cats. Venous blood pH and bicarbonate were inversely correlated with urine output in ml/kg/h after 4 h. The overall incidence of POD within 48 h of catheterisation was 87.7%. There was a significant correlation between intravenous fluid rate at time point x and urine output at time point x + 1 at all the time points except for the fluid rate at time point 0 and the urine output after 4 h. PODFR was seen in 21/57 cats (36.8%). CONCLUSIONS AND RELEVANCE: POD is a frequent finding in cats treated for urethral obstruction, and can be very pronounced. Further studies are required to determine whether or not a change in venous blood pH actually interferes with renal concentrating ability. The discrepancy between the frequency of cats with polyuria and PODFR (87.7% vs 36.8%) in the present study indicates that administered intravenous fluid therapy might be the driving force for the high incidence of polyuria in some cats with naturally occurring obstructive feline lower urinary tract disease.


The Effect of Moderate Dietary Protein and Phosphate Restriction on Calcium-Phosphate Homeostasis in Healthy Older Cats.

BACKGROUND: Dietary phosphate and protein restriction decreases plasma PTH and FGF-23 concentrations and improves survival time in azotemic cats, but has not been examined in cats that are not azotemic. HYPOTHESIS: Feeding a moderately protein- and phosphate-restricted diet decreases PTH and FGF-23 in healthy older cats and thereby slows progression to azotemic CKD. ANIMALS: A total of 54 healthy, client-owned cats (≥ 9 years). METHODS: Prospective double-blinded randomized placebo-controlled trial. Cats were assigned to test diet (protein 76 g/Mcal and phosphate 1.6 g/Mcal) or control diet (protein 86 g/Mcal and phosphate 2.6 g/Mcal) and monitored for 18 months. Changes in variables over time and effect of diet were assessed by linear mixed models. RESULTS: A total of 26 cats ate test diet and 28 cats ate control diet. There was a significant effect of diet on urinary fractional excretion of phosphate (P = 0.045), plasma PTH (P = 0.005), and ionized calcium concentrations (P = 0.018), but not plasma phosphate, FGF-23, or creatinine concentrations. Plasma PTH concentrations did not significantly change in cats fed the test diet (P = 0.62) but increased over time in cats fed the control diet (P = 0.001). There was no significant treatment effect of the test diet on development of azotemic CKD (3 of 26 (12%) test versus 3 of 28 (11%) control, odds ratio 1.09 (95% CI 0.13-8.94), P = 0.92). CONCLUSIONS AND CLINICAL IMPORTANCE: Feeding a moderately protein- and phosphate-restricted diet has effects on calcium-phosphate homeostasis in healthy older cats and is well tolerated. This might have an impact on renal function and could be useful in early chronic kidney disease.


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

Comparison of intradermal and percutaneous testing to histamine, saline and nine allergens in healthy adult cats.
BACKGROUND: Intradermal testing (IDT) in cats has potential limitations; this has led to an interest in novel testing methods. A pilot study demonstrated that healthy cats produced reliable percutaneous glycerinated (PG) histamine wheals, whereas percutaneously applied glycerosaline did not lead to wheal formation. HYPOTHESIS/OBJECTIVE: The purpose of this study was to determine if percutaneously applied aqueous and glycerinated allergens would lead to irritant reactions in healthy cats. METHODS: Percutaneous testing (PCT) with both glycerinated and aqueous allergens and IDT were compared in twelve healthy cats. The lateral thorax was clipped and histamine, saline and nine allergens were tested in rows. Objective and subjective evaluations were performed at 15, 20 and 25 min, and 4 h. Results were evaluated as positive or negative at 15, 20, 25 min and 4 h. RESULTS: Skin test reactions for intradermal (ID) histamine wheals were larger when compared to PG and percutaneous aqueous (PA) at the immediate reading points (P < 0.05) subjectively and objectively; however, PG was not significantly different from ID when compared as either positive (2-4) or negative (0-1). PG histamine and allergen reactions, when present, were larger than equivalent PA reactions. PG and PA allergens did not cause irritant reactions at tested concentrations. Bassia scoparia (kochia), when tested at 1000 PNU/mL with IDT, was suspected to be an irritant. CONCLUSIONS AND CLINICAL IMPORTANCE: Percutaneously (PCT) applied allergens did not cause irritant reactions in healthy cats. PG histamine wheals, although smaller than ID histamine wheals, were easily recognizable and PCT was simple to perform.

Telephone survey to investigate relationships between onychectomy or onychectomy technique and house soiling in cats.
OBJECTIVE To determine whether associations existed between onychectomy or onychectomy technique and house soiling in cats. DESIGN Cross-sectional study. SAMPLE 281 owners of 455 cats in Polk County, Iowa, identified via a list of randomly selected residential phone numbers of cat owners in that region. PROCEDURES A telephone survey was conducted to collect information from cat owners on factors hypothesized a priori to be associated with house soiling, including cat sex, reproductive status, medical history, and onychectomy history. When cats that had undergone onychectomy were identified, data were collected regarding the cat’s age at the time of the procedure
and whether a carbon dioxide laser (CDL) had been used. Information on history of house soiling behavior (urinating or defecating outside the litter box) was also collected. RESULTS Onychectomy technique was identified as a risk factor for house soiling. Cats for which a non-CDL technique was used had a higher risk of house soiling than cats for which the CDL technique was used. Cats that had undergone onychectomy and that lived in a mult cat (3 to 5 cats) household were more than 3 times as likely to have house soiled as were single-housed cats with intact claws. CONCLUSIONS AND CLINICAL RELEVANCE Results of this cross-sectional study suggested that use of the CDL technique for onychectomy could decrease the risk of house soiling by cats relative to the risk associated with other techniques. This and other findings can be used to inform the decisions of owners and veterinarians when considering elective onychectomy for cats.


Uroliths of cats in Switzerland from 2002 to 2009.
INTRODUCTION: In this study data on composition of uroliths collected from cats and epidemiologic data of affected cats in Switzerland from 2002 to 2009 are summarised. Of 884 stones analysed 50% (n=441) were composed of calcium oxalate, 45% (n=398) of struvite, 3% (n=18) of ammonium urate, 1% (n=12) were mixed stones, 1% (n=9) were composed of silica, 3 stones were solidified blood, 2 consisted of cystine and 1 of xanthine. 40% of the ureteral stones were composed of struvite. Domestic cats had significantly less calcium oxalate stones compared to British Shorthair or Persian cats. Cats with calcium oxalate stones were older and cats with struvite stones were younger than other affected cats. Female and male cats were equally affected with stones. Compared to studies from other countries, in Switzerland silica stones occurred more often and ureteral stones were more often composed of Struvite. The present study shows that occurrence and prevalence of urinary calculi of cats from Switzerland exhibited only slight differences to studies from other countries.


Weight management in obese pets: the tailoring concept and how it can improve results.
Obesity is now recognised as the most important medical disease in pets worldwide. All current strategies for weight management involve dietary energy restriction with a purpose-formulated diet. Whilst current weight management regimes can be successful, outcomes are often disappointing with the rate of weight loss progressively slowing down as time goes on. Success is most challenging for the most obese dogs and cats that are more likely to discontinue the programme before reaching target weight. To improve outcomes, clinicians must focus carefully on better tailoring programmes, paying particular to setting an appropriate target weight so as to maximise the benefits for the individual. In this opinionated review, the author will discuss findings from recent clinical research studies examining weight management in obese dogs and cats. A strategy for tailoring weight management targets will then be discussed, illustrated with case examples.


BACKGROUND: Quality of life (QoL) questionnaires are desirable for clinical practice but can be time-consuming to administer and interpret, making their widespread adoption difficult. OBJECTIVE: Our aim was to assess the performance of the World Health Organization Quality of Life (WHOQOL)-
100 questionnaire as four item banks to facilitate adaptive testing using simulated computer adaptive tests (CATs) for physical, psychological, social, and environmental QoL. METHODS: We used data from the UK WHOQOL-100 questionnaire (N=320) to calibrate item banks using item response theory, which included psychometric assessments of differential item functioning, local dependency, unidimensionality, and reliability. We simulated CATs to assess the number of items administered before prespecified levels of reliability was met. RESULTS: The item banks (40 items) all displayed good model fit (P>.01) and were unidimensional (fewer than 5% of t tests significant), reliable (Person Separation Index>.70), and free from differential item functioning (no significant analysis of variance interaction) or local dependency (residual correlations < +.20). When matched for reliability, the item banks were between 45% and 75% shorter than paper-based WHOQOL measures. Across the four domains, a high standard of reliability (alpha>.90) could be gained with a median of 9 items. CONCLUSIONS: Using CAT, simulated assessments were as reliable as paper-based forms of the WHOQOL with a fraction of the number of items. These properties suggest that these item banks are suitable for computerized adaptive assessment. These item banks have the potential for international development using existing alternative language versions of the WHOQOL items.


Over recent years, a growing number of papillomaviruses have been identified, which cause a wide range of lesions in domestic and wild animals. Papillomavirus-induced lesions may have a great impact on animal health, and some diseases observed in farm animals are associated with significant economic losses. This concise review brings together recent advancements on animal papillomavirus research, providing the scientific community and veterinary practitioners with an update on this rapidly evolving field. Among others, bovine, canine and feline papillomaviruses (BPV, CPV and FcaPV) are most extensively discussed, in view of the recent discovery of new viral types and their worldwide importance for animal health. Feline papillomaviruses 2 is an emerging, highly prevalent pathogen in domestic cats, associated with a subset of malignant skin lesions. Aspects related to cross-species infection by BPV and its environmental co-factors are also addressed. Animal papillomaviruses are also fascinating models for studying molecular and cell biology and have recently inspired some major breakthroughs. Overall, it is clear that additional, international and systematic efforts are needed to clarify which lesions are caused by which viral types and to develop experimental models for studying animal papillomavirus.


New Approaches to Feline Diabetes Mellitus: Glucagon-like peptide-1 analogs.

CLINICAL RELEVANCE: Incretin-based therapies are revolutionizing the field of human diabetes mellitus (DM) by replacing insulin therapy with safer and more convenient long-acting drugs. MECHANISM OF ACTION: Incretin hormones (glucagon-like peptide-1 [GLP-1] and glucose-dependent insulinotropic peptide [GIP]) are secreted from the intestinal tract in response to the presence of food in the intestinal lumen. GLP-1 delays gastric emptying and increases satiety. In the pancreas, GLP-1 augments insulin secretion and suppresses glucagon secretion during hyperglycemia in a glucose-dependent manner. It also protects beta cells from oxidative and toxic injury and promotes expansion of beta cell mass. ADVANTAGES: Clinical data have revealed that GLP-1 analog drugs are as effective as insulin in improving glycemic control while reducing body weight in people suffering from type 2 DM. Furthermore, the incidence of hypoglycemia is low with these drugs because of their
glucose-dependent mechanism of action. Another significant advantage of these drugs is their duration of action. While insulin injections are administered at least once daily, long-acting GLP-1 analogs have been developed as once-a-week injections and could potentially be administered even less frequently than that in diabetic cats. OUTLINE: This article reviews the physiology of incretin hormones, and the pharmacology and use of GLP-1 analogs, with emphasis on recent research in cats. Further therapies that are based on incretin hormones, such as DPP-4 inhibitors, are also briefly discussed, as are some other treatment modalities that are currently under investigation.

Gottlieb, D. L., J. Prittie, Y. Buriko, and K. E. Lamb (2016) J Vet Emerg Crit Care (San Antonio) Evaluation of acute traumatic coagulopathy in dogs and cats following blunt force trauma. OBJECTIVE: To evaluate the presence of acute traumatic coagulopathy (ATC) in dogs and cats following blunt trauma and to relate coagulation variables with injury severity and admission variables. DESIGN: Prospective, single center, observational study from 2013 to 2014. SETTING: Urban private referral hospital. ANIMALS: Eighteen and 19 client-owned dogs and cats, respectively, sustaining blunt trauma within 8 hours of presentation without prior resuscitation; 17 healthy staff and client-owned control cats METHODS: Blood samples were collected upon presentation for measurement of blood gas, lactate, blood glucose, ionized calcium, PCV, total plasma protein, prothrombin time (PT), activated partial thromboplastin time (aPTT), fibrinogen, platelet count, and thromboelastography. RESULTS: ATC was diagnosed in 1 dog and 1 cat on presentation. Hypercoagulability was documented in 4/18 (22%) of dogs and 1/19 (5.3%) of cats. In dogs, prolongation of PT (P = 0.018), aPTT (P = 0.013) and decrease in maximum amplitude (MA) (P = 0.027) were significantly associated with injury severity as measured by the animal trauma triage (ATT) score. In cats, PT, aPTT, MA, and clot strength (G) were not associated with injury severity. In cats, increasing blood glucose and lactate were significantly associated with decreasing MA (P = 0.041, P = 0.031) and G (P = 0.014, P = 0.03). In both dogs (P = 0.002) and cats (P = 0.007), fibrinogen concentration was significantly correlated with G. CONCLUSIONS: ATC is rare in minimally injured dogs and cats following blunt trauma. In dogs, ATT score is significantly associated with PT, aPTT, and MA, suggesting an increased risk of ATC in more severely injured animals. ATT score does not appear to predict coagulopathies in cats. Future studies including more severely injured animals are warranted to better characterize coagulation changes associated with blunt trauma.

Gourkow, N., and C. J. Phillips (2016) Prev Vet Med 131:103-110. Effect of cognitive enrichment on behavior, mucosal immunity and upper respiratory disease of shelter cats rated as frustrated on arrival. Acquisition of resources and opportunity to engage in natural behaviors has been shown to reduce frustration-related behaviors and enhance health in nondomestic felids kept in zoos, but little is known about whether there are similar effects in domestic cats living in confinement in animal shelters. Fifteen cats rated as Frustrated during the first hour of confinement to a cage at an animal shelter were assigned to either a Treatment (n=7) or Control (n=8) group. Treatment cats were taken from their cages to a separate room four times daily for 10min each time over a 10 d period, where they took part in training sessions to learn a novel behavior (paw-hand contact with a researcher). Changes in emotional states and mucosal immune response were evaluated over 10days. Infectious status was determined upon admission and incidence of upper respiratory was determined up to day 40 based on clinical signs. Treated cats were more likely to be rated as Content than Control cats and had greater concentrations of S-IgA (537µg/g) in feces than Control cats (101µg/g). Within the Treatment group, cats that responded
positively had greater concentrations of S-IgA (925µg/g) than those that responded negatively (399µg/g). Control cats were more likely to develop respiratory disease over time compared to cats that received treatment (Hazard Ratio: 2.37, Confidence Interval: 1.35-4.15). It is concluded that there is prima facie evidence that cognitive enrichment of cats exhibiting frustration-related behaviors can elicit positive affect (contentment), stimulate secretion of IgA and reduce incidence of respiratory disease, which is worthy of further study.


Nodo-paranodopathy, internodopathy and cleftopathy: Target-based reclassification of Guillain-Barré-like immune-mediated polyradiculoneuropathies in dogs and cats. Recent views on Guillain-Barré syndrome (GBS) question the accuracy of classification into axonal and demyelinating subtypes that represent convergent neuropathological phenotypes rather than immunological targets. Instead it has been proposed to clarify the primarily affected fibre subunit in nerve biopsies. As nerve biopsies rarely are part of routine work-up in human patients we evaluated tissues taken from companion animals affected by GBS-like polyradiculoneuropathy to screen for distribution of immune cells, targeted fibre components and segregating non-inflammatory lesions. We identified that immune responses were directed either at Schmidt-Lanterman clefts, the paranode-node complex or both. Based on infiltrative and non-inflammatory changes, four subtypes and/or stages were distinguished, some of which indicate localisation of primary target antigens while others represent convergent late stage pictures, as a consequence to epitope spreading. The impact of histological subtyping onto clinical management and prognosis remains to be evaluated in future clinical trials. Natural development and clinical manifestation of large animal dysimmune neuropathy may reflect human Guillain-Barré syndrome more accurately than experimental models and therefore provide complementary clues for translational research.


Increased detection of Dirofilaria immitis antigen in cats after heat pretreatment of samples. OBJECTIVES: To determine whether pretreating diagnostic samples with heat increases the detection of Dirofilaria immitis antigen in adult cats, we evaluated feline serum and plasma samples collected in heartworm-endemic areas of the southern United States. METHODS: Commercial microtiter well assays for detection of D immitis antigen were used to evaluate serum or plasma samples from 385 shelter and free-roaming cats from the southcentral and southeastern United States before and after heat treatment; commercial antibody tests were performed on a subset of samples. RESULTS: Prior to sample heat treatment, 1/220 (0.5%) shelter cats and 4/165 (2.4%) free-roaming cats had detectable D immitis antigen. After heat pretreatment, the detection rate increased to 13/220 (5.9%) and 13/165 (7.9%), respectively. Antibody reactive to D immitis was significantly more common (P <0.001) in serum of cats that were antigen positive after heat treatment (10/13; 76.9%) than serum from cats that remained antigen negative after heat treatment (22/163; 13.5%). CONCLUSIONS AND RELEVANCE: Heat pretreatment of feline samples increased antigen detection by commercial assays for D immitis and improved overall concordance of antigen and antibody test results in antigen-positive samples in this population. Although further work to investigate the specificity of D immitis antigen
assays when using pre-treated samples is warranted, this approach may be useful in diagnosis of heartworm infection in individual cats and may increase the accuracy of surveys based on antigen detection.


**Not another type of potato: MC1R and the russet coloration of Burmese cats.**

The Burmese is a breed of domestic cat that originated in Southeast Asia and was further developed in the United States. Variants in melanocortin 1 receptor (MC1R) causes common coat colour phenotypes in a variety of mammalian species but only limited colour variation in the domestic cat. Known as the extension (E) locus, melanocortin 1 receptor (MC1R) interacts with the agouti locus to produce the eumelanin and pheomelanin pigments. Recently, a novel reddish coloration, which is termed russet, was identified in the Burmese cat breed. Because this russet Burmese coloration changes with aging, MC1R was suggested as candidate gene. The similar colouration in specific lineages of Norwegian Forest cat known as amber (e) (c.250G>A; p.Asp84Asn) was excluded for this Burmese phenotype. The complete 954-bp coding region of MC1R was directly sequenced in russet Burmese and suspected carriers. A 3-bp deletion (c.439_441del) associated with the deletion of a phenyalanine (p.Phe146del) in the protein sequence was identified. All russet coloured cats were homozygous for the variant, and all obligate carriers were heterozygous, confirming that the deletion segregated concordantly with colouring in Burmese cats from the New Zealand foundation lineage. The variant was not identified in 442 cats from 26 different breeds and random-bred cats. Twenty-six Burmese from the USA did not have the variant. This MC1R variant defines a unique coloration and the second breed-specific MC1R variant in cats. The interactions of the two recessive feline MC1R alleles (E > e, e(r)) is unknown.


**Ultrasonographic, endoscopic and histological appearances of the caecum in cats presenting with chronic clinical signs of caecocolic disease.**

OBJECTIVES: This study aimed to describe the ultrasonographic, endoscopic and histological characteristics of the caecum and ileocaecocolic junction in cats suffering from chronic clinical signs compatible with caecocolic disease. METHODS: Cats presenting with clinical signs suggestive of a caecocolic disease were prospectively recruited. All cats underwent an ultrasonographic examination of the caecum, ileum, colon, ileocolic lymph nodes and local mesenteric fat, in addition to comprehensive abdominal ultrasonography. This was followed by a colonoscopy with a macroscopic assessment of the caecocolic mucosa; caecocolic tissue samples were systematically collected for histologic analysis. RESULTS: Eighteen cats were included. Eleven of 18 cats had ultrasonographic abnormalities adjacent to the ileocaecocolic junction (lymphadenopathy, local steatitis) and 13/18 cats had abnormalities directly related to the junction (wall thickening, loss of wall layering). Seventeen of 18 cats had at least one ultrasonographic abnormality. Endoscopically, hyperaemia, oedema, discoloration and/or erosions, were found in all cats. Each cat was classified with mild or moderate-to-severe lesions according to endoscopic results; no classification could be established statistically for ultrasonographic results. The accentuation of the dimpled pattern tended to be inversely related to the severity of endoscopic lesion scoring. Histologically, a large proportion of cats showed typhlitis (13/16), one had lymphoma and two were normal. All cats with typhlitis also had colitis. There was only a slight agreement between endoscopic and histological caecal results on the severity of lesions. Loss of caecal wall layering on ultrasound was found in 7/18 cats and, surprisingly, did not appear as a reliable predictor of the severity
CONCLUSIONS AND RELEVANCE: Ultrasonography and endoscopy should not be used as the sole methods to investigate the ileocaecolic region in cats with clinical signs suggestive of caecocolic disease. The presence of chronic clinical signs should routinely prompt histological biopsy.


**Current Topics in Canine and Feline Obesity.**

The domestication and urbanization of dogs and cats has dramatically altered their environment and behavior. Human and pet obesity is a global concern, particularly in developed countries. An increased incidence of chronic disease is associated with obesity secondary to low-grade systemic inflammation. This article reviews current research into the genetic, dietary, and physiologic factors associated with obesity, along with use of “omics” technology to better understand and characterize this disease.


**Metastatic neuroendocrine carcinoma of aortic body origin in a cat.**

An 8-year-old, female spayed Domestic Shorthair cat was presented to the Auburn University Emergency and Critical Care service for evaluation of pleural effusion and a suspected intrathoracic mass. Computed tomography was performed which confirmed the presence of a large intrathoracic mass, likely heart-based. Fine-needle aspirates were obtained and a cytologic diagnosis of a neuroendocrine tumor was made. Treatment with toceranib phosphate was briefly attempted at home by the owners. The cat died at home approximately 6 weeks after diagnosis. Necropsy and subsequent histopathologic examination revealed a metastatic neuroendocrine carcinoma of aortic body origin. Aortic body tumors are extremely rare in cats and to the authors’ knowledge, a neuroendocrine carcinoma of aortic body origin with distant metastases has not yet been reported in a cat.


Persistent bacterial infections of the gastrointestinal mucosa are causally linked to gastric carcinoma and mucosa-associated lymphoid tissue (MALT) lymphoma in people and laboratory animals. We examined the relationship of mucosa-associated bacteria to alimentary lymphoma in cats. Intestinal biopsies from 50 cats with alimentary lymphoma (small cell, n = 33; large cell, n = 17) and 38 controls without lymphoma (normal to minimal change on histopathology, n = 18; lymphocytic-plasmacytic enteritis, n = 20) were evaluated. The number and spatial distribution of bacteria (ie, in luminal cellular debris, villus-associated mucus, adherent to epithelium, mucosal invasion, intravascular, or serosal) were determined by fluorescence in situ hybridization with the eubacterial probe EUB-338. Mucosa-invasive bacteria were more frequently observed in cats with large cell lymphoma (82%, P ≤.001) than in cats with small cell lymphoma (18%), normal to minimal change on histopathology, and lymphocytic-plasmacytic enteritis (3%). Intravascular bacteria were observed solely in large cell lymphoma (29%), and serosal colonization was more common in cats with large cell lymphoma (57%) than with small cell lymphoma (11%, P ≤01), normal to minimal change (8%, P ≤01), and lymphocytic-plasmacytic enteritis (6%, P ≤.001). The high frequency of invasive bacteria within blood vessels and serosa of cats with large cell lymphoma may account for the sepsis-related complications
associated with large cell lymphoma and inform clinical management. Further studies are required to determine the role of intramucosal bacteria in the etiopathogenesis of feline alimentary lymphoma.


**Occupancy of the Invasive Feral Cat Vari**

The domestic cat (Felis catus) is an invasive exotic in many locations around the world and is thought to be a key factor driving recent mammal declines across northern Australia. Many mammal species native to this region now persist only in areas with high topographic complexity, provided by features such as gorges or escarpments. Do mammals persist in these habitats because cats occupy them less, or despite high cat occupancy? We show that occupancy of feral cats was lower in mammal-rich habitats of high topographic complexity. These results support the idea that predation pressure by feral cats is a factor contributing to the collapse of mammal communities across northern Australia. Managing impacts of feral cats is a global conservation challenge. Conservation actions such as choosing sites for small mammal reintroductions may be more successful if variation in cat occupancy with landscape features is taken into account.


**Effect of Body Weight on Echocardiographic Measurements in 19,866 Pure-Bred Cats with or without Heart Disease.**

BACKGROUND: Echocardiography is a cost-efficient method to screen cats for presence of heart disease. Current reference intervals for feline cardiac dimensions do not account for body weight (BW).

OBJECTIVE: To study the effect of BW on heart rate (HR), aortic (Ao), left atrial (LA) and ventricular (LV) linear dimensions in cats, and to calculate 95% prediction intervals for these variables in normal adult pure-bred cats.

ANIMALS: 19 866 pure-bred cats.

METHODS: Clinical data from heart screens conducted between 1999 and 2014 were included. Associations between BW, HR, and cardiac dimensions were assessed using univariate linear models and allometric scaling, including all cats, and only those considered normal, respectively. Prediction intervals were created using 95% confidence intervals obtained from regression curves.

RESULTS: Associations between BW and echocardiographic dimensions were best described by allometric scaling, and all dimensions increased with increasing BW (all P<0.001). Strongest associations were found between BW and Ao, LV end diastolic, LA dimensions, and thickness of LV free wall. Weak linear associations were found between BW and HR and left atrial to aortic ratio (LA:Ao), for which HR decreased with increasing BW (P<0.001), and LA:Ao increased with increasing BW (P<0.001). Marginal differences were found for prediction formulas and prediction intervals when the dataset included all cats versus only those considered normal.

CONCLUSIONS AND IMPORTANCE: BW had a clinically relevant effect on echocardiographic dimensions in cats, and BW based 95% prediction intervals may help in screening cats for heart disease.


**Prevalence of intestinal parasites in breeding cattery cats in Japan.**

OBJECTIVES: To address the lack of up-to-date published data, the present study assessed the prevalence of intestinal parasites in breeding catteries in Japan.

METHODS: Fresh faecal samples were
randomly collected from 342 cats (aged 1 month to 12 years) in seven breeding catteries in Japan, located in prefectures of Nagano (n = 2), Saitama (n = 1), Aichi (n = 2), Gifu (n = 1) and Miyagi (n = 1), on a single occasion. The samples were tested for the presence of Giardia species copro-antigen using a commercially available enzyme-linked immunosorbent assay kit. Other intestinal parasites were identified microscopically using the formalin-ethyl acetate sedimentation technique. 

RESULTS: The total prevalence of intestinal parasites was 20.8%; only two genera of protozoa (Giardia species: 18.7% and Cystoisospora species: 5.0%) were detected. Coinfections of both protozoans were recorded in 2.9% of cats. In contrast, no helminths were detected. The presence of total infection, Giardia species, Cystoisospora species and multiple infestations in cats <1 year old were significantly more prevalent than in cats ≥1 year old. There were no significant differences among faecal conditions with or without intestinal parasites. Giardia species infection was present in samples from all breeding catteries, except for one facility. Cystoisospora species and coinfections were shown in four and two breeding catteries, respectively. The prevalence of intestinal parasites was markedly variable among the breeding catteries.

CONCLUSIONS AND RELEVANCE: The present study demonstrates the significance of Giardia species and Cystoisospora species infections in breeding catteries. Additionally, it is suggested that environmental contamination is the most important factor influencing the prevalence of protozoal infections in breeding catteries.


Efficacy of Topical Therapy with Newly Developed Terbinafine and Econazole Formulations in the Treatment of Dermatophytosis in Cats.

In the field of veterinary dermatology dermatophytosis is one of the most frequently occurring infectious diseases, therefore its treatment should be effective, convenient, safe and inexpensive. The aim of this study was to evaluate the efficacy of newly developed topical formulations in the treatment of cats with dermatophytosis. Evaluation of clinical efficacy and safety of terbinafine and econazole formulations administered topically twice a day was performed in 40 cats. Cats, suffering from the most widely spread Microsporum canis-induced dermatophytosis and treated with terbinafine hydrochloride 1% cream, recovered within 20.3±0.88 days; whereas when treated with econazole nitrate 1% cream, they recovered within 28.4±1.14 days. A positive therapeutic effect was yielded by combined treatment with local application of creams and whole coat spray with enilconazole 0.2% emulsion “Imaverol”. Most cats treated with econazole cream revealed redness and irritation of the skin at the site of application. This study demonstrates that terbinafine tended to have superior clinical efficacy (p<0.001) in the treatment of dermatophytosis in cats compared to theazole tested.


Evidence for seasonal reproduction in UK domestic cats.

OBJECTIVES: The aims of this study were to analyse a large body of data obtained by the Royal Society for the Prevention of Cruelty to Animals (RSPCA) Greater Manchester Animal Hospital on the breeding pattern of owned domestic cats in the UK, and to provide clear statistical evidence of whether seasonal variation remains present in temperate climates. METHODS: The total number of cats spayed and the number of cats found to be pregnant were recorded on a monthly basis from December 2005 to July 2014 by the RSPCA Greater Manchester Animal Hospital. The percentage of cats found to be pregnant was calculated for each month and the 8.5 years of data were binned into calendar months. The mean and SD of the monthly pregnancy rate was calculated for each calendar month bin, as was
the difference between the mean percentage of detected pregnancies and the global mean. The Z score for each month’s difference was then calculated. RESULTS: Data were available for 5414 cats neutered during the 8.5 consecutive years of this study. A global average of 8.9% of cats spayed were found to be pregnant. The mean calendar month pregnancy rate exhibited a very significant variation, with the highest positive deviation being in April (Z score +2.9) and the highest negative deviation being in November/December (Z score -4.5). When aggregated into 3 month averages, an extremely significant difference between ‘spring’ and ‘winter’ months of >7 SE (P <0.01) was found.

CONCLUSIONS AND RELEVANCE: This study provides clear statistical evidence, from a large data set, that seasonal breeding patterns are still present under UK temperate conditions. We discuss the impact that this has on charity rescue shelters and propose that a campaign targeted at clients of animal welfare charities encouraging autumn neutering will be the most cost-effective method of cat population control, and help relieve the demand on welfare charity resources.


OBJECTIVES: In humans, genome-wide association studies have identified variants in the uromodulin gene (UMOD) associated with blood pressure and renal function. This study aimed to evaluate the association of single nucleotide polymorphisms at the UMOD locus with renal function and blood pressure in cats.

METHODS: We retrospectively identified cats aged 14 years that had participated in a geriatric monitoring program, and from which stored DNA samples were available, from a computerised database. We then measured the association of specific single nucleotide polymorphisms in the feline UMOD gene with renal function and systolic blood pressure as continuous variables and, also, the dichotomous outcome of azotaemic chronic kidney disease and systemic hypertension.

RESULTS: Eight intronic single nucleotide polymorphisms, one 1372 base pairs upstream from UMOD and two exonic single nucleotide polymorphisms were evaluated in 227 cats with renal and blood pressure data. An analysis of 188 cats found four single nucleotide polymorphisms to be significantly associated (P<0.01) with systolic blood pressure although all were in linkage disequilibrium. No significant associations were identified between single nucleotide polymorphisms and renal function or chronic kidney disease.

CLINICAL SIGNIFICANCE: Results of this pilot study suggest that genetic variation in UMOD might influence blood pressure in cats, similar to findings in humans. Validation of these results is required.


Analysis of feline splenic radiographic measurements and their correlation to ultrasonographic measurements.

OBJECTIVES: The purpose of this study was to establish a method for feline splenic measurement on abdominal radiographs and evaluate for correlation between the radiographic measurements and ultrasonographic measurements.

METHODS: One hundred cats with normal abdominal radiographs and ultrasound (US) studies of the spleen were evaluated. The hypothesis was that the measurement of the spleen on the radiographs would correlate with the measurement of the spleen on US. The radiographic and ultrasonographic measurements were tabulated and compared using linear regression and t-tests using unequal variances.

RESULTS: The measurement of the spleen on the ventrodorsal projection was characterized as one of three shapes (A, B or C), and thereby based on the thickest part
of the spleen (when corrected for radiographic magnification: A = 9.9 ± 2.2 mm; B = 8.1 ± 1.8 mm; C = 8.0 ± 2.3 mm). There were 48 cats where the head of the spleen was seen on the right lateral (n = 10), left lateral (n = 24) or both (n = 14) projections. On one left lateral, both the head and tail of the spleen were seen. There was weak correlation between the radiographic and US measurements (R ≥ 0.6).

Splenic thickness of shape A on the ventrodorsal projection was significantly greater than categories B and C. CONCLUSIONS AND RELEVANCE: Radiographic measurement of the spleen is not a reliable indicator of its ultrasonographic measurement. The ultrasonographic measurements seen in this study (mean of 8.0 ± 1.6 mm) were similar to measurements of the spleen reported in previous studies. It is rare to see the tail of the spleen on lateral feline abdominal radiographs.


Pharmacokinetics of liposomal encapsulated buprenorphine suspension following subcutaneous administration to cats.

We investigated the effects of liposome encapsulation at prolonging the systemic exposure of buprenorphine following subcutaneous administration in cats. Seven healthy male cats were dosed intravenously with 0.02 mg/kg buprenorphine solution (STD-BUP), followed 14 days later by a subcutaneous injection of 0.2 mg/kg buprenorphine as a liposomal suspension (SUS-BUP) containing drug molecules both in liposomes and the suspending vehicle. Buprenorphine time plasma concentration data for both dosing routes were analyzed simultaneously with four compartmental models. Goodness of fit was assessed both graphically and with the Akaike information criterion. The time-course of intravenous STD-BUP was biphasic, with a 4.39 h average terminal half-life. The subcutaneous SUS-BUP produced plasma buprenorphine concentrations above 0.5 µg/L for more than 96 h, with three distinct peaks in the first 15 h. The model with best fit comprised a central and a peripheral compartment, plus three subcutaneous absorption compartments: one of dissolved drug molecules that were absorbed through a first-order process, and two of liposome-encapsulated drug molecules that were transferred to the solution compartment through separate zero-order processes. Liposomes effectively prolonged the systemic exposure of buprenorphine in cats.


Diagnostic imaging features of normal anal sacs in dogs and cats.

This study was conducted to provide normal reference features for canine and feline anal sacs using ultrasound, low-field magnetic resonance imaging (MRI) and radiograph contrast as diagnostic imaging tools. A total of ten clinically normal beagle dogs and eight clinically normally cats were included. General radiography with contrast, ultrasonography and low-field MRI scans were performed. The visualization of anal sacs, which are located at distinct sites in dogs and cats, is possible with a contrast study on radiography. Most surfaces of the anal sacs tissue, occasionally appearing as a hyperechoic thin line, were surrounded by the hypoechoic external sphincter muscle on ultrasonography. The normal anal sac contents of dogs and cats had variable echogenicity. Signals of anal sac contents on low-field MRI varied in cats and dogs, and contrast medium using T1-weighted images enhanced the anal sac walls more obviously than that on ultrasonography. In conclusion, this study provides the normal features of anal sacs from dogs and cats on diagnostic imaging. Further studies including anal sac evaluation are expected to investigate disease conditions.
Hypothermia in Uremic Dogs and Cats.

BACKGROUND: The prevalence of uremic hypothermia (UH) and the effects of improving uremia on body temperature have not been determined in veterinary patients. OBJECTIVES: To determine the prevalence of UH and correlations between uremia and body temperature in patients undergoing intermittent hemodialysis (IHD). ANIMALS: Uremic dogs (n = 122) and cats (n = 79) treated by IHD at the Bobst Hospital of the Animal Medical Center from 1997 to 2013. METHODS: Retrospective review of medical records. RESULTS: The prevalence of hypothermia was 38% in azotemic cats and 20.5% in azotemic dogs. Statistically significant temperature differences were observed between uremic and nonuremic dogs (nonuremic: mean, 100.8°F; range, 91.2-109.5°F; uremic: mean, 99.9°F; range, 95.6-103.8°F; P <.0001) and cats (nonuremic: mean, 100.6°F; range, 94.0-103.8°F; uremic: mean, 99.3°F; range, 92.3-103.4°F; P <.0001). In dog dialysis patients, significant models included (1) timing (pre-dialysis versus post-dialysis) with weight class (small [P <.0001], medium [P =.016], and large breed [P =.033] dogs), (2) timing with serum creatinine concentration (P =.021), and (3) timing with BUN concentration (P <.0001). In cat dialysis patients, there was a significant interaction between timing and weight as a categorical variable (<5 kg and ≥5 kg). CONCLUSIONS AND CLINICAL IMPORTANCE: Uremic hypothermia appears to be a clinical phenomenon that occurs in cats and dogs. Uremic patients are hypothermic compared to ill nonuremic patients and body temperatures increase when uremia is corrected with IHD in dogs and in cats >5 kg. In cats, UH seems to be a more prevalent phenomenon driven by uremia. Uremic hypothermia does occur in dogs, but body weight is a more important predictor of body temperature.


Feline vector-borne diseases have increasingly become a focus of interest in recent years. Toxoplasma gondii, Dirofilaria immitis, and Chlamydia felis are common pathogens of cats that can affect humans among different countries all over the world. However, information about prevalence of T. gondii and C. felis is available in China, but information about coinfection of T. gondii, D. immitis, and C. felis in cats is limited. Thus, this study was conducted to estimate the prevalence of these pathogens’ infection among stray and companion cats in northeastern and eastern China and identify the influence of age, gender, types, and regions on seropositivity. The circulating antigens of D. immitis and specific antibodies to T. gondii and C. felis were examined using kits commercially available. The overall prevalence of T. gondii, D. immitis, and C. felis was 15.43%, 1.93%, and 9.90%, respectively. Coinfection was common, and infection with both T. gondii and C. felis was the most common coinfection (22.32%). Stray cats have significantly higher seroprevalences than companion cats (p <0.05). Moreover, the infection rates of these pathogens keep increasing year by year. This is the first report of T. gondii, D. immitis, and C. felis infection in cats in northeastern and eastern China. The findings of this study reveal that T. gondii, D. immitis, and C. felis are prevalent in stray and companion cats in northeastern China, which provided baseline data for the effective prevention and control of these parasites’ prevalence in these regions and other parts of China.
Characterisation of methicillin-resistant Staphylococcus aureus clinical isolates from animals in New Zealand, 2012-2013, and subclinical colonisation in dogs and cats in Auckland.

AIMS: To characterise methicillin-resistant Staphylococcus aureus (MRSA) isolates from infection sites in animals in New Zealand and assess the prevalence of subclinical MRSA colonisation in dogs and cats attending veterinary clinics in Auckland. METHODS: MRSA isolates from clinical specimens obtained by the main New Zealand veterinary diagnostic laboratories between June 2012 and June 2013, were genotypically characterised by DNA microarray hybridisation analysis and spa typing. In addition, nasal or perineal skin swabs collected from a cross-sectional sample of dogs (n=361) and cats (n=225) attending 29 veterinary clinics in Auckland during the same period were analysed for MRSA by culture. RESULTS: Eight MRSA clinical isolates were submitted for characterisation by the participating laboratories. The isolates originated from five dogs, including two isolates from the same dog, one foal, and one isolate had no identification of the source. The strain-types identified were AK3 (ST-5 SCCmecIV t045; n=1), USA500 (ST8 SCCmecIV t064; n=1), WSPP (ST30 SCCmecIV t019; n=1), Rhine Hesse (ST5 SCCmecII t002; n=2), and EMRSA-15 (ST22 SCCmecIV t032; n=3). No MRSA were isolated from 586 cultured swabs. Methicillin-susceptible S. aureus were detected in 9/257 (3.5%) swabs and non-aureus staphylococci in 22/257 (8.5%) swabs. The estimated true MRSA subclinical colonisation prevalence was 0%, with an upper 95% CI boundary of 1.9% for cats and 1.4% for dogs. CONCLUSIONS: The modest number of MRSA isolates submitted for this study by the participating laboratories suggests clinical MRSA infection in animals in New Zealand continues to be sporadic. The wide variety of strain-types found mirrored the evolving strain-type diversity observed in humans. We cannot rule out bias due to the non-random sampling of dogs and cats, but the apparent colonisation prevalence of 0% was consistent with the low prevalence of subclinical colonisation in humans in New Zealand. These similarities indicate the epidemiology of animal and human MRSA infections are linked. CLINICAL RELEVANCE: In the last decade, the prevalence of human MRSA infections in New Zealand has steadily increased. This is the second published study of MRSA in animals in New Zealand. The results indicate clinical MRSA infection in animals remains sporadic, but the diversification of the strain-types may pose new therapeutic challenges to veterinarians, due to their diverse resistome.


Effects of Long-Term Exposure to an Electronic Containment System on the Behaviour and Welfare of Domestic Cats.

Free-roaming cats are exposed to a variety of risks, including involvement in road traffic accidents. One way of mitigating these risks is to contain cats, for example using an electronic boundary fence system that delivers an electric ‘correction’ via a collar if a cat ignores a warning cue and attempts to cross the boundary. However, concerns have been expressed over the welfare impact of such systems. Our aim was to determine if long-term exposure to an electronic containment system was associated with reduced cat welfare. We compared 46 owned domestic cats: 23 cats that had been contained by an electronic containment system for more than 12 months (AF group); and 23 cats with no containment system that were able to roam more widely (C group). We assessed the cats’ behavioural responses and welfare via four behavioural tests (unfamiliar person test; novel object test; sudden noise test; cognitive bias test) and an owner questionnaire. In the unfamiliar person test, C group lip-licked more than the AF group, whilst the AF group looked at, explored and interacted more with the unfamiliar person than C group. In the novel object test, the AF group looked at and explored the object more than C group. No significant differences were found between AF and C groups for the sudden noise or cognitive bias tests. Regarding the questionnaire, C group owners thought their cats showed more irritable behaviour...
and AF owners thought that their cats toileted inappropriately more often than C owners. Overall, AF cats were less neophobic than C cats and there was no evidence of significant differences between the populations in general affective state. These findings indicate that an electronic boundary fence with clear pre-warning cues does not impair the long term quality of life of cats.


**Lynxacarus radovskyi mites in feral cats: a study of diagnostic methods, preferential body locations, co-infestations and prevalence.**

BACKGROUND: Lynxacarus radovskyi (fur mites) are ectoparasites found on the hair shafts of cats living in tropical environments. Diagnosis is via microscopic examination of hairs. Various anatomical areas have been reported to harbour these mites. OBJECTIVES: To assess adhesive tape impressions and trichograms for detecting L. radovskyi and co-infestations; to determine host body predilection sites and affected gender; to determine prevalence of L. radovskyi in a feral cat population. ANIMALS: 121 feral cats in a trap, neuter and release programme. METHODS: After cats were premedicated for surgical sterilization, hairs from seven to nine body sites were removed from each cat using adhesive tape impression and trichogram techniques. Samples were examined at 10-100× magnification using compound or stereo microscopes. RESULTS: The prevalence of L. radovskyi was 71% (86 of 121) within the feral cat population. Tape impressions identified 75 cats; trichograms identified 56 cats. There were fewer false negative results with tape impressions. Caudal body sites were more likely to be positive, with the perianal area being the most commonly affected. Males and females were infested equally. Tape impressions identified more Cheyletiella blakei infestations and both methods identified some Felicola felis infestations. CONCLUSIONS AND CLINICAL IMPORTANCE: Tape impressions were easier to perform and identified more L. radovskyi positive cats and more co-infestations. Hairs from the perianal area and other caudal body sites are most likely to harbour L. radovskyi. Within this feral cat population, L. radovskyi was a common infestation.


**Evaluation of injectable robenacoxib for the treatment of post-operative pain in cats: results of a randomized, masked, placebo-controlled clinical trial.**

BACKGROUND: Few pharmaceuticals are registered in cats for the management of post-operative pain and inflammation. The objective of this study was to assess the field efficacy and safety of an injectable formulation of the nonsteroidal anti-inflammatory drug robenacoxib in cats undergoing surgery. The study was a multi-center, prospective, randomized, masked, parallel-group, placebo-controlled clinical trial. A total of 349 cats were enrolled and underwent surgery comprising forelimb onychectomy, as an example of orthopedic surgery, plus either ovariohysterectomy or castration. All cats received butorphanol prior to anesthesia and forelimb four-point regional nerve blocks with bupivacaine after induction of general anesthesia. Cats were randomized to receive daily subcutaneous (s.c.) injection of robenacoxib, at a target dosage of 2.0 mg/kg (n = 174), or placebo (n = 175) once prior to surgery and for an additional two days post-operatively. RESULTS: Significantly (P = 0.037) fewer cats administered robenacoxib received additional analgesia rescue therapy (34 of 173, 19.7 %) compared to cats given placebo (73 of 175, 41.7 %). The percentage of treatment success was therefore 80.3 % with robenacoxib and 58.3 % with placebo. Behavior, posture, pain on palpation of the paw and soft tissue surgical sites, and overall pain were significantly (P < 0.05) improved versus placebo at various time points within the first 8 h in cats receiving robenacoxib. The most frequently reported adverse events were incision site infection/dehiscence, bleeding, vomiting, decreased appetite and
lethargy. Frequencies of reported adverse clinical signs, hematology, serum chemistry and urinalysis variables, and body weight changes were similar between groups. There were no significant changes from baseline with robenacoxib in hepatic, hematological or renal clinical pathology variables.

CONCLUSIONS: Robenacoxib by s.c. injection was effective and well tolerated in the control of post-operative pain associated with orthopedic, ovariohysterectomy and castration surgery in cats.


Could the domestic cat play a significant role in the transmission of Echinococcus multilocularis? A study based on qPCR analysis of cat feces in a rural area in France.

Echinococcus multilocularis, a cestode parasite responsible for alveolar echinococcosis in humans, is often reported in Europe. It involves red foxes, domestic dogs, and domestic and wild cats as definitive hosts. The parasite infects small mammals and accidentally humans as intermediate hosts and develops in a similar way to a tumor, usually in the liver. Domestic animals are suspected of playing a role in parasite transmission, but this is rarely proven. Moreover, the role of domestic cats is thought to be small, because of experimental studies showing incomplete development of the parasite observed in their intestines. In the present study, we investigated copro-sampling performed in a rural and highly endemic area in Eastern France, on carnivore feces (n = 150). From these samples, the parasite was detected and identified by DNA analysis using quantitative PCR targeting part of a mitochondrial gene (Em-qPCR). Taeniid eggs were isolated from positive-Em-qPCR samples by flotation, and species identification was confirmed by sequencing on DNA extracts. From a total of 43 copro-samples from cats, four tested positive for E. multilocularis by the Em-qPCR. In two of these, we found parasite eggs that were identified as E. multilocularis. This finding was confirmed by sequencing, while one dog stool out of 61 collected was found to be positive, no egg was detectable. At the same time, 34% of fox stools tested positive for the parasite. The present study challenges the current idea that cats are only of minor significance in the E. multilocularis life cycle.

Knight, A., and M. Leitsberger (2016) Animals (Basel) 6

Vegetarian versus Meat-Based Diets for Companion Animals.

Companion animal owners are increasingly concerned about the links between degenerative health conditions, farm animal welfare problems, environmental degradation, fertilizers and herbicides, climate change, and causative factors; such as animal farming and the consumption of animal products. Accordingly, many owners are increasingly interested in vegetarian diets for themselves and their companion animals. However, are vegetarian canine and feline diets nutritious and safe? Four studies assessing the nutritional soundness of these diets were reviewed, and manufacturer responses to the most recent studies are provided. Additional reviewed studies examined the nutritional soundness of commercial meat-based diets and the health status of cats and dogs maintained on vegetarian and meat-based diets. Problems with all of these dietary choices have been documented, including nutritional inadequacies and health problems. However, a significant and growing body of population studies and case reports have indicated that cats and dogs maintained on vegetarian diets may be healthy—including those exercising at the highest levels—and, indeed, may experience a range of health benefits. Such diets must be nutritionally complete and reasonably balanced, however, and owners should regularly monitor urinary acidity and should correct urinary alkalisation through appropriate dietary additives, if necessary.

**Associations between respiratory signs and abnormalities reported in thoracic CT scans of cats.**

**OBJECTIVES:** To estimate the prevalence of subclinical abnormalities reported in thoracic (CT) scans of cats and to investigate associations between respiratory signs and CT signs. **METHODS:** Retrospective review of signalment, indications, respiratory signs and reported CT findings in a series of cats. Associations between patient variables, respiratory signs and CT signs were analysed using multi-variable regression methods. **RESULTS:** Records of 352 consecutive cats were reviewed. Abnormalities affecting thoracic structures were reported in CT scans of 138/179 (77%) cats that did not have respiratory signs; the most prevalent CT findings were pulmonary collapse (41%), evidence of bronchial disease (24%) and space-occupying lesions (21%). Dyspnoea, cough and tachypnoea were associated with space-occupying lesions. Dyspnoea was also associated with pulmonary consolidation and atelectasis. Increasing body weight was associated with pulmonary atelectasis and increasing age was associated with evidence of bronchial disease. **CLINICAL SIGNIFICANCE:** Abnormalities were commonly detected in thoracic CT scans of cats that did not show respiratory signs. The most prevalent abnormality - pulmonary atelectasis - is probably a temporary effect of sedation or anaesthesia. A high prevalence of subclinical abnormalities and limited correlations between clinical signs and CT findings will complicate diagnosis.


**Therapeutic effects of an alpha-casozepine and L-tryptophan supplemented diet on fear and anxiety in the cat.**

**OBJECTIVES:** This study assessed the anxiolytic effectiveness of a test diet (Royal Canin Feline Calm diet) supplemented with L-tryptophan and alpha-casozepine. **METHODS:** Subjects were 24 cats that were classified as mildly or markedly fearful based on the presence of a person in their home room. Three different protocols were used to assess anxiety: (1) evaluation of the response to a human in the cat’s home room (home room test); (2) analysis of the response to placement in an empty test room (open-field test) and; (3) analysis of the response to an unfamiliar human (human interaction test). All three protocols were first run at baseline, and the results were used to assign the animals to control and test diet groups that showed equivalent fear and anxiety. Both groups were retested on the three protocols after 2 weeks (test 1) and again after 4 weeks (test 2). **RESULTS:** The diet groups differed for two behavioral measures in the open-field test: inactivity duration and inactivity frequency. The control group showed statistically significant increases in inactivity duration between baseline and test 1 and baseline and test 2, while the group fed the test diet showed a marginally not significant decrease in inactivity duration between baseline and test 1 and a not significant decrease for test 2. There was also a significant increase in inactivity frequency between baseline and test 1 in the test diet group and marginally not significant decrease in the control group. There were no differences between groups in the approach of the cats toward people for the home room test and the human interaction test. **CONCLUSIONS AND RELEVANCE:** These results suggest that the test diet reduced the anxiety response to placement in an unfamiliar location, but that fear in the presence of an unfamiliar person was not counteracted by the diet.


**COMPUTED TOMOGRAPHY OF TOOTH RESORPTION IN CATS.**

Tooth resorption is the most common dental disease in cats and can be a source of oral pain. The
current clinical gold standard for diagnosis includes a combination of oral exam and dental radiography, however early lesions are not always detected. Computed tomography (CT) of the skull, including the dental arches, is a commonly performed diagnostic procedure, however the appearance of tooth resorption on CT and the diagnostic ability of CT to detect tooth resorption have not been evaluated. The purpose of this prospective, descriptive, diagnostic accuracy study was to characterize the CT appearance of tooth resorption in a sample of affected cats and to evaluate the sensitivity and specificity of CT for tooth resorption compared to the clinical gold standard of oral exam and intraoral dental radiography. Twenty-eight cat cadaver specimens were recruited for inclusion. Each specimen was evaluated using oral exam, intraoral dental radiography, and computed tomography (four different slice thicknesses). Each tooth was evaluated for the presence or absence of tooth resorption. Teeth with lesions and a subset of normal teeth were evaluated with histopathology. On CT, tooth resorption appeared as irregularly marginated hypoattenuating defects in the mineral attenuating tooth components, most commonly involving the root or cementoenamel junction. Sensitivity for CT detection of tooth resorption was fair to poor (42.2-57.7%) and specificity was good to excellent (92.8-96.3%). Findings from this study indicated that CT has high specificity but low sensitivity for detection of tooth resorption in cats.

High-resolution computed tomography evaluation of the bronchial lumen to vertebral body diameter and pulmonary artery to vertebral body diameter ratios in anesthetized ventilated normal cats.
OBJECTIVES: Bronchial lumen to pulmonary artery diameter (BA) ratio has been utilized to investigate pulmonary pathology on high-resolution CT images. Diseases affecting both the bronchi and pulmonary arteries render the BA ratio less useful. The purpose of the study was to establish bronchial lumen diameter to vertebral body diameter (BV) and pulmonary artery diameter to vertebral body diameter (AV) ratios in normal cats. METHODS: Using high-resolution CT images, 16 sets of measurements (sixth thoracic vertebral body [mid-body], each lobar bronchi and companion pulmonary artery diameter) were acquired from young adult female cats and 41 sets from pubertal female cats. RESULTS: Young adult and pubertal cat BV ratios were not statistically different from each other in any lung lobe. Significant differences between individual lung lobe BV ratios were noted on combined age group analysis. Caudal lung lobe AV ratios were significantly different between young adult and pubertal cats. All other lung lobe AV ratios were not significantly different. Caudal lung lobe AV ratios were significantly different from all other lung lobes but not from each other in both the young adult and pubertal cats. CONCLUSIONS AND RELEVANCE: BV ratio reference intervals determined for individual lung lobes could be applied to both young adult and pubertal cats. Separate AV ratios for individual lung lobes would be required for young adult and pubertal cats. These ratios should allow more accurate evaluation of cats with concurrent bronchial and pulmonary arterial disease.

Clinical and Diagnostic Imaging Features of Brain Herniation in Dogs and Cats.
BACKGROUND: Quantification of brain herniation on MRI and its immediate clinical implications are poorly described. OBJECTIVES: Define the normal position of caudal fossa structures on brain MRIs in dogs and cats utilizing morphometry, compare this to dogs and cats with caudal transtentorial
herniation (CTH), foramen magnum herniation (FMH) or both identified on MRI, and investigate
associations between herniation severity, clinical signs, and 24-hour outcome. ANIMALS: Ninety-two
controls (66 dogs, 26 cats), 119 cases with herniation (88 dogs, 31 cats). METHODS: Retrospective
case series. The MRI database was searched for controls with normal brain anatomy and cases with
brain herniation. Morphometry in controls established TTX (transtentorial to rostroventral cerebellum)
to quantify CTH and FMX (caudoventral cerebellum to foramen magnum) to quantify FMH.
Measurements were compared between cases and controls. Correlations with specific clinical variables
and outcome were investigated. RESULTS: Measurements in medium/large control dogs versus small
dog and cat controls were significantly different (P < .001, TTX: -0.46, -0.305, -0.3, FMX: 0.695, 0.27,
0.25, respectively). 119/1564 (7.6%) cases that underwent brain imaging had brain herniation. TTX and
FMX were significantly different between controls and cases with CTH or FMH (P < .001). 67/89
(75%) cases with supratentorial lesions had no signs directly attributable to herniation. 71/119 (60%)
had a normal anesthetic recovery. TTX was significantly associated with 24-hour survival (P < .001).
CONCLUSIONS AND CLINICAL IMPORTANCE: Brain herniation can be quantified on MRI.
Clinical signs directly attributable to brain herniation commonly are absent, and more severe CTH
based on TTX is associated with a worse short-term outcome.

Platelet Activation and Clopidogrel Effects on ADP-Induced Platelet Activation in Cats with or
without the A31P Mutation in MYBPC3.
BACKGROUND: Clopidogrel is commonly prescribed to cats with perceived increased risk of
thromboembolic events, but little information exists regarding its antiplatelet effects. OBJECTIVE: To
determine effects of clopidogrel on platelet responsiveness in cats with or without the A31P mutation
in the MYBPC3 gene. A secondary aim was to characterize variability in feline platelet responses to
clopidogrel. ANIMALS: Fourteen healthy cats from a Maine Coon/outbred mixed Domestic cat
colony: 8 cats homozygous for A31P mutation in the MYBPC3 gene and 6 wild-type cats without the
A31P mutation. METHODS: Ex vivo study. All cats received clopidogrel (18.75 mg PO q24h) for 14
days. Before and after clopidogrel treatment, adenosine diphosphate (ADP)-induced P-selectin
expression was evaluated. ADP- and thrombin-induced platelet aggregation was measured by optical
aggregometry (OA). Platelet pVASP and ADP receptor response index (ARRI) were measured by
Western blot analysis. RESULTS: Platelet activation from cats with the A31P mutation was
significantly (P =.0095) increased [35.55% (18.58-48.55) to 58.90% (24.85-69.90)], in response to
ADP. Clopidogrel treatment attenuated ADP-induced P-selectin expression and platelet aggregation.
ADP- and PGE1 -treated platelets had a similar level of pVASP as PGE1 -treated platelets after
clopidogrel treatment. Clopidogrel administration resulted in significantly lower ARRI [24.13%
(12.46-35.50) to 11.30% (-7.383 to 23.27)] (P =.017). Two of 13 cats were nonresponders based on OA
and flow cytometry. CONCLUSION AND CLINICAL IMPORTANCE: Clopidogrel is effective at
attenuating platelet activation and aggregation in some cats. Cats with A31P mutation had increased
platelet activation relative to the variable response seen in wild-type cats.

New advances in the diagnosis of canine and feline liver and pancreatic disease.
The diagnosis of liver and pancreatic disorders in dogs and cats present their own set of challenges.
However, as new diagnostic tests are developed and the optimal ways in which to use existing tests are
determined, the ability of the veterinary profession to make these diagnoses continues to improve.
Histopathological assessment is considered to be the reference standard for the diagnosis of many hepatic and pancreatic diseases, but it has some inherent limitations. New classes of diagnostic tests for liver disease that are currently being studied include direct and indirect serum markers of hepatic fibrosis, such as hyaluronic acid; novel markers of hepatocellular injury, such as circulating microRNAs; and quantitative tests of hepatic microsomal function. Assays for pancreas-specific lipase have greatly improved the ability of practitioners to diagnose pancreatitis in dogs and cats. However, further research is needed to fully understand the characteristics of these assays, especially in patients with concurrent non-pancreatic disease. The more common use and refinement of CT and MRI to assess the hepatobiliary system and pancreas of dogs and cats also have huge potential to improve diagnostic capabilities.


**Dietary Aspects of Weight Management in Cats and Dogs.**

The optimal weight loss diet for cats and dogs is best determined by obtaining a full dietary history and performing a detailed assessment of the pet, pet owner, and environment in which the pet lives. Incorporating information about pet and owner preferences allows for individualization of the weight management plan and has the potential to increase adherence. Calorie density, macronutrients, and micronutrient concentrations should be considered as part of a weight management plan. Owners should play an active role in the weight loss plan to have the best outcome.


**Placement of subcutaneous ureteral bypasses without fluoroscopic guidance in cats with ureteral obstruction: 19 cases (2014-2016).**

OBJECTIVES: The purpose of this study was to describe the perioperative and postoperative complications as well as short-term and long-term outcomes in cats with ureteral obstructions treated by placement of a subcutaneous ureteral bypass (SUB) device without imaging control. The second objective of this study was to compare cats treated by SUB device with cats treated by traditional surgical intervention. METHODS: Data were obtained retrospectively from the medical records (2014-2016) of cats that underwent SUB placement (SUB cats) and cats that underwent traditional ureteral surgery (C cats). RESULTS: Nineteen SUB devices were placed without fluoroscopic, radiographic or ultrasonographic guidance in 13 cats. Fifteen traditional interventions (ureterotomy and neoureterocystostomy) were performed in 11 cats. Successful placement of the SUB device was achieved in all cats with only one major intraoperative complication (kinking of the kidney catheter) and one minor intraoperative complication (misplacement of the kidney catheter). Eleven SUB cats recovered from the surgical procedure; two SUB cats and three C cats died during the anaesthesia recovery period. Postoperative SUB complications included anaemia (n = 2), urinary tract infection (UTI) (n = 4), non-infectious cystitis (n = 5) and SUB device obstruction (n = 1). Postoperative traditional surgery complications included anaemia (n = 7), UTIs (n = 6), non-infectious cystitis (n = 1), re-obstruction (n = 4) and ureteral stricture (n = 1). Median postoperative duration of hospitalisation (3 days) was significantly shorter for SUB cats than for C cats (P = 0.013). Ten SUB cats (76.9%) and four C cats (40%) were still alive at a median follow-up of 225 days and 260 days, respectively. Owners were completely (90%) or mostly (10%) satisfied with the SUB device placement.

CONCLUSIONS AND RELEVANCE: SUB device placement appears to be an effective and safe option for treating ureteral obstruction in cats, and this study has shown that fluoroscopic guidance is

**ACVIM Small Animal Consensus Recommendations on the Treatment and Prevention of Uroliths in Dogs and Cats.**

In an age of advancing endoscopic and lithotripsy technologies, the management of urolithiasis poses a unique opportunity to advance compassionate veterinary care, not only for patients with urolithiasis but for those with other urinary diseases as well. The following are consensus-derived, research and experience-supported, patient-centered recommendations for the treatment and prevention of uroliths in dogs and cats utilizing contemporary strategies. Ultimately, we hope that these recommendations will serve as a foundation for ongoing and future clinical research and inspiration for innovative problem solving.


**Distribution of feline lymphoma in the central and peripheral nervous systems.**

In cats, lymphoma (lymphosarcoma) is the most common neoplasm affecting the spinal cord and the second most common intracranial tumour. Although lymphoma commonly develops in the spinal cord as a part of a multicentric process, a primary form may occur. Lymphoma can exhibit a wide range of morphological patterns, including intraparenchymal brain mass, lymphomatosis cerebri, intravascular lymphoma, lymphomatous choroiditis and meningitis, extradural, intradural-extradural or intramedullary lymphoma in the spinal cord, or neurolymphomatosis in the peripheral nerves. Lymphoma may occur as a paraneoplastic disorder associated with peripheral neuropathies. Magnetic resonance imaging (MRI) and computed tomography (CT) are the techniques of choice for morphological assessment of nervous system lesions in vivo. However, biopsy should be performed to achieve a definitive diagnosis. Knowledge of the different morphological patterns expressed by lymphoma in the nervous system of cats allows veterinary clinicians to suspect lymphoma and to arrange appropriate diagnostic procedures, including immunophenotype and clonality studies, along with therapeutic protocols and prognostic evaluations.


**European multicenter study on antimicrobial resistance in bacteria isolated from companion animal urinary tract infections.**

BACKGROUND: There is a growing concern regarding the increase of antimicrobial resistant bacteria in companion animals. Yet, there are no studies comparing the resistance levels of these organisms in European countries. The aim of this study was to investigate geographical and temporal trends of antimicrobial resistant bacteria causing urinary tract infection (UTI) in companion animals in Europe. The antimicrobial susceptibility of 22 256 bacteria isolated from dogs and cats with UTI was determined. Samples were collected between 2008 and 2013 from 16 laboratories of 14 European countries. The prevalence of antimicrobial resistance of the most common bacteria was determined for
each country individually in the years 2012-2013 and temporal trends of bacteria resistance were established by logistic regression. RESULTS: The aetiology of uropathogenic bacteria differed between dogs and cats. For all bacterial species, Southern countries generally presented higher levels of antimicrobial resistance compared to Northern countries. Multidrug-resistant Escherichia coli were found to be more prevalent in Southern countries. During the study period, the level of fluoroquinolone-resistant E. coli isolated in Belgium, Denmark, France and the Netherlands decreased significantly. A temporal increase in resistance to amoxicillin-clavulanate and gentamicin was observed among E. coli isolates from the Netherlands and Switzerland, respectively. Other country-specific temporal increases were observed for fluoroquinolone-resistant Proteus spp. isolated from companion animals from Belgium. CONCLUSIONS: This work brings new insights into the current status of antimicrobial resistance in bacteria isolated from companion animals with UTI in Europe and reinforces the need for strategies aiming to reduce resistance.


Prevention of laryngospasm with rocuronium in cats: a dose-finding study.
OBJECTIVE: To identify the dose of rocuronium that will prevent a laryngeal response to water spraying of the glottis in anesthetized cats. STUDY DESIGN: Randomized crossover study.
ANIMALS: Eight healthy, adult, short-haired cats, aged 1-4 years, weighing 3.2-6.0 kg. METHODS: Each cat was anesthetized four times and administered one of four doses of rocuronium (0.1, 0.2, 0.3 and 0.6 mg kg(-1)) in random order. The larynx was observed with a video-endoscope inserted through a laryngeal mask airway. Video-clips of the laryngeal response to a sterile water spray (0.2 mL) were obtained at baseline (without rocuronium) and at maximal effect of each treatment. Glottal closure score (0-2), duration of glottal closure, and number of adductive arytenoid movements were obtained from video-clips of laryngeal responses (reproduced in slow motion) at baseline and after treatment. Two observers blinded to treatment allocation scored the vigor of the laryngeal response on a visual analog scale (VAS). The duration of apnea (up to 5 minutes) was recorded for each treatment. RESULTS: Compared with baseline, rocuronium 0.3 mg kg(-1) and 0.6 mg kg(-1) significantly decreased all glottal scores obtained from the videos (all p < 0.03). Both observers gave lower VAS scores after 0.3 mg kg(-1) (both p = 0.015). Apnea lasting ≥ 5 minutes occurred in none, one, three and seven of eight cats administered doses of rocuronium 0.1, 0.2, 0.3 and 0.6 mg kg(-1), respectively.
CONCLUSIONS AND CLINICAL RELEVANCE: Rocuronium 0.3 mg kg(-1) and 0.6 mg kg(-1) consistently decreased the completeness and duration of the laryngeal response to water spray, and reduced the number of arytenoid adductive movements in response to that stimulus. However, a laryngeal response was never completely prevented. Rocuronium 0.3 mg kg(-1) may be useful for facilitating tracheal intubation. Positive pressure ventilation must be available for cats administered rocuronium.


Posaconazole Pharmacokinetics in Healthy Cats after Oral and Intravenous Administration.
BACKGROUND: Posaconazole is the most active available azole antifungal drug, but absorption and pharmacokinetics are not available to guide dosing regimens in cats. OBJECTIVE: To determine the pharmacokinetics of posaconazole in cats given an IV solution and PO suspension. ANIMALS: Six healthy, adult research cats. METHODS: After a 12-hour fast, each cat received 15 mg/kg of
posaconazole PO suspension with food. Four cats also received 3 mg/kg IV posaconazole after a 7-day washout period. Plasma was collected at predetermined intervals for analysis using high-pressure liquid chromatography (HPLC). Concentration data were analyzed using a 2-compartment pharmacokinetic analysis for IV administration data and a 1-compartment analysis with first-order input for PO administration data using Phoenix® software. RESULTS: After IV dosing, volume of distribution (VSS) was 1.9 (0.3) L/kg (mean, standard deviation), terminal half-life (T½) was 57.7 (28.4) hours, and clearance was 28.1 (17.3) mL/kg/h. After PO dosing, peak concentration (Cmax) was 1.2 (0.5) µg/mL and T½ was 38.1 (15.0) hours. Bioavailability of PO suspension was 15.9% (8.6). No adverse effects were observed with either route of administration. CONCLUSION AND CLINICAL IMPORTANCE: Despite low PO absorption, these data allow for simulation of PO dosage regimens that could be explored in clinical studies. Two regimens can be considered to maintain targeted trough concentrations of 0.5-0.7 µg/mL as extrapolated from studies in humans: (1) 30 mg/kg PO loading dose followed by 15 mg/kg q48h, or (2) 15 mg/kg PO loading dose followed by 7.5 mg/kg q24h.

The domestic cat is natural host to both feline immunodeficiency virus and Felis catus gammaherpesvirus 1 (FcaGHV1). Comparative data suggest that these agents might act as synergistic copathogens in feline AIDS-related lymphoma. To identify leucocyte subsets harbouring gammaherpesvirus DNA, whole blood from 5 healthy, FcaGHV1-infected cats was labelled with monoclonal antibodies to feline CD21, CD4, CD8 and CD14 for 4-way fluorescence-activated cell sorting. FcaGHV1gB qPCR was performed on DNA extracted from purified fractions and whole blood longitudinally. FcaGHV1 DNA was detected in CD21+, CD4+, CD8+, but not CD14+ cells. Variation in whole blood load, up to 19,788 copies/10(6)cells, was detected in individual cats over time. FcaGHV1 DNA was undetectable in one cat on one occasion highlighting that qPCR of whole blood from a single time point will not detect all cases of FcaGHV1 infection. Further investigation of the role of FcaGHV1 in feline lymphoid malignancies is warranted.

Effect of a GnRH-agonist (deslorelin) was studied on reproductive function and ovarian luteinizing hormone receptor (LHR) and follicle stimulating hormone receptor (FSHR) expression in prepubertal female cats that were either implanted with 4.7-mg deslorelin (implanted: n = 6) or not (controls: n = 18) or ovariohysterectomized at prepubertal age (prepubertal OVH: n = 6). Body weights, fecal estradiol, and sexual behavior of implanted and control cats were monitored for 48 weeks followed by collection of ovaries and uteri. Ovaries and uteri were collected from control cats at follicular, luteal, and inactive stage (n = 6/group) and from prepubertal OVH cats at prepubertal age. Ovaries and uteri were analyzed for anatomical/histological characteristics. Ovaries were also analyzed for LHR and FSHR expression. Statistical analysis showed higher (P ≤ 0.05) body weight in control than implanted cats only during 22nd to 26th weeks of the study. Estrus was observed in control cats only. Deslorelin reduced (P ≤ 0.05) ovarian weight and number of antral follicles but did not affect endometrial thickness and gland diameter. However, myometrial thickness of implanted cats was significantly
lower than control cats at follicular and luteal stage. Ovarian LHR mRNA expression was lower \((P \leq 0.05)\) in implanted cats than control cats at follicular stage. FSHR mRNA and LHR protein expression did not differ among the three groups. FSHR protein expression was lower \((P \leq 0.05)\) in prepubertal OVH cats and was not affected by deslorelin. In conclusion, deslorelin suppresses reproductive function in prepubertal female cats for at least 48 weeks possibly through a change in the ovarian mRNA expression of LHR.

Tibial plateau levelling osteotomy in eleven cats with cranial cruciate ligament rupture.
OBJECTIVE: To report the surgical procedure, intra- and postoperative complications, and short-term follow-up of tibial plateau levelling osteotomy (TPLO) in feline patients with cranial cruciate ligament (CrCL) rupture using a 2.0 or 2.4 mm Synthes® TPLO plate. STUDY DESIGN: Prospective study.
MATERIAL AND METHODS: Eleven cats with a CrCL rupture were included in the study. Inspection of intra-articular structures was carried out via arthroscopy or arthrotomy. Each patient was re-examined one and 10 days after surgery. Orthopaedic examination and follow-up radiographs were obtained four to 12 weeks postoperatively. RESULTS: Two meniscopathies and one partial CrCL rupture were detected. Minor intra-operative complications occurred in five cats (suboptimal positioning of the plate \([n = 3]\), proximal fibular fracture \([n = 1]\), a visible osteotomy gap \([n = 1]\)). Postoperatively, minor complications were detected in three cats (mild patellar desmitis \([n = 2]\), superficial wound infection \([n = 1]\)). No additional surgical reintervention, graded as major complication, was necessary. Four to eight weeks postoperatively, all cats showed no to mild intermittent lameness. Complete bone union was apparent within four to 12 weeks. Owners reported a high level of comfort and mobility during the last follow-up. CONCLUSION: The preliminary results of this study support the use of TPLO in cats, but larger case numbers are needed to evaluate its practicability, as well as long-term outcome (>1 year), especially evaluating the development and the clinical relevance of osteoarthritis.

Canine parvovirus: the worldwide occurrence of antigenic variants.
The most important enteric virus infecting canids is canine parvovirus type 2 (CPV-2). CPV is the aetiologic agent of a contagious disease, mainly characterized by clinical gastroenteritis signs in younger dogs. CPV-2 emerged as a new virus in the late 1970s, which could infect domestic dogs, and became distributed in the global dog population within 2 years. A few years later, the virus’s original type was replaced by a new genetic and antigenic variant, called CPV-2a. Around 1984 and 2000, virus variants with the single change to Asp or Glu in the VP2 residue 426 were detected (sometimes termed CPV-2b and -2c). The genetic and antigenic changes in the variants have also been correlated with changes in their host range; in particular, in the ability to replicate in cats and also host range differences in canine and other tissue culture cells. CPV-2 variants have been circulating among wild carnivores and have been well-documented in several countries around the world. Here, we have reviewed and summarized the current information about the worldwide distribution and evolution of CPV-2 variants since they emerged, as well as the host ranges they are associated with.

Plate failure by bending following tibial fracture stabilisation in 10 cats.

OBJECTIVE: To describe the clinical findings and management of tibial fractures in cats in which osteosynthesis failed due to plate bending. METHODS: Case records and radiographs of cat tibial fracture repairs from five referral centres were reviewed for signalment and to assess incidence of plate failure by bending. Cats that sustained plate bending following plate or plate-rod fixation were reviewed for fracture configuration, repair method, initial postoperative and postfailure tibial alignment, revision treatment and outcome. RESULTS: The incidence of plate bending in cat fractures managed with plate and plate-rod fixation in the four referral centres where the overall number could be established was 13% (8/60). In the 10 cats in which plates bent, initial fractures were generally oblique or spiral with mild comminution and located in the middle or distal third of the tibia. Mean time to implant failure was 24 days (range 2 to 56 days). Mean tibial valgus angle increased from 12.9° to 30.9° following bending of the plate. Short-term outcome following revision surgery using orthogonal plating or stacked medial plates was favourable with improvement in tibial valgus in all five fractures with follow-up data. CLINICAL SIGNIFICANCE: Plate bending following tibial fracture stabilisation in these 10 cats resulted in tibial valgus deformation. Consideration of plate and/or intramedullary rod selection and application should be given to avoid a plate strain environment that exceeds the yield point of the plate.


The prevalence of and risk factors for shedding Toxocara eggs in cats older than 6 months were determined by examining 670 faecal samples collected in 4 cross-sectional studies in the Netherlands. Additionally, cat owners provided information on their attitude towards routine deworming. Samples were examined using the centrifugal sedimentation flotation method. Overall Toxocara prevalence was 7.2 %. Multivariable logistic regression analysis revealed that young age and living in rural areas were significant risk factors for shedding Toxocara eggs. Moreover, the more time a cat was allowed to roam outdoors, the higher was its risk to shed Toxocara as compared to cats with no outdoor access at all. For 199 cats (81.6 % of cats subjected to a deworming regimen) owners provided the reason for treatment. The main reason for routine deworming (80.4 %) concerned the cat’s health and only 10.6 % of the cats were treated for public health reasons. Moreover, the generally advocated four-times-a-year deworming advice was applied on only 24.5 % of cats. We concluded that free roaming is a key factor in the acquisition of patent Toxocara infections leading to the environmental contamination with Toxocara eggs. Additionally, the knowledge of cat owners is still insufficient to expect them to make sound decisions on routine deworming.


OBJECTIVES: Body temperature is commonly used for assessing health and identifying infectious diseases in cats. Rectal thermometry, the most commonly used method, is stressful, invasive and time consuming. Non-contact infrared thermometry (NIRT) has been used with mixed success to measure temperature in humans and other species. The purpose of this study was to determine if NIRT measurements were comparable to rectal temperature measurements or, if not highly correlated, could at least identify cats in the hypothermic or hyperthermic range in need of further evaluation. METHODS: From a total of six NIRT devices and 15 anatomic sites, three devices and three sites
(pinna, gingiva and perineum) with the highest correlation to rectal temperature were selected for further study. Measurements were made in 188 adult cats housed indoors at animal shelters, veterinary clinics and private homes across a wide range of body temperatures and compared with rectal temperatures. RESULTS: Bland-Altman analysis revealed poor agreement between NIRT and rectal thermometry. The mean NIRT measurements ranged from 0.7-1.3°C below the mean rectal measurements, but the effect was not consistent; NIRT measurements tended to exceed rectal measurements in hypothermic cats and fall below rectal measurements in normothermic and hyperthermic cats. CONCLUSIONS AND RELEVANCE: The accuracy of temperature measurements using NIRT devices is not reliable for clinical use in cats.

Omi, T., S. Nakazawa, C. Udagawa, N. Tada, K. Ochiai, Y. H. Chong, Y. Kato, H. Mitsui, A. Gin, H. Oda, D. Azakami, K. Tamura, T. Sako, T. Inagaki, A. Sakamoto, T. Tsutsui, M. Bonkobara, S. Tsuchida, and S. Ikemoto (2016) PLoS One 11:e0165000. Molecular Characterization of the Cytidine Monophosphate-N-Acetylneuraminic Acid Hydroxylase (CMAH) Gene Associated with the Feline AB Blood Group System. Cat’s AB blood group system (blood types A, B, and AB) is of major importance in feline transfusion medicine. Type A and type B antigens are Neu5Gc and Neu5Ac, respectively, and the enzyme CMAH participating in the synthesis of Neu5Gc from Neu5Ac is associated with this cat blood group system. Rare type AB erythrocytes express both Neu5Gc and Neu5Ac. Cat serum contains naturally occurring antibodies against antigens occurring in the other blood types. To understand the molecular genetic basis of this blood group system, we investigated the distribution of AB blood group antigens, CMAH gene structure, mutation, diplotypes, and haplotypes of the cat CMAH genes. Blood-typing revealed that 734 of the cats analyzed type A (95.1%), 38 cats were type B (4.9%), and none were type AB. A family of three Ragdoll cats including two type AB cats and one type A was also used in this study. CMAH sequence analyses showed that the CMAH protein was generated from two mRNA isoforms differing in exon 1. Analyses of the nucleotide sequences of the 16 exons including the coding region of CMAH examined in the 34 type B cats and in the family of type AB cats carried the CMAH variants, and revealed multiple novel diplotypes comprising several polymorphisms. Haplotyping inference, which was focused on non-synonymous SNPs revealed that eight haplotypes carried one to four mutations in CMAH, and all cats with type B (n = 34) and AB (n = 2) blood carried two alleles derived from the mutated CMAH gene. These results suggested that double haploids selected from multiple recessive alleles in the cat CMAH loci were highly associated with the expression of the Neu5Ac on erythrocyte membrane in types B and AB of the feline AB blood group system.

Palmer, J. S., A. E. Jones, J. L. Ward, N. Balakrishnan, K. E. Linder, E. B. Breitschwerdt, and B. W. Keene (2016) J Vet Cardiol 18:213-225. Infective endocarditis in 13 cats. INTRODUCTION: To describe the clinical presentation, clinicopathological abnormalities and outcomes of a series of cats diagnosed with infective endocarditis (IE) at two tertiary care referral institutions. ANIMALS: Thirteen client-owned cats presenting to the cardiology or emergency services of tertiary referral institutions with a diagnosis of endocarditis based on the modified Duke criteria. MATERIALS AND METHODS: Retrospective case series. Medical records were reviewed to extract relevant data. In addition, cases that had cardiac tissue available were evaluated by polymerase chain reaction for the presence of Bartonella DNA. RESULTS: Prevalence of feline IE was 0.007%. Cats with endocarditis tended to be older (median age: 9 years, range: 2-12 years) and no sex or breed was
overrepresented. Commonly encountered clinical signs included respiratory distress (n = 5) and locomotor abnormalities of varying severity (n = 5). Echocardiographic examination detected valvular lesions consistent with endocarditis on the aortic (n = 8) or mitral (n = 5) valves. Nine cats were diagnosed with congestive heart failure at the time of endocarditis diagnosis. Overall, prognosis was grave with a median survival time of 31 days. CONCLUSIONS: In contrast to dogs, cats with IE typically present with clinical signs consistent with cardiac decompensation and locomotor abnormalities suggestive of either thromboembolic disease or inflammatory arthritis. Given the advanced state of disease when diagnosis typically occurs, prognosis is grave.


Epidemiological and pathological study of feline morbillivirus infection in domestic cats in Japan. BACKGROUND: Feline morbillivirus (FmoPV) is a novel paramyxovirus found to infect domestic cats. FmoPV has been isolated in several countries in Asia and Europe and is considered to have genetic diversity. Also, it is suspected to be associated with feline renal diseases including tubulointerstitial nephritis (TIN), which affects domestic cats with a high incidence rate. RESULTS: To clarify the state of FmoPV infection among domestic cats in Japan, an epidemiological survey was conducted. Twenty-one out of 100 cats were found to have serum antibodies (Ab) against FmoPV-N protein by indirect immunofluorescence assay (IF) using FmoPV-N protein-expressing HeLa cells. Twenty-two of the cats were positive for FmoPV RNA in the urine and/or renal tissues. In total, 29 cats were positive for Ab and/or viral RNA. These FmoPV-infected cats were classified into three different phases of infection: RNA+/Ab + (14 cats), RNA+/Ab- (8 cats) and RNA-/Ab + (7 cats). In immunohistochemistry (IHC), 19 out of 29 cats were positive for FmoPV-N protein in kidney tissues; however, the FmoPV-N protein was located in the inflammatory lesions with severe grade in only four out of the 19 cats. Since 15 out of 29 infected cats were positive for viral RNA and Ab, approximately half of the infected cats were persistently infected with FmoPV. CONCLUSIONS: A statistically significant difference was observed between infection of FmoPV and the presence of inflammatory changes in renal lesions, indicating a relationship between FmoPV infection and feline renal diseases. However, we could not obtain histopathological evidence of a relationship between FmoPV infection and TIN.


Retrospective evaluation of the incidence and prognostic significance of spontaneous echocardiographic contrast in relation to cardiac disease and congestive heart failure in cats: 725 cases (2006-2011). OBJECTIVE: To determine whether the presence of spontaneous echocardiographic contrast (SEC) in cats with cardiomyopathy is associated with increased mortality. To establish whether specific types of cardiomyopathy are more often associated with SEC in an attempt to provide a risk-stratification scheme for cats with increased risk of thromboembolic events. DESIGN: Retrospective study 2006-2011. SETTING: Tertiary referral and teaching hospital. ANIMALS: Seven hundred twenty-five client-owned cats undergoing echocardiographic evaluation. MEASUREMENTS AND MAIN RESULTS: Patient characteristics, including age, breed, clinical signs, type of cardiovascular disease, presence of SEC, and survival time were recorded. Thyroxine, HCT, and blood pressure were recorded
when available. Among cats diagnosed with cardiac abnormalities based on echocardiographic findings, those with SEC were at significantly increased risk of death as compared to those without SEC. Cats with dilated cardiomyopathy, unclassified cardiomyopathy, and hypertrophic cardiomyopathy were significantly more likely to have SEC compared to cats with other types of cardiac disease. CONCLUSIONS: Cats with cardiomyopathy and SEC have an increased risk of death compared to cats without SEC, although other previously identified factors such as the presence of congestive heart failure and increased left atrium to aorta ratio remain important determinants of mortality. Cats with hypertrophic cardiomyopathy, unclassified cardiomyopathy, and dilated cardiomyopathy may benefit from anticoagulant therapy due to the increased risk of SEC in these subpopulations.


The objective of this study was to model the pharmacokinetics (PKs) of robenacoxib in cats using a nonlinear mixed-effects (NLME) approach, leveraging all available information collected from cats receiving robenacoxib s.c. and/or i.v.: 47 densely sampled laboratory cats and 36 clinical cats sparsely sampled preoperatively. Data from both routes were modeled sequentially using Monolix 4.3.2. Influence of parameter correlations and available covariates (age, gender, bodyweight, and anesthesia) on population parameter estimates were evaluated by using multiple samples from the posterior distribution of the random effects. A bicompartmental disposition model with simultaneous zero and first-order absorption best described robenacoxib PKs in blood. Clearance was 0.502 L/kg/h and the bioavailability was high (78%). The absorption constant point estimate (Ka = 0.68 h(-1)) was lower than beta (median, 1.08 h(-1)), unveiling flip-flop kinetics. No dosing adjustment based on available covariates information is advocated. This modeling work constitutes the first application of NLME in a large feline population.


Phylogenetic characterisation of feline immunodeficiency virus in naturally infected cats in Croatia indicates additional heterogeneity of subtype B in Europe.

This study was performed on 29 domestic cats with a variety of clinical signs, possibly related to FIV infection. Blood samples were tested by a rapid immunochromatographic (ICA) procedure for detection of FIV antibodies. Subsequently, polymerase chain reaction (PCR) was performed to amplify a portion of the proviral gag gene. All 11 positive PCR products were sequenced and compared with previously reported FIV sequences. Croatian proviral isolates that could be amplified were clustered within subtype B, and additional heterogeneity was confirmed by the formation of three separate clusters. Phylogenetic analysis of circulating strains in Croatia and in southeast Europe is necessary to improve diagnostic methods and selection of the appropriate vaccinal strains.


Calcaneal Fractures in Non-Racing Dogs and Cats: Complications, Outcome, and Associated Risk Factors.
OBJECTIVE: To estimate the prevalence of complications and describe the outcome associated with calcaneal fractures in non-racing dogs and in cats. STUDY DESIGN: Retrospective multicenter clinical cohort study. ANIMALS: Medical records of client-owned dogs and cats (2004-2013). METHODS: Medical records were searched and 50 animals with calcaneal fractures were included for analysis. Complications were recorded and an outcome score applied to each fracture. Associations between putative risk factors and both major complications, and final outcome scores were explored.

RESULTS: Complications occurred in 27/50 fractures (61%) including 23 major and 4 minor complications. At final follow-up, 4 animals (10%) were sound, 27 (64%) had either intermittent or consistent mild weight-bearing lameness, 7 (17%) had moderate weight-bearing lameness, and 1 (2%) had severe weight-bearing lameness. Fractures managed using plates and screws had a lower risk of complications than fractures managed using pin and tension band wire, lag or positional screws or a combination of these techniques (Relative risk 0.16, 95% CI 0.02-1.02, P=.052). Non-sighthounds had reduced odds of a poorer outcome score than sighthounds (Odds ratio 0.11, 95% CI 0.02-0.50, P=.005) and fractures with major complications had 13 times the odds of a poorer outcome score (Odds ratio 13.4, 95% CI 3.6-59.5, P<.001). CONCLUSION: This study reports a high occurrence of complications associated with calcaneal fracture stabilization in non-racing dogs and in cats, and a poorer outcome score was more likely in animals with complications. A more guarded prognosis should be given to owners of non-racing dogs or cats with calcaneal fractures than previously applied to racing Greyhounds with calcaneal fractures.

Peterson, M. E., C. A. Castellano, and M. Rishniw (2016) J Vet Intern Med Evaluation of Body Weight, Body Condition, and Muscle Condition in Cats with Hyperthyroidism. BACKGROUND: The contribution of fat loss versus muscle wasting to the loss of body weight seen in hyperthyroid cats is unknown. OBJECTIVES: To investigate body weight, body condition score (BCS), and muscle condition score (MCS) in hyperthyroid cats. ANIMALS: Four hundred sixty-two cats with untreated hyperthyroidism, 117 of which were reevaluated after treatment. METHODS: Prospective cross-sectional and before-after studies. Untreated hyperthyroid cats had body composition evaluated (body weight, BCS, and MCS). A subset of these cats were reevaluated 3-12 months after treatment when euthyroid. RESULTS: Pretreatment body weight (median, 4.36 kg; IQR, 3.5 to 5.2 kg) was lower than premorbid weight (5.45 kg; IQR, 4.6 to 6.4 kg, P < .0001) recorded 1-2 years before diagnosis. 154 (35.3%) cats were thin or emaciated; 357 (77.3%) had loss of muscle mass. Cats showed increases in body weight (median, 4.1 kg to 5.0 kg), BCS (median, 3/5 to 3.5/5), and MCS (2/3 to 3/3) after treatment (P < .001), but mild-to-moderate muscle wasting persisted in 45% of treated cats. CONCLUSIONS AND CLINICAL IMPORTANCE: Most hyperthyroid cats lose body weight but maintain an ideal or overweight BCS, with only a third being underweight. As in human hyperthyroid patients, this weight loss is associated with muscle wasting, which affects >75% of hyperthyroid cats. Successful treatment leads to weight gain and increase of BCS in most cats, but almost half fail to regain normal muscle mass.

Ramírez-Hernández, C., A. Barbosa-Quintana, and R. Ramírez-Romero (2016) Vet Pathol Left Ventricular Apical Aneurysm in a Cat With Primary Cardiomyopathy. A 13-year-old female Persian cat died suddenly after severe respiratory distress. At necropsy, the changes were compatible with congestive heart failure. The heart was enlarged with a flabby and puckered sac-like aneurysm at the apex of the left ventricle. The apical zone showed a thin muscular
wall arising from the free wall of the left ventricle connected to a bulged saccular area through a wide communication. Microscopically, the wall of the aneurysm was composed of fibrous connective tissue with neovascularization and sparse atrophied myocardial cells at the margins. A few isolated cardiomyocytes in the lesion stained positively for desmin, and the inner lining of the aneurysm had immunoreactivity to von Willebrand factor and CD31. Mature fibrous connective tissue was interspersed with degenerated and disorganized cardiomyocytes elsewhere in the myocardium, and many small myocardial arteries were tortuous and thickened. In this case of sudden death, the diagnosis was primary cardiomyopathy, with formation of a left ventricular apical aneurysm within an area of marked myocardial fibrosis and cardiomyocyte atrophy.


Diagnosis of prediabetes in cats: glucose concentration cut points for impaired fasting glucose and impaired glucose tolerance.

Diabetes is typically diagnosed in cats once clinical signs are evident. Diagnostic criteria for prediabetes in cats have not been defined. The objective of the study was to establish methodology and cut points for fasting and 2-h blood glucose concentrations in healthy client-owned senior cats (≥8 yr) using ear/paw samples and a portable glucose meter calibrated for feline blood. Of the 78 cats, 27 were ideal (body condition score [BCS] 4 or 5 of 9), 31 overweight (BCS 6 or 7), and 20 obese (BCS 8 or 9); 19 were Burmese and 59 non-Burmese. After an 18-24-h fast and an ear/paw blood glucose measurement using a portable glucose meter, glucose (0.5 g/kg bodyweight) was administered intravenous and blood glucose measured at 2 min and 2 h. Cut points for fasting and 2-h glucose concentrations were defined as the upper limits of 95% reference intervals using cats with BCS 4 or 5. The upper cut point for fasting glucose was 6.5 mmol/L. Of the overweight and obese cats, 1 (BCS 7) was above this cut point indicating evidence of impaired fasting glucose. The cut point for 2-h glucose was 9.8 mmol/L. A total of 7 cats (4 with BCS 8 or 9 including 1 Burmese; 3 with BCS 6 or 7, non-Burmese) were above this cut point and thus had evidence of impaired glucose tolerance. In conclusion, the methodology and cutpoints for diagnosis of prediabetes are defined for use in healthy cats 8 yr and older with a range of BCSs.


Dosing obese cats based on body weight spuriously affects some measures of glucose tolerance.

The primary objective was to investigate whether dosing glucose by body weight results in spurious effects on measures of glucose tolerance in obese cats because volume of distribution does not increase linearly with body weight. Healthy research cats (n = 16; 6 castrated males, 10 spayed females) were used. A retrospective study was performed using glucose concentration data from glucose tolerance and insulin sensitivity tests before and after cats were fed ad libitum for 9 to 12 mo to promote weight gain. The higher dose of glucose (0.5 vs 0.3 g/kg body weight) in the glucose tolerance tests increased 2-min glucose concentrations (P < 0.001), and there was a positive correlation between 2-min and 2-h glucose (r = 0.65, P = 0.006). Two-min (P = 0.016 and 0.019, respectively), and 2-h (P = 0.057 and 0.003, respectively) glucose concentrations, and glucose half-life (T1/2; P = 0.034 and <0.001 respectively) were positively associated with body weight and body condition score. Glucose dose should be decreased by 0.05 g for every kg above ideal body weight. Alternatively, for every unit of body condition score above 5 on a 9-point scale, observed 2-h glucose concentration should be adjusted...
down by 0.1 mmol/L. Dosing glucose based on body weight spuriously increases glucose concentrations at 2 h in obese cats and could lead to cats being incorrectly classified as having impaired glucose tolerance. This has important implications for clinical studies assessing the effect of interventions on glucose tolerance when lean and obese cats are compared.


Feline sporotrichosis is an endemic disease in Rio de Janeiro, Brazil, where zoonotic transmission of Sporothrix spp. has been reported since 1998. Itraconazole (ITZ) remains the first choice for treating this disease in cats. However, there have been reports of therapeutic failure and a long-term endeavor. Potassium iodide (KI), considered in the past as a drug with variable effectiveness in cats with sporotrichosis, arises as an important option in the treatment of cats from the endemic area of Rio de Janeiro. In order to evaluate the effectiveness of the association of ITZ and KI in naive cats with sporotrichosis, a prospective cohort study was conducted on 30 cats receiving ITZ 100 mg/day and KI 2.5 mg-20 mg/kg/day. Clinical and laboratory adverse effects were assessed once a month according to the standard care protocol. The cure rate was 96.15% within a median of 14 weeks of treatment. Adverse effects were observed in 50% of cats and were managed with a temporary drug suspension and/or a hepatoprotective therapy. The association of ITZ and KI emerges as an effective option for the treatment of feline sporotrichosis.


Factors influencing common diagnoses made during first-opinion small-animal consultations in the United Kingdom.

It is currently unclear how frequently a diagnosis is made during small-animal consultations or how much of a role making a diagnosis plays in veterinary decision-making. Understanding more about the diagnostic process will help direct future research towards areas relevant to practicing veterinary surgeons. The aim of this study was to determine the frequency with which a diagnosis was made, classify the types of diagnosis made (and the factors influencing these) and determine which specific diagnoses were made for health problems discussed during small-animal consultations. Data were gathered during real-time direct observation of small-animal consultations in eight practices in the United Kingdom. Data collected included characteristics of the consultation (e.g. consultation type), patient (e.g. breed), and each problem discussed (e.g. new or pre-existing problem). Each problem discussed was classified into one of the following diagnosis types: definitive; working; presumed; open; previous. A three-level multivariable logistic-regression model was developed, with problem (Level 1) nested within patient (Level 2) nested within consulting veterinary surgeon (Level 3). Problems without a previous diagnosis, in cats and dogs only, were included in the model, which had a binary outcome variable of definitive diagnosis versus no definitive diagnosis. Data were recorded for 1901 animals presented, and data on diagnosis were gathered for 3192 health problems. Previous diagnoses were the most common diagnosis type (n=1116/3192; 35.0%), followed by open (n=868/3192; 27.2%) then definitive (n=660/3192; 20.7%). The variables remaining in the final model were patient age, problem history, consultation type, who raised the problem, and body system affected. New problems, problems in younger animals, and problems raised by the veterinary surgeon were more likely to result in a definitive diagnosis than pre-existing problems, problems in older
animals, and problems raised by the owner. The most common diagnoses made were overweight/obese and periodontal disease (both n=210; 6.6%). Definitive diagnoses are rarely made during small-animal consultations, with much of the veterinary caseload involving management of ongoing problems or making decisions around new problems prior to a diagnosis being made. This needs to be taken into account when considering future research priorities, and it may be necessary to conduct research focused on the approach to common clinical presentations, rather than purely on the common diagnoses made. Examining how making a diagnosis affects the actions taken during the consultation may shed further light on the role of diagnosis in the clinical decision-making process.


**Epidemiological survey of zoonotic helminths in feral cats in Gran Canaria island (Macaronesian archipelago-Spain).**

The presence of zoonotic parasites in feral cats have been widely considered all over the world. In Gran Canaria (Macaronesian archipelago, Canary Islands, Spain) the number of feral cats has grown out of control in urban and rural areas. 48 of Felis catus captured in different Gran Canaria areas were studied. Animals were necropsied and several organs were systematically examined in order to collect and identify macroscopic parasites. In addition, coprological tests were done in 28 cats. There were no statistically significant differences in the prevalence rate among sex, age or capture area, showing an overall prevalence of helminths of 77.1%. The most common tapeworms were Dipylidium caninum (64.6%) and Taenia taeniaeformis (31.3%), followed by the nematodes Toxocara cati (20.8%), Ankylostoma tubaeforme (18.8%), Aelurostrongylus abstrusus (10.4%) and Trichuris vulpis (2.08%). We also find several eggs of Alaria alata in the small intestine of one cat (2.08%), being the first description of this trematode in cats in the Canary Islands. Aproximatelly, 40% of the studied cats harboured more than one parasite. High rates of zoonotic species found in these animals suggest the need of controlling parasitic infections and preventive measures against them.


**Efficacy of allogeneic mesenchymal stem cell administration in a model of acute ischemic kidney injury in cats.**

OBJECTIVE: To evaluate the effects of allogeneic mesenchymal stem cells (MSCs) in a model of ischemic acute kidney injury (AKI). STUDY DESIGN: Randomized controlled trial. ANIMALS: Adult, purpose-bred research cats (n=15) and a historical reference group (n=3). METHODS: Cats underwent unilateral, in vivo, warm renal ischemia, then intravenous administration of 4 million adipose-derived MSCs, bone marrow-derived MSCs, or fibroblasts (n=5/treatment) 1h after reperfusion. Serum creatinine and blood urea nitrogen concentrations were measured at baseline and days 1 and 6. Urine specific gravity, urine protein to urine creatinine ratio, and glomerular filtration rate were measured at baseline and day 6. Both kidneys were harvested on day 6; histopathology was described and scored and smooth muscle actin was quantified with histomorphometry. A 2-way ANOVA was used to compare time and treatment. Chi square analysis was used to determine the % of cats with at least International Renal Interest Society (IRIS) Grade 1 AKI. RESULTS: Time, but not treatment, had a significant effect on renal function. No difference was noted in % of cats with IRIS AKI. Significantly fewer mitotic figures were observed in ischemic kidneys that received bone-marrow derived MSCs vs. fibroblasts. No differences in smooth muscle actin staining were noted.
CONCLUSIONS: This study did not support the use of allogeneic MSCs in AKI in the regimen described here. Type of renal injury, MSC dose, allogenicity, duration, and route or timing of administration could influence the efficacy MSCs.


Body Condition Scores and Evaluation of Feeding Habits of Dogs and Cats at a Low Cost Veterinary Clinic and a General Practice.
This study assessed body condition scores (BCS) and feeding habits for dogs and cats. Eighty-six cats and 229 dogs (and their owners) were enrolled from 2 clinics: a low cost clinic (n = 149) and a general practice (n = 166). BCS and body weight were recorded. Owners completed a survey which included animal age, sex, and breed; owner demographics; and feeding practices (e.g., diet, rationale for feeding practices). Owners from the low cost clinic had a significantly lower income (P < 0.001) and education (P < 0.001) compared to those from the general practice. Animals from the low cost clinic were younger (P < 0.001) and dogs were less likely to be neutered (P < 0.001). Overweight prevalence was 55% overall (P = 0.083), with a significantly higher prevalence in the general practice for cats (44% versus 66%; P = 0.046), but not for dogs (58% versus 53%; P = 0.230). Multivariate analysis showed that only neuter status was significantly associated with BCS (P = 0.004). Veterinarians were the most common source of nutritional information, though lack of accurate nutrition knowledge was common among all participants. These findings support the need for enhanced communication about optimal BCS and nutrition regardless of socioeconomic status.


Adverse reactions following administration of contrast media for diagnostic imaging in anaesthetized dogs and cats: a retrospective study.
OBJECTIVE: To evaluate incidences of adverse reaction after the administration of contrast media. STUDY DESIGN: Retrospective observational study. ANIMALS: Animals included 356 dogs and 58 cats receiving non-ionic iodinated contrast agents, and 425 dogs and 49 cats receiving gadolinium-based contrast agents. METHODS: Anaesthesia records of dogs and cats receiving intravenous (IV) gadobutrol for magnetic resonance imaging (MRI) or IV iohexol for computed tomography (CT) were reviewed. Changes in pulse rate, respiratory rate and mean arterial pressure at 5 minutes after administration of the contrast medium were evaluated. Changes of 10-20% were considered mild, those of >20% moderate, and reactions that required immediate treatment were considered severe. Associations of sex, age and weight with contrast reaction were investigated using logistic regression. Differences in the incidences of reactions to CT and MRI contrast media were examined with chi-squared tests. A p-value of <0.05 was considered to indicate statistical significance. RESULTS: Of cats receiving iohexol, eight (13.8%) had mild and 10 (17.2%) had moderate reactions. Of cats receiving gadobutrol, six (12.2%) had mild and six (12.2%) had moderate reactions. No cats had severe reactions and the risk for reaction was not associated with type of medium, age, weight or sex (p > 0.2). Of dogs receiving iohexol, 64 (18.0%) had mild, 65 (18.3%) had moderate and three (0.8%) had severe reactions. Of dogs receiving gadobutrol, 42 (9.9%) had mild, 87 (20.5%) had moderate and one (0.2%) had a severe reaction. When dogs receiving iohexol were compared with those receiving gadobutrol, the odds ratio of a moderate reaction was 2.0 (95% confidence interval 1.34-3.10; p = 0.001). These estimates did not change substantially after adjustment for age, weight and sex. CONCLUSIONS AND CLINICAL RELEVANCE: Severe reactions to iohexol and gadobutrol are rare in dogs and cats; moderate reactions are more likely with iohexol than with gadobutrol.

**Right ventricular involvement in feline hypertrophic cardiomyopathy.**

**OBJECTIVES:** To evaluate right ventricular (RV) wall thickness and chamber dimensions in cats with hypertrophic cardiomyopathy (HCM).

**ANIMALS:** One hundred fifty-one healthy control cats and 200 cats with HCM.

**METHODS:** Retrospective, observational, clinical cohort study. Two-dimensional echocardiograms from all cats were analyzed. Right atrial diameter, RV free wall thickness, and RV chamber diameter were quantified using multiple imaging views. Conventional (mean ± 2 standard deviations) and allometrically scaled ($Y = a \times M(b)$) reference values were determined in normal cats and compared to values found in cats with HCM. Linear and logistic regression, multivariate regression, and mixed model analysis were performed to identify associations between RV wall thickness and severity of left ventricular (LV) hypertrophy, clinical severity of HCM, and presence of pleural effusion.

**RESULTS:** Mean RV wall thickness was increased in HCM (p<0.001). Considering increased RV wall thickness in at least one segment, 94 (47%) and 112 (56%) cats with HCM had RV hypertrophy using upper reference limits based on mean ± 2 standard deviations or allometric scaling, respectively. There was an association between severity of LV and RV hypertrophy (p<0.05). Left-sided congestive heart failure (n = 58) was associated with increased RV wall thickness in all segments compared to cats with preclinical HCM (p<0.001). Body weight had negligible effects on RV wall thickness ($R^2$ 0.08-0.17, p<0.001), whereas age and breed had no effect (p>0.05) in control cats.

**CONCLUSIONS:** Increased RV wall thickness is common in cats with HCM and relates to severity of LV hypertrophy and clinical status.


**Q Fever (Coxiella burnetii) Knowledge and Attitudes of Australian Cat Breeders and Their Husbandry Practices.**

A Q fever outbreak in a small animal veterinary hospital, associated with a cat caesarean section, initiated a cat seroprevalence study (n = 712) that found circulating antibodies to Coxiella burnetii was highest in cattery-confined breeding cats (9.3%). These findings stimulated interest about potential sources of C. burnetii infection for cats and humans associated with cats. Cat breeders are potentially a group at increased risk of C. burnetii infection, and this study sought to identify potential risk factors. A cross-sectional online survey was conducted targeting all domestic cat breeders registered with an affiliate member body in Australia in 2015. Responses from 177 cat breeders across Australia were analysed. Forty per cent of responding cat breeders had not heard of Q fever. Raw meat was fed as an integral constituent of the diet by 89% of respondents. Eighty per cent of respondents allowed queens access to the home for parturition, and assistance of queens and resuscitation of kittens at the time of birth were reported by 97% of respondents. Respondents who perceived some level of exposure to Q fever through their breeding activities were three times less likely to perform mouth-to-snout resuscitation (OR 0.3 95% CI 0.1-0.9; P = 0.034) than those who did not perceive a risk of exposure. Similarly, respondents who perceived Q fever as a risk through breeding activities were close to eight times more likely to use personal protective equipment during parturition (OR 7.7 95% CI 1.5-39.9; P = 0.015) than those who did not. Husbandry practices of cat breeders that may increase the risk of C. burnetii transmission require further targeted investigations to assess the contribution of these risk factors to the acquisition of disease. Concurrent education forums are recommended to inform Australian cat breeders of the aetiopathogenesis of Q fever.
Evaluation of the Leptospira species microscopic agglutination test in experimentally vaccinated cats and Leptospira species seropositivity in aged azotemic client-owned cats.
OBJECTIVES: The objectives of this study were to validate the microscopic agglutination test (MAT) using feline sera, determine cross-reactivity of Borrelia burgdorferi antibodies in the MAT, and evaluate if there is an association between Leptospira species seropositivity in aged (≥10 years) client-owned cats with and without azotemia (creatinine >2 g/dl). METHODS: A four-serovar canine leptospiral vaccine was administered to two specific pathogen-free (SPF) cats on days 0 and 14. The MAT was performed intermittently until day 42 for the serovars Canicola, Grippotyphosa, Hardjo, Icterohaemorrhagiae, Pomona and Bratislava, with a cut-off value of ≥1:100. Five purpose-bred cats were infested with wild-caught Ixodes scapularis adults with an average B burgdorferi infection rate of 50%, and tested for antibodies against B burgdorferi C6 peptide and DNA in skin biopsies, as well as by MAT. Sera from 66 azotemic and 75 non-azotemic cats ≥10 years of age were tested for Leptospira species antibodies using the MAT and results were compared by the χ² test. RESULTS: Both SPF cats seroconverted by week 3 and formed antibodies against at least one serovar. There was no cross-reactivity in the MAT using samples from cats with antibodies to B burgdorferi. MAT results were positive for 4/66 azotemic cats and 8/75 non-azotemic cats; these results were not statistically different. CONCLUSIONS AND RELEVANCE: The MAT can be interpreted using feline serum and does not appear to cross-react in cats with B burgdorferi antibodies. There was no association between Leptospira species MAT results and azotemia in this group of aged client-owned cats but further studies are needed to determine if leptospirosis contributes to feline chronic kidney disease.

Retrospective analysis of cutaneous lesions in 23 canine and 17 feline cases of coccidioidomycosis seen in Arizona, USA (2009-2015).
BACKGROUND: Coccidioidomycosis is a fungal disease caused by the dimorphic saprophytic fungus Coccidioides immitis or C. posadasii. Primary pulmonary infection can disseminate to cutaneous and subcutaneous tissues, or less commonly direct cutaneous inoculation may occur. HYPOTHESIS/OBJECTIVES: To characterize the historical, clinical, diagnostic and treatment findings in dogs and cats with cutaneous manifestation of coccidioidomycosis. ANIMALS: Twenty three dogs and seventeen cats diagnosed between 2009 and 2015 in Arizona, USA. METHODS: Retrospective review of medical records from dogs and cats from an endemic area with a confirmed diagnosis via histopathology, cytology and/or culture, and skin lesions. RESULTS: Age of affected dogs ranged from 14 weeks to 13 years (median = 7 years), whereas cats ranged from 3 to 17 years (median = 9 years). Subcutaneous nodules were the most common lesions in both species. Lesions were distributed widely and not often found over sites of bone infection. In 75% of dogs and 54.5% of cats with cutaneous lesions there were clinical signs of systemic illness, supporting the diagnosis of cutaneous disseminated disease. Four dogs and four cats had localized lesions with no systemic illness, consistent with possible primary cutaneous infection. The most common mode of diagnosis was cytology identification in both species. Fluconazole was the most commonly prescribed antifungal drug. CONCLUSIONS AND CLINICAL IMPORTANCE: Coccidioidomycosis is the most common mycosis of dogs and cats in endemic regions and cutaneous signs of the disease may be an initial presenting complaint. This study identified a variety of cutaneous manifestations of the disease in dogs and cats and should be recognized by clinicians.

**Transudate or exudate: can lactate dehydrogenase activity in canine and feline effusions help to differentiate between the two**

**BACKGROUND:** Lactate dehydrogenase (LDH) activity is often measured in human effusions to help in differentiating between transudates and exudates. Few studies have been performed using effusion samples from animals. **OBJECTIVES:** The purpose of the study was to determine whether LDH can be used to differentiate between transudative and exudative effusions in dogs and cats (including postmortem samples), and whether there is a difference between different laboratory methods of LDH measurement. **METHODS:** Lactate dehydrogenase activity was measured in canine and feline effusions that were submitted to the Murdoch University Veterinary Hospital Clinical Pathology Laboratory over approximately 12 months using 2 wet and one dry chemistry methods, including 10 effusions collected postmortem. Results were compared to classification using traditional methods for effusion types. **RESULTS:** Lactate dehydrogenase activity was significantly higher in exudates than in transudates, significantly different depending on the method of measurement, and significantly higher in all effusions collected postmortem. An LDH effusion:serum ratio of < 0.5 was associated with transudates. There was no significant difference between samples collected into EDTA or plain serum tubes, in frozen and thawed samples, or after storage at 4°C for 3-7 days. **CONCLUSIONS:** Measurement of LDH activity may be useful in helping to differentiate between transudates and exudates in cats and dogs. The method of measurement must be known and kept consistent if cutoff values are to be used. The LDH activity was increased in all effusions collected from animals after death, potentially invalidating its use postmortem.


**Do cats with a cranial cruciate ligament injury and osteoarthritis demonstrate a different gait pattern and behaviour compared to sound cats**

**BACKGROUND:** Osteoarthritis (OA) is a common cause of chronic pain and dysfunction in older cats. The majority of cats with OA do not show signs of overt lameness, yet cats with orthopaedic disease are known to redistribute their body weight from the affected limb. OA can cause changes in the cat’s behaviour, which is often misinterpreted as signs of aging. The aim of the present study was to investigate if cats with a previous cranial cruciate ligament (CCL) injury perform differently on the pressure mat and exhibit different behaviour compared to sound cats according to the owner’s subjective assessment. Ten cats with a previous CCL injury were assessed with a pressure mat system and their owners were asked to complete an assessment questionnaire. The results were compared to those of 15 sound cats, matched to have the same weight and body condition score. **RESULTS:** The front/hind limb index for peak vertical force (PVF) was significantly higher for CCL cats, and there was a decreased PVF and vertical impulse (VI) on the affected hindlimb compared to the unaffected one. The results indicate that cats with a previous CCL injury put less weight, on the affected hindlimb but for a longer time. There was a significantly higher owner assessment questionnaire score for the group of cats with CCL injury compared to sound cats. **CONCLUSIONS:** Cats with a previous CCL injury have a different gait pattern compared to sound cats and a different behaviour according to owner subjective assessment. It is of great importance that further studies are performed to investigate the long term effects of CCL injury as a cause of pain and physical dysfunction, and its role in the development of OA in cats. Improved assessment tools for chronic pain caused by OA in cats are needed, both to facilitate diagnosis and to evaluate pain-relieving treatment.
Stella, J. L., and C. C. Croney (2016) ScientificWorldJournal 2016:6296315. **Environmental Aspects of Domestic Cat Care and Management: Implications for Cat Welfare.** Domestic cats (Felis silvestris catus) are the most commonly kept companion animals in the US with large populations of owned (86 million), free-roaming (70 million), research (13,000), and shelter (2-3 million) cats. Vast numbers of cats are maintained in homes and other facilities each year and are reliant on humans for all of their care. Understanding cat behavior and providing the highest quality environments possible, including positive human-cat interactions, based on research could help improve the outcomes of biomedical research, shelter adoptions, and veterinary care, as well as overall cat welfare. Often, however, cats’ needs are inadequately met in homes and some aspects may also not be well met in research colonies and shelters, despite the fact that similar problems are likely to be encountered in all of these environments. This paper provides a brief overview of common welfare challenges associated with indoor housing of domestic cats. Essential considerations for cage confinement are reviewed, along with implications of poor cat coping, such as weakening of the human-animal bond and relinquishment to shelters. The important role that environmental management plays in cat behavior and welfare outcomes is explored along with the need for additional research in key areas.

Stiles, J., and B. Kimmitt (2016) J Feline Med Surg 18:702-711. **Eye examination in the cat: Step-by-step approach and common findings.** PRACTICAL RELEVANCE: The ability to perform a complete eye examination in the cat is critically important for patients with an ocular disorder or a systemic disease, as well as for the geriatric cat. CLINICAL CHALLENGES: Cats may need short breaks between portions of the eye exam in order to minimize stress. For the clinician, use of ophthalmic equipment and interpretation of normal vs abnormal findings may take some practice in order to develop proficiency. AUDIENCE: This review is aimed at veterinary practitioners and outlines all the steps and equipment necessary to perform a complete ophthalmic examination in the cat. EQUIPMENT: Although some specialized equipment is required, a complete eye exam can be performed with a modest investment in equipment and supplies. EVIDENCE BASE: This article draws on published references for normal parameters measured in the feline eye exam, as well as the experience of the authors.

Stock, E., K. Vanderperren, T. Bosmans, A. Dobbeleir, L. Duchateau, M. Hesta, L. Lybaert, K. Peremans, E. Vandermeulen, and J. Saunders (2016) PLoS One 11:e0164488. **Evaluation of Feline Renal Perfusion with Contrast-Enhanced Ultrasonography and Scintigraphy.** Contrast-enhanced ultrasound (CEUS) is an emerging technique to evaluate tissue perfusion. Promising results have been obtained in the evaluation of renal perfusion in health and disease, both in human and veterinary medicine. Renal scintigraphy using 99mTc-Mercaptoacetyltriglycine (MAG3) is another non-invasive technique that can be used to evaluate renal perfusion. However, no data are available on the ability of CEUS or 99mTc-MAG3 scintigraphy to detect small changes in renal perfusion in cats. Therefore, both techniques were applied in a normal feline population to evaluate detection possibilities of perfusion changes by angiotensin II (AT II). Contrast-enhanced ultrasound using a bolus injection of commercially available contrast agent and renal scintigraphy using 99mTc-MAG3 were performed in 11 healthy cats after infusion of 0.9% NaCl (control) and AT II. Angiotensin II induced changes were
noticed on several CEUS parameters. Mean peak enhancement, wash-in perfusion index and wash-out rate for the entire kidney decreased significantly after AT II infusion. Moreover, a tendency towards a lower wash-in area-under-the-curve was present. Renal scintigraphy could not detect perfusion changes induced by AT II. This study shows that CEUS is able to detect changes in feline renal perfusion induced by AT II infusion.

Quantitative Differences Between the First and Second Injection of Contrast Agent in Contrast-Enhanced Ultrasonography of Feline Kidneys and Spleen.
Contrast-enhanced ultrasound is a valuable and safe technique for the evaluation of organ perfusion. Repeated injections of ultrasound contrast agent are often administered during the same imaging session. However, it remains unclear if quantitative differences are present between the consecutive microbubble injections. Therefore, the first and second injection of contrast agent for the left renal cortex, renal medulla and the splenic parenchyma in healthy cats were compared. A lower peak intensity and area under the curve were observed for the first injection of contrast agent in the feline kidney, both for the renal cortex and medulla, and spleen. Moreover, for the renal cortex, the time-intensity curve was steeper after the second injection. Findings from the present study demonstrate that a second injection of contrast agent provides stronger enhancement. The exact mechanism behind our findings remains unclear; however, saturation of the lung macrophages is believed to play an important role.

Diagnosis and interpretation of intestinal dysbiosis in dogs and cats.
The intestinal tracts of dogs and cats harbor a highly complex microbiota, which consists of bacteria, fungi, viruses and protozoa. Until recently, traditional bacterial culture was commonly used to identify bacteria present in the gastrointestinal tract, but it is now well recognized that standard plating techniques do not have enough resolution for identification of the mostly anaerobic bacteria that reside within the gut. Molecular methods are now established for assessing intestinal dysbiosis in dogs and cats with gastrointestinal disease, but these approaches are not yet widely available for routine diagnosis. The loss of normal commensal bacterial microbiota (i.e. Lachnospiraceae, Ruminococcaceae, and Faecalibacterium spp.) in acute and chronic intestinal diseases has been linked to metabolic changes, for example alterations in immunomodulatory bacterial metabolites, such as short chain fatty acids and secondary bile acids. This highlights the importance of dysbiosis in the pathophysiology of gastrointestinal diseases. Development of molecular based assays for specific bacterial groups, calculations of microbial dysbiosis indices and assays for microbial functional metabolites are currently underway to help assess dysbiosis. These will yield a better understanding of the pathophysiology of gastrointestinal diseases and may also lead to new diagnostic and therapeutic approaches to dysbiosis.

Impact of feline AIM on the susceptibility of cats to renal disease.
Renal failure is one of the most important social problems for its incurability and high costs for
patients’ health care. Through clarification of the underlying mechanism for the high susceptibility of cats to renal disease, we here demonstrates that the effective dissociation of serum AIM protein from IgM is necessary for the recovery from acute kidney injury (AKI). In cats, the AIM-IgM binding affinity is 1000-fold higher than that in mice, which is caused by the unique positively-charged amino-acid cluster present in feline AIM. Hence, feline AIM does not dissociate from IgM during AKI, abolishing its translocation into urine. This results in inefficient clearance of lumen-obstructing necrotic cell debris at proximal tubules, thereby impairing AKI recovery. Accordingly, mice whose AIM is replaced by feline AIM exhibit higher mortality by AKI than in wild-type mice. Recombinant AIM administration into the mice improves their renal function and survival. As insufficient recovery from AKI predisposes patients to chronic, end-stage renal disease, feline AIM may be involved crucially in the high mortality of cats due to renal disease. Our findings could be the basis of the development of novel AKI therapies targeting AIM-IgM dissociation, and may support renal function in cats and prolong their lives.


**Perioperative morbidity and outcome of esophageal surgery in dogs and cats: 72 cases (1993-2013).**

**OBJECTIVE** To evaluate perioperative morbidity and outcome in dogs and cats undergoing esophageal surgery.  
**DESIGN** Retrospective case series.  
**ANIMALS** 63 client-owned dogs and 9 client-owned cats.  
**PROCEDURES** Medical records of dogs and cats that underwent esophageal surgery were reviewed for information on signalment, history, results of preoperative diagnostic testing, condition treated, details of surgery, intraoperative complications, and postoperative complications. Long-term follow-up data were obtained via veterinarian and client telephone conversations. The relationship between complications and survival to hospital discharge was evaluated by means of regression analysis.  
**RESULTS** The most common indication for surgical intervention was an esophageal foreign body in dogs (50/63 [79%]) and esophageal stricture in cats (3/9). Complications were documented in 54% (34/63) of dogs and 3 of 9 cats. The most common immediate postoperative complications were respiratory in nature (9 dogs, 1 cat). Partial esophagectomy and resection with anastomosis were significantly associated with the development of immediate postoperative complications in dogs. The most common delayed postoperative complications were persistent regurgitation (7 dogs) and esophageal stricture formation (3 dogs, 1 cat). For dogs, a mass lesion and increasing lesion size were significantly associated with the development of delayed postoperative complications. Six dogs (10%) and 1 cat died or were euthanized prior to discharge, and pneumomediastinum and leukopenia were negative prognostic factors for dogs being discharged from the hospital.  
**CONCLUSIONS AND CLINICAL RELEVANCE** Results of this study suggested that the short-term prognosis for dogs and cats that survive surgery for treatment of esophageal lesions is favorable, with 90% of patients discharged from the hospital (57/63 dogs; 8/9 cats). However, dogs treated for more extensive esophageal lesions as well as those undergoing esophagectomy or resection and anastomosis were more likely to develop postoperative complications.


**Small animal disease surveillance: pruritus, and coagulase-positive staphylococci.**
Presentation for pruritus comprised 6.5 per cent, 3.6 per cent and 2.0 per cent of canine, feline and rabbit consultations, respectively, between January 2014 and June 2016. Topical antimicrobials were the most commonly prescribed pruritus treatments for dogs (33.6 per cent of consultations); for cats, it was systemic glucocorticoids (53.5 per cent). In surveillance of coagulase-positive staphylococci, 16 per cent of 176 coagulase-positive staphylococci isolated from canine diagnostic samples were sensitive to all tested antibacterial classes; multidrug resistance (resistance to three or more antibacterial classes) was found in 6.8 per cent.

There’s no ball without noise: cats’ prediction of an object from noise.
We used an expectancy violation procedure to ask whether cats could use a causal rule to infer the presence of an unseen object on hearing the noise it made inside a container and predict its appearance when the container was turned over. We presented cats with either an object dropping out of an opaque container or no object dropping out (turning-over phase) after producing either a rattling sound by shaking the container with the object inside, or no sound (shaking phase). The cats were then allowed to freely explore the experimental environment (exploration phase). The relation between the sound and the object matched with physical laws in half of the trials (congruent condition) and mismatched in the other half (incongruent condition). Inferring the presence of an unseen object from the noise was predicted to result in longer looking time in the incongruent condition. The prediction was supported by the cats’ behavior during the turning-over phase. The results suggest that cats used a causal-logical understanding of auditory stimuli to predict the appearance of invisible objects. The ecology of cats’ natural hunting style may favor the ability for inference on the basis of sounds.

Genetic characterization of feline bocavirus detected in cats in Japan.
Feline bocavirus (FBoV) has been classified into three genotypes (FBoV1-FBoV3). FBoVs are mainly detected in feces. In the present study, we collected rectal swabs from cats in Japan and examined the samples for the presence of FBoV. The FBoV infection rate was 9.9 % in 101 cats. No significant association was observed between FBoV infection and clinical symptoms. Based on the full-length NS1 protein, the three strains of FBoVs detected in the present study shared high homologies with the genotype 2 FBoV POR1 strain. This is the first study to report FBoV in Japan.

Ectoparasites of free-roaming domestic cats in the central United States.
Free-roaming domestic cat (Felis catus) populations serve as a valuable resource for studying ectoparasite prevalence. While they share a similar environment as owned cats, free-roaming cats do not receive routine veterinary care or ectoparasiticide application, giving insight into parasite risks for owned animals. We examined up to 673 infested cats presented to a trap-neuter-return (TNR) clinic in the central United States. Ectoparasite prevalences on cats were as follows: fleas (71.6%), ticks (18.7%), Felicola subrostratus (1.0%), Cheyletiella blakei (0.9%), and Otodectes cynotis (19.3%). Fleas, ticks, and O. cynotis were found in all months sampled. A total of 1117 fleas were recovered from 322 infested cats. The predominate flea recovered from cats was Ctenocephalides felis (97.2%) followed by Pulex spp. (2.8%), Cediopsylla simplex (0.6%), and Nosopsyllus fasciatus (0.6%). A total
of 373 ticks were recovered from 126 infested cats. The predominate tick species was Amblyomma americanum (65.9%) followed by Ixodes scapularis (32.5%), Dermacentor variabilis (10.3%), and Rhipicephalus sanguineus (0.8%). Immature tick stages accounted for 54.7% of all ticks found, highlighting an under-appreciated source of tick burden on domestic cats. The results of this study emphasize the importance of year-round use of ectoparasiticides with both insecticidal and acaricidal activity on domestic cats.


Oral administration of famciclovir for treatment of spontaneous ocular, respiratory, or dermatologic disease attributed to feline herpesvirus type 1: 59 cases (2006-2013).

OBJECTIVE To evaluate outcomes for cats treated with orally administered famciclovir 3 times/d for clinical signs attributed to naturally occurring feline herpesvirus type 1 (FHV-1) infection and to assess variables related to owner satisfaction with the treatment. DESIGN Retrospective case series. ANIMALS 59 client-owned cats. PROCEDURE Medical records were reviewed to identify cats treated for presumed FHV-1 infection from 2006 through 2013 with ≥1 follow-up visit. Signalment, duration of clinical signs, prior treatment, examination findings, diagnostic test results, concurrent treatments, and outcome data were recorded. Owners were asked to complete a survey regarding patient- and treatment-related variables. Data were compared between cats that received low (approx 40 mg/kg [18 mg/lb]) and high (approx 90 mg/kg [41 mg/lb]) doses of famciclovir, PO, 3 times/d.

RESULTS Patient age ranged from 0.03 to 16 years. Conjunctivitis (51/59 [86%]), keratitis (51 [86%]), blepharitis (19 [32%]), nasal discharge or sneezing (10 [17%]), and dermatitis (4 [7%]) were common findings. Clinical improvement was subjectively graded as marked in 30 (51%) cats, mild in 20 (34%), and nonapparent in 9 (15%). Median time to improvement was significantly shorter, and degree of improvement was significantly greater in the highdose group than in the low-dose group. Adverse effects potentially attributable to famciclovir administration were reported for 10 cats. On the basis of survey responses, most (29/32 [91%]) owners were satisfied with their cat’s treatment.

CONCLUSIONS AND CLINICAL RELEVANCE Famciclovir at the prescribed dosages was associated with improved clinical signs in cats with presumed FHV-1 infection, and few adverse effects were attributed to the treatment. Further studies are needed to assess whether a famciclovir dosage of 90 versus 40 mg/kg, PO, 3 times/d would result in increased efficacy and shorter treatment time.

Tozon, N., U. Lampreht Tratar, K. Znidar, G. Sersa, J. Teissie, and M. Cemazar (2016) J Vis Exp Operating Procedures of the Electrochemotherapy for Treatment of Tumor in Dogs and Cats. Electrochemotherapy (ECT) is a local approach which is used for treating solid tumors of different histologies. Its mechanism is based on cell membrane permeabilization by means of “electroporation”. To achieve the “electroporation” of the cells, electric pulses are generated by a generator and delivered to the target tissue by the use of electrodes. Electroporation is a physical method which is used to introduce molecules, like cytostatic drugs, into the cells that could not pass the cell membrane on their own. In electrochemotherapy, currently, cisplatin and bleomycin are clinically used. Electrochemotherapy antitumor effectiveness is high, for example up to 100% complete response of canine mast cell tumors smaller than 2 cm(3) was achieved. Additionally, electrochemotherapy can be used for the treatment of inoperable tumors. One of the important characteristics of electrochemotherapy is that it can be effective as a one-time treatment only. However, in the case of failure or partial tumor response it can be repeated several times with equal or improved effectiveness.
Electrochemotherapy is already a standard treatment for cutaneous and subcutaneous tumors of various histologies in human and veterinary oncology. Furthermore, several clinical studies exploiting electrochemotherapy for deep-seated tumors are on-going.


Low genetic diversity among historical and contemporary clinical isolates of felid herpesvirus 1.

BACKGROUND: Felid herpesvirus 1 (FHV-1) causes upper respiratory tract diseases in cats worldwide, including nasal and ocular discharge, conjunctivitis and oral ulceration. The nature and severity of disease can vary between clinical cases. Genetic determinants of virulence are likely to contribute to differences in the in vivo phenotype of FHV-1 isolates, but to date there have been limited studies investigating FHV-1 genetic diversity. This study used next generation sequencing to compare the genomes of contemporary Australian clinical isolates of FHV-1, vaccine isolates and historical clinical isolates, including isolates that predated the introduction of live attenuated vaccines into Australia. Analysis of the genome sequences aimed to assess the level of genetic diversity, identify potential genetic markers that could influence the in vivo phenotype of the isolates and examine the sequences for evidence of recombination. RESULTS: The full genome sequences of 26 isolates of FHV-1 were determined, including two vaccine isolates and 24 clinical isolates that were collected over a period of approximately 40 years. Analysis of the genome sequences revealed a remarkably low level of diversity (0.0-0.01 %) between the isolates. No potential genetic determinants of virulence were identified, but unique single nucleotide polymorphisms (SNPs) in the UL28 and UL44 genes were detected in the vaccine isolates that were not present in the clinical isolates. No evidence of FHV-1 recombination was detected using multiple methods of recombination detection, even though many of the isolates originated from cats housed in a shelter environment where high infective pressures were likely to exist. Evidence of displacement of dominant FHV-1 isolates with other (genetically distinct) FHV-1 isolates over time was observed amongst the isolates obtained from the shelter-housed animals.

CONCLUSIONS: The results show that FHV-1 genomes are highly conserved. The lack of recombination detected in the FHV-1 genomes suggests that the risk of attenuated vaccines recombining to generate virulent field viruses is lower than has been suggested for some other herpesviruses. The SNPs detected only in the vaccine isolates offer the potential to develop PCR-based methods of differentiating vaccine and clinical isolates of FHV-1 in order to facilitate future epidemiological studies.


Retrospective assessment of peripheral nerve block techniques used in cats undergoing hindlimb orthopaedic surgery.

OBJECTIVES: The aim of this study was to assess retrospectively the efficacy and complication rate of hindlimb peripheral nerve blocks (PNBs) in cats. METHODS: Clinical records of cats that received PNBs and underwent hindlimb orthopaedic surgery from February 2010 to October 2014 were examined. Type of PNB, type and dose of local anaesthetic used, end-expiratory fraction of isoflurane (FE'iso) administered, additional intraoperative analgesia, incidence of hypotension, postoperative opioid requirement, postoperative contralateral limb paralysis and neurological complications at the 6 week re-examination were investigated. RESULTS: Eighty-nine records were retrieved but only 69 were analysed. Four combinations of PNBs were used: 34 lateral preiliac (LPI) approach to lumbar plexus (LP) associated with lumbar paravertebral approach to sciatic nerve (SN); 20 LPI-LP associated
with the lateral approach to SN; three LPI-LP associated with gluteal approach to SN; 12 dorsal-paravertebral (DPV) approach to LP associated with lateral SN. Levobupivacaine was used for the majority of PNBs. The mean intraoperative FE’Iso was 1.15%; hypotension was documented in 55.1% of anaesthetics, while 31.8% of cats received fentanyl and/or ketamine intraoperatively. Postoperatively, 72.7% of cats received at least one dose of opioid, while five cats required further postoperative analgesia (ketamine constant rate infusion and/or gabapentin). No cats showed contralateral limb paralysis and neurological complications at the 6 week re-examination. No differences were found when comparing the different PNBs used. CONCLUSIONS AND RELEVANCE: PNBs contributed to perioperative anaesthesia/analgesia in cats undergoing hindlimb orthopaedic surgery. However, the clinical relevance of intraoperative hypotension needs further investigation.


**Transplantation of amniotic membrane-derived multipotent cells ameliorates and delays the progression of chronic kidney disease in cats.**

Chronic kidney disease (CKD) is a common clinical condition in domestic cats, characterized by tubulointerstitial, vascular and glomerular inflammation and severe fibrosis. Studies in rodent model of induced CKD have shown a decrease and stabilization of the clinical condition. In this study was evaluated the safety and effect of intrarenal and intravenous infusion of allogeneic mesenchymal stem cells (AMSCs) derived from feline amniotic membrane in cats with naturally occurring CKD. Cat AMSCs were harvested after mechanical and enzymatic digestion of amnion. A healthy cat received intrarenal injection of AMSCs guided by ultrasound in both kidneys (5 × 10^5 cells/kidney). Nine cats with CDK received repeated intravenous infusions of AMSCs (2 × 10^6 cells × 2 treatments). The clinical parameters of healthy cat did not change, but sedation and general anaesthesia was required. The number of interventions stressed the animal, and he developed transient haematuria after AMSC injection. Cats with CDK registered a significant improvement of renal function (decrease in serum creatinine and urine protein concentrations and increase in urine specific gravity). The kidney architecture and morphology did not change following the treatment. The feline AMSCs have a renoprotective effect and improve renal function in cats with naturally occurring CKD, stabilizing the clinical condition and disease progression. Thus, intravenous injection of AMSCs may be an important tool to provide welfare in cats with chronic kidney disease.


**Pharmacokinetics of voriconazole after intravenous and oral administration to healthy cats.**

OBJECTIVE To determine pharmacokinetics and adverse effects after voriconazole administration to cats and identify an oral dose of voriconazole for cats that maintains plasma drug concentrations within a safe and effective range. ANIMALS 6 healthy cats. PROCEDURES Voriconazole (1 mg/kg, IV) was administered to each cat (phase 1). Serial plasma voriconazole concentrations were measured for 24 hours after administration. Voriconazole suspension or tablets were administered orally at 4, 5, or 6 mg/kg (phase 2). Plasma voriconazole concentrations were measured for 24 hours after administration. Pharmacokinetics of tablet and suspension preparations was compared. Finally, an induction dose of 25 mg/cat (4.1 to 5.4 mg/kg, tablet formulation), PO, was administered followed by 12.5 mg/cat (2.05 to 2.7 mg/kg), PO, every 48 hours for 14 days (phase 3). Plasma voriconazole concentration was measured on days 2, 4, 8, and 15. RESULTS Voriconazole half-life after IV administration was
approximately 12 hours. Maximal plasma concentration was reached within 60 minutes after oral administration. A dose of 4 mg/kg resulted in plasma concentrations within the target range (1 to 4 µg/mL). Adverse effects included hypersalivation and miosis. During long-term administration, plasma concentrations remained in the target range but increased, which suggested drug accumulation.

CONCLUSIONS AND CLINICAL RELEVANCE Voriconazole had excellent oral bioavailability and a long half-life in cats. Oral administration of a dose of 12.5 mg/cat every 72 hours should be investigated. Miosis occurred when plasma concentrations reached the high end of the target range. Therefore, therapeutic drug monitoring should be considered to minimize adverse effects.


OBJECTIVES: Recently, two point-of-care (PoC) feline immunodeficiency virus (FIV) antibody test kits (Witness and Anigen Rapid) were reported as being able to differentiate FIV-vaccinated from FIV-infected cats at a single time point, irrespective of the gap between testing and last vaccination (0-7 years). The aim of the current study was to investigate systematically anti-FIV antibody production over time in response to the recommended primary FIV vaccination series. METHODS: First, residual plasma from the original study was tested using a laboratory-based ELISA to determine whether negative results with PoC testing were due to reduced as opposed to absent antibodies to gp40. Second, a prospective study was performed using immunologically naive client-owned kittens and cats given a primary FIV vaccination series using a commercially available inactivated whole cell/inactivated whole virus vaccine (Fel-O-Vax FIV, three subcutaneous injections at 4 week intervals) and tested systematically (up to 11 times) over 6 months, using four commercially available PoC FIV antibody kits (SNAP FIV/FeLV Combo [detects antibodies to p15/p24], Witness FeLV/FIV [gp40], Anigen Rapid FIV/FeLV [p24/gp40] and VetScan FeLV/FIV Rapid [p24]). RESULTS: The laboratory-based ELISA showed cats from the original study vaccinated within the previous 0-15 months had detectable levels of antibodies to gp40, despite testing negative with two kits that use gp40 as a capture antigen (Witness and Anigen Rapid kits). The prospective study showed that antibody testing with SNAP Combo and VetScan Rapid was positive in all cats 2 weeks after the second primary FIV vaccination, and remained positive for the duration of the study (12/12 and 10/12 cats positive, respectively). Antibody testing with Witness and Anigen Rapid was also positive in a high proportion of cats 2 weeks after the second primary FIV vaccination (8/12 and 7/12, respectively), but antibody levels declined below the level of detection in most cats (10/12) by 1 month after the third (final) primary FIV vaccination. All cats tested negative using Witness and Anigen Rapid 6 months after the third primary FIV vaccination. CONCLUSIONS AND RELEVANCE: This study has shown that a primary course of FIV vaccination does not interfere with FIV antibody testing in cats using Witness and Anigen Rapid, provided primary vaccination has not occurred within the previous 6 months. Consequently, Witness and Anigen Rapid antibody test kits can be used reliably to determine FIV infection status at the time of annual booster FIV vaccination to help detect ‘vaccine breakthroughs’ and in cats that have not received a primary course of FIV vaccination within the preceding 6 months. The duration of antibody response following annual booster FIV vaccination and the resulting effect on antibody testing using PoC kits needs to be determined by further research. The mechanism(s) for the variation in FIV antibody test kit performance remains unclear.

A case-control field study was undertaken to determine the level of protection conferred to client-owned cats in Australia against feline immunodeficiency virus (FIV) using a commercial vaccine. 440 cats with outdoor access from five Australian states/territories underwent testing, comprising 139 potential cases (complete course of primary FIV vaccinations and annual boosters for three or more years), and 301 potential controls (age, sex and postcode matched FIV-unvaccinated cats). FIV status was determined using a combination of antibody testing (using point-of-care test kits) and nucleic acid amplification, as well as virus isolation in cases where results were discordant and in all suspected FIV-vaccinated/FIV-infected cats (‘vaccine breakthroughs’). Stringent inclusion criteria were applied to both ‘cases’ and ‘controls’; 89 FIV-vaccinated cats and 212 FIV-unvaccinated cats ultimately satisfied the inclusion criteria. Five vaccine breakthroughs (5/89; 6%), and 25 FIV-infected controls (25/212; 12%) were identified, giving a vaccine protective rate of 56% (95% CI 20 to 84). The difference in FIV prevalence rates between the two groups was not significant (P=0.14). Findings from this study raise doubt concerning the efficacy of Fel-O-Vax FIV® under field conditions. Screening for FIV infection may be prudent before annual FIV re-vaccination and for sick FIV-vaccinated cats. Owners should not rely on vaccination alone to protect cats against the risk of acquiring FIV infection; other measures such as cat curfews, the use of ‘modular pet parks’ or keeping cats exclusively indoors, are recommended.


Effect of prewarming EDTA blood samples to 37°C on platelet count measured by Sysmex XT-2000iV in dogs, cats, and horses.

BACKGROUND: Pseudothrombocytopenia secondary to platelet clumping is a common cause of preanalytic error for platelet counts in dogs, cats, and horses. In human beings, it is suggested that prewarming blood samples to 37°C prior to hematology analysis will reduce platelet clumping.

OBJECTIVES: The purpose of the study was to evaluate the effect of prewarming EDTA blood samples to 37°C on measured platelet counts and other hematologic variables. METHODS: The EDTA blood samples from dogs, cats and horses submitted to the clinical pathology laboratory at the University of Cambridge were included. Complete blood cell counts performed using a Sysmex XT-2000iV hematology analyzer were done on samples at room temperature (approximately 22°C) and following warming of the samples to 37°C in a water bath. The Wilcoxon signed rank test was used to compare hematologic variables, including platelet count, before and after sample warming to 37°C. Data are presented as median (25(th), 75(th) percentile) increase. RESULTS: Blood samples from 39 dogs, 19 cats, and 10 horses were included. Sample warming to 37°C resulted in a statistically significant increase in platelet counts in dogs (11 [-2, 30] ×10(9) /L), cats (36 [14, 84] ×10(9) /L), and horses (42 [31, 79] ×10(9) /L). Sample warming did not significantly affect other hematologic variables. CONCLUSIONS: Prewarming EDTA blood samples to 37°C prior to hematology analysis increased platelet counts overall in canine, feline, and equine blood, but did not abrogate platelet clumping and pseudothrombocytopenia fully in some cases. Furthermore, true pseudothrombocytopenia was not confirmed in these animals.


Owner observations regarding cat scratching behavior: an internet-based survey.

OBJECTIVES: This study was performed to examine aspects of the cat, environment and scratching post that might influence scratching behavior, in an effort to determine how inappropriate scratching
behavior might be refocused on acceptable targets. METHODS: An internet survey, posted on several public websites, gathered details about scratching behavior, as described by owners in their home environments, from 4331 respondents over a 4 month period. Responses from 39 different countries were analyzed, mostly from the USA, Canada and the UK. RESULTS: Owners offered traditionally recommended scratching substrates including rope, cardboard, carpet and wood. Rope was most frequently used when offered, although carpet was offered most commonly. Most owners provided at least one scratching post; cats scratched the preferred substrate more often when the post was a simple upright type or a cat tree with two or more levels and at least 3 ft high. Narrower posts (base width ≤3 ft) were used more often than wider posts (base width ≥5 ft). Intact or neutered cats (males and females) were as likely to scratch inappropriately, and inappropriate scratching decreased with age. Geriatric cats between the ages of 10 and 14 years preferred carpet substrate most frequently; all other ages preferred rope first. Inappropriate scratching decreased as the different types/styles of posts increased in the home. Inappropriate scratching did not increase if the number of cats or dogs increased in the household. Declawed cats were preventatively declawed most often to prevent household item destruction. CONCLUSIONS AND RELEVANCE: Although cats can have individual preferences, our data provide a starting point for veterinarians recommending scratching posts to clients.


**Feline Exocrine Pancreatic Insufficiency: A Retrospective Study of 150 Cases.**

BACKGROUND: Little information is available about the clinical presentation and response to treatment of cats with exocrine pancreatic insufficiency (EPI). OBJECTIVES: To describe the signalment, clinical signs, concurrent diseases, and response to treatment of cats with EPI. ANIMALS: One hundred and fifty cats with EPI. METHODS: Retrospective case series. RESULTS: Questionnaires were sent to 261 veterinarians, and 150 (57%) were returned with data suitable for statistical analysis. The median age of the cats with EPI was 7.7 years. The median body condition score was 3 of 9. Ninety-two of 119 cats (77%) had hypocobalaminemia, and 56 of 119 cats (47%) had increased and 6 of 119 cats (5%) had decreased serum folate concentrations. Clinical signs included weight loss (91%), unformed feces (62%), poor hair coat (50%), anorexia (45%), increased appetite (42%), lethargy (40%), watery diarrhea (28%), and vomiting (19%). Eighty-seven cats (58%) had concurrent diseases. Treatment response was reported to be good in 60%, partial in 27%, and poor in 13% of 121 cats. Trypsin-like immunoreactivity <4 µg/L was associated with a positive response to treatment (OR, 3.2; 95% CI, 1.5-7.0; P =.004). Also, cobalamin supplementation improved the response to treatment (OR, 3.0; 95% CI, 1.4-6.6; P =.006). CONCLUSIONS AND CLINICAL IMPORTANCE: Exocrine pancreatic insufficiency in cats often has a different clinical presentation than in dogs. The age range for EPI in cats is wide, and many cats can be ≤5 years of age. Most cats respond well to appropriate treatment for EPI, and cobalamin supplementation appears to be necessary for a good response.


**Single-dose pharmacokinetics and cardiovascular effects of oral pimobendan in healthy cats.**

INTRODUCTION: To investigate the pharmacokinetics and pharmacodynamics of oral pimobendan in conscious, healthy cats. ANIMALS: Eight healthy adult cats. MATERIALS AND METHODS: A randomised, single-blinded, crossover design was used. Two oral doses of pimobendan (0.625-mg
[LD], 1.25-mg [HD]) and a control substance (3-mL water) were administered to each cat. Blood collection, echocardiography, and oscillometric blood pressure measurements were performed repeatedly for 12 h following each dose. Plasma concentrations of pimobendan and the active metabolite, O-desmethylpimobendan (ODMP), were quantified using ultra-high-performance liquid chromatography tandem mass spectrometry. Cardiovascular parameters were evaluated for between- and within-treatment effects over time using linear mixed modelling. RESULTS: Pimobendan was rapidly absorbed and converted to ODMP with the pimobendan AUC0-∞ greater than ODMP AUC0-∞ (ODMP:pimobendan AUC0-∞ ratio 0.6 [LD] and 0.5 [HD]) despite a longer elimination half-life of ODMP (pimobendan t1/2 0.8 h vs. ODMP t1/2 1.6 h [LD]; pimobendan t1/2 0.7 h vs. ODMP t1/2 1.3 h [HD]). Averaged across all time points, pimobendan increased several measures of systolic function; however, its effect could not be further characterised. Although treatment was well-tolerated, two cats vomited following HD and another had a ventricular premature beat recorded following LD. CONCLUSIONS: The lower ODMP:pimobendan AUC0-∞ ratio compared to that observed previously in dogs suggests reduced metabolism in cats. Treatment effects were observed in measures of systolic function; however, the duration of action and differences in effects between the two pimobendan doses could not be characterised. Further studies are required to evaluate pimobendan in feline cardiovascular medicine.


**Recurrent and non-recurrent feline injection-site sarcoma: computed tomographic and ultrasonographic findings.**

OBJECTIVES: This study describes the sonographic and computed tomographic (CT) characteristics of primary and recurrent feline injection-site sarcomas (FISSs). METHODS: Between 2005 and 2013, 32 cats were selected for prospective and retrospective studies. Tumor shape and margins, presence of thickening of the adipose tissue, muscular and bone involvement, pre- and postcontrast attenuation, blurring of fat planes, calcification and liquefactive necrosis, intratumoral areas and skip metastasis were analyzed in CT scans. Echogenicity, echotexture, tumor margins and peritumoral tissue characteristics were analyzed by ultrasound (US). RESULTS: Irregular shape (62.5%) with digitiform projections (100.0%), mixed (peripheral and intratumoral) contrast enhancement (67.7%), blurring of fat planes (68.8%) and signs of liquefactive intratumoral necrosis (68.8%) were the prevailing CT findings. Ultrasonography revealed irregular tumor margins, peripheral hyperechoic capsule-like rim, heterogeneous echotexture, and hyperechoic tissue contiguous with the formations and thickening of adjacent subcutaneous tissues in all cases. Mixed echogenicity with areas suggestive of tumor liquefactive necrosis was documented in 83.3% of cases. Skip metastases were highly correlated with tumor recurrence (P = 0.001). The incidence of muscular involvement tended to be higher (P = 0.003) in tumors presenting with thickening of adjacent adipose tissue. CONCLUSIONS AND RELEVANCE: CT and US features common to FISS lesions were highlighted in this study. The imaging modalities employed allowed assessment of peritumoral inflammation, particularly adipose tissue inflammation. Imaging data may contribute to FISS diagnosis, therapeutic planning and patient follow-up.