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**Tick pests and vectors (Acari: Ixodoidea) in European towns: Introduction, persistence and management.**

Ticks have always been a part of fauna in and around human settlements, and their significance changed concurrently with the enlargement of settlements and their transformation into towns. The increased rate of urbanization during the last decades has created a new reality for tick existence. Two groups of ticks are of major concern for modern towns: those living under natural conditions of urban surroundings and those well-adapted to urban conditions. During the process of urbanization, encroachment into forested and uncultivated areas as well as protection of existing green spaces create opportunities for ticks living in nature to also exist under urban and suburban conditions. Conditions of modern urban and especially suburban environment in developed European countries adequately meet tick requirements. Tick species having an advantage in urban areas are those that can use one and the same host at all parasitic stages, can starve for a prolonged time, can use either urban pests or domesticated animals as hosts, and can live in man-made buildings. The ticks of the Argas reflexus group (Argasidae) and the brown dog tick Rhipicephalus sanguineus (Ixodidae) comply with practically all conditions necessary for successful survival in urban areas. The ability of ticks to transmit numerous human and animal pathogens and the presence of many reservoir hosts in urban and suburban areas create persistent danger for human populations and domestic animals. Impact on urban ticks should be directed against the two major requirements of tick existence: reducing populations of potential tick hosts (feral pigeons, stray dogs and cats, and urban rodents), and changing other environmental conditions to make them less suitable for ticks. It is especially important that urban inhabitants be properly informed about the danger posed by ticks, the sites of possible tick attacks, and basic self-protection techniques.


**Himalayan fossils of the oldest known pantherine establish ancient origin of big cats.**

Pantherine felids (‘big cats’) include the largest living cats, apex predators in their respective ecosystems. They are also the earliest diverging living cat lineage, and thus are important for understanding the evolution of all subsequent felid groups. Although the oldest pantherine fossils occur in Africa, molecular phylogenies point to Asia as their region of origin. This paradox cannot be reconciled using current knowledge, mainly because early big cat fossils are exceedingly rare and fragmentary. Here, we report the discovery of a fossil pantherine from the Tibetan Himalaya, with an age of Late Miocene-Early Pliocene, replacing African records as the oldest pantherine. A ‘total evidence’ phylogenetic analysis of pantherines indicates that the new cat is closely related to the snow leopard and exhibits intermediate characteristics on the evolutionary line to the largest cats. Historical biogeographic models provide robust support for the Asian origin of pantherines. The combined analyses indicate that 75% of the divergence events in the pantherine lineage extended back to the Miocene, up to 7 Myr earlier than previously estimated. The deeper evolutionary origin of big cats revealed by the new fossils and analyses indicate a close association between Tibetan Plateau uplift and diversification of the earliest living cats.


**Exudative pleural diseases in small animals.**

Exudative pleural diseases are a common cause of respiratory distress and systemic illness in dogs and
cats. This article addresses the pathophysiology, development, and classification of exudative pleural effusions. The most current diagnostic strategies, causes, imaging findings, and medical or surgical treatment options for select diseases are reviewed in detail.


0.4% Dimeticone spray, a novel physically acting household treatment for control of cat fleas.
The cat flea, Ctenocephalides felis, is the most important ectoparasite of cats and dogs worldwide as a cause of irritation and health problems. Most products to control these pests in the household environment rely upon a combination of neurotoxic insecticides and insect growth regulators to inhibit development of flea eggs and larvae into adults. However, some of these are affected by problems of insecticide resistance as well as public concerns about their potential for toxicity in domestic use.

Heavy synthetic oils, like the siloxane dimeticone, are currently widely used to treat human ectoparasite infestations, acting by a physical mode of action, and have been used in a variety of presentations for killing all life stages of fleas. We have investigated the activity of low concentrations of high molecular weight dimeticone in a volatile silicone base for ability to immobilise flea life stages without asphyxiating them. We found that cat flea adults and larvae were immobilised by a surface film of dimeticone that inhibited movement of cuticular joints, apparently forming an effective sticky trap. When cocoons were treated the fleas continued to develop within the pupae but failed to emerge. An aerosol spray incorporating 0.4% concentration of dimeticone, for use as a residual household treatment, showed no significant difference in knock down capability compared with that of a widely used pyriproxifen/permethrin spray in a repeat challenge test, with effects persisting to inhibit adult flea emergence in the test arena area for more than 3 weeks after application.


X-RAY ATTENUATION OF THE LIVER AND KIDNEY IN CATS CONSIDERED AT VARYING RISK OF HEPATIC LIPIDOSIS.

X-ray attenuation of the liver has been measured using computed tomography (CT) and reported to decrease in cats with experimentally induced hepatic lipidosis. To assess the clinical utility of this technique, medical records and noncontrast CT scans of a series of cats were retrospectively reviewed. A total of 112 cats met inclusion criteria and were stratified into three hepatic lipidosis risk groups. Group 1 cats were considered low-risk based on no history of inappetence or weight loss, and normal serum chemistry values; Group 2 cats were considered intermediate risk based on weight loss, serum hepatic enzymes above normal limits, or reasonably controlled diabetes mellitus; and Group 3 cats were considered high risk based on poorly controlled diabetes mellitus due to hypersomatotropism.

Mean CT attenuation values (Hounsfield units, HU) were measured using regions of interest placed within the liver and cranial pole of the right kidney. Hepatic and renal attenuation were weakly positively correlated with each other ($r = 0.2$, $P = 0.03$) and weakly negatively correlated with body weight ($r = -0.21$, $P = 0.05$, and $r = -0.34$, $P = 0.001$, respectively). Mean (SD) hepatic and renal cortical attenuation values were 70.7 (8.7) HU and 49.6 (9.2) HU for Group 1 cats, 71.4 (7.9) HU and 48.6 (9.1) HU for Group 2, and 68.9 (7.6) HU and 47.6 (7.2) HU for Group 3. There were no significant differences in hepatic or renal attenuation among groups. Findings indicated that CT measures of X-ray attenuation in the liver and kidney may not be accurate predictors of naturally occurring hepatic lipidosis in cats.
**Whole-genome comparison of meticillin-resistant Staphylococcus aureus CC22 SCCmecIV from people and their in-contact pets.**  
BACKGROUND: Meticillin-resistant Staphylococcus aureus (MRSA) infections remain important medical and veterinary challenges. The MRSA isolated from dogs and cats typically belong to dominant hospital-associated clones, in the UK mostly EMRSA-15 (CC22 SCCmecIV), suggesting original human-to-animal transmission. Nevertheless, little is known about host-specific genetic variation within the same S. aureus lineage. HYPOTHESES/OBJECTIVES: To identify host-specific variation amongst MRSA CC22 SCCmecIV by comparing isolates from pets with those from in-contact humans using whole-genome microarray. METHODS: Six pairs of MRSA CC22 SCCmecIV from human carriers (owners and veterinary staff) and their respective infected in-contact pets were compared using a 62-strain whole-genome S. aureus microarray (SAM-62). The presence of putative host-specific genes was subsequently determined in a larger number of human (n = 47) and pet isolates (n = 93) by PCR screening. RESULTS: Variation in mobile genetic elements (MGEs) occurred frequently and appeared largely independent of host and in-contact pair. A plasmid (SAP078A) encoding heavy-metal resistance genes (arsR, arsA, cadA, cadC, mco and copB) was found in three of six human and none of six animal isolates. However, only two of four resistance genes were associated with human hosts (P = 0.015 for arsA and cadA). CONCLUSIONS AND CLINICAL IMPORTANCE: The variation found amongst MGEs highlights that genetic adaptation in MRSA continues. However, host-specific MGEs were not detected, which supports the hypothesis that pets may not be natural hosts of MRSA CC22 and emphasizes that rigorous hygiene measures are critical to prevent contamination and infection of dogs and cats. The host specificity of individual heavy-metal resistance genes warrants further investigation into different selection pressures in humans and animals.

**What is a feral cat?: Variation in definitions may be associated with different management strategies.**  
STUDY RATIONALE: The definition of a true feral cat is an area of much contention, with many variations used worldwide. In this study, opinions were gathered from feral cat rescue workers and veterinary surgeons working in the United Kingdom to identify a practical definition of a feral cat, suitable for use in the field, education and research. PROTOCOL: A mixed methods approach, using questionnaires and focus groups, was used to collect data from feral cat workers and veterinary surgeons. FINDINGS: Conflicts in opinion on the implications of taming feral cats exist. The rescue workers typically felt that most cats could be tamed, whereas the veterinary surgeons felt this was generally inappropriate, except in the case of young kittens. A consistent definition of feral cats would enable better communication regarding the welfare and management of these animals, and would be useful for further research and education of the public. PROPOSED DEFINITION: A feral cat is proposed by this study to be a cat that is unapproachable in its free-roaming environment and is capable of surviving with or without direct human intervention, and may additionally show fearful or defensive behaviour on human contact.

**Veterinary and human anaesthesia: an overview of some parallels and contrasts.**  
The history of human and veterinary anaesthesia is both intertwined and parallel. Physicians and
anaesthetists often first experimented on animals and developments from human anaesthesia have been incorporated into veterinary medicine. Within veterinary medicine, anaesthesia is a specialty discipline as it is in human medicine. Veterinary anaesthetists undertake additional training and rigorous examinations for a diploma or fellowship. In contrast to human anaesthesia in Australia and New Zealand, veterinary anaesthesia is often performed by non-specialists and by veterinary nurses. Veterinary anaesthesia uses many of the same drugs for premedication, induction and maintenance of anaesthesia as human anaesthesia. However, there are species specific effects of some of the drugs used that differ from the effects in humans. Furthermore, some agents, particularly alpha-2 adrenoreceptor agonists and ketamine, are used very widely in veterinary practice. Also in contrast to most human anaesthesia, in large animal and exotic animal practice the patients can present a physical danger to the anaesthetist. The most notable contrast between human and veterinary anaesthesia is in the reported perioperative complication and mortality rates, with a species dependent perianesthetic mortality of up to 2% in dogs, cats and horses and greater than 2% in guinea pigs and birds, which is up to 100-fold higher than in human anaesthesia.

Ventral occipito-atlanto-axial fluid-filled lesion causing dynamic spinal cord compression in a cat.
Cystic lesions affecting the vertebral canal or spinal cord have rarely been reported in cats. A 3-year-old female neutered domestic longhair cat presented for evaluation of a 2-year-history of episodes of ataxia and paresis affecting all limbs. Neurological examination was consistent with a lesion in the C1-C5 spinal cord segments. Magnetic resonance imaging (MRI) showed a fluid-filled lesion at the occipito-atlanto-axial region causing dynamic spinal cord compression on flexion of the neck. The imaging characteristics were compatible with a juxta-articular cyst. To our knowledge, this is the first report of a fluid-filled lesion causing dynamic cervical spinal cord compression in a cat and highlights the importance of performing flexion-extension MRI views in diagnosing cases with dynamic spinal cord compression.

Vaccines against Toxoplasma gondii: new developments and perspectives.
Toxoplasmosis caused by the protozoan Toxoplasma gondii is a major public health problem, infecting one-third of the world human beings, and leads to abortion in domestic animals. A vaccine strategy would be an ideal tool for improving disease control. Many efforts have been made to develop vaccines against T. gondii to reduce oocyst shedding in cats and tissue cyst formation in mammals over the last 20 years, but only a live-attenuated vaccine based on the S48 strain has been licensed for veterinary use. Here, the authors review the recent development of T. gondii vaccines in cats, food-producing animals and mice, and present its future perspectives. However, a single or only a few antigen candidates revealed by various experimental studies are limited by only eliciting partial protective immunity against T. gondii. Future studies of T. gondii vaccines should include as many CTL epitopes as the live attenuated vaccines.

Using cardiac biomarkers in veterinary practice.
Blood-based assays for various cardiac biomarkers can assist in the diagnosis of heart disease in dogs and cats. The two most common markers are cardiac troponin-I and N-terminal pro-B-type natriuretic peptide. Biomarker assays can assist in differentiating cardiac from noncardiac causes of respiratory signs and detection of preclinical cardiomyopathy. Increasingly, studies indicate that cardiac biomarker testing can help assess the risk of morbidity and mortality in animals with heart disease. Usage of cardiac biomarker testing in clinical practice relies on proper patient selection, correct interpretation of test results, and incorporation of biomarker testing into existing diagnostic methods.

Use of prednisolone as monotherapy in the treatment of feline pemphigus foliaceus: a retrospective study of 37 cats.
BACKGROUND: Prednisone doses of up to 8 mg/kg/day have been used to treat feline pemphigus foliaceus (PF). Oral prednisolone has more favourable pharmacokinetics in cats than prednisone; therefore, lower doses of prednisolone may be effective in treating feline PF.
HYPOTHESIS/OBJECTIVES: To assess the dose of prednisolone required to induce and maintain remission of PF in cats. ANIMALS: Thirty-seven client-owned cats with a diagnosis of PF treated with prednisolone monotherapy for induction of remission. METHODS: A retrospective analysis of records of a veterinary dermatology referral practice between the years of 1995 and 2013 was carried out. History, clinical signs, cytological and/or histopathological findings, lack of response to antimicrobials, absence of fungal hyphae on periodic acid Schiff staining and/or negative fungal culture and positive response to immunosuppressive therapy were used to confirm the diagnosis. Cats were included in the study if prednisolone was used as the monotherapy induction protocol. RESULTS: Complete remission was achieved within 8 weeks in 97% of cats with a median induction dose of 2 mg/kg prednisolone daily. In cats requiring ongoing treatment, 67% were maintained in remission with prednisolone monotherapy. The median maintenance dose was 1.2 mg/kg/week. In 14% of cats, medication was eventually discontinued. CONCLUSIONS AND CLINICAL IMPORTANCE: Daily prednisolone at 2 mg/kg is an effective dose for inducing remission of PF in cats. Adverse effects were uncommon with this dose. In a small population, permanent remission may be induced. Secondary bacterial overgrowth and exudate in claw folds resolved in all cases with immunosuppressive therapy; therefore, antimicrobial therapy may be unnecessary.

Use of pheromones to reduce stress in sheltered cats.

Use of IV Lipid Emulsion for Treatment of Ivermectin Toxicosis in a Cat.
Ivermectin toxicosis in cats is infrequently reported. IV lipid emulsion (ILE) is a novel treatment in veterinary medicine that has been used for amelioration of adverse effects seen with multiple lipid soluble compounds. Previously, ILE has been investigated in experimental models with rats, rabbits, pigs, and dogs, mainly for resuscitation of cardiopulmonary arrest and treatment of hypotension due to local anesthetic drug overdose. There are few case reports in veterinary medicine of using ILE for drug toxicity. Only one feline case has been reported, with IV lipids used for treatment of lidocaine toxicity. This report describes a case of ivermectin toxicosis in a 1 yr old domestic shorthair that was safely and successfully treated using ILE.
**Upper respiratory tract endoscopy in the cat: a minimally invasive approach to diagnostics and therapeutics.**

**CLINICAL CHALLENGES:** Endoscopy of the feline upper respiratory tract has always taken a bit of a back seat to exploration of the canine nose and paranasal sinuses, pharynx and trachea, due to some anatomic limitations and lack of availability of appropriate-sized equipment. **PRACTICAL RELEVANCE:** With proper training, however, even the inexperienced endoscopist can find that endoscopy and endoscopic surgery can be of tremendous utility in feline practice. What had previously been largely off-limits sites, in terms of direct visualization and surgical intervention, the feline rhinarium, paranasal sinuses, pharynx and trachea are now anatomic areas that can be effectively visualized in most clinical scenarios. Moreover, endoscopic surgery is now an area gaining significant appreciation for its diagnostic and therapeutic benefits. **AUDIENCE:** This article will not serve as a complete treatise on disease processes of the upper respiratory tract in cats, but rather is intended as a technical and instructional reference point on upper airway endoscopy for veterinary surgeons, both in first opinion as well as referral small animal practice.

**Update on immununosuppressive therapies for dogs and cats.**

Treatment of immune-mediated disease in dogs and cats continues to evolve as new therapies are introduced or adapted from human medicine. Glucocorticoids remain the first-line therapy for many of the immune-mediated or inflammatory diseases of cats and dogs. The focus of this article is to provide an update on some of the common immunosuppressive therapies used in small animal veterinary medicine. The goals of therapy are to induce disease remission through the inhibition of inflammation and the modulation of lymphocyte function.

**Ultrasound-guided pudendal nerve block in cats undergoing perineal urethrostomy: a prospective, randomised, investigator-blind, placebo-controlled clinical trial.**

The objective of this study was to evaluate the clinical usefulness, in terms of analgesic efficacy and safety, of ultrasound-guided pudendal nerve block performed with bupivacaine in cats undergoing perineal urethrostomy. Eighteen client-owned male cats scheduled for perineal urethrostomy were enrolled in the study and assigned to one of two treatment groups. The pudendal nerve block was performed under general anaesthesia as described elsewhere, with 0.3 ml/kg of either saline (group C) or 0.5% bupivacaine (group B) - the total injection volume being split equally on the two sites of injection (left and right). Intra-operatively, assessment of nociception was based on the rescue analgesics requirement, as well as on the evaluation of changes in physiological parameters in comparison with the baseline values. Post-operative pain assessment was performed using three different pain scales at recovery and then 1, 2 and 3 h after recovery. Cats in group B showed lower heart rates and required fewer analgesics during surgery than group C. Post-operatively, group B had lower pain scores and needed less rescue buprenorphine than group C. Iatrogenic block-related complications were not observed. In conclusion, the ultrasound-guided pudendal nerve block can be considered clinically useful in feline medicine as it provides reliable analgesia in cats undergoing perineal urethrostomy.
Ultrasonographic measurement of the relative thickness of intestinal wall layers in clinically healthy cats.
The normal sonographic thickness of the individual layers (ie mucosa, submucosa, muscularis and subserosa-serosa) of the intestinal wall was evaluated in 20 clinically healthy cats. The mean thickness of the wall was 2.20 mm, 2.22 mm, 3.00 mm and 2.04 mm for duodenum, jejunum, ileum (fold) and ileum (between folds), respectively. The mean thickness of the mucosal layer was 1.27, 1.2, 0.46 and 0.49 mm for duodenum, jejunum, ileum (fold) and ileum (between folds), respectively, and its contribution to wall thickness was significantly greater than that of the other layers in the duodenum (57.7%) and jejunum (55.2%). The mean thickness of submucosal layer was 0.36, 0.36, 1.49 and 0.53 mm for duodenum, jejunum, ileum (fold) and ileum (between folds), respectively, and its contribution to wall thickness was greater than that of the muscularis in the duodenum (16.3%), jejunum (16%) and ileum (fold) (49.8 %). The mean thickness of muscularis was 0.28, 0.35, 0.66 and 0.65 mm for duodenum, jejunum, ileum (fold) and ileum (between folds), respectively, with a corresponding contribution to wall thickness of 12.7%, 14.4%, 22% and 31.6%. Finally, the mean thickness of serosa was 0.29, 0.31, 0.38 and 0.38 mm for duodenum, jejunum, ileum (fold) and ileum (between folds), respectively, with a corresponding contribution to wall thickness of 13.3%, 14.4%, 12.7% and 18.7%. These values can provide baseline information that might be useful in evaluating intestinal disorders affecting preferentially some of the intestinal layers.

ULTRASONOGRAPHIC CHARACTERISTICS OF LIPIDURIA IN CLINICALLY NORMAL CATS.
Echoes are frequently seen in the urinary bladder of cats during abdominal ultrasound. These have been attributed to hematuria, pyuria, crystalluria, and lipid. However, sonographic findings have not been previously correlated with urinalysis. We prospectively evaluated 40 clinically normal cats via ultrasound, serum chemistry, and urinalysis. Thin layer chromatography was performed on the urine to determine the amount (mg) of lipid subfractions including diacylglycerol, triglyceride, phospholipid, free fatty acid, cholesterol, and cholesterol ester. Ninety percent (36/40) of the cats in our population had sonographic echoes suspended in the urinary bladder, with most having a subjective score of mild echoes (n = 20). None of the sonographic echoes were gravity dependent or caused distal acoustic shadowing, reverberation, or twinkle artifact. Of the cats with sonographic echoes in the urine, 66% (24/36) had no significant findings on urinalysis other than the presence of lipid. The total amount of subjective sonographic echoes was not significantly related to the total amount of fat measured on thin layer chromatography or the number of lipid droplets seen on urinalysis. An increased amount of urine diacylglycerol was significantly associated with clumping of echoes (P = 0.02) and the amount of lipid droplets seen on urinalysis (P = 0.04). An association between increased amounts of urine diacylglycerol and the amount of echoes seen on ultrasound approached significance (P = 0.05). Findings from this study support previously published theories that sonographic echoes within the urinary bladder of clinically normal cats may be due to urine lipid.

Trilostane Therapy for Treatment of Spontaneous Hyperadrenocorticism in Cats: 15 Cases
BACKGROUND: Medical treatment with trilostane improves clinical signs, causes unclear insulin requirement changes, and variable survival times in cats. OBJECTIVES/HYPOTHESIS: To characterize the long-term efficacy of trilostane in treating cats with hyperadrenocorticism (HAC).

ANIMALS: Fifteen client-owned cats with spontaneous HAC.

METHODS: Multicenter descriptive retrospective study with a search performed on all medical records for cats diagnosed with spontaneous HAC.

RESULTS: Clinical signs (13 of 15 cats) and ACTH stimulation testing results (13 of 15) improved with trilostane therapy. Diabetes mellitus was reported in 9/15 cases. Insulin requirements decreased by 36% within 2 months in 6/9 diabetic cats. Median survival time was 617 days for all cats (range 80-1,278 days). Complications included weight loss, urinary tract infections, chronic kidney disease, seizures, and recurrent pancreatitis. Hypocortisolemia was documented in 1 case. Cause of death occurred as a result of nonadrenal or nondiabetic illnesses (renal failure, seizures [caused by hypoglycemia or unknown], or lymphoma).

CONCLUSIONS AND CLINICAL IMPORTANCE: Trilostane ameliorates clinical signs of HAC in cats, is tolerated well in the long term, and can lead to improved regulation of diabetes.


Treating animal bites: susceptibility of Staphylococci from oral mucosa of cats.

Infected wounds determined by cats’ bites represent high costs to public health, and their adequate treatment relies on the knowledge of the antimicrobial susceptibility of bacterial agents found in the oral microbiota. Members of the genus Staphylococcus sp. belong to the microbiota of the oral mucosa of cats and are frequently involved in secondary infections of these wounds. This study aimed to evaluate the antimicrobial susceptibility of Staphylococcus species isolated from oral mucosa of cats. Samples were collected from 200 clinically healthy cats and processed by standard bacteriological methods and tested for susceptibility to a panel of 16 antimicrobials. A total of 212 staphylococci isolates were obtained from 141 of the 200 cats (70.5%), and more than one colony was recognized in 53 cases. Coagulase-negative species were most frequently found (89.6%) distributed among Staphylococcus xylosus (50.9%), Staphylococcus felis (27.4%), Staphylococcus simulans (6.1%) and Staphylococcus sciuri (5.2%). Coagulase-positive species (10.4%) were distributed among Staphylococcus aureus (4.7%) and Staphylococcus intermedius group (SIG) (5.7%). Regarding to antimicrobial resistance, 178 isolates (83.9%) were resistant to at least one antimicrobial, and rifampicin showed the best results with 100% of sensitive strains. Conversely, high rates of resistance were observed for penicillin and tetracycline (56.1%). The 212 staphylococci isolates and 30 (14.1%) strains were resistant to methicillin (on the disc susceptibility test) and may be preliminarily considered as methicillin-resistant staphylococci. In conclusion, this study reports important rates of antimicrobial resistance among the species of Staphylococcus isolated from clinical specimens of cats, which must be considered for the treating of cats’ bites in humans.


Transdermal application of methimazole in hyperthyroid cats: a long-term follow-up study.

Transdermal methimazole is suggested as an alternative to oral therapy for hyperthyroid cats that are difficult to pill. However, no information on long-term management with this treatment is available. Our objective was therefore to retrospectively evaluate the efficacy and safety of long-term transdermal methimazole-treated hyperthyroid cats. Sixty cats with newly diagnosed hyperthyroidism and available
long-term follow-up information were included. Methimazole was formulated in a pluronic lecithin organogel-based vehicle and was applied to the pinna of the inner ear. Cats were re-evaluated at regular intervals. Median (range) follow-up was 22.6 months (3.6-88.4 months). Clinical improvement was observed in all cats and side effects were rare (mild transient gastrointestinal signs: n = 3; erythema of the pinna: n = 2, necessitating a switch to oral medication). Despite a significant decrease, with median T4 concentrations within the reference interval during the follow-up period, several cats repeatedly had T4 concentrations in the thyrotoxic and hypothyroid range. Maximal and minimal daily doses during the follow-up period were 15.0 and 1.0 mg, respectively; they were significantly higher than the starting dose after 24-36 months of therapy. Although the majority of owners were highly satisfied with the treatment, several admitted not treating their cat regularly. Transdermal methimazole is a safe option for the long-term management of feline hyperthyroidism. However, it seems difficult to keep the T4 concentrations constantly within the reference interval: higher doses can be expected after prolonged treatment and, despite the convenience of transdermal application, owner compliance should be assessed regularly.


Transcriptional profiling of feline infectious peritonitis virus infection in CRFK cells and in PBMCs from FIP diagnosed cats.

BACKGROUND: Feline Infectious Peritonitis (FIP) is a lethal systemic disease, caused by the FIP Virus (FIPV); a virulent mutant of Feline Enteric Coronavirus (FECV). Currently, the viruses virulence determinants and host gene expressions during FIPV infection are not fully understood. METHODS: RNA sequencing of Crandell Rees Feline Kidney (CRFK) cells, infected with FIPV strain 79--1146 at 3 hours post infection (h.p.i), were sequenced using the Illumina next generation sequencing approach. Bioinformatic’s analysis, based on Felis catus 2X annotated shotgun reference genome, using CLC bio Genome Workbench mapped both control and infected cell reads to 18899 genes out of 19046 annotated genes. Kal’s Z test statistical analysis was used to analyse the differentially expressed genes from the infected CRFK cells. Real time RT-qPCR was developed for further transcriptional profiling of three genes (PD-L1, PD-L1 and A3H) in infected CRFK cells and Peripheral Blood Mononuclear Cells (PBMCs) from healthy and FIP-diseased cats. RESULTS: Based on Kal’s Z-test, with False Discovery Rate (FDR) <0.05 and >1.99 fold change on gene expressions, a total of 61 genes were differentially expressed by both samples, where 44 genes were up-regulated and the remainder were down-regulated. Most genes were closely clustered together, suggesting a homogeneous expression. The majority of the genes that were significantly regulated, were those associated with monocytes-macrophage and Th1 cell functions, and the regulation of apoptosis. Real time RT-qPCR developed focusing on 2 up-regulated genes (PD-L1 and A3H) together with an apoptosis associated gene PD-L1 expressions in FIPV infected CRFK cells and in PBMCs from healthy and FIP diagnosed cats produced concordant results with transcriptome data. CONCLUSION: The possible roles of these genes, and their importance in feline coronaviruses infection, are discussed.


Trans-iliac pin/bolt/screw internal fixation for sacroiliac luxation or separation in cats: six cases.

Trans-iliac pin, bolt or screw stabilisation was performed on six cats with sacroiliac (SI) luxation and separation. For the purpose of this study, SI luxation is defined as the separation of the iliac wing from the sacrum without fracture of the sacral or iliac wing; SI separation is defined as the separation of the
iliac wing from the sacrum secondary to fracture of the sacrum and/or the iliac wing. Complications, surgical time and medium-to-long-term outcome were assessed by a retrospective review of the clinical records and owner questionnaires. Postoperative reduction of the SI joint was good-to-excellent in all cases and the outcome was considered good to excellent in all cats apart from one, where the trans-iliac bolt migrated dorsally from the iliac wing. This cat had bilateral SI luxations. Based on our results, trans-iliac fixation of SI luxation/separation is associated with good clinical outcome and should be considered as a treatment option in unilateral SI luxation in cats. Caution should be exercised for the use of trans-iliac pin/bolt as the sole method of stabilisation in bilateral SI luxations.

Toxoplasma gondii, Source to Sea: Higher Contribution of Domestic Felids to Terrestrial Parasite Loading Despite Lower Infection Prevalence.
Environmental transmission of Toxoplasma gondii, a global zoonotic parasite, adversely impacts human and animal health. Toxoplasma is a significant cause of mortality in threatened Southern sea otters, which serve as sentinels for disease threats to people and animals in coastal environments. As wild and domestic felids are the only recognized hosts capable of shedding Toxoplasma oocysts into the environment, otter infection suggests land-to-sea pathogen transmission. To assess relative contributions to terrestrial parasite loading, we evaluated infection and shedding among managed and unmanaged feral domestic cats, mountain lions, and bobcats in coastal California, USA. Infection prevalence differed among sympatric felids, with a significantly lower prevalence for managed feral cats (17%) than mountain lions, bobcats, or unmanaged feral cats subsisting on wild prey (73-81%). A geographic hotspot of infection in felids was identified near Monterey Bay, bordering a high-risk site for otter infection. Increased odds of oocyst shedding were detected in bobcats and unmanaged feral cats. Due to their large populations, pet and feral domestic cats likely contribute more oocysts to lands bordering the sea otter range than native wild felids. Continued coastal development may influence felid numbers and distribution, increase terrestrial pathogens in freshwater runoff, and alter disease dynamics at the human-animal-environment interface.

Thoracic computed tomography, angiographic computed tomography, and pathology findings in six cats experimentally infected with Aelurostrongylus abstrusus.
Aelurostrongylus abstrusus infection is common in endemic areas and may cause severe respiratory clinical signs. Computed tomography (CT) is an important tool to diagnose pulmonary disease, because it allows detection of small lesions and discrimination of superimposed structures. The purpose of this study was to characterize by CT and angiographic CT the pulmonary lesions in six cats before, and 48 and 81 days after inoculation with 100 or 800 A. abstrusus infective larvae. Histological examination of the accessory lung lobe was performed to determine the microscopic, pathomorphologic correlate of the CT findings. The predominant CT lesion consisted of multiple nodules of varying size distributed throughout the lungs, severity depending on infectious dose. The histological correlate of the nodular lesions was multifocal dense granulomatous to mixed inflammatory cell infiltrates, including eosinophils distributed in the parenchyma and obliterating the alveoli. Marked, multifocal, dose-dependent thickening of the bronchi and adjacent interstitial changes blurred the margins of the outer serosal surface of the bronchi and vessels. Histologically, this was due to peribronchial mixed cell
inflammation. During the course of infection some of the nodular and peribronchial changes were replaced by areas of ground-glass opacity. In addition to providing detailed depiction of pulmonary lesions resulting from an infectious cause and clearly defining lesions with respect to time and severity of infection, CT allowed quantitative assessment of bronchial thickness and lymph node size during the course of disease. Findings indicated that CT characteristics of this disease are consistent with pathologic findings.


Feline Chronic Gingivostomatitis Syndrome (FCGS) is a common disease in clinical practice. Among the therapeutic options available, long-acting corticosteroids are frequently used due to their anti-inflammatory and immunosuppressive properties. Although they may improve the clinical symptoms, they can lead to a progressive form of the disease that becomes refractory to treatment. Furthermore, their direct relationship with type II diabetes mellitus (DM) is well known. Consequently, these drugs are controversial and not recommended for routine management of FCGS. Recombinant feline interferon-omega (rFeIFN-omega) is an immunomodulatory compound. Recently, its daily oral administration has been shown to be successful in treating refractory cases of FCGS. This case study describes two clinical cases of type II DM complicated by FCGS. Both animals were calicivirus positive and they had been previously treated with long-acting corticosteroids, which may have been the major cause of DM. The two cats were treated with glargine insulin (Lantus, starting dose 1 IU/cat twice daily (BID)), achieving remission 10 and 18 weeks later respectively. Considering the difficulty with control of FCGS in these animals, an oral daily dose of rFeIFN-omega was started as an alternative to long-acting corticosteroids. In both cats oral clinical signs gradually improved and 60 days after the start of therapy the owners reported a significant relief of pain during mastication. According to the authors’ knowledge, this is the first case report that describes the successful use of rFeIFN-omega in the management of FCGS in type II diabetic cats, in which long-acting corticosteroids are contraindicated.


Feline leukemia virus (FeLV) is a naturally transmitted gammaretrovirus that infects domestic cats. FeLV-945, the predominant isolate associated with non-T-cell disease in a natural cohort, is a member of FeLV subgroup A but differs in sequence from the FeLV-A prototype, FeLV-A/61E, in the surface glycoprotein (SU) and long terminal repeat (LTR). Substitution of the FeLV-945 LTR into FeLV-A/61E resulted in pathogenesis indistinguishable from that of FeLV-A/61E, namely, thymic lymphoma of T-cell origin. In contrast, substitution of both FeLV-945 LTR and SU into FeLV-A/61E resulted in multicentric lymphoma of non-T-cell origin. These results implicated the FeLV-945 SU as a determinant of pathogenic spectrum. The present study was undertaken to test the hypothesis that
FeLV-945 SU can act in the absence of other unique sequence elements of FeLV-945 to determine the disease spectrum. Substitution of FeLV-A/61E SU with that of FeLV-945 altered the clinical presentation and resulted in tumors that demonstrated expression of CD45R in the presence or absence of CD3. Despite the evident expression of CD45R, a typical B-cell marker, T-cell receptor beta (TCRbeta) gene rearrangement indicated a T-cell origin. Tumor cells were detectable in bone marrow and blood at earlier times during the disease process, and the predominant SU genes from proviruses integrated in tumor DNA carried markers of genetic recombination. The findings demonstrate that FeLV-945 SU alters pathogenesis, although incompletely, in the absence of FeLV-945 LTR. Evidence demonstrates that FeLV-945 SU and LTR are required together to fully recapitulate the distinctive non-T-cell disease outcome seen in the natural cohort.

The role of food for the formation and prevention of gastrointestinal lesions induced by aspirin in cats.
BACKGROUND/AIMS: The effects of feeding conditions (fasted or fed) and dietary fiber (DF) in the diet on gastrointestinal (GI) damage induced by aspirin (ASA) were examined in cats. METHODS: Plain ASA (P-ASA, 20 mg/kg) or one enteric-coated ASA tablet (EC-ASA, containing 100 mg ASA) was administered p.o. once daily for 3 or 7 days just after morning meal, 3 h after the evening meal, or in the morning without a morning meal (fasted). Several types of diet, dry food (DRY, DF: 2.8 %), canned food (CAN, DF: 0.4 %), and diets with added cellulose or pectin were provided twice daily. RESULTS: P-ASA or EC-ASA administered just after feeding of DRY caused marked lesions in the GI tract, although EC-ASA did not produce any lesions in the stomach. GI damage was markedly decreased when ASA was administered 3 h after the evening meal. The induction of lesions by EC-ASA was markedly decreased in cats that ate CAN, but lesions were induced in cats fed CAN with added cellulose (6 %). The addition of pectin (6 %) to the DRY markedly decreased the induction of lesions by EC-ASA. CONCLUSIONS: The results indicate that the induction of GI lesions by ASA was highly dependent on the feeding conditions and DF. To minimize the induction of GI damage, it would be better to take ASA 3 h after the evening meal, or after consuming diets that contain low amounts of insoluble DF and high amounts of soluble DF.

The relationship of serum cobalamin to methylmalonic acid concentrations and clinical variables in cats.
BACKGROUND: Serum cobalamin concentration [CBL] suggests CBL deficiency in cats but serum methylmalonic acid concentration [MMA] more accurately indicates CBL deficiency. OBJECTIVE: To examine the ability of [CBL] to predict CBL deficiency defined by increased [MMA], and relationships of [CBL] and [MMA] with select clinical and clinicopathological variables. ANIMALS: One hundred sixty-three client-owned cats with [CBL] measurements, 114 cats with simultaneous [MMA] measurements; 88 cats with medical information. METHODS: Prospectively collected [CBL] and [MMA] were compared using scatter plots, receiver operating characteristic and correlative analyses with historical [CBL] thresholds and those identified in the study. [CBL] and [MMA] were compared retrospectively to specific clinical and clinicopathological variables. RESULTS: [CBL] correlated negatively with [MMA] (tau = -0.334, P <.0001), [MMA] >/= 1,343 nmol/L identified CBL deficiency. [CBL] = 209 pg/mL optimized sensitivity (0.51), specificity (0.96), PPV (0.89), and NPV
(0.74) for detecting [MMA] \( \geq 1,343 \text{ nmol/L} \). Prevalence of CBL deficiency was 42% (48/114) when defined by [MMA] \( \geq 1,343 \text{ nmol/L} \) versus 23% (27/114) by [CBL] \( \leq 209 \text{ pg/mL} \). Unexpectedly, 23 and 45% of 48 cats with [MMA] \( \geq 1,343 \text{ nmol/L} \) had [CBL] > 900 pg/mL and 290 pg/mL (historical thresholds). [CBL] correlated with mean corpuscular volume (tau = -0.199, P = .013) and [MMA] with hematocrit (tau = -0.28, P = .006).

**CONCLUSIONS AND CLINICAL IMPORTANCE:** Cobalamin deficiency ([MMA] \( \geq 1,343 \text{ nmol/L} \)) occurred in 42% of cats and is predicted with high specificity by [CBL] \( \leq 209 \text{ pg/mL} \). CBL status correlates with microcytosis and anemia. Discordance between [CBL] and [MMA] cautions against relying on any single marker for determining CBL status.


**The epidemiology and public health importance of toxocariasis: a zoonosis of global importance.**

Toxocariasis, caused by infection with larvae of Toxocara canis, and to a lesser extent by Toxocara cati and other ascaridoid species, manifests in humans in a range of clinical syndromes. These include visceral and ocular larva migrans, neurotoxocariasis and covert or common toxocariasis. Toxocara canis is one of the most widespread public health and economically important zoonotic parasitic infections humans share with dogs, cats and wild canids, particularly foxes. This neglected disease has been shown through seroprevalence studies to be especially prevalent among children from socio-economically disadvantaged populations both in the tropics and sub-tropics and in industrialised nations. Human infection occurs by the accidental ingestion of embryonated eggs or larvae from a range of wild and domestic paratenic hosts. Most infections remain asymptomatic. Clinically overt infections may go undiagnosed, as diagnostic tests are expensive and can require serological, molecular and/or imaging tests, which may not be affordable or available. Treatment in humans varies according to symptoms and location of the larvae. Anthelmintics, including albendazole, thiabendazole and mebendazole may be given together with anti-inflammatory corticosteroids. The development of molecular tools should lead to new and improved strategies for the treatment, diagnosis and control of toxocariasis and the role of other ascaridoid species in the epidemiology of Toxocara spp. Molecular technologies may also help to reveal the public health importance of T. canis, providing new evidence to support the implementation of national control initiatives which have yet to be developed for Toxocara spp. A number of countries have implemented reproductive control programs in owned and stray dogs to reduce the number of young dogs in the population. These programs would positively impact upon T. canis transmission since the parasite is most fecund and prevalent in puppies. Other control measures for T. canis include the regular and frequent anthelmintic treatment of dogs and cats, starting at an early age, education and enforcement of laws for the disposal of canine faeces, dog legislation and personal hygiene. The existence of wild definitive and paratenic hosts complicates the control of T. canis. Increasing human and dog populations, population movements and climate change will all serve to increase the importance of this zoonosis. This review examines the transmission, diagnosis and clinical syndromes of toxocariasis, its public health importance, epidemiology, control and current research needs.


**The efficacy of cetirizine hydrochloride on the pruritus of cats with atopic dermatitis: a randomized, double-blind, placebo-controlled, crossover study.**

**BACKGROUND:** Various antihistamines have been used in the management of feline atopic dermatitis, with variable reported benefit. To date, there have been no randomized, double-blind, placebo-controlled, crossover clinical trials on the use of this drug class in cats.
HYPOTHESIS/OBJECTIVES: To evaluate the clinical efficacy of cetirizine hydrochloride for the control of pruritus and dermatitis in cats diagnosed with atopic dermatitis. METHODS: In this randomized, double-blind, placebo-controlled crossover clinical trial, 21 client-owned cats diagnosed with mild to moderate nonseasonal atopic dermatitis were randomly assigned to two groups. Cats in each group received either 1 mg/kg cetirizine hydrochloride or placebo once daily per os for 28 days followed by a 14 day wash-out period. Treatments were then crossed over, and cats received placebo or cetirizine hydrochloride for another 28 days. Owners marked a pruritus severity scale before inclusion in the study and weekly throughout the entire study period. Lesions were scored by the clinician using a Canine Atopic Dermatitis Extent and Severity Index (CADESI)-03 modified for the cat before enrolment and at day 28 of each treatment. RESULTS: Nineteen cats completed the study. There were no statistically significant differences between treatment with cetirizine hydrochloride and placebo for modified CADESI-03 or pruritus scores. CONCLUSION AND CLINICAL IMPORTANCE: This study suggests that cetirizine hydrochloride cannot be recommended for the management of feline atopic dermatitis.


The Effect of Feeding a Renal Diet on Plasma Fibroblast Growth Factor 23 Concentrations in Cats with Stable Azotemic Chronic Kidney Disease.

BACKGROUND: Fibroblast growth factor 23 (FGF-23) is a phosphatonin, which is increased in cats with azotemic CKD. Dietary phosphate restriction decreases FGF-23 concentrations in humans and rodents, but this relationship has not previously been examined in the cat. OBJECTIVES: To investigate the effect of feeding renal diet on plasma FGF-23 concentrations in cats with stable azotemic CKD. ANIMALS: Azotemic, client-owned cats (≥9 years); 33 cats ate renal diet (RD group) and 11 cats did not eat renal diet (comparator group) over 28-56 days. METHODS: Retrospective longitudinal study: Plasma FGF-23, PTH, and phosphate concentrations were measured at baseline and after 28-56 days. Cats in the RD group were classified as hyperphosphatemic (HP) or normophosphatemic (NP) based on the International Renal Interest Society targets for plasma phosphate concentration. Nonparametric tests were performed. RESULTS: In the HP group (n = 15), feeding renal diet was associated with a significant decrease in plasma phosphate (P = .001), PTH (P = .007), and FGF-23 (P = .008), but not creatinine concentrations (P = .91). In the NP group (n = 18), feeding renal diet was associated with a significant decrease in plasma FGF-23 (P = .006), but not phosphate (P = .48), PTH (P = .35), or creatinine concentrations (P = .10). No significant changes were seen in any parameters in the comparator group during the study period. CONCLUSIONS AND CLINICAL IMPORTANCE: Feeding renal diet is associated with reductions in plasma FGF-23 concentrations in hyper- and normophosphatemic cats with stable azotemic CKD, suggesting that dietary phosphate restriction may enable cats with CKD to maintain normal plasma phosphate concentrations in association with lower plasma FGF-23 concentrations.


The cat as a model for human obesity: insights into depot-specific inflammation associated with feline obesity.

According to human research, the location of fat accumulation seems to play an important role in the induction of obesity-related inflammatory complications. To evaluate whether an inflammatory response to obesity depends on adipose tissue location, adipokine gene expression, presence of immune
cells and adipocyte cell size of subcutaneous adipose tissue (SAT) and visceral adipose tissue (VAT) were compared between lean and obese cats. Additionally, the present study proposes the cat as a model for human obesity and highlights the importance of animal models for human research. A total of ten chronically obese and ten lean control cats were included in the present study. Body weight, body condition score and body composition were determined. T-lymphocyte, B-lymphocyte, macrophage concentrations and adipocyte cell size were measured in adipose tissue at different locations. Serum leptin concentration and the mRNA expression of leptin and adiponectin, monocyte chemoattractant protein-1, chemoligand-5, IL-8, TNF-alpha, interferon-gamma, IL-6 and IL-10 were measured in blood and adipose tissues (abdominal and inguinal SAT, and omental, bladder and renal VAT). Feline obesity was characterised by increased adipocyte cell size and altered adipokine gene expression, in favour of pro-inflammatory cytokines and chemokines. Consequently, concentration of T-lymphocytes was increased in the adipose tissue of obese cats. Alteration of adipose tissue was location dependent in both lean and obese cats. Moreover, the observed changes were more prominent in SAT compared with VAT.


**Tail vaccination in cats: a pilot study.**
Feline injection site sarcomas affect 1-10 cats per every 10,000 vaccinated and are associated with high mortality. Radical resection may be curative, but is often associated with prolonged recovery, disfigurement and loss of function when tumors occur at currently recommended injection sites. The objective of this study was to assess alternatives to currently recommended vaccination sites in terms of preference by oncology practitioners, ease of injection and serological responses. Surgical, radiation and medical oncology practitioners were surveyed regarding their preference for vaccination sites based on the ease of tumor resection. A six-point Likert scale was used to measure each cat’s behavioral reaction to vaccination when injected subcutaneously in the distal hind limb or the distal tail. Serum collected before and 1-2 months after vaccination was tested for antibody titers against feline panleukopenia virus (FPV) and rabies virus (RV). The preferred sites for vaccination by 94 oncology practitioners were below the stifle (41%) and the tail (30%). There were no significant differences in the cats’ behavioral reaction to vaccination below the stifle (n = 31) and in the distal tail (n = 29). Of the cats seronegative for FPV at the time of vaccination, 100% developed protective antibody titers (>\(\geq\)40) against FPV 1-2 months following vaccination. For cats seronegative for RV, all but one cat (tail vaccine) developed acceptable antibody titers (>\(\geq\)0.5 IU/ml) against RV. Tail vaccination was well-tolerated and elicited similar serological responses to vaccination in the distal limbs.


**Survival of first-stage larvae of the cat lungworm Troglostrongylus brevior (Strongylida: Crenosomatidae) under different conditions.**
Troglostrongylus brevior has recently been recognised as a neglected causative agent of broncho-pulmonary infestation in domestic cats. Nonetheless, information on the biology and ecology of this nematode is still scarce. In this study, the survival of T. brevior first-stage larvae (L1) was evaluated in water and in faecal samples at different controlled temperatures in the laboratory (i.e., 4 and 26 degrees C) or in the outdoor environment (mean temperature 14\(+/-\)3.1 degrees C). Vitality of larvae was
microscopically assessed every 7 days, until their death. Larval survival ranged from 7 days in both water and faeces at 26 degrees C up to 142 days at 4 degrees C, respectively. Larvae maintained in the environment (14 degrees C) survived from 35 up to 63 days in faeces and water, respectively. Data herein presented clearly indicate that the survival of T. brevior L1s is negatively correlated with temperature (P < 0.001). According to the results of this study, the infection in mollusc intermediate hosts in the Mediterranean area may easily occur during winter/spring, while during hot and dry seasons a reduction of transmission should be expected.


**Surveillance: pointing the way to improved welfare for companion animals.**
In May this year, the VetCompass small animal surveillance project passed a notable milestone and celebrated the half-millionth animal being added to its database. To date, 190 veterinary practices across the UK have shared data on 2,890,973 episodes of clinical care covering 502,712 animals, including 251,771 dogs and 201,802 cats as well as a wide range of other companion animal species. Dan O’Neill describes the project and explains how the data gathered are being used.


**Surveillance of upper respiratory tract disease in owned cats in Australia, 2009-2012.**
Reported cases of feline upper respiratory tract disease (URTD) - presumptively diagnosed as feline herpesvirus (FHV) or feline calicivirus (FCV) - throughout Australia (2010-2012) were obtained from Disease WatchDog, a companion animal disease surveillance system. This surveillance system is based on voluntary reporting of cases by veterinarians, using a web-based program. Animal factors, location and vaccination information are also reported. Cases reported were mapped and seasonal patterns were described. A total of 131 FHV cases and 120 FCV cases were reported. Excluding euthanasia, case fatality rates were 1.12% and 1.28%, respectively. The largest proportion of cases was reported in winter. Young cats (<= 2 years), intact cats, unvaccinated cats and (for FHV) male cats appeared to be over-represented in the cases reported. The distributions of cases reported in this surveillance system provide information to aid the diagnosis of infectious feline URTD and to develop client educational programs.


**Stent encrustation in feline and human artificial urine: does the low molecular weight composition account for the difference?**
Anecdotal evidence suggests that the rate of encrustation on JJ stents placed in domesticated cats appears to be decreased as compared to humans. Our study tests the hypothesis that this may be due to specific differences in the chemical composition of human and feline urine. Artificial human and feline urine solutions were used in an in vitro encrustation model where an 80% stent encrustation could be expected after 7 weeks of incubation. Scanning electron microscopy (SEM) was used to analyse crystal morphology. Energy dispersive X-ray spectrometry (EDS) was used to assess composition weight. The percentage of surface coverage of encrustation on the respective stents was quantified using image J Java plug-in software. No significant difference was observed between both solutions with regard to quality and quantity of stent encrustation. Crystals were formed in both solutions as a mixture of Ca-dihydrate and Ca-monohydrate. The study shows that there is no significant difference in the rate of encrustations on JJ stents incubated in artificial feline or human urine. This suggests that a possible
difference in stent encrustation between cats and humans is due to factors other than the inorganic biochemical composition of the urines alone. Keeping in mind a true species difference, analysis of urinary macromolecules and proteins will be the logical next step.

BACKGROUND: Portosystemic shunts are uncommonly reported in cats. The majority of reports describe congenital shunts in young cats originating from the left gastric vein. Although they are only rarely reported, acquired portosystemic shunts in cats appear to be more variable in their anatomic location. HYPOTHESIS/OBJECTIVE: To describe the signalment and disease conditions found in cats with splenosystemic shunts. ANIMALS: Thirty-three client-owned cats with documented splenosystemic shunts. MATERIALS AND METHODS: Retrospective study. All cats with vascular communications between the splenic and left renal veins or the splenic vein and caudal vena cava diagnosed ultrasonographically between 2004 and 2011 were included. Collected data included age, breed, sex, presenting complaints, clinicopathologic data, as well as clinical diagnosis when available. RESULTS: Splenosystemic shunts were identified in 1.3% of the cats that had an abdominal ultrasound performed during the study period. Older, spayed female cats were found to be significantly overrepresented when compared with the total population of cats having undergone ultrasound over the same time period. A large proportion of cats (42%) had a hepatopathy with the potential for associated portal hypertension. CONCLUSIONS AND CLINICAL IMPORTANCE: Neither the signalment of cats in this report nor the anatomy of their portovascular anomalies shared similarities with those cats previously identified with single-vessel shunts. The relevance and etiology of these newly described splenosystemic shunts remain elusive and warrants further investigation.

Speed of kill efficacy and efficacy of flavored spinosad tablets administered orally to cats in a simulated home environment for the treatment and prevention of cat flea (Ctenocephalides felis) infestations.
The efficacy of spinosad against adult fleas (Ctenocephalides felis) on cats was evaluated in two separate controlled, blinded studies—one to determine flea knockdown and speed of flea kill (SOFK) on experimentally infested cats, another to assess the ability of spinosad to prevent flea infestations in a simulated home environment (SHE) study design. In each study, pre-treatment live flea counts were used as a blocking factor to randomize cats to treatment, and treated in the fed state, with flavored tablets containing either no active ingredient (control) or spinosad (50-100mg/kg in the SOFK study; 50-75 mg/kg body weight in the SHE study). In the SOFK study, 6 cats per group were infested with unfed adult fleas on Day -1. Groups 1-5 received control tablets; groups 6-10 received spinosad tablets. Flea counts were conducted at 0.5, 2, 4, 8 and 24h post-dosing. In the SHE study, 12 flea-free cats per group, treated on Days 0, 30 and 60, were maintained in solid-sided cages with solid carpeted floors. Each cat was infested on Days 1, 7 and 14 with 100 unfed adult fleas. Individual flea comb counts were performed on Days 3, 9, 16, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91 and 95. After each count, except Day 95, up to 300 live fleas were replaced on each cat. To augment flea challenge, the carpeted area in each cage was sprinkled weekly with larval flea growth media (dried blood, yeast). In the SOFK study, reductions in mean flea counts in the spinosad groups were observed at all post-treatment assessments, beginning at 0.5h post-infestation with significant differences (p<0.0001) from vehicle-treated cats.
from 2h post-treatment when efficacy was >90%, through the final flea counts 24h post-infestation when no fleas were found on spinosad treated cats. In the SHE study, GM post-treatment flea counts in the control group ranged between 38.9 and 107.0 (arithmetic means 58.8-118.1); no live fleas were combed from spinosad-treated cats (100% effectiveness) at any time point post-treatment. No adverse events that were attributable to the treatments were observed in either study. These studies demonstrated that spinosad administered orally to cats is safe and effective, providing >90% efficacy from 2h post-dosing and 100% knockdown at 24h, and preventing infestations over a 95 day study period from a flea-contaminated simulated home environment.


**Soil contamination by parasite eggs in rural village in the Philippines.**

Infectious diseases caused by soil-transmitted helminths (STHs) are important diseases of humans, which affect about one third of the world’s population. Examination of soil can be used to estimate the risk of STH infection in humans. We carried out this survey to clarify the current status of soil contamination by parasite eggs and to assess the risk of STH infection. During survey periods, we examined soil, faeces, and the lifestyle of residents. Six genera and eight species of parasite eggs including Ascaris lumbricoides, Toxocara cati, Toxocara canis, and Trichuris trichiura were recovered from 85 out of 120 soil samples (71%). Contamination of soil by parasite eggs had spread widely throughout the village, and 50% of eggs recovered had already developed into fertilized eggs. It is remarkable that Ascaris eggs were recovered from inside the houses. Prevalence of STH in school children was 63%. This may indicate that school or preschool children cause soil contamination. Some of the eggs recovered were not only from humans but also from dogs and cats. From the results obtained, the need for health education with regards to zoonoses was revealed because 77% of fertilized Toxocara spp. eggs were detected. We conclude that the risk of STH infection in residents was extremely high, because the soil in this village was highly contaminated by infective parasite eggs.


**Sleeping and resting respiratory rates in healthy adult cats and cats with subclinical heart disease.**

Sleeping and resting respiratory rates are commonly measured variables in patients with cardiac disease. However, little information is available on these variables in healthy client-owned cats or cats with subclinical heart disease (SHD). Therefore, we examined and characterized the sleeping respiratory rate (SRR) and resting respiratory rate (RRR) in 59 echocardiographically normal (EN) and 28 apparently healthy (AH) cats, and 54 SHD cats acquired by the cat owners in the home environment on 8-10 separate occasions. The within-cat mean sleeping respiratory rate (SRRmean) in EN cats, AH cats and SHD cats with mild or moderate left atrial (LA) enlargement (as defined by quantiles of the ratio of the LA to the Aorta [LA:AO]) was consistently <30 breaths/min; median SRRmean approximated 21 breaths/min. The SRRmean of SHD cats with severe LA enlargement sometimes exceeded 30 breaths/min, and was higher than SRRmean of other SHD cats (P <0.05). The within-cat mean resting respiratory rate was consistently higher than SRRmean (P <0.05). Age and geographic location, but not bodyweight, affected SRRmean in EN and AH cats. Within-cat SRR and within-cat RRR did not vary markedly from day-to-day, as evidenced by a low within-cat coefficient of variation. Data acquisition was considered easy or non-problematic by most participants. Our data provide useful guidelines for SRR and RRR, obtained in the home environment, in healthy cats and cats with subclinical heart disease, and might prove useful in managing cats with clinical heart disease. Cats with
SRRmean >30 breaths/min and cats with multiple SRR measurements >30 breaths/min likely warrant additional evaluation.


**Skin fragility syndrome in a cat with multicentric follicular lymphoma.**

An 11-year-old, spayed female domestic shorthair cat was presented for a right flank wound. On clinical examination, a single non-painful skin tear lesion with irregular edges was detected. During the examination, star-shaped cigarette paper-like skin lesions appeared spontaneously. An abdominal mass was also palpated. Feline skin fragility syndrome (FSFS) was suspected and a multicentric lymphoma was diagnosed by fine needle aspiration. The cat’s condition declined and it died spontaneously. Postmortem examination confirmed the diagnosis of lymphoma. Neoplastic lymphocytes were not observed in the skin. Histological analysis of the skin was consistent with the morphological aspects of FSFS. A possible direct link between the two conditions remains a matter of speculation, but this case report provides the first description of FSFS associated with multicentric follicular lymphoma. Thus, multicentric follicular lymphoma should be considered as a differential diagnosis in cats presenting with FSFS.


**Simultaneous detection of the feline lungworms Troglostrongylus brevior and Aelurostrongylus abstrusus by a newly developed duplex-PCR.**

In addition to Aelurostrongylus abstrusus (Strongylida: Angiostrongylidae), referred to as the feline lungworm, Troglostrongylus brevior (Strongylida: Crenosomatidae) has recently been identified as an agent of bronco-pulmonary infestations in cats. These two parasites have a similar biology, share ecological niches, potentially co-infesting cats, but are difficult to be differentiated due to the morphological similarities of their first-stage larvae (L1). This paper describes a molecular tool, based on single-step duplex polymerase chain reaction (duplex-PCR) on the ribosomal internal transcribed spacer 2 region (ITS-2) for the simultaneous detection and differentiation of T. brevior and A. abstrusus. L1 of both species were collected from faecal samples, morphologically identified, and single larval specimens isolated. An aliquot of faeces was used as a test sample for a case of mixed natural infestation. The duplex-PCR was performed using species-specific forward primer sets for the ITS-2 region (i.e., A. abstrusus: 220bp; T. brevior: 370bp). The detection limit of the molecular assay was also assessed by serial dilutions of DNA from single larvae of both species (from approximately 4.0 to 4.0x10^-5μg/μl). The duplex-PCR carried out on individual DNA samples was able to detect as low as 5.2x10^-3μg/μl of DNA for A. abstrusus, 4.9x10^-3μg/μl for T. brevior, and as low as 4.0x10^-3μg/μl for samples containing both species. Species-specific bands of the expected sizes and two bands were simultaneously amplified from the faecal sample containing both species. The phylogenetic analyses of the ITS-2 sequences here examined and those available for other metastrongyloids were concordant in clustering them with those of other Troglostrongylus brevior and A. abstrusus sequences available in GenBank database. This molecular approach proved to be effective and highly sensitive for the simultaneous detection of the two lungworms species and it might be used for molecular epidemiological studies and for monitoring therapeutic protocols.
Should the veterinary profession invest in developing methods to assess quality of life in healthy dogs and cats?


BACKGROUND: Cats are definitive hosts of Toxoplasma gondii and play an essential role in the epidemiology of this parasite. The study aims at clarifying whether cats are able to develop specific antibodies against different clonal types of T. gondii and to determine by serotyping the T. gondii clonal types prevailing in cats as intermediate hosts in Germany. METHODOLOGY: To establish a peptide-microarray serotyping test, we identified 24 suitable peptides using serological T. gondii positive (n=21) and negative cat sera (n=52). To determine the clonal type-specific antibody response of cats in Germany, 86 field sera from T. gondii seropositive naturally infected cats were tested. In addition, we analyzed the antibody response in cats experimentally infected with non-canonical T. gondii types (n=7). FINDINGS: Positive cat reference sera reacted predominantly with peptides harbouring amino acid sequences specific for the clonal T. gondii type the cats were infected with. When the array was applied to field sera from Germany, 98.8% (85/86) of naturally-infected cats recognized similar peptide patterns as T. gondii type II reference sera and showed the strongest reaction intensities with clonal type II-specific peptides. In addition, naturally infected cats recognized type II-specific peptides significantly more frequently than peptides of other type-specificities. Cats infected with non-canonical types showed the strongest reactivity with peptides presenting amino-acid sequences specific for both, type I and type III. CONCLUSIONS: Cats are able to mount a clonal type-specific antibody response against T. gondii. Serotyping revealed for most seropositive field sera patterns resembling those observed after clonal type II-T. gondii infection. This finding is in accord with our previous results on the occurrence of T. gondii clonal types in oocysts shed by cats in Germany.


Seroprevalence of feline leukemia virus, feline immunodeficiency virus and heartworm infection among owned cats in tropical Mexico.

Several infectious agents may be distributed within a healthy population of cats where diverse risk factors predispose them to come into contact with pathogens. Blood samples from 227 owned cats in Merida, Mexico, were collected with the objective of determining the seroprevalence and associated risk factors of feline leukemia virus (FeLV) and Dirofilaria immitis antigen, and feline immunodeficiency virus (FIV) antibody. Serological detection of FeLV and D immitis antigens, and FIV antibodies was performed using the commercial kit SNAP Feline Triple Test. The prevalence was found to be 7.5% for FeLV, 2.5% for FIV and 0% for D immitis. Adult cats were at a higher risk of coming into contact with FeLV (P <0.01) than younger cats. Owing to its low prevalence, a risk factor analysis was not performed for FIV. The prevalence of retroviral infections found in this study was low, but within the limits reported in the different geographical areas of the world. Cases of filariosis in
the domestic cats of Merida, Mexico, may be absent or very low; however, the low sample size may have influenced these results.


**Serological survey of paracoccidioidomycosis in cats.**
The objective of the present study was to evaluate infection of cats by Paracoccidioides brasiliensis. Serum samples of 136 cats from rural (n = 86) and urban areas (n = 50) were analyzed by indirect ELISA and immunodiffusion test using P. brasiliensis gp43 and exoantigen as antigens, respectively, and an overall reactivity of 31.6 % was observed by ELISA although no reactivity was detected by immunodiffusion. The positivity observed in animals living in rural areas (48.8 %) with free access to soil was significantly higher (P < 0.0001) than among urban animals (2 %) with limited access to soil, although no significant difference was observed in relation to age or sex. The high rates of positivity observed in cats from rural areas suggest that not diagnosed cases of this mycosis may be occurring in cats living in endemic areas for human paracoccidioidomycosis. This is the first report showing serological evidence of P. brasiliensis infection in cats.


**Septic peritonitis from pyloric and non-pyloric gastrointestinal perforation: prognostic factors in 44 dogs and 11 cats.**
OBJECTIVES: To identify potential prognostic factors affecting outcome in septic peritonitis caused by gastrointestinal perforation in dogs and cats. METHODS: A retrospective study. Animals operated on for septic peritonitis because of gastrointestinal perforation were evaluated. Risk factors assessed included age, duration of clinical signs, recent prior abdominal surgery, recent prior anti-inflammatory drug administration, placement of a closed-suction drain and location of perforation. RESULTS: Fifty-five animals (44 dogs and 11 cats) were included. The overall mortality was 63.6%. No association was found between age, duration of clinical signs or prior abdominal surgery and outcome. Animals with a history of prior anti-inflammatory drugs were significantly (P=0.0011) more likely to have perforation of the pylorus (73.3%). No significant difference in outcome was found between animals treated with closed-suction drains and those treated with primary closure or between pyloric perforation and perforation at other gastrointestinal sites. CLINICAL SIGNIFICANCE: Administration of anti-inflammatory drugs in dogs and cats is a significant risk factor for pyloric perforation. Pyloric perforation was not associated with a poorer outcome than perforation at other gastrointestinal sites. Placement of a closed suction drain did not improve outcome compared to primary closure.


**Selective serotonin reuptake inhibitor (SSRI) toxicosis in cats: 33 cases (2004-2010).**
OBJECTIVE: To evaluate a population of cats with selective-serotonin reuptake inhibitor (SSRI) toxicosis and characterize the population affected, list products ingested, the clinical signs observed, treatments performed, length of hospitalization, patient outcome, and overall prognosis. DESIGN: Retrospective study from 2004 to 2010. SETTING: Referral veterinary center. ANIMALS: Thirty-three witnessed cat SSRI ingestions. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: The medical records of cats with a witnessed SSRI ingestion identified by review of an
animal poison control center electronic database were evaluated. The most common SSRIs ingested were venlafaxine (Effexor; 12/33; 36%), fluoxetine (Prozac; 12/33; 36%), citalopram (Celexa; 6/33; 18%), and escitalopram (Lexapro; 3/33; 9%). Overall, 24% of cats (8/33) became symptomatic, while 76% (25/33) remained asymptomatic. Of the symptomatic cats, sedation was the most common clinical sign (6/8; 75%), followed by gastrointestinal signs (4/8; 50%), central nervous system stimulation (1/8; 13%), cardiovascular signs (1/8; 13%), and hyperthermia (1/8; 13%). Veterinary care was sought in 20 cats (20/33; 61%). Sixteen cats (16/20; 80%) were hospitalized, while 4 cats (4/20; 20%) were treated as outpatients. Treatment for hospitalized patients included administration of IV fluid therapy (14/16; 88%), activated charcoal (12/16; 75%), anti-arrhythmic agents (7/16; 44%), methocarbamol (6/16; 38%), cyproheptadine (6/16; 38%), anti-emetics (5/16; 31%), and sedation (5/16; 31%). Diagnostics included blood work (7/16; 44%), blood pressure measurement (3/16; 19%), and electrocardiogram monitoring (2/16; 13%). Mean hospitalization time for all cases of SSRI ingestion was 14.6 +/- 7.8 hours (n = 16). All symptomatic cats in this study (8/8; 100%) had resolution of clinical signs and survived to discharge. CONCLUSIONS: The prognosis for SSRI ingestion in this population of cats was excellent. Decontamination and supportive care for at least 12-24 hours can be considered in cats with SSRI ingestion, particularly venlafaxine to monitor resolution of clinical signs.


Scratching behaviour and its features: a questionnaire-based study in an Italian sample of domestic cats.

Scratching behaviour in cats is described as a normal expression of the feline ethogram, having different possible purposes related to visual and chemical communication. During behavioural consultations owners often mention scratching as an additional problem. This preliminary study aimed to understand the characteristics of this complex behaviour by examining the variables displayed by a sample of the Italian feline population using multiple correspondence analysis. One hundred and twenty-eight cats were screened by means of a questionnaire to identify features of their scratching behaviour. Our data showed the importance of both the presence/absence of a scratching post in the cat’s living area and its relationship to marking. When a scratching post is present in a cat’s living area, the cat appears to use it. Some aspects related to sex, neutering, age and environmental characteristics may modify the expression of scratching as a marking behaviour. Research has led to increased knowledge of this behaviour and may help veterinarians in describing to owners why it is important for cats to express scratching behaviour in their environment. Such information could help veterinarians and owners to recognise normal and problematic scratching behaviours.


Safety, tolerability, and pharmacokinetics of 6-month daily dosing of an oral formulation of cyclosporine (ATOPICA for cats) in cats.

Cyclosporine was proven efficacious in the treatment of feline hypersensitivity dermatitis. This target animal study was conducted to evaluate the safety, tolerability, and pharmacokinetics of ATOPICA for Cats(R) (cyclosporine oral solution, USP) MODIFIED following 6-month daily dosing in cats. Forty healthy cats (four cats/sex/group) received 0, 8 (1x), 16 (2x), 24 (3x), or 40 (5x) mg/kg cyclosporine once daily for 6 months (183 days). Body weight, food consumption, ophthalmoscopic, physical examinations including neurological assessments, blood pressure, electrocardiography, clinical
pathology (hematology, coagulation, clinical chemistry, urinalysis), organ weights, and macroscopic and microscopic examinations were performed and assessed. In addition, blood concentrations of cyclosporine were measured at the pretreatment trough on Days 1, 2, 7, 14, 31, 91, 154, and 182, and post-treatment on Days 1, 31, and 182. Adverse effects possibly related to treatment included prolonged APTT and one report each of bone marrow hypocellularity and lymphoma; all occurred in cats treated with doses more than 16 mg/kg. There was no significant accumulation of cyclosporine beyond the first week of treatment. Results confirm that ATOPICA for Cats is safe and well tolerated in cats without unexpected accumulation beyond the first week of treatment when administered as directed.


Risk factors for urinary tract infection with multiple drug-resistant Escherichia coli in cats.
The emergence of multiple drug-resistant (MDR) bacteria is a growing public health problem. The objective of this retrospective study was to identify risk factors associated with MDR Escherichia coli infection of the urinary tract in cats. All cats presenting with an E coli urinary infection between March 2010 and December 2012 were included and divided into two groups: an MDR group and a non-MDR group. The effects of different variables on the occurrence of a MDR E coli infection were evaluated: age, sex, additional diseases, number of antibiotics and number of days of hospitalisation. Fifty-two cats were identified (10 MDR and 42 non-MDR). The number of antibiotic groups used within the last 3 months was associated with an increased risk of MDR E coli urinary infection (P = 0.007). The association of the number of days of hospitalisation within the last 3 months and the increased risk of MDR E coli urinary infection did not reach significance (P = 0.090). This study provides evidence that systematic urinary culture with antibiotic sensitivity testing should be recommended when treating urinary tract infections if antibiotics have been prescribed within the past 3 months. Moreover, the selection of MDR bacteria through antibiotic use should be considered as a potential risk associated with treatment.


Risk behaviours exhibited by free-roaming cats in a suburban US town.
Free-roaming cats may experience numerous hazardous encounters in the outdoor environment, including: vehicular accidents, aggression from other animals and exposure to infectious disease. This research quantitatively examined the outdoor activities of 55 owned cats by monitoring pets outfitted with ‘KittyCam’ video cameras. KittyCams are a type of Crittercam, designed by National Geographic to allow recording of a cat-eye view without disrupting behaviour. We investigated the activities of free-roaming cats in suburban Athens-Clarke County, Georgia, during all four seasons. Research objectives included documenting the type and regularity of risk behaviours exhibited by free-roaming cats and identifying characteristics of pet cats (eg, age, sex, roaming habitat) which predict risky behaviour in the outdoors. The most common risk behaviours exhibited by suburban free-roaming cats included crossing roads (45 per cent of our sample), encountering strange cats (25 per cent), eating and drinking substances away from home (25 per cent), exploring storm drain systems (20 per cent), and entering crawlspaces of houses (20 per cent). Male cats were more likely to engage in risk behaviours than female cats, and older cats engaged in fewer risk behaviours than younger individuals. We hope this information can be used to encourage the public to keep cats indoors more often (with consideration for their indoor quality of life) or supervise them while outdoors.
A wide variety of markers are available to assess the function and pathology of the gastrointestinal (GI) tract. This review describes some of these markers with special emphasis given to markers used in dogs and cats. Small intestinal disease can be confirmed and localized by the measurement of serum concentrations of folate and cobalamin. Fecal alphal-proteinase inhibitor concentration can increase in individuals with excessive GI protein loss. A wide variety of inflammatory markers are available for a variety of species that can be used to assess the inflammatory activity of various types of inflammatory cells in the GI tract, although most of these markers assess neutrophilic inflammation, such as neutrophil elastase, calprotectin, or S100A12. N-methylhistamine can serve as a marker of mast cell infiltration. Markers for lymphocytic or eosinophilic inflammation are currently under investigation. Exocrine pancreatic function can be assessed by measurement of serum concentrations of pancreatic lipase immunoreactivity (PLI) and trypsin-like immunoreactivity (TLI). Serum PLI concentration is increased in individuals with pancreatitis and has been shown to be highly specific for exocrine pancreatic function and sensitive for pancreatitis. Serum TLI concentration is severely decreased in individuals with exocrine pancreatic insufficiency.

The host defense against viral infection is acquired during the coevolution or symbiosis of the host and pathogen. Several cellular factors that restrict retroviral infection have been identified in the hosts. Feline leukemia virus (FeLV) is a gammaretrovirus that is classified into several receptor interference groups, including a novel FeLV-subgroup D (FeLV-D) that we recently identified. FeLV-D is generated by transduction of the env gene of feline endogenous gammaretrovirus of the domestic cat (ERV-DCs) into FeLV. Some ERV-DCs are replication competent viruses which are present and hereditary in cats. We report here the determination of new viral receptor interference groups and the discovery of a soluble antiretroviral factor, termed Refrex-1. Detailed analysis of FeLV-D strains and ERV-DCs showed two receptor interference groups that are distinct from other FeLV subgroups, and Refrex-1 specifically inhibited one of them. Refrex-1 is characterized as a truncated envelope protein of ERV-DC and includes the N-terminal region of surface unit, which is a putative receptor-binding domain, but lacks the transmembrane region. Refrex-1 is efficiently secreted from the cells and appears to cause receptor interference extracellularly. Two variants of Refrex-1 encoded by provirus loci, ERV-DC7 and DC16, are expressed in a broad range of feline tissues. The host retains Refrex-1 as an antiretroviral factor, which may potentially prevent reemergence of the ERVs and the emergence of novel ERV-related viruses in cats. Refrex-1 may have been acquired during endogenization of ERV-DCs and may play an important role in retroviral restriction and antiviral defense in cats.

Pulmonary fibrosis is a progressive fatal interstitial lung disease that is often idiopathic, occurs in
multiple species, and may be caused by a number of inciting factors. The purpose of this retrospective, multicenter study was to describe the radiographic and histopathologic characteristics of idiopathic and induced pulmonary fibrosis in a group of cats. Cats with thoracic radiographs and histopathologically confirmed pulmonary fibrosis were recruited using the American College of Veterinary Radiology list serve. A board-certified veterinary radiologist and diagnostic imaging intern reviewed radiographs and recorded characteristics by consensus. Findings from additional imaging modalities were also recorded when available. All histopathology samples were re-reviewed by a veterinary pathology resident. A total of nine cats met inclusion criteria. All patients had a broad range of radiographic characteristics that included broncho-interstitial pattern, alveolar pattern, pulmonary masses, pulmonary bullae, pleural effusion, and cardiomegaly. Cats with available echocardiographic studies had characteristics that included right ventricular dilation and hypertrophy and pulmonary arterial hypertension interpreted to be secondary to primary lung disease. Cats with available CT studies had characteristics that included focally increased soft tissue attenuation, masses, and ventral consolidation that exhibited no improvement with dorsal versus ventral recumbency. Histopathology showed pulmonary fibrosis, type II pneumocyte hyperplasia, and smooth muscle hypertrophy in all patients. Epithelial metaplasia was present only in one patient. Findings from the current study indicated that cats with pulmonary fibrosis have highly variable radiographic characteristics and that these characteristics may mimic other diseases such as asthma, pneumonia, pulmonary edema, or neoplasia.


Rabies surveillance in the United States during 2012.
SUMMARY-During 2012, 49 states and Puerto Rico reported 6,162 rabid animals and 1 human rabies case to the CDC, representing a 2.1% increase from the 6,031 rabid animals and 6 human cases reported in 2011. Approximately 92% of reported rabid animals were wildlife. Relative contributions by the major animal groups were as follows: 1,953 raccoons (31.7%), 1,680 bats (27.3%), 1,539 skunks (25.0%), 340 foxes (5.5%), 257 cats (4.2%), 115 cattle (1.9%), and 84 dogs (1.4%). Compared with 2011, there was a substantial increase in the number of rabid cattle reported. One case of rabies involving a human was reported from California after the patient died abroad. The infection was determined to be a result of a rabies virus variant associated with Tadarida brasiliensis, with exposure occurring in California.

Prospective evaluation of healthy Ragdoll cats for chronic kidney disease by routine laboratory parameters and ultrasonography.
Ragdoll breeder organisations often forewarn Ragdoll cat owners that renal problems may develop as a result of polycystic kidney disease (PKD), chronic interstitial nephritis, familial renal dysplasia or nephrocalcinosis. Healthy Ragdoll and non-Ragdoll cats were prospectively evaluated by measuring serum creatinine and urea concentrations, routine urinalysis and abdominal ultrasonography. All Ragdoll cats also underwent genetic PKD testing. One hundred and thirty-three Ragdoll and 62 control cats were included. Ragdoll cats had significantly lower serum urea concentrations and higher urinary specific gravity. However, median creatinine concentration, median urinary protein-to-creatinine ratio, and the proportion of cats with serum creatinine or urea concentration exceeding the reference interval did not differ. One or more renal ultrasonographical changes were detected in 66/133 (49.6%) Ragdoll
and in 25/62 (40%) control cats. Ragdoll cats showed significantly more frequent segmental cortical lesions (7.5% versus 0%), abnormal renal capsule (19.5% versus 8%) and echogenic urine (51.9% versus 25.8%). Chronic kidney disease (CKD) was ultrasonographically suspected in 7/133 (5.3%) Ragdoll and in none of the control cats, which approached significance. Laboratory parameters confirmed kidney dysfunction only in 1/7 of these Ragdoll cats. All Ragdoll cats were PKD negative.

In conclusion, first, breed-specific serum creatinine reference intervals are not likely required for Ragdoll cats. Second, renal ultrasonographical abnormalities are common, both in Ragdoll and non-Ragdoll cats. Third, healthy young Ragdoll cats are uncommonly affected by PKD and CKD, but an increased susceptibility of Ragdoll cats to develop CKD cannot be excluded. Finally, Ragdoll cats are predisposed to segmental cortical lesions, which may indicate renal infarction or cortical scarring.


Prognostic significance of Kit receptor tyrosine kinase dysregulations in feline cutaneous mast cell tumors.

Feline cutaneous mast cell tumors (FeCMCTs) are characterized by variable biological behavior. Development of multiple nodules and potential visceral involvement, along with inconsistency of conventional prognostic aids, justify uncertainty in differentiating benign from malignant forms. c-Kit proto-oncogene activating mutations have been reported in feline mast cell tumors (MCTs), but their prognostic relevance was not investigated. This study was performed on FeCMCTs with variable clinical outcome to assess whether Kit cytoplasmic immunohistochemical labeling can be regarded as indicative of c-Kit mutations and to evaluate the relationship between Kit dysregulation and survival. Twenty-four cats diagnosed with a primary cutaneous MCT were enrolled. Kit immunohistochemical pattern and c-Kit (exons 8, 9, 11) mutational status were assessed in 34 tumor samples. Risk factors affecting survival were a number of mitoses greater than 5 per 10 HPFs (P =.017) and cytoplasmic Kit labeling (P =.045). Increased mitotic activity was associated with Kit cytoplasmic expression (P =.01). c-Kit encoding mutations were present in 19 (56%) tumors (exon 8, 19%; exon 9, 71%; exon 11, 10%), however, they were not significantly related to protein expression and they had no influence on prognosis. Additionally, in 6 of 9 (67%) cats, multiple nodules from the same cat had different mutational statuses. Mutations in the fifth immunoglobulin-like domain of Kit occur frequently in FeCMCT, but they are variably associated with aberrant protein expression and do not appear to be strictly correlated with biological behavior. These findings need to be confirmed in larger series, and exploration of further genomic regions of c-Kit is warranted.


Prognostic Indicators in Cats with Hypertrophic Cardiomyopathy.

BACKGROUND: Left atrial (LA) enlargement, congestive heart failure (CHF), and aortic thromboembolism (ATE) are associated with decreased survival in cats with hypertrophic cardiomyopathy (HCM), but the prognostic value of echocardiographic variables has not been well characterized. HYPOTHESIS/OBJECTIVES: We hypothesized that LA echocardiographic variables and assessment of left ventricular (LV) diastolic and systolic function would have prognostic value in cats with HCM. ANIMALS: Two hundred eighty-two cats diagnosed with HCM. METHODS: Clinical and echocardiographic records of affected cats seen at the Royal Veterinary College from 2004 to 2009 were retrospectively analyzed. Only cats with echocardiographic confirmation of LV diastolic wall
thickness $\geq 6$ mm were included. Outcomes were obtained from clinical records or referring veterinarians and owners. RESULTS: Deaths occurred in 164 cats, of which 107 were believed to have been cardiac deaths. Univariable predictors of an increased risk of cardiac death included older age, absence of a murmur, presence of a gallop sound or arrhythmia, presentation with either CHF or ATE, extreme LV hypertrophy ($\geq 9.0$ mm), LV fractional shortening (FS%) $\leq 30\%$, regional wall hypokinesis, increased left atrial size, decreased left atrial function, spontaneous echoc- contrast/thrombus or both, absence of left ventricular outflow tract obstruction, and a restrictive diastolic filling pattern. Cox’s proportional hazard analysis identified LA dysfunction, low LV systolic function, and extreme LV hypertrophy as independent predictors of decreased cardiac survival time.

CONCLUSIONS AND CLINICAL IMPORTANCE: Echocardiographic measurement of LA function, extreme LV hypertrophy, and LV systolic function provides important prognostic information in cats with HCM.


Prevalence of Tritrichomonas foetus infections in French catteries.
Recently, Tritrichomonas foetus, the known etiologic agent of bovine trichomonosis was identified in domestic cats in many countries around the world. In felids, this parasite would be a significant cause of large-bowel diarrhoea. Therefore the aim of the present study was to determine for the first time the prevalence of T. foetus infection in French catteries. In this epidemiological survey, rectal swabs from 140 cats participating in three international shows were tested for the presence of motile parasites by microscopy after culturing. The prevalence of T. foetus infection was 14.3% among cats (20/140) and 15.9% among catteries (18/117). These values were similar to those previously obtained in other European countries. Except for the age, no significant associations were found between the presence of T. foetus and various risk factors of infection such as the size of the cattery, the type of food, or the vicinity of a dog. Internal transcribed region of the ribosomal DNA unit was sequenced from the 20 T. foetus isolates identified in this study. They exhibited 100% identity and are homologous with other sequences of strains isolated from domestic cats in other countries.


Prevalence of Toxoplasma gondii and Leishmania spp. infection in cats from Brazil.
A total of 386 feline blood samples from Brazil were collected and analyzed by the indirect immunofluorescence antibody test (IFAT) for the presence of Toxoplasma gondii and Leishmania spp. antibodies. Specific antitoxoplasma IgG were found in 63 of 386 (16.3\%) cats and immunoglobulin G against Leishmania spp. was detected in two serum samples. The overall prevalence was significantly higher in adult cats than in juvenile cats for T. gondii infection. There were no significant differences between positivity and gender or breed. The frequency of T. gondii antibodies found in domestic cats of Brazil suggests active transmission within an urban environment. This study proved the occurrence of two important protozoan zoonosis in felines from Brazilian endemic area for visceral leishmaniasis.

Prevalence of regional and distant metastasis in cats with advanced oral squamous cell
The objective of this study was to evaluate the prevalence of regional and distant metastasis in cats with advanced oral squamous cell carcinoma (SCC) in a retrospective case series. Forty-nine cats with cytologically- or histopathologically-confirmed oral SCC presented to the Matthew J Ryan Veterinary Hospital of the University of Pennsylvania. History, clinical and laboratory results, diagnostic imaging findings and survival times were obtained from the medical records of patients who received diagnostic evaluation for metastasis. The prevalence of metastasis was assessed by means of mandibular lymph node cytology and three-view thoracic radiography. The prevalence of mandibular lymph node metastasis was 31% (15/49). Evidence of possible thoracic metastasis was seen in 10% (5/49) of cases. Of the patients with mandibular lymph node metastasis, 53% (8/15) were maxillary, 27% mandibular (4/15), 13% sublingual (2/15) and 7% caudal pharyngeal (1/15). Pulmonary metastasis was seen in three mandibular, one maxillary and one sublingual mass. Forty-one patients died or were euthanased owing to progression of local disease, and seven patients were lost to follow-up. The prevalence of regional metastasis in this study was more common than most previously reported studies, while the rate of pulmonary metastasis was higher than has previously been published. Although significant conclusions cannot be drawn, control of the primary tumor, regardless of tumor size at diagnosis, appears to be an important factor in improving survival time, and therefore treatment of metastasis may be important in those cases where long-term control of the primary tumor is possible.

Prevalence of otitis externa in stray cats in northern Italy.
Feline otitis externa is a dermatological disorder that has not been evaluated much in stray cats. One hundred and eighty-seven stray cats were randomly selected during a trap-neuter-release programme to investigate the prevalence of otitis externa in stray cat colonies in northern Italy. Swabs for cytological examination were obtained from the external ear canal of each cat. A direct otoscopic assessment of the external ear canal was made in 86/187 cats. Cytological evidence of otitis externa was present in 55.1% of cats. The influence on otitis of age, gender, habitat and season of sampling were tested, but no risk factors were found. Otodectes cynotis (as a sole agent or in combination) was the primary cause of otitis in 53.3% of cats. Cocci and rods, either alone or in combination with other agents, were perpetuating factors in 71.8% and 29.1% of cats, respectively. Pregnancy status was a risk factor for otitis caused by coccal infections. Malassezia species, alone or in combination, was the perpetuating factor in 50.5% of cats with otitis. Urban habitat and winter season were risk factors for otitis associated with Malassezia species. Demodex cati was identified as an incidental finding in two cats. There was good agreement between otoscopy and cytology with regard to the diagnosis of otitis externa. The results of this study show a high prevalence of otitis externa in stray colony cats and provide information on causal factors for feline otitis externa.

Prevalence and co-infection of haemotropic mycoplasmas in Portuguese cats by real-time polymerase chain reaction.
The diagnosis of feline haemoplasmosis has improved over the years, with several techniques enabling a clear and specific diagnosis, and where polymerase chain reaction (PCR) is considered as the ‘gold standard’. The aim of this study was to survey the prevalence of feline haemoplasmas in 320 cats from
the north-central region of Portugal by the use of real-time PCR, as well as to evaluate any associations between infection, clinical presentation and risk factors. The overall prevalence of infection by feline haemoplasmas was 43.43% (139/320), where 41.56% (133/320) corresponded to Candidatus Mycoplasma haemominutum (CMhm), 12.81% (41/320) to Mycoplasma haemofelis (Mhf), 4.38% (14/320) to Candidatus Mycoplasma haematoparvum and 1.25% (4/320) to Candidatus Mycoplasma turicensis. Almost 13% (47/320) of the samples were co-infected, with the most common co-infection being CMhm and Mhf (23.74%). Infection was found statistically significant with feline immunodeficiency/feline leukaemia virus status (P = 0.034), but no significant association was found for breed, sex, fertility status (neutered/spayed/entire), age, clinical status, living conditions (in/outdoor), anaemia status, or the presence/absence of ticks or fleas. Cats from north-central Portugal are infected with all the known feline haemoplasma species, with CMhm being the most common one. Prevalence of all feline haemoplasmas was higher than that reported previously in cats from other European countries, but similar to that described in Portugal for dogs. These data provide a better perspective regarding Mycoplasma species infection in Europe, and new information that helps us better understand feline haemoplasmosis.


OBJECTIVES: To estimate the prevalence, spatial patterns and clustering in the distribution of soil-transmitted helminth (STH) infections, and factors associated with hookworm infections in a tribal population in Tamil Nadu, India. METHODS: Cross-sectional study with one-stage cluster sampling of 22 clusters. Demographic and risk factor data and stool samples for microscopic ova/cysts examination were collected from 1237 participants. Geographical information systems mapping assessed spatial patterns of infection. RESULTS: The overall prevalence of STH was 39% (95% CI 36%-42%), with hookworm 38% (95% CI 35-41%) and Ascaris lumbricoides 1.5% (95% CI 0.8-2.2%). No Trichuris trichiura infection was detected. People involved in farming had higher odds of hookworm infection (1.68, 95% CI 1.31-2.17, P < 0.001). In the multiple logistic regression, adults (2.31, 95% CI 1.80-2.96, P < 0.001), people with pet cats (1.55, 95% CI 1.10-2.18, P = 0.011) and people who did not wash their hands with soap after defecation (1.84, 95% CI 1.27-2.67, P = 0.001) had higher odds of hookworm infection, but gender and poor usage of foot wear did not significantly increase risk. Cluster analysis, based on design effect calculation, did not show any clustering of cases among the study population; however, spatial scan statistic detected a significant cluster for hookworm infections in one village. CONCLUSION: Multiple approaches including health education, improving the existing sanitary practices and regular preventive chemotherapy are needed to control the burden of STH in similar endemic areas.


Chronic kidney disease (CKD) and degenerative joint disease are both considered common in older cats. Information on the co-prevalence of these two diseases is lacking. This retrospective study was designed to determine the prevalence of CKD in two cohorts of cats: cats randomly selected from four evenly distributed age groups (RS group) and cats recruited for degenerative joint disease studies (DJD
group), and to evaluate the concurrence of CKD and DJD in these cohorts. The RS group was randomly selected from four age groups from 6 months to 20 years, and the DJD group comprised cats recruited to four previous DJD studies, with the DJD group excluding cats with a blood urea nitrogen and/or serum creatinine concentration >20% (the upper end of normal) for two studies and cats with CKD stages 3 and 4 for the other two studies. The prevalence of CKD in the RS and DJD groups was higher than expected at 50% and 68.8%, respectively. CKD was common in cats between 1 and 15 years of age, with a similar prevalence of CKD stages 1 and 2 across age groups in both the RS and DJD cats, respectively. We found significant concurrence between CKD and DJD in cats of all ages, indicating the need for increased screening for CKD when selecting DJD treatments. Additionally, this study offers the idea of a relationship and causal commonality between CKD and DJD owing to the striking concurrence across age groups and life stages.

**Presence of zoonotic Enterocytozoon bieneusi in cats in a temple in central Thailand.**
Enterocytozoon bieneusi is a common opportunistic intestinal pathogen in humans and animals. To investigate the prevalence, genotype and host specificity of E. bieneusi, 111 dog faecal samples were collected from dairy cattle farms, and 95 and 80 faecal samples were collected from dogs and cats, respectively, in a temple in central Thailand. E. bieneusi was found in 25 (31.3%) cats by nested PCR, but not in dogs. Genotyping analysis targeting the internal transcribed spacer of the rRNA gene identified genotype D - and other novel genotypes very similar to genotype D - which is a zoonotic genotype reported in both HIV patients and villagers in rural communities in Thailand. This is the first study to find E. bieneusi genotype D in cats, and it may be that cats are found to play an important role in E. bieneusi zoonotic transmission to humans. The present study indicates that further molecular epidemiological investigations of E. bieneusi among cats are necessary to evaluate their possible role as reservoir hosts and the potential risk they represent to humans.

**Prazosin in cats with urethral obstruction.**

**Practical interpretation and application of exocrine pancreatic testing in small animals.**
The pancreas remains a difficult organ to evaluate using laboratory methods alone. No single laboratory test is diagnostic of pancreatitis (chronic or acute) without other diagnostic modalities concurring with the diagnosis or ruling out other diseases. The diagnosis of pancreatitis is particularly difficult in cats, and pancreatitis often occurs with other diseases. The use of pancreatic cytology may be useful in diagnosing both inflammation and neoplasia. Exocrine pancreatic insufficiency (EPI) can be relatively easily diagnosed when clinically manifested by the measurement of trypsinlike immunoreactivity. Diagnosis is more difficult when EPI is subclinical.

**Photodynamic Hyperthermal Chemotherapy with Indocyanine Green in 16 Cases of Malignant**
Soft Tissue Sarcoma: A Novel Cancer Therapy.

Sixteen cases of malignant soft tissue sarcoma (STS) (10 canine and 6 feline) were treated with a novel triple therapy that combined photodynamic therapy, hyperthermia using indocyanine green with a broad-band light source, and local chemotherapy after surgical tumor resection. This triple therapy was designated photodynamic hyperthermal chemotherapy (PHCT). In all cases, the surgical margin was insufficient. In one feline case, PHCT was performed without surgical removal. PHCT was performed over an interval of 1 to 2 weeks and was repeated 3 to 21 times. No severe side effects, including severe skin burns, necrosis, or rupture of skin sutures, were observed in any of the animals. No recurrence was observed in 7 of 10 (70.0%) dogs and 3 of 6 (50.0%) cats over follow-up periods ranging from 286 to 1901 days. These results suggest that PHCT decreases the risk of recurrence. PHCT should therefore be considered an adjuvant therapy for STS in companion animal medicine.


Pharmacokinetics of the novel atypical opioid tapentadol after intravenous, intramuscular and subcutaneous administration in cats.

Drugs that provide effective analgesia in cats are limited. The aim of the present study was to investigate the pharmacokinetics of the novel atypical drug tapentadol (TAP) after intravenous (IV), intramuscular (IM) and subcutaneous (SC) injection in six healthy cats using a 3x3 Latin square crossover study design. The dose rate used was 5mg/kg and the concentrations of TAP in plasma were evaluated using high-performance liquid chromatography. Some adverse effects including salivation, agitation and panting, were noted, especially following IV administration. In all three administration groups, TAP concentrations were detectable in plasma for up to 8h. Bioavailability for each route was almost complete, accounting for 94% and 90% after IM and SC administrations, respectively. Drug absorption was faster after IM than SC administration (0.25h vs. 0.63h). The half-life of the terminal portion of the plasma concentration curve was not significantly different between the three routes of administrations (2-3h). TAP appears to have some variation in its pharmacokinetic features in cats compared to other animal species. Further studies are needed to evaluate whether TAP would be suitable for use in cats that are experiencing moderate to severe pain, but are sensitive to the adverse effects of commonly prescribed opioids.


Pharmacokinetics and pharmacodynamics of suberoylanilide hydroxamic acid in cats.

Suberoylanilide hydroxamic acid (SAHA), or vorinostat, is a histone deacetylase inhibitor approved for use as chemotherapy for lymphoma in humans. The goal of this study was to establish pharmacological parameters of SAHA in cats. Our interest in treating cats with SAHA is twofold: as an anticancer chemotherapeutic and as antilatency therapy for feline retroviral infections. Relying solely on data from studies in other animals would be inappropriate as SAHA is partially metabolized by glucuronidation, which is absent in feline metabolism. SAHA was administered to cats intravenously (2 mg/kg) or orally (250 mg/m2, ~17 mg/kg) in a cross-over study design. Clinically, SAHA was well tolerated at these dosages as no abnormalities were noted following administration. The pharmacokinetics of SAHA in cats was found to be similar to that of dogs, but the overall serum drug exposure was much less than that of humans at an equivalent dose. The pharmacodynamic effect of an increase in acetylated histone proteins in blood was detected after both routes of administration. An increased oral dose of 60 mg SAHA/kg administered to one animal resulted in a surprisingly modest increase in peak drug
concentration, suggesting possible saturation of absorption kinetics. This study provides a foundation for future studies of the clinical efficacy of SAHA in treating feline disease.


Pharmacogenomics of *Cytauxzoon felis* cytochrome b: implications for atovaquone and azithromycin therapy in domestic cats with cytauxzoonosis.

*Cytauxzoon felis*, an emerging virulent protozoan parasite that infects domestic cats, is treated with atovaquone and azithromycin (A&A). Atovaquone targets parasite cytochrome b. We characterized the *C. felis* cytochrome b gene (cytb) in cats with cytauxzoonosis and found a cytb genotype that was associated with survival in A&A-treated cats.

Murphy, B., C. Hillman, and S. McDonnel (2013) Virus Res

Peripheral immunophenotype and viral promoter variants during the asymptomatic phase of feline immunodeficiency virus infection.

Feline immunodeficiency virus (FIV)-infected cats enter a clinically asymptomatic phase during chronic infection. Despite the lack of overt clinical disease, the asymptomatic phase is characterized by persistent immunologic impairment. In the peripheral blood obtained from cats experimentally infected with FIV-C for approximately 5 years, we identified a persistent inversion of the CD4/CD8 ratio. We cloned and sequenced the FIV-C long terminal repeat containing the viral promoter from cells infected with the inoculating virus and from in vivo-derived peripheral blood mononuclear cells and CD4T cells isolated at multiple time points throughout the asymptomatic phase. Relative to the inoculating virus, viral sequences amplified from cells isolated from all of the infected animals demonstrated multiple single nucleotide mutations and a short deletion within the viral U3, R and U5 regions. A transcriptionally inactivating proviral mutation in the U3 promoter AP-1 site was identified at multiple time points from all of the infected animals but not within cell-associated viral RNA. In contrast, no mutations were identified within the sequence of the viral dUTPase gene amplified from PBMC isolated at approximately 5 years post infection relative to the inoculating sequence. The possible implications of these mutations to viral pathogenesis are discussed.


Pericardial lymphoma in seven cats.

A presumed primary pericardial lymphoma was diagnosed in seven cats. Clinical findings at presentation included poor body condition, dehydration and dyspnoea. Thoracic diagnostic imaging was performed in six cases and revealed pleural effusion and a diffuse thickening of the pericardium. A cytological diagnosis of lymphoma was obtained in six cases; in four cases the diagnosis was confirmed at necropsy. Immunophenotyping were performed in six cases: three cases were classified as T-cell and three as B-cell lymphoma. Four cats did not receive any treatment. One cat received only prednisone and two cats received chemotherapy. Six cats lived 7-11 days, except for one cat that received a multi-drug chemotherapy protocol, and was still alive at the time of writing (750 days after diagnosis). Primary pericardial lymphoma is a rare extranodal feline lymphoma that has never been described previously.

We describe a novel surgical technique used to correct feline patellar luxation (PL) where abnormal patellar tracking persists despite conventional corrective surgery. An anatomical difference between feline and canine stifles is that the feline patella is wider relative to the trochlear sulcus. This results in less constrained patellar tracking. Therefore, patellar subluxation is common in normal cats. It was noticed that in some feline cases with clinically significant PL, PL persisted intra-operatively despite performing the standard corrective procedures. We report a novel surgical technique - partial parasagittal patellectomy - to address the wide shape of the feline patella relative to the sulcus. This technique has been successfully performed in four cats with good outcomes. However, the immediate risks and long-term effects of partial parasagittal patellectomy are not known. We reserve this technique for surgical cases where PL cannot be controlled by conventional means.

Papillomavirus-associated multicentric squamous cell carcinoma in situ in a cat: an unusually extensive and progressive case with subsequent metastasis.

BACKGROUND: Multicentric squamous cell carcinoma in situ (MSCCIS) is an uncommon cutaneous disease of middle-aged to older cats, with some cases being linked to papillomavirus infection. The disease course is usually benign. Initial eruption of multifocal, pigmented, hyperkeratotic plaques is typical, with gradual progression to thickly crusted ulcerative lesions. ANIMAL: A 5-year-old male neutered Devon rex cat in apparent good health was initially presented with a 16 month history of over 40 nonpruritic dorsally distributed hyperpigmented patches. Lesions progressed gradually over 2 years to larger, more pigmented, crusted plaques and ulcerated nodules. At 7 years of age the cat developed neurological signs and systemic illness and was euthanized. METHODS AND RESULTS: Initial skin histopathology revealed discrete regions of epidermal and follicular epithelial hyperplasia, with moderate numbers of apoptotic keratinocytes, and mild focal epithelial dysplasia. A diagnosis of erythema multiforme was considered; feline herpesvirus-1 immunohistochemistry was negative. Repeat histopathology 22 months after initial presentation confirmed MSCCIS with foci of invasive squamous cell carcinoma (SCC). Postmortem examination 1 month later revealed SCC within the thoracic wall, lungs and vessels of the thoracic spinal cord and heart base, presumed to be metastases from skin lesions. Fluorescent in situ hybridization of initial and later histopathology samples was positive for Felis domesticus papillomavirus type 2. Immunoreactivity of p16 was prominent within early and late cutaneous lesions and internal SCCs. CONCLUSIONS: This case represents an unusual presentation of papillomavirus-associated MSCCIS with extensive lesions, atypical initial histopathology and progression to SCC with distant metastases.
considered. It important to know from what data dosing recommendations are derived and how much evidence supports the use of oral analgesics and analgesic adjuncts in dogs and cats.

Pavia, P. R., J. Kovak-McClaran, and K. Lamb (2013) J Small Anim Pract
Outcome following liver lobectomy using thoracoabdominal staplers in cats.
OBJECTIVES: To present outcomes and complications following liver lobectomy using thoracoabdominal staplers in cats, to identify factors associated with survival time and to confirm safety and feasibility. METHODS: Retrospective analysis of case records (n=18) of cats that underwent liver lobectomy with a thoracoabdominal staple. RESULTS: Fourteen of the 18 cats (78%) survived to discharge. Median survival time was 136.5 days. On log-rank univariate analysis, preoperative abdominal fluid (P=0.002), preoperative anaemia (P=0.03) and perioperative transfusion (P=0.01) were associated with decreased survival time. Perioperative anaemia was common (89%), and rate of transfusion during hospitalisation was 61%. Clinical signs of illness, azotaemia, elevated liver enzyme activities and malignant neoplasia did not appear to impact survival; however, anaemia, abdominal fluid and transfusion may be associated with decreased survival time. CLINICAL SIGNIFICANCE: Liver lobectomy using thoracoabdominal staplers was effective in removal of hepatic lesions and all cats survived surgery. Outcome was negatively associated with preoperative abdominal fluid (haemorrhagic and non-haemorrhagic), preoperative anaemia or perioperative transfusion. Surgeons should be prepared to employ ancillary methods of haemostasis to augment the staple line, and need for blood transfusion should be anticipated.

Ocular manifestation of lymphoma in newly diagnosed cats.
Ocular manifestations of lymphoma are described in humans and dogs but rarely in cats. In this prospective study, cats with newly diagnosed and treatment-naive lymphoma were evaluated concerning clinical stage and ophthalmologic findings. Twenty-six cats were included. In 12 cats (48%), ocular changes were documented. Uveitis anterior and posterior were predominant findings, being present in 58% of affected individuals. Other findings included exophthalmos, corneal surface lesions and chemosis. Eight cats received chemotherapy, two of which had ocular involvement. In these two cats, a complete remission of an anterior and a partial remission of a posterior uveitis were documented. Due to the detection of ocular involvement, a stage migration from stage IV to V occurred in four patients. In the light of these findings, an ophthalmological examination may be considered as an important part of staging in feline lymphoma as well as of follow-up examination in affected cats.

Ocular and neural distribution of feline herpesvirus-1 during active and latent experimental infection in cats.
BACKGROUND: Herpes simplex virus 1 (HSV-1) and varicella zoster virus (VZV) cause extensive intra-ocular and neural infections in humans and are closely related to Felid herpes virus 1 (FeHV-1). We report the extent of intra-ocular replication and the extent and morphological aspects of neural replication during the acute and latent phases of FeHV-1 infection. Juvenile, SPF cats were inoculated with FeHV-1. Additional cats were used as negative controls. Cats were euthanized on days 6, 10, and 30 post-inoculation. RESULTS: FeHV-1 was isolated from the conjunctiva, cornea, uveal tract, retina,
optic nerve, ciliary ganglion (CG), pterygopalatine ganglion (PTPG), trigeminal ganglion (TG),
brainstem, visual cortex, cerebellum, and olfactory bulb of infected cats during the acute phase, but not
the cranial cervical ganglion (CCG) and optic chiasm. Viral DNA was detected in all tissues during
acute infection by a real-time quantitative PCR assay. On day 30, viral DNA was detected in all TG, all
CCG, and 2 PTPG. Histologically mild inflammation and ganglion cell loss were noted within the TG
during acute, but not latent infection. Using linear regression, a strong correlation existed between
clinical score and day 30 viral DNA copy number within the TG. CONCLUSIONS: The correlation
between clinical score and day 30 viral DNA copy number suggests the severity of the acute clinical
infection is related to the quantity of latent viral DNA. The histologic response was similar to that seen
during HSV-1 or VZV infection. To the author’s knowledge this is the first report of FeHV-1 infection
involving intraocular structures and autonomic ganglia.


Occurrence of bacteriuria in 18 catheterised cats with obstructive lower urinary tract disease: a
pilot study.
The incidence of catheter-associated urinary tract infections in cats catheterised for an obstructive
lower urinary tract disease (LUTD) has not previously been evaluated. The objective of this study was
to evaluate the frequency of significant bacteriuria in cats with obstructive LUTD managed for 48 h
with a closed urine collection system. Eighteen male cats admitted for a non-infectious obstructive
LUTD were evaluated. This was a prospective study. A standard protocol was used for aseptic catheter
placement and maintenance. Three urine samples were collected from each animal through the catheter
immediately after placement, 24 h after placement and just before removal. All samples underwent
complete urinalysis, including bacterial culture. Catheter tips were tested by bacterial culture. Six cats
(33.3%) developed significant bacteriuria during catheterisation. The causative bacteria were common
feline uropathogens (Escherichia coli, Staphylococcus species) in five cases, and Streptococcus bovis
in one. One cat developed a fungal infection. The presence of bacteria in urinary sediment was
 correlated strongly with positive urine culture results. The catheter tips from 10/18 cats (55.5%) were
positive for culture. The positive predictive value of a positive culture from the urinary catheter tip was
87.5%. The specificity was 53.8%. The same infectious agents were cultured from both urine and
catheter tip in six cases. In summary, one-third of cats developed significant bacteriuria during
catheterisation. Silent bacteriuria could not be clearly differentiated from true urinary tract infection.
The presence of bacteria in the urinary sediment was strongly indicative of bacteriuria. The specificity
of urinary catheter tip culture was low.


Nonuraemic nonfatal idiopathic calciphylaxis in a kitten.
BACKGROUND: Calciphylaxis is a rare cutaneous disorder, characterized by vascular calcification
and progressive skin necrosis, not yet described in cats. It is scarcely reported in animals, mostly due to
iatrogenic or uraemic disturbances of the calcium-phosphate balance. In human patients, it is most
commonly seen with end-stage renal disease, but several nonuraemic disorders, including inherited
dysfunctions of tissue calcification inhibitors, have also been described. HYPOTHESIS/OBJECTIVES:
To describe a case of nonuraemic calciphylaxis in a cat. ANIMALS: A 10-week-old male domestic
short hair kitten was presented with hyperacute skin lesions. Initial dermatological signs were
characterized by sharp demarcated erosions and ulcerations on the face, including the nasal planum and
lips. Cutaneous lesions rapidly progressed into thick crusts with ulcerations, involving parts of the face and pinna as well as abdominal skin. METHODS: Complete blood count, serum chemistry profile, urinalysis, parathyroid hormone measurement and histopathological examination of skin biopsies. RESULTS: Histopathology from newly developed abdominal skin lesions revealed severe epidermal necrosis and calcification, multifocal pannicular calcification and calcified subcutaneous vessels, supporting a diagnosis of calciphylaxis. Treatment consisted of systemic and topical antimicrobials, analgesics, pentoxifylline, Lantharenol((R)), sodium thiosulfate and vitamin K. After initiation of therapy, no further progression was noticed; all medications could be discontinued eventually, and no relapse was seen in the following 2 years. CONCLUSIONS AND CLINICAL IMPORTANCE: Calciphylaxis should be considered as a differential diagnosis for ulcerative cutaneous disorders in young cats. More information on this disease is needed to elucidate the pathomechanism.


Nonsutured Hotz-Celsius technique performed by CO laser in two dogs and two cats.

It is described a new version of modified Hotz-Celsius technique performed in four patients, two cats and two dogs. The surgery was carried out using CO2 laser in order to avoid bleeding and decrease the anesthetic time. Besides, the wound created was not sutured and it healed by secondary intention without any complication. As a conclusion, this modification is a successful alternative to treat entropion in a safe and fast way.


Neuraxial morphine induced pruritus in two cats and treatment with sub anaesthetic doses of propofol.

HISTORY: Two cats were presented for orthopaedic surgery. PHYSICAL EXAMINATION: With the exception of the orthopaedic injuries found, clinical examination showed no abnormality.

MANAGEMENT: As part of anaesthetic management, one cat received intrathecal morphine, the other epidural morphine. Following recovery, intense grooming was observed. After ensuring adequate analgesia this behaviour was interpreted as pruritus. In the first cat, pruritus was initially managed with medetomidine constant rate infusion (CRI) at 1 and 1.5 mug kg(-1) hour(-1). The lower dose produced sedation and no relief from pruritus, the higher dose ablated pruritus but induced sedation. Two propofol (lipid emulsion formulation) boli of 0.1 mg kg(-1) ablated pruritus without causing sedation. The second cat was successfully treated with four boli of 0.1 mg kg(-1) propofol over 20 minutes.

FOLLOW-UP: Following treatment with propofol, pruritus did not recur in either cat and both were discharged from the hospital. CONCLUSIONS: This is the first clinical report of morphine-induced pruritus in cats and management with low-dose propofol. These cases suggest an antipruritic mechanism for lipid-formulation propofol.


Natural anti-insulin autoantibodies in cats: Enzyme-linked immunosorbent assay for the determination of plasma anti-insulin IgG and its concentrations in domestic cats.

Anti-insulin immunoglobulin G (IgG) has been found in the sera of healthy cats. To determine the concentrations of these antibodies, an enzyme-linked immunosorbent assay (ELISA) for anti-insulin IgG was developed. ELISA maintained the linearity of a standard concentration line between 67.5 and
2160 ng/ml. The coefficients of variances (CVs) of intra-assays in two different plasma samples were 4.0% and 3.7%, respectively. The inter-assay CVs in two different plasma samples were 5.1% and 6.9%, respectively. The dilution curves of two samples were rectilinear. Anti-insulin IgG was detected in all 84 of the healthy cats that were tested. Plasma anti-insulin IgG concentrations ranged from 80 to 1578 μg/ml, with a median concentration of 221 μg/ml, and this value correlated positively with total plasma IgG concentrations (r=0.383, p<0.01). In an intravenous glucose tolerance test, plasma anti-insulin IgG concentrations did not alter, even with changes in plasma glucose and insulin concentrations. The ELISA that was developed was able to determine plasma anti-insulin IgG in domestic cats, and confirmed that all healthy cats had plasma anti-insulin IgG. Determining the plasma concentrations of anti-insulin IgG in cats with various pathological conditions might clarify the role of anti-insulin IgG.


**Mycobacterium bovis infections in domesticated non-bovine mammalian species. Part 2: A review of diagnostic methods.**

Despite the large host range of Mycobacterium bovis, ante-mortem diagnostic tests for the infection mostly lack sensitivity/specificity and/or remain unvalidated in non-bovine species. The epidemiology and importance of M. bovis infection in these species are discussed in the first part of this two-part review. This second part focuses on the diagnostic options available to identify infected species such as sheep, goats, cats, and camelids, and highlights the significant challenges posed, both in establishing estimates of disease prevalence and in controlling infections in these species, in the absence of fully validated tests.


**Mycobacterium bovis infections in domesticated non-bovine mammalian species. Part 1: Review of epidemiology and laboratory submissions in Great Britain 2004-2010.**

Mycobacterium bovis, the causative agent of bovine tuberculosis (bTB), can infect a broad range of mammalian species in addition to domestic and feral cattle and badgers. Since legislation introduced in 2006 in Great Britain requires animal keepers, meat inspectors and veterinarians to notify the authorities of suspect bTB lesions or the isolation of M. bovis in any mammal excluding humans, the organism has been increasingly identified in domestic species other than cattle. Although in most cases ‘spill-over’ hosts, these remain a potential source of infection for cattle, wildlife, and possibly humans. In this first part of a two-part review of M. bovis infections in non-bovine domestic species, current knowledge of the epidemiology of such infections is presented along with novel data relating to diagnostic submissions for mycobacterial culture between 2004 and 2010. Over this period M. bovis infection was identified in 116 cats, 7 dogs, 34 llamas, 133 alpacas, 35 goats, 24 sheep and 85 pigs and wild boar. The risk that such infections pose to the control of bTB, and as zoonoses, is discussed. In part two, the options available to diagnose bTB in these species, as well as the challenges posed to disease detection and control will be discussed in depth.

**Multiple mutant T alleles cause haploinsufficiency of Brachyury and short tails in Manx cats.**

Most mammals possess a tail, humans and the Great Apes being notable exceptions. One approach to understanding the mechanisms and evolutionary forces influencing development of a tail is to identify the genetic factors that influence extreme tail length variation within a species. In mice, the Tailess locus has proven to be complex, with evidence of multiple different genes and mutations with pleiotropic effects on tail length, fertility, embryogenesis, male transmission ratio, and meiotic recombination. Five cat breeds have abnormal tail length phenotypes: the American Bobtail, the Manx, the Pixie-Bob, the Kurilian Bobtail, and the Japanese Bobtail. We sequenced the T gene in several independent lineages of Manx cats from both the US and the Isle of Man and identified three 1-bp deletions and one duplication/deletion, each predicted to cause a frameshift that leads to premature termination and truncation of the carboxy terminal end of the Brachyury protein. Ninety-five percent of Manx cats with short-tail phenotypes were heterozygous for T mutations, mutant alleles appeared to be largely lineage-specific, and a maximum LOD score of 6.21 with T was obtained at a recombination fraction (Theta) of 0.00. One mutant T allele was shared with American Bobtails and Pixie-Bobs; both breeds developed more recently in the US. The ability of mutant Brachyury protein to activate transcription of a downstream target was substantially lower than wild-type protein. Collectively, these results suggest that haploinsufficiency of Brachyury is one mechanism underlying variable tail length in domesticated cats.


**Multiple (disseminated) follicular cysts in five dogs and one cat.**


**Morphology of congenital portosystemic shunts emanating from the left gastric vein in dogs and cats.**

OBJECTIVE: To describe the anatomy of congenital portosystemic shunts emanating from the left gastric vein in dogs and cats. METHODS: A retrospective review of a consecutive series of dogs and cats managed for congenital portosystemic shunts. RESULTS: Forty-six dogs and 27 cats met the inclusion criteria of a congenital portosystemic shunt emanating from the left gastric vein. Of the 46 dogs, 28 (61%) had a shunt that entered the left phrenic vein, 10 (22%) had a shunt that entered the post hepatic caudal vena cava and in 8 (17%) the shunt entered the azygos vein. Of the 27 cats, 19 (70%) had a shunt that entered the left phrenic vein and 8 (30%) had a shunt that entered the post hepatic caudal vena cava. CLINICAL SIGNIFICANCE: The systemic vein into which the shunt entered was consistent showing three common presentations: left gastro-phrenic, left gastro-caval and left gastro-azygos. This information may help with surgical planning in cases undergoing shunt closure surgery.


**More than just T(4): diagnostic testing for hyperthyroidism in cats.**

CLINICAL CHALLENGES: In older cats presenting with clinical features of hyperthyroidism, confirmation of a diagnosis of thyroid disease is usually straightforward. However, the potential for false-negative and false-positive results exists with all thyroid function tests (especially in the context of routine screening of asymptomatic cats) and leads to clinical dilemmas. For example, a high serum T(4) value may be found in a cat that lacks clinical signs of hyperthyroidism, or hyperthyroidism may
be suspected in a cat with normal total T(4) concentrations. PRACTICAL RELEVANCE: To avoid unnecessary treatment and potentially adverse effects in a euthyroid cat, thyroid function tests must always be interpreted in the light of the cat’s history, clinical signs, physical examination findings and other laboratory findings. EVIDENCE BASE: In this article the author reviews the use of commonly recommended thyroid function tests, focusing on clinical scenarios that present diagnostic difficulties. In doing so, he draws on the veterinary and comparative literature, his own clinical experience, and data, unpublished to date, obtained from a series of 100 hyperthyroid cats consecutively diagnosed at his clinic.

Leal, R. O., S. Gil, N. Sepulveda, D. McGahie, A. Duarte, M. Niza, and L. Tavares (2013) J Small Anim Pract Monitoring acute phase proteins in retrovirus infected cats undergoing feline interferon-omega therapy. OBJECTIVES: Recombinant feline interferon-omega therapy is an immunomodulator currently used in the treatment of different retroviral diseases including feline immune deficiency virus and feline leukaemia virus. Although its mechanism of action remains unclear, this drug appears to potentiate the innate response. Acute phase proteins are one of the key components of innate immunity and studies describing their use as a monitoring tool for the immune system in animals undergoing interferon-omega therapy are lacking. This study aimed to determine whether interferon-omega therapy influences acute phase protein concentrations namely serum amyloid-A, alpha-1-glycoprotein and C-reactive protein. METHODS: A single-arm study was performed using 16 cats, living in an animal shelter, naturally infected with retroviruses and subjected to the interferon-omega therapy licensed protocol. Samples were collected before (D0), during (D10 and D30) and after therapy (D65). Serum amyloid-A and C-reactive protein were measured by specific enzyme-linked immunosorbent assay kits and alpha-1-glycoprotein by single radial immunodiffusion. RESULTS: All the acute phase proteins significantly increased in cats undergoing interferon-omega therapy (D0/D65: P<0.05) CLINICAL SIGNIFICANCE: Acute phase proteins appear to be reasonable predictors of innate-immune stimulation and may be useful in the individual monitoring of naturally retroviral infected cats undergoing interferon-omega therapy.

Beha, G., L. V. Muscatello, B. Brunetti, P. Asproni, F. Millanta, A. Poli, C. Benazzi, and G. Sarli (2013) J Comp Pathol Molecular Phenotype of Primary Mammary Tumours and Distant Metastases in Female Dogs and Cats. Distant metastases represent a major step in the progression and fatal outcome of canine and feline mammary carcinomas. Recent studies have characterized the molecular phenotypes of mammary tumours and provided information on molecules that may allow targeted therapy in sites from which the tumours may not readily be surgically resected. Molecular phenotypes were determined immunohistochemically in three feline and two canine cases of mammary neoplasia, each presenting with multiple distant metastases. These tumours and their metastases often overexpressed the c-erbB-2 phenotype. A basal-like phenotype was found in the distant metastases from two cases. These findings suggest that canine and feline mammary tumours with distant metastases may be amenable to novel targeted therapies.

**Molecular Identification of Ancylostoma caninum Isolated from Cats in Southern China Based on Complete ITS Sequence.**

Ancylostoma caninum is a blood-feeding parasitic intestinal nematode which infects dogs, cats, and other mammals throughout the world. A highly sensitive and species-specific PCR-RFLP technique was utilised to detect the prevalence of A. caninum in cats in Guangzhou, southern China. Of the 102 fecal samples examined, the prevalence of A. caninum in cats was 95.1% and 83.3% using PCR-RFLP and microscopy, respectively. Among them, the prevalence of single hookworm infection with A. caninum was 54.90%, while mixed infections with both A. caninum and A. ceylanicum were 40.20%. Comparative analysis of three complete ITS sequences obtained from cat-derived A. caninum showed the same length (738 bp) as that of dog-derived A. caninum. However, the sequence variation range was 98.6%-100%, where only one cat isolate (M63) showed 100% sequence similarity in comparison with two dog-derived A. caninum isolates (AM850106, EU159416) in the same studied area. The phylogenetic tree revealed A. caninum derived from both cats and dogs in single cluster. Results suggest that cats could be the main host of A. caninum in China, which may cause cross-infection between dogs and cats in the same area.


**Molecular detection of Rickettsia felis in different flea species from Caldas, Colombia.**

Rickettsioses caused by Rickettsia felis are an emergent global threat. Historically, the northern region of the province of Caldas in Colombia has reported murine typhus cases, and recently, serological studies confirmed high seroprevalence for both R. felis and R. typhi. In the present study, fleas from seven municipalities were collected from dogs, cats, and mice. DNA was extracted and amplified by polymerase chain reaction (PCR) to identify gltA, ompB, and 17kD genes. Positive samples were sequenced to identify the species of Rickettsia. Of 1,341 fleas, Ctenocephalides felis was the most prevalent (76.7%). Positive PCR results in the three genes were evidenced in C. felis (minimum infection rates; 5.3%), C. canis (9.2%), and Pulex irritans (10.0%). Basic Local Alignment Search Tool (BLAST) analyses of sequences showed high identity values (> 98%) with R. felis, and all were highly related by phylogenetic analyses. This work shows the first detection of R. felis in fleas collected from animals in Colombia.


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

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

**Mixed infection by Aelurostrongylus abstrusus and Troglostrongylus brevior in kittens from the same litter in Italy.**
Parasitic nematodes affecting the respiratory system of felids are spreading in endemic regions and emerging in previously free areas and/or hosts. This is particularly the case of the cat lungworm Aelurostrongylus abstrusus, which can cause respiratory signs in cats all over the world. Additionally, Troglostrongylus brevior has been recently found in domestic cats from Ibiza Island in Spain and Southern Italy. The present paper describes the first mixed infection by these lungworms in kittens belonging to the same litter. Two approximately 10-11 weeks old kittens were found infected by A. abstrusus and T. brevior at a copromicroscopical examination. The identity of larvae shed by faeces were confirmed with an already validated PCR specific for A. abstrusus and a novel DNA-based assay specific for T. brevior. One kitten showed severe respiratory signs and died despite an anthelmintic treatment, while the other had a subclinical infection and recovered after a parasiticide administration with milbemycin oxime. New insights into epidemiology, biology, clinical aspects and control of these parasitoses are discussed.


**Mirtazapine as an appetite stimulant and anti-emetic in cats with chronic kidney disease: a masked placebo-controlled crossover clinical trial.**
Cats with chronic kidney disease (CKD) often experience inappetence and vomiting and might benefit from the administration of mirtazapine, a medication with appetite stimulant and anti-nausea properties. The aim of this placebo-controlled, double-masked crossover clinical trial was to evaluate the effects of mirtazapine on bodyweight, appetite and vomiting in cats with CKD. Eleven cats with stable CKD were randomized to receive 1.88 mg mirtazapine or placebo orally every other day for 3 weeks. After a 4 day washout period, each cat crossed over to the alternate treatment for 3 weeks. Physical examinations and serum biochemistry profiles were performed before and after each treatment period and owners kept daily logs of appetite, activity, behavior, and vomiting episodes. Compared to placebo, mirtazapine administration resulted in a statistically significant increase in appetite (P=0.02) and activity (P=0.02) and a statistically significant decrease in vomiting (P=0.047), as determined by Wilcoxon matched pairs analysis. Cats treated with mirtazapine also gained significant bodyweight compared with placebo-treated cats (P=0.002) as determined by linear mixed model analysis. Median weight gain during mirtazapine administration was 0.18 kg (range 0-0.45 kg). Median weight loss during placebo administration was 0.07 kg (range 0-0.34 kg). Mirtazapine is an effective appetite stimulant and anti-emetic for cats with CKD and could be a useful adjunct to the nutritional management of these cases.


**Mineral metabolism in growing cats: changes in the values of blood parameters with age.**
The purpose of this study was to describe changes in calcium, phosphorus, magnesium, parathyroid hormone, calcitriol and calcidiol in cats from 3 to 15 months of age. Fourteen European shorthair healthy cats of both sexes (seven males, seven females) belonging to a research colony were studied from 3 to 15 months of age. Plasma concentrations of total calcium, ionised calcium, albumin,
phosphorus, magnesium, intact parathyroid hormone (I-PTH), whole parathyroid hormone (W-PTH), calcidiol and calcitriol were measured at 3, 6, 9, 12 and 15 months of age. From 3 months of age to adulthood cats showed a decrease in calcium (both total and ionised), phosphorus and magnesium. No major changes in PTH were evident, although the ratio of W-PTH:I-PTH decreased significantly with age. A reciprocal change in vitamin D metabolites (decrease in calcitriol and increase in calcidiol) was identified during the growing process. Our results, showing changes in most parameters of mineral metabolism during growth, reinforce the need to use adequate age-related reference values for diagnostic purposes.


Draper, W. E., L. Bolfer, E. Cottam, M. McMichael, and T. Schubert (2013) J Am Anim Hosp Assoc 49:325-328. Methocarbamol CRI for symptomatic treatment of pyrethroid intoxication: a report of three cases. Pyrethroids are popular for use in companion animals due to their relatively low mammalian toxicity and efficacy against arthropods. Nonetheless, pyrethroid intoxication has been reported in cats and dogs, and cats appear to be more susceptible due to difficulty in biotransformation and excretion of pyrethroids. Pyrethroid intoxications are generally due to either the improper use or accidental ingestion of approved products. Methocarbamol, given as intermittent injections, is a common first-line treatment choice for the tremors associated with pyrethroid intoxication. Two cats and one dog were treated with a methocarbamol continuous rate infusion (CRI) for pyrethroid intoxication. Clinical signs of toxicity resolved within a few hr in all three cases, with no adverse drug effects. A methocarbamol CRI can be considered in animals presenting with pyrethroid intoxication.

Streitberger, A., V. Hocke, and P. Modler (2013) J Vet Cardiol 15:181-187. Measurement of pulmonary transit time in healthy cats by use of ultrasound contrast media “Sonovue(R)”: feasibility, reproducibility, and values in 42 cats. OBJECTIVE: To evaluate the feasibility of measuring pulmonary transit time (PTT) in healthy cats by transthoracic echocardiography using the ultrasound contrast agent Sonovue((R)). To determine normalized PTT (nPTT) values in 42 healthy cats and to estimate the interobserver variability and the within-day repeatability of nPTT measurements. ANIMALS: Forty-two privately owned healthy cats of different breeds, gender and age presented for cardiac examination. METHODS: A bolus injection of contrast agent (Sonovue((R))) was administered intravenously. The right parasternal short axis echocardiographic view was used to record the contrast agent’s transit time from the pulmonary artery to the left atrium. Pulmonary transit time and nPTT were determined independently by three examiners with different levels of experience. RESULTS: Normalized PTT was 4.12 +/- 1.0 (mean +/- SD) in our population. The median interobserver variability across our population was 6.8%, the median within-day variability for the three observers were 13.1%, 12.7% and 13%. No effect of the observer’s experience on nPTT measurement was identified. Age, sex and body weight did not significantly influence nPTT. CONCLUSIONS: This study demonstrates that nPTT measurement is feasible in cats.
using ultrasound and the blood pool contrast media Sonovue(R)). Measurements of nPTT can be performed in a clinical setting. Normalized PTT values in healthy cats are comparable with those reported in healthy dogs.

Measurement of IL-12 (p40, p35), IL-23p19, and IFN-gamma mRNA in Duodenal Biopsies of Cats with Inflammatory Enteropathy.
BACKGROUND: Dietary hypersensitivity and inflammatory bowel disease (IBD) are important causes of chronic vomiting and diarrhea in cats. IL-23 has been recently found to be a key factor in the immunopathogenesis of IBD in humans but the involvement in IBD has not been investigated in cats. HYPOTHESIS/OBJECTIVES: Expression of genes encoding IL-12p35 and p40, IL-23p19, and IFN-gamma may be up-regulated in duodenal biopsy specimens taken from cats with histologic evidence of inflammation. ANIMALS AND METHODS: Duodenal biopsy specimens were collected from control cats (n = 21) and cats with inflammatory enteropathy (n = 13). Routine histopathology, immunohistochemistry (IHC), and qRT-PCR were used to assess expression of MHC class II and to measure gene transcripts encoding the p35, p40, and p19 subunits of the IL-12 family of cytokines and IFN-gamma. RESULTS: There were significant differences in expression of mRNA encoding IL-12p35 and IL-23p19 between healthy cats and cats with inflammatory enteropathy. IL-12p35 mRNA was lower in the duodenal mucosa of cats with inflammatory enteropathy compared with the mucosa of healthy cats (P =.001). In contrast, IL-23p19 mRNA expression was higher in duodenal biopsy specimens from cats with inflammatory enteropathy than in those from healthy controls (P =.001). There was no difference in expression of IL-12p40 and IFN-gamma mRNA (P >.05). The majority of cats with inflammatory enteropathy had histologic evidence of moderate to severe colitis (score 2). CONCLUSIONS AND CLINICAL IMPORTANCE: The results of this preliminary study suggest that IL-23 plays a role in the pathogenesis of feline inflammatory enteropathy.

Macroparasite communities in stray cat populations from urban cities in Peninsular Malaysia.
The occurrence of macroparasites was studied from 543 stray cats in four urban cities from the west (Kuala Lumpur), east (Kuantan), north (Georgetown) and south (Malacca) of Peninsular Malaysia from May 2007 to August 2010. Five ectoparasites species were recovered namely, Ctenocephalides felis, Felicola subrostratus, Haemaphysalis bispinosa, Heterodoxus spiniger and Lynxacarus radovskyi. Two cats from Georgetown were infested with the dog louse, H. spiniger and this represented the first host record for this species in Malaysia. Up to nine species of helminths were recovered with overall high prevalences of infection of 83% in Kuantan, followed by 75.1% in Kuala Lumpur, 71.6% in Georgetown and 68% in Malacca. The helminth species comprised five nematodes, Toxocara malaysiensis, Toxocara cati, Ancylostoma braziliensis, Ancylostoma ceylanicum, Physaloptera praeputialis, two cestodes Taenia taeniaeformis, Dipyldium caninum and one trematode, Playtnosomum fastosum. The majority of helminths were present in the four study sites except for the absence of P. praeputialis in Kuala Lumpur. The prevalence and abundance of infections were analysed taking intrinsic (host age and sex) and extrinsic (season) factors into consideration. Levels of infection and infestation were mainly influenced by host age and to a lesser extent sex and season, whereas four nematode species exhibited significant interactions within the intestine of the cat host. The potential for
transmission of some macroparasite species from stray cats to the human population in urban areas is discussed.


**Lower respiratory tract endoscopy in the cat: diagnostic approach to bronchial disease.**

**PRACTICAL RELEVANCE:** Respiratory endoscopy is a useful diagnostic tool to evaluate the airways for the presence of mass lesions or foreign material while allowing for sample collection for cytologic and microbiologic assessment. While bronchial disease (eosinophilic or neutrophilic) is the most common lower respiratory disease identified in cats, infectious, anomalous and neoplastic conditions can clinically mimic inflammatory bronchial disease. Diagnostic imaging is unable to define the etiology for clinical signs of cough, tachypnea or respiratory difficulty, necessitating visual evaluation and collection of airway samples. Endoscopy allows intervention that can be life-saving and also confirmation of disease, which is important given that life-long medication is likely to be required for management of inflammatory airway disease. **PATIENT GROUP:** Cats with either airway or pulmonary disease benefit from laryngoscopy, tracheoscopy and bronchoscopy to determine an etiologic diagnosis. In the best situation, animals that require these procedures present early in the course of disease before clinical decompensation precludes anesthetic intervention. However, in some instances, these tests must be performed in unstable cats, which heightens the risk of the procedure. Cats that do not respond to empiric medical therapy can also benefit from bronchoscopic evaluation. **CLINICAL CHALLENGES:** Due to the small size of feline airways and the tendency for cats to develop laryngospasm, passage of endoscopic equipment can be difficult. Bronchoconstriction can lead to hemoglobin desaturation with oxygen and respiratory compromise. **EVIDENCE BASE:** This article reviews published studies and case reports pertaining to the diagnostic approach to feline respiratory disease, focusing specifically on endoscopic examination of the lower airways in cats. It also discusses appropriate case selection, equipment, endoscopic techniques and visual findings based primarily on the authors’ experiences.


**Jugular vascular access port implantation for frequent, long-term blood sampling in cats: methodology, assessment, and comparison with jugular catheters.**

Long-term, frequent venous access for diagnostic, therapeutic, or research purposes in cats is problematic. Frequent blood sampling over extended periods is necessary for some therapeutic regimes and often required for clinical research in veterinary science. In this paper, we describe the implantation of vascular access ports (VAPs) and assess their use for repeated blood sampling over 16 weeks and 38 weeks, as well as the use of jugular catheters for one week. The VAP placement procedure was well-tolerated with few minor complications (minor swelling, contusion, or superficial dermatitis from self-trauma), which were not observed when neck bandages were applied immediately after surgery. Thromboembolism occurred in two cats, but did not occur after switching to a smaller catheter with a rounded tip and taurolidine-citrate locking solution. Although duration of access was much longer with VAPs compared to jugular catheters, patency rates were similar (89% (n=28) to 92% (n=12) after 16 weeks and 75% (n=12) after 38 weeks for VAPs; 88% (n=49) after one week for jugular catheters). Behavioural reactions to blood collection from 30 cats-assessed over 16 weeks and comprising 378 collections-were absent or minor in 99% of collections. These findings indicate that
VAPs offer a viable alternative to jugular catheters for studies requiring frequent blood sampling and lasting more than 2 weeks.

Hvidsten, D., S. Stuen, A. Jenkins, O. Dienus, R. S. Olsen, B. E. Kristiansen, R. Mehl, and A. Matussek (2013) Ticks Tick Borne Dis

**Ixodes ricinus and Borrelia prevalence at the Arctic Circle in Norway.**
The distribution limit of Ixodes ricinus ticks in northwestern Europe (Bronnoy, Norway, 1 degrees south of the Arctic Circle), has been known since the 1930s. To reconfirm this finding and extend studies in the areas adjacent to the Arctic Circle (66 degrees 33’ N), ticks were collected from dogs and cats in 8 districts in northern Norway from 64 degrees 56’ N to 68 degrees 48’ N. We detected 549 I. ricinus, 244 (44%) of them in Bronnoy district, and 305 (range 6-87 ticks) in 7 districts in the northern part of the study area. The prevalence of Borrelia in these ticks was determined by real-time PCR. In the Bronnoy district (65 degrees 28’ N, 12 degrees 12’ E), 29% of the I. ricinus were Borrelia spp.-positive, and the species B. afzelii was nearly twice as prevalent as B. garinii and/or B. valaisiana. In the study area north of Bronnoy district, only 12 (4%) of the collected ticks contained Borrelia spp. In conclusion, tick occurrence and Borrelia prevalence are high in the Bronnoy district. In contrast, I. ricinus occurrence and Borrelia prevalence are low further north across the Arctic Circle in Norway.


**ISFM guidelines on population management and welfare of unowned domestic cats (Felis catus).**
GUIDELINES RATIONALE: Cats are among the most commonly kept domestic pets, and coexist with humans in a variety of different circumstances. Cats are sentient beings and, as such, humans have a responsibility for cat welfare where humans and cats coexist. Because cats reproduce efficiently, measures to control populations are frequently needed, but these should be based on ethical and humane approaches. FRAMEWORK: These consensus guidelines from the International Society of Feline Medicine’s Welfare Advisory Panel provide a framework for the approach to welfare and population control measures, primarily among unowned cats and those going through a homing programme.


**Is Wolbachia participating in the bronchial reactivity of cats with heartworm associated respiratory disease?**
Heartworm associated respiratory disease is a pulmonary syndrome in cats that results from the vascular and parenchymal inflammatory response associated with the arrival and death of Dirofilaria immitis worms into the distal pulmonary arteries. This parasite harbors intracellular Wolbachia, an endosymbiont bacteria. The association between the parasite and the bacteria is obligatory. Some studies suggest the involvement of Wolbachia in the development of the inflammatory reaction and in the polarization of the host immune response against the parasite. Barometric whole-body plethysmography is a non-invasive pulmonary function test that allows a dynamic study of breathing patterns and is useful to study airway disease and the response to different treatments. The aim of this prospective non-blinded study was to compare the influence of Wolbachia upon the respiratory
function variables in a population of cats seropositive to D. immitis by use of Barometric whole-body plethysmography. Fourteen seropositive cats to Wolbachia and eight seronegative cats were put into the plethysmograph chamber and different respiratory variables were measured. The results were analyzed and compared between the two groups of animals. Significant differences were found for bronchoconstriction index variables PAU (pause) (P-value<0.05) and Penh (enhanced pause) (P-value<0.05). The results obtained in our study suggest that Wolbachia seems to produce a greater acute inflammatory response at bronchial, vascular and parenchymal level worsening the state of broncho-reactivity associated with the presence of seropositivity to D. immitis in cats.


Investigation of diabetes mellitus in Burmese cats as an inherited trait: a preliminary study.
AIM: To investigate, in a pilot study, a possible genetic component to type 2 diabetes mellitus (T2D) in Burmese cats in New Zealand by analysing pedigree data. METHODS: Pedigrees were obtained for 305 Burmese cats living in New Zealand; diabetes was diagnosed in 19 of these due to presence of polyuria and polydipsia, persistent concentrations of glucose in plasma >16 mmol/L and glucosuria prior to insulin treatment. Pedigrees were also submitted for 16 cats with no clinical signs of T2D. The remaining 270 cats were unobserved relatives of these individuals. Inbreeding coefficients and heritability were calculated, and a single major locus model segregation analysis was conducted using pedigree analysis software. RESULTS: Nineteen cats were diagnosed with T2D. Males (n = 14) and females (n = 5) were both affected, suggesting that the gene or genes causing diabetes are autosomal rather than sex-linked. Examination of the pedigree revealed few signs of fully penetrant dominant gene action: diabetes was ostensibly rarely seen in sequential generations and nearly always skipped at least one and often more generations; apparently unaffected offspring of apparently unaffected parents sometimes produced affected progeny. The mean relatedness of the affected animals within the core pedigree (16 diabetic cats) was 0.049, and mean inbreeding 0.033. Based on 100,000 permutations of the trait values, the expected relatedness of a random sample of 16 animals taken from the phenotyped animals would be 0.013 (SD 0.007) (permutation p = 0.0009). The observed inbreeding was also significant (permutation p= 0.02). Heritability was estimated to be 9 (95% CI = 0-57)% assuming all animals with unknown status were unaffected. The best fitting genetic model was a major gene model with dominant expression with the risk allele frequency at 15% with 60% penetrance. CONCLUSIONS: In this pilot study the increased inbreeding in the cases, lack of likely sampling bias, the increased frequency of T2D in Burmese, and small number of breed founders are consistent with the involvement of a major locus in diabetes in Burmese cats with a significant risk allele prevalence. However, low case numbers meant this could not be unambiguously confirmed. A genome-wide association study may be useful for investigating the genetic cause of T2D.


Investigation of 1H MRS for quantification of hepatic triglyceride in lean and obese cats.
(1)H magnetic resonance spectroscopy ((1)H MRS) is the preferred technique for noninvasive quantification of hepatic triglyceride in humans. Domestic cats are subject to liver lipid accumulation, but MRS has not been investigated for quantification of liver fat in cats. The purpose of this project was to explore a technique for (1)H MRS measurement of hepatic triglyceride in lean and obese cats. Hepatic (1)H MRS was performed, using a 3T imaging unit and a single-voxel spin-echo spectroscopy sequence, on 6 lean (3.3-4.6 kg) and 12 obese cats (5.2-9.8 kg). Median liver fat percentages in lean and obese cats were 1.3% and 6.8%, respectively. Results are biologically plausible, based on chemical
assay in a separate group of cats; however, full validation of the method is necessary before other conclusions can be drawn. This report should provide a foundation for the further development of spectroscopic techniques for studying hepatic lipid accumulation in cats.


Intravesical glycosaminoglycans for obstructive feline idiopathic cystitis: a pilot study.

Feline idiopathic cystitis is a common condition, often resulting in repeated episodes of life-threatening urethral obstruction. Defective urinary bladder glycosaminoglycans have been implicated as a causal factor. In this report, a commercially available glycosaminoglycan product was infused into the urinary bladders of cats with urethral obstruction from idiopathic cystitis to study the effect on repeated obstruction. In this randomized, blind, placebo-controlled clinical trial, the therapeutic protocol was well-tolerated with no adverse effects. Whereas no glycosaminoglycan-treated cats (n = 9) developed repeated urethral obstruction during the 7-day follow-up period, 3/7 placebo-treated cats developed repeated obstructions. Approaching statistical significance (P = 0.06), these data suggest that further investigation of this new treatment option is warranted.


Intrarenal Distributions and Changes of Angiotensin-Converting Enzyme and Angiotensin-Converting Enzyme 2 in Feline and Canine Chronic Kidney Disease.

Angiotensin-converting enzyme (ACE) is a key enzyme in the renin-angiotensin system (RAS). ACE2 is a newly identified member of the RAS. The present immunohistochemical study focused on changes in intrarenal ACE and ACE2 immunoreactivity in feline and canine chronic kidney disease (CKD). ACE immunoreactivity was predominantly observed in the brush border of the proximal tubules in dogs and cats. ACE immunoreactivity was lower in CKD kidneys than in normal kidneys, and quantitative analysis demonstrated negative correlations between ACE and renal tissue damage in dogs. ACE2 immunoreactivity was also detected in the proximal tubules; it increased or decreased with CKD in dogs, depending on the renal region assessed. The changes in ACE and ACE2 in CKD were associated with the plasma creatinine concentration in dogs. Findings from dogs with glomerulonephritis were similar to those from dogs with non-glomerulonephritis. The present study suggests that changes in the intrarenal expression of ACE and ACE2 contribute to the pathological mechanisms of canine CKD, but not to the mechanisms of feline CKD.


OBJECTIVE: To immunologically phenotype and histologically classify canine and feline intraocular and periocular lymphomas. METHODS: The databases of four veterinary medical diagnostic laboratories were searched to identify cases of intraocular or periocular lymphoma in dogs and cats between 2001 and 2012. Hematoxylin and eosin (H&E) stained slides were reviewed for confirmation and classification of lymphoma, and immunohistochemistry for CD3 (T-cell marker) and CD79a and/or CD20 (B-cell markers) was examined to determine the lineage of the neoplastic lymphocytes. RESULTS: Six canine and 15 feline cases of ocular lymphoma were identified. In the canine cases, there were three intraocular and three periocular lymphomas where two intraocular and one periocular lymphomas were B-cell, one of each intraocular and periocular lymphomas were T-cell and one
periocular lymphoma was nonreactive with CD3, CD79a or CD20. In the feline cases, there were six intraocular and nine periocular lymphomas where five intraocular and six periocular lymphomas were B-cell, and one intraocular and three periocular lymphomas were T-cell. Only one canine case had concurrent generalized lymphadenopathy, only one canine conjunctival lymphoma had simultaneous cutaneous lymphoma, and only one feline case had bilateral ocular involvement when they were diagnosed. CONCLUSION: Canine and feline intraocular and periocular lymphomas are often of B-cell phenotype. Although in general terms lymphoma is not considered a primary tumor when it occurs in or adjacent to the globe, these tumors frequently first become evident in the globe and/or periocular area. An accurate early diagnostic approach is crucial for the patient’s quality of life because B-cell lymphomas are generally more amenable to chemotherapy than T-cell lymphomas.

The cat lungworm Aelurostrongylus abstrusus affects the domestic cats and other felids all over the world. Feline aelurostrongylosis is of importance in clinical feline medicine. Snails and slugs are the intermediate hosts, but the cat is probably infected by eating paratenic hosts, e.g., rodents, birds, amphibians and reptiles. Herein we present the first finding of A. abstrusus in a naturally infected invasive synantropic slugs Arion lusitanicus (intermediate host) and wild living rodents Apodemus agrarius (paratenic host). The results confirm the usefulness of molecular approaches for investigating the biology, ecology and epidemiology of A. abstrusus, the agent of feline aelurostrongylosis.

Trichomonads are a group of anaerobic flagellates. Two species of intestinal trichomonads have been described in cats - pathogenic Tritrichomonas foetus and probably harmless Pentatrichomonas hominis. InPouch TF-Feline medium (Bio-Med Diagnostics, White City, Oregon, USA) is considered the gold standard for diagnosis of T. foetus infection in cats. It is commercially available, relatively cheap and easy-to-use. The medium is intended to be highly specific to T. foetus as morphologically similar Pentatrichomonas hominis and Giardia sp. do not survive here longer than 24h. In this study we successfully cultivated P. hominis in InPouch TF-Feline medium for 3 days after inoculation with cat faeces. The identity of the organism was assessed by sequencing of SSU rDNA and ITS region. Possible coinfection with T. foetus was ruled out using Tritrichomonas-specific PCR. Our results suggest possible misdiagnosis of tritrichomonosis in cats using InPouch TF-Feline medium. PCR-based verification of culture-positive samples prior the potentially neurotoxic ivermectin treatment is recommended.

Male sterilization by chemical agents is a nonsurgical contraceptive approach designed to induce azoospermia and, therefore, infertility. Intratesticular injection of zinc gluconate for sterilization of dogs has been described, but its use in cats remains limited. The objective of the present study was to evaluate, by light and transmission electron microscopy, the efficacy of a single intratesticular injection of a zinc gluconate solution (Testoblock) as a sterilant for male cats. Twelve sexually mature mixed breed cats were allocated at random into two groups (control = 6; treated = 6) and given a single injection into each testis of either isotonic saline or zinc gluconate, respectively. Histopathologic and ultrastructural evaluation was assessed at 120 days postinjection. Histopathologic changes were not detected in the testes from the control group. However, histologic evaluation of the treated group revealed atrophic and dilated seminiferous tubules, a decrease in the number of germ cells, and incomplete spermatogenesis. Sertoli cells had various degrees of cytoplasmic vacuolization. Intertubular tissue revealed active fibroblasts, collagen deposition, and inflammatory cells. The diameter of seminiferous tubules, epithelial height and tubular area were reduced (P < 0.05) in the treated group compared with controls. Azoospermia occurred in 8 of the 11 treated cats (73%). Ultrastructural evaluation of Leydig cells revealed loss of nuclear chromatin, increased smooth endoplasmatic reticulum, and mitochondria degeneration. Intratesticular injection of zinc gluconate solution impaired spermatogenesis in cats and has great potential as a permanent sterilant in this species.

**Inhaled budesonide therapy in cats with naturally occurring chronic bronchial disease (feline asthma and chronic bronchitis).**

OBJECTIVES: To describe the long term use of inhaled budesonide in cats with naturally occurring asthma and chronic bronchitis and to measure its effects. METHODS: Owners of 43 cats diagnosed with asthma or chronic bronchitis, which had been prescribed 400 microg of inhaled budesonide twice daily, were contacted and information was retrieved by a questionnaire. Nineteen cats still receiving inhaled budesonide after more than 2 months were re-evaluated clinically and underwent barometric whole body plethysmography and adrenocorticotropic hormone-stimulation testing. RESULTS: In 20 of the cats, therapy had been withdrawn by the owners. Cats (n=23) still receiving inhaled budesonide improved clinically and 19 cats that were reevaluated had significantly lower basal PENH (P=0.048) and higher PCPenh300 (P=0.049) values than before treatment. Corticosteroid-induced side effects were not observed in any cats but hypothalamic-pituitary-adrenal axis suppression was detected in 3 of 15 cases. CLINICAL SIGNIFICANCE: Treatment with inhaled budesonide was well tolerated, resulting in improvement of clinical signs and barometric whole body plethysmography parameters. Although inhaled budesonide therapy was found to cause suppression of the hypothalamic-pituitary-adrenal axis in some cats, no cats showed clinical signs attributable to corticosteroid side effects.

**Influence of acidifying or alkalinizing diets on bone mineral density and urine relative supersaturation with calcium oxalate and struvite in healthy cats.**

OBJECTIVE: To evaluate the influence of acidifying or alkalinizing diets on bone mineral density and urine relative supersaturation (URSS) with calcium oxalate and struvite in healthy cats. ANIMALS: 6 castrated male and 6 spayed female cats. PROCEDURES: 3 groups of 4 cats each were fed diets for 12 months that differed only in acidifying or alkalinizing properties (alkalinizing, neutral, and acidifying). Body composition was estimated by use of dual energy x-ray absorptiometry, and 48-hour urine
samples were collected for URSS determination. RESULTS: Urine pH differed significantly among diet groups, with the lowest urine pH values in the acidifying diet group and the highest values in the alkalinizing diet group. Differences were not observed in other variables except urinary ammonia excretion, which was significantly higher in the neutral diet group. Calcium oxalate URSS was highest in the acidifying diet group and lowest in the alkalinizing diet group; struvite URSS was not different among groups. Diet was not significantly associated with bone mineral content or density.

CONCLUSIONS AND CLINICAL RELEVANCE: Urinary undersaturation with calcium oxalate was achieved by inducing alkaluria. Feeding an alkalinizing diet was not associated with URSS with struvite. Bone mineral density and calcium content were not adversely affected by diet; therefore, release of calcium from bone caused by feeding an acidifying diet may not occur in healthy cats.


Infection of cats with atypical feline coronaviruses harbouring a truncated form of the canine type I non-structural ORF3 gene.
Feline and canine coronaviruses (FCoV and CCoV, respectively) are common pathogens of cats and dogs sometimes leading to lethal infections named feline infectious peritonitis (FIP) and canine pantropic coronavirus infection. FCoV and CCoV are each subdivided into two serotypes, FCoV-I/II and CCoV-I/II. A phylogenetic relationship is evident between, on one hand, CCoV-I/FCoV-I, and on the other hand, CCoV-II/FCoV-II, suggesting that interspecies transmission can occur. The aim of the present study was to evaluate the prevalence of coronavirus (CoV)-infected cats according to their contact with dogs and to genetically analyse the CoV strains infecting cats. From 2003 to 2009, we collected 88 faecal samples from healthy cats and 11 ascitic fluids from FIP cats. We investigated the possible contact with dog in the household and collected dogs samples if appropriate. Out of 99 cat samples, 26 were coronavirus positive, with six cats living with at least one dog, thus showing that contact with dogs does not appear as a predisposing factor for cats CoV infections. Molecular and phylogenetic analyses of FCoV strains were conducted using partial N and S sequences. Six divergent strains were identified with the N gene clustering with CCoV-I whereas the 3’ end of S was related to FCoV-I. Further analysis on those six samples was attempted by researching the presence of the ORF3 gene, the latter being peculiar to CCoV-I to date. We succeeded to amplify the ORF3 gene in five samples out of six. Thus, our data strongly suggest the circulation of atypical FCoV strains harbouring the CCoV-I ORF3 gene among cats. Moreover, the ORF3 genes recovered from the feline strains exhibited shared deletions, never described before, suggesting that these deletions could be critical in the adaptation of these strains to the feline host.


Induction of scratching behaviour in cats: efficacy of synthetic feline interdigital semiochemical.
The aim of the study was to evaluate the effects of synthetic feline interdigital semiochemical (FIS) on the induction of scratching behaviour in cats during a standardised behavioural test. The trial was a randomised blinded study on a single group of subjects, following a crossover design. The scratching behaviour of 19 cats was evaluated during a standardised test in which cats were introduced to an area with one scratching post. Each cat acted as its own control (receiving, at random, FIS then placebo or vice versa). The test lasted for 5 mins, after which the cat was left alone in the test area. Duration, frequency of scratching and latency of first scratching behaviour were noted. Two independent
Observers analysed the videos. Thirty-eight tests were recorded with a different scratching post each time (two tests per cat). The scratching post with the semiochemical was more scratched in duration and frequency by the cats involved in the study (intention to treat analysis). The same conclusion was found using per-protocol analysis, which included only cats that scratched during the test. Regarding latency, no significant difference was found between treatment and placebo. The results seem of interest in explaining the role of a FIS in inducing scratching behaviour on a scratching post. The semiochemical approach can modify the choice of areas selected spontaneously by cats, and could be used either as a preventive measure for a cat arriving at home or to control or change an inappropriate scratching behaviour.

**Indirect assessment of dihydropyrimidine dehydrogenase activity in cats.**
Use of 5-fluoropyrimidine antimetabolite drugs, specifically 5-fluorouracil (5-FU), has been discouraged in cats because of adverse events including neurotoxicity and death. Causes of toxicity have never been elucidated. In humans, toxicity has been associated with ineffective metabolism secondary to deficiencies in dihydropyrimidine dehydrogenase (DPD). Direct assessment of DPD activity is challenging; determination of uracil:dihydrouracil (U:UH2) in plasma using high performance liquid chromatography (HPLC) has been reported as an indirect measurement. U:UH2 was measured in the plasma of 73 cats. Mean U:UH2 for all cats was 1.66 +/- 0.11 (median 1.53, range 0.24-7.00). Seventeen (23%) cats had U:UH2 >2, a value associated with decreased DPD activity in humans. Spayed female cats had significantly lower U:UH2 as compared with intact females, and age and U:UH2 were weakly but significantly negatively correlated (r = -0.26). Studies correlating U:UH2 and 5-FU tolerability are required to further determine the validity and use of this test in cats.

**Increasing frequency of feline cytauxzoonosis cases diagnosed in western Kentucky from 2001 to 2011.**
Feline cytauxzoonosis is a rapidly progressing and usually fatal disease in domestic cats caused by the tick-borne pathogen, *Cytauxzoon felis*. The primary reservoir host for this protozoan parasite is the bobcat (*Lynx rufus*). In this retrospective study, we have examined the positive cases of feline cytauxzoonosis identified at Murray State University’s Breathitt Veterinary Center, a regional diagnostic facility located in Hopkinsville, Kentucky, between January 2001 and December 2011. Center records reveal that there has been an increase in the rate of diagnosis of domestic feline infection with *C. felis* over that 10-year span with the majority of cases (75%) occurring between 2006 and 2011. The infection was diagnosed from March through October and showed a single peak in May, corresponding well with the questing period for the lone star tick, *Amblyomma americanum*, a known vector of *C. felis*.

**Impact of Ultra-Rapid Freezing on the Motility, Morphology, Viability and Acrosome Integrity of Epididymal Cat Sperm Diluted in Sucrose-Based Extenders.**
The objective of the present study was to investigate the influence of different sucrose-based extenders on the motility, morphology, viability and acrosomal integrity of epididymal cat spermatozoa cryopreserved by ultra-rapid freezing method. Nine cats were castrated, and collected semen was
diluted 1 : 1 with Dulbecco’s phosphate-buffered saline-BSA1%-based extender supplemented with different sucrose concentrations (0, 0.25, 0.4 and 0.6 m). After ultra-rapid freezing, samples were thawed and sperm motility, morphology, viability and acrosome status were assessed. At thawing, the number of progressively motile (p < 0.01) and morphologically normal (p < 0.01) sperm was higher in the sucrose-supplemented groups than in the sucrose-free group. Viability of spermatozoa cryopreserved without sucrose was significantly reduced. In extender supplemented with 0.4 m sucrose, spermatozoa viability showed higher values (57.0 +/- 4.7; p < 0.01). No significant differences were detected among groups for sperm acrosome integrity. Results support that cat sperm survive after ultra-rapid freezing using sucrose as a cryoprotectant, and the best results were achieved when 0.4 m of sucrose was used. This is the first report on sperm ultra-rapid freezing of cat sperm and further studies on extenders, sperm management or cryovials should be carried out to improve sperm cryosurvival.


Idiosyncratic drug toxicity affecting the liver, skin, and bone marrow in dogs and cats.

Idiosyncratic drug toxicity reactions are, by definition, uncommon, but can lead to serious or even fatal organ toxicity. The liver, skin, and peripheral blood cells/bone marrow are common targets. Most of these reactions are the result of reactive metabolites, which may cause local cell or organelle damage, or may be amplified by a systemic immune response. Individual risk may depend on differences in drug biotransformation, levels of oxidative stress, or antigen presentation.


Idiopathic generalised tremor syndrome in two cats.

Two male neutered domestic shorthair cats were evaluated for generalised tremors. On neurological examination both cats showed whole-body tremors worsening with stress. A mainly cerebellar disorder was suspected. Blood examination, cerebrospinal fluid analysis and electrophysiological examination of both cats and magnetic resonance imaging of the brain in one cat were normal. Idiopathic generalised tremor syndrome (IGTS) was suspected owing to the exclusion of underlying causes and the clinical similarities with the syndrome in dogs. Treatment as recommended for dogs was initiated and resulted in improvement. This report describes the first cases of IGTS in cats.


Hypocalcemia of critical illness in dogs and cats.

Hypocalcemia occurs in critically ill dogs and cats and is associated with medications, treatments, and underlying diseases such as acute kidney disease, pancreatitis, parathyroid disease, sepsis, and trauma. Possible underlying mechanisms include hypovitaminosis D, acquired or relative hypoparathyroidism, hypomagnesemia, and alterations in the ionized fraction of calcium caused by changes in chelated or protein-bound calcium. If severe or acute, hypocalcemia can cause obvious clinical signs related to muscle or neurologic hyperexcitability or more subtle signs of cardiovascular dysfunction. Emergency treatment with calcium gluconate administration is recommended when clinical signs are present or if there is moderate to severe ionized hypocalcemia.

Hybrid cutting balloon dilatation for treatment of cor triatriatum sinister in a cat.
A hybrid surgical approach and balloon dilatation were performed successfully in a cat with cor triatriatum sinister and clinical signs of congestive heart failure. Left lateral thoracotomy was used to access the heart and cutting balloon followed by standard balloon dilatation were utilized to dilate the perforation in the anomalous left atrial membrane. Clinical signs resolved completely after dilation of the anomalous left atrial membrane. Based upon the outcome of this case, balloon dilatation appears to be a viable treatment option for cats affected with cor triatriatum sinister.


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

Sula, M. M., B. L. Njaa, and M. E. Payton (2013) Vet Pathol
Histologic Characterization of the Cat Middle Ear: In Sickness and in Health.
The purpose of this study was to establish microscopic normal in the middle ear of the cat while concurrently characterizing gross and microscopic lesions reflecting spontaneous otitis media. Both ears from 50 cats were examined grossly and processed for histologic examination of the external, middle, and internal ear on a single slide. Gross lesions of the middle ear were present in 14 of 100 (14%) and included turbid fluid, frank pus, hemorrhage, and fibrous thickening of the auricular mucoperiosteum. Histologically, 48 of 100 (48%) ears had evidence of ongoing or previous inflammatory middle ear disease, including proteinaceous fluid; vascular ectasia; expansion of the auricular mucoperiosteum by neutrophils, lymphocytes, and macrophages; cholesterol clefts; hemorrhage; fibrin; granulation tissue; membranous pseudo-glands; fibrosis; proliferation and/or osteolysis of the tympanic and septum bullae. Histologic lesions were identified in 34 of 100 ears (34%) lacking gross evidence of disease. Ears were classified histologically as either normal (52/100 [52%]) or diseased (48/100 [48%]). Diseased ears were further classified as mild to moderate (37/100 [37%]) or severely (11/100 [11%]) affected. Internal ear involvement was present in 11 of 100 (11%) ears. Histologic evidence of middle ear disease in cats is far greater than gross lesions or clinical literature suggests; further investigation and correlation of clinical and histologic disease are warranted. With minimal additional preparation, diagnostic specimens may be readily prepared and evaluated for this integral sensing organ.

Hemipelvectomy: Outcome in 84 dogs and 16 cats. A veterinary society of surgical oncology
retrospective study.

OBJECTIVE: To report clinical findings, perioperative complications and long-term outcome in dogs and cats that had hemipelvectomy surgery for treatment of neoplasia. STUDY DESIGN: Multi-institutional retrospective case series. ANIMALS: Dogs (n = 84) and cats (16). METHODS: Medical records (January 2000 to December 2009) of dogs and cats that had hemipelvectomy at participating institutions were reviewed. Postoperative progress and current status of the patient at the time of the study was determined by either medical record review, or via telephone contact with the referring veterinarian or owner. RESULTS: Complications were infrequent and usually minor. Hemorrhage was the main intraoperative complication; 2 dogs required blood transfusion. One dog developed an incisional hernia. In dogs, hemangiosarcoma had the worst prognosis with a median survival time (MST) of 179 days. MST for chondrosarcoma (1232 days), osteosarcoma (533 days), and soft tissue sarcoma (373 days) were not statistically different. Median disease-free interval (DFI) for local recurrence of all tumor types was 257 days. Cats had 75% survival at 1 year, which was significantly longer than dogs. CONCLUSIONS: Survival times for most tumor types can be good, but surgical margins should be carefully evaluated to ensure complete tumor removal. Adjuvant therapies may be advisable particularly for dogs to reduce rates of local recurrence or distant metastasis.


Haematological and biochemical reference intervals of four feline breeds.

Many feline breeds have been generated from a small number of ancestors. Thus, breed-specific peculiarities can be expected, which could include haematological and biochemical measurements. Despite this, there are only a few reports on breed-specific reference intervals (RI). This information is essential in routine practice where results from individual patients are usually compared with a RI. The aim was to compare haematological and biochemical data from clinically healthy Abyssinian, Holy Birman, Norwegian Forest and Siberian cats with published RIs to assess whether the published RIs are acceptable in these breeds. Comparison with established RIs using guidelines from the National Committee for Clinical Laboratory Standards and the American Society of Veterinary Clinical Pathology, revealed a number of breed-related clinicopathological differences. New RIs were established, but in most cases the new RIs overlapped the published RIs, and the use of the breed-specific data would minimally affect the clinical interpretation of laboratory results. Important differences that could result in misinterpretation of laboratory results were as follows: microcytosis and high alpha2-globulin concentrations in Abyssinian cats; high serum creatinine, alpha2-globulin and glucose concentrations in Holy Birman cats; high serum alkaline phosphatase activity and calcium and phosphate concentration in Norwegian Forest cats; low beta2-globulin and gamma-globulin concentrations in Norwegian Forest and Siberian cats. Breed-specific RIs should be used for these analytes. In addition, care should be taken in interpreting clinicopathological data in purebred cats for which specific RIs have not been established.


Granulomatous rhinitis due to Candida parapsilosis in a cat.

A 9-year-old female spayed Domestic Medium Hair cat presented to the referring veterinarian with a 2-week history of sneezing, which progressed to swelling over the nasal planum. The cat had been under veterinary care for inflammatory bowel disease and had been treated with 1.25 mg/kg prednisolone once a day for approximately 1 year. On physical examination, an approximately 2-3 mm diameter,
round polypoid pink soft-tissue mass was protruding slightly from the right nostril. Through histologic examination of representative sections from the mass, there was a severe diffuse infiltrate of epithelioid macrophages and neutrophils that surrounded frequent 15-20 microm yeast organisms. A Grocott methenamine silver stain revealed the presence of pseudohyphae in addition to the previously noted yeast forms. Real-time polymerase chain reaction (PCR) for Cryptococcus neoformans, Ajellomyces dermatitidis (syn. Blastomyces dermatitidis), Coccidioides immitis, Ajellomyces capsulatus (syn. Histoplasma capsulatum), Malassezia spp., and Candida spp. was performed on the paraffin-embedded sample. The PCR for Candida spp. was positive; the product was then sequenced and was determined to be consistent with Candida parapsilosis. Following the PCR diagnosis and prior to treatment of the infection, C. parapsilosis was cultured from a nasal swab. The infection in the cat in the current report was considered opportunistic and secondary to immunosuppression, following treatment for the inflammatory bowel disease.

**Genetic variability in Microsporum canis isolated from cats, dogs and humans in Brazil.**  
Dermatophytosis caused by Microsporum canis is a heterogeneous disease with variable clinical manifestations. M. canis is a zoophilic dermatophyte and the most frequent fungi isolated from dogs, cats and children in Brazil. The aim of this study was to investigate the genetic variability of M. canis isolates from different animal species using two microsatellite markers, namely, McGT(13) and McGT(17), and to correlate the results with the clinical and epidemiological patient data in Brazil. The study included a global set of 102 M. canis strains, including 37 symptomatic cats, 35 asymptomatic cats, 19 human patients with tinea, 9 asymptomatic dogs and 2 symptomatic dogs. A total of 14 genotypes were identified, and 6 large populations were distinguished. There was no correlation between these multilocus genotypes and the clinical and epidemiological data, including the source, symptomatology, clinical picture, breed, age, sex, living conditions and geographic location. These results demonstrate that the use of microsatellite polymorphisms is a reliable method for the differentiation of M. canis strains. However, we were unable to demonstrate a shared clinical and epidemiological pattern among the same genotype samples.

**Genetic diversity of Toxoplasma gondii isolates from Ethiopian feral cats.**  
Recent studies indicate greater genetic variability among isolates of Toxoplasma gondii worldwide than previously thought. However, there is no information on genetic diversity of T. gondii from any host in Ethiopia. In the present study, genotyping was performed on viable T. gondii isolates by bioassays in mice from tissues and feces of 27 cats from Ethiopia. Viable T. gondii was isolated from hearts of 26 cats, feces alone of 1 cat, and feces and tissues of 6 cats; in total there were 33 isolates. Genotyping was performed on DNA from cell-cultured derived T. gondii tachyzoites and by using 10 PCR-restriction fragment length polymorphism markers (SAG1, SAG2, SAG3, BTUB, GRA6, c22-8, c29-2, L358, PK1, and Apico). Four genotypes were recognized, including ToxoDB #1 (Type II clonal, nine isolates), ToxoDB #2 (Type III, five isolates), Toxo DB #3 (Type II variant, ten isolates), and ToxoDB #20 (nine isolates). Of interest is the isolation of different genotypes from tissues and feces of two cats, suggesting re-infection or mixed strain T. gondii infection. These findings are of epidemiological
significance with respect to shedding of oocysts by cats. This is the first report of genotyping of T. gondii from any host in Ethiopia.


**Genetic characterization of feline calicivirus strains associated with varying disease manifestations during an outbreak season in Missouri (1995-1996).**

Feline calicivirus (FCV) is a common cause of mild to severe upper respiratory tract disease (URTD) in cats. FCV strain 21223 was isolated from a kitten with severe pneumonia in a disease outbreak with unusually high mortality (35 %) that occurred in a Missouri feline colony in 1995-1996. Phylogenetic analysis of the genome sequence of strain 21223 indicated the emergence of a new FCV strain. Analysis of the full-length genome sequence of a closely related (99.5 % nucleotide identity) strain, 3786, obtained from an asymptomatic animal in the same colony four months later, showed the presence of seven amino acid substitutions, with six of them located in the VP1 capsid sequence encoded by ORF2. Comparative analysis of the E-region sequences (426-521 aa ORF2) presumably involved in virus-host cell receptor interactions did not identify amino acid substitutions unique to the virulent strain. We determined the complete genome sequences of four virus isolates that were collected in regional catteries in the months following the outbreak that were associated with different manifestations of the disease (URTD, chronic stomatitis, and gingivitis). We show that genetically distinct FCV strains were cocirculating in the area, and no apparent correlation could be made between overall sequence and observed disease.


Feline infectious peritonitis (FIP) is a lethal infectious disease affecting domestic and wild cats. Several reports suggested that TNF-alpha is related to the progression of FIP. Thus, the administration of a feline TNF-alpha-neutralizing antibody to cats with FIP may reduce the disease progression. In this study, we have prepared nine monoclonal antibodies (MAbs) that recognize feline TNF-alpha. All MAbs neutralized recombinant TNF-alpha. The 50% inhibitory concentrations (IC50) of the MAbs for the cytotoxicity of recombinant TNF-alpha were 5-684ng/ml. MAb 2-4 exhibited high neutralizing activity against natural TNF-alpha derived from FIPV-infected macrophages, and was confirmed to inhibit the following feline TNF-alpha-induced conditions in vitro: (i) an increase in the survival rate of neutrophils from cats with FIP, (ii) aminopeptidase N (APN) mRNA expression in macrophages, and (iii) apoptosis of a feline T-lymphocyte cell line.

Sayre, R. S., and K. A. Spaulding (2013) J Feline Med Surg **Formulation of a standardized protocol and determination of the size and appearance of the spleen in healthy cats.**

Standard protocol for splenic measurement is warranted to aid in interpretation when sonographically imaging the spleen of cats. The purpose of this study was to describe the appearance and size of healthy cat spleens, and to develop a standard method of evaluation. Data were obtained from 31 clinically healthy non-sedated cats with no sonographic abnormalities. The sonographic appearance of the spleen’s relative echogenicity compared to the left renal cortex and the hepatic parenchyma was
recorded. Splenic height was measured at three sites. Three measurements were determined at each site, and the mean value of these three measurements was determined and used for data analysis. A significance level of $P < 0.05$ was used for analysis, which was performed using S-PLUS software (version 8.1). The mean proximal height of the spleen was 7.1 mm. The mean body sagittal height was 9.3 mm. The mean height of the tail of the spleen was 8.7 mm (95% confidence interval). The splenic parenchymal echogenicity was less than the left renal cortex echogenicity and greater than the liver in 17/31 cats; less than the left kidney cortex and equal to the liver in 5/31 cats; equal to the cortex of the left kidney and greater than the liver in 5/31 cats; equal to the liver and renal cortex in 2/31 cats; and less than the liver and kidney with the renal cortex less than the liver in 2/31 cats. The protocol recommended for consistent evaluation of the spleen in the cat includes three specific measurements.


**Follow-up protein profiles in urine samples during the course of obstructive feline idiopathic cystitis.**

Feline idiopathic cystitis (FIC) is a common lower urinary tract disorder in cats, which often recurs. Published reports document increased urine fibronectin and thioredoxin concentrations in cats with FIC compared with healthy control cats. Therefore, these proteins might be of interest in the pathophysiology of FIC. The purpose of the present study was to evaluate variations in these urine proteins throughout the course of FIC by assessing their concentrations in urine specimens from cats with a history of obstructive FIC. Urine total protein (TP) was measured using the Bradford assay, while urine fibronectin and thioredoxin concentrations were determined by Western blot analysis. Urine TP was significantly higher in cats with obstructive FIC at presentation (day 0) than in healthy control cats ($P<0.01$). There were significant decreases in urine TP in cats with obstructive FIC after 3 months ($P<0.01$). Significantly higher urine fibronectin ($P<0.01$) and thioredoxin ($P<0.05$) concentrations were demonstrated in cats with FIC at day 0 compared to control cats, but there was no significant change over time ($P>0.05$). Increased concentrations of these proteins over time might reflect ongoing structural and pathological alterations to functional processes in the urinary bladders of cats with obstructive FIC.


**Flow cytometric immunophenotyping of feline bone marrow cells and haematopoietic progenitor cells using anti-human antibodies.**

There is a paucity of species-specific antibodies available for feline haematopoietic conditions. The purpose of this study was to broaden the panel of antibodies available for use in the immunophenotypic characterisation of feline hematopoietic cells by testing clones of anti-human monoclonal antibodies (mAbs) on normal, neoplastic and cultured feline haematopoietic progenitors to determine cross-reactivity to feline counterparts. In this study, 24 clones of anti-human mAbs were tested on normal or neoplastic feline bone marrow and peripheral blood cells. Six of these mAbs, including anti-cluster of differentiation (CD)61, anti-CD18, anti-CD14, anti-CD235a, anti-CD41 and anti-CD29, cross-reacted with normal feline bone marrow cells, whereas anti-CD33 and anti-CD117 cross-reacted with the blast cells in the bone marrow of two cats with myelodysplastic syndrome, and anti-CD71, anti-235a, anti-41 and anti-42 cross-reacted with immature erythroid cells in a cat with erythroleukaemia. In a feline immunodeficiency virus-positive cat, bone marrow cells were labelled with anti-CD33, anti-14 and anti-45. Anti-CD18, anti-CD14, anti-CD41 and anti-CD61 also reacted with the peripheral blood cells
of the healthy cats. The feline haematopoietic progenitors formed colonies in the methylcellulose-based semisolid medium with significant enrichment of colony-forming unit-granulocyte, monocyte and burst-forming unit-erythroid. A panel of six anti-feline mAbs (anti-CD21-like, anti-T lymphocytes, anti-CD172a, anti-granulocyte, anti-CD45-like and anti-CD18) and eight anti-human antibodies (anti-CD71, anti-CD33, anti-CD235a, anti-CD41, anti-CD61, anti-CD117, anti-CD38 and anti-CD34) were used for the immunophenotypic characterisation of the feline bone marrow progenitors. CD45, CD33, CD235a and CD18 were expressed by the feline haematopoietic progenitor cells, with the highest expression level for CD45.

First report of Dracunculus insignis in two naturally infected cats from the northeastern USA.
Dracunculiasis is rarely reported in cats, yet over the last few years we have identified two cats with filarioid-like spirurid infections. Case 1 was a 9-year-old cat with pituitary-dependent hyperadrenocorticism from New York state from which four adult dracunculoid nematodes were isolated from its torso. Based on morphometric characteristics and parasite geographic distribution, the specimens were identified as Dracunculus insignis females; at least one of the females was gravid, suggestive of patent infection. Species identification was confirmed through amplification and sequence analysis of nuclear and mitochondrial loci. Case 2 was a 14-year-old diabetic cat from Massachusetts. Formalin-fixed sections were obtained from a subcutaneous mass excised from the left foreleg. Histopathological examination revealed a large nematode with morphometrical characteristics of Dracunculus, surrounded by lymphocytes and sheets of eosinophils. These two cases appear to be the first published reports of dracunculiasis in domestic cats in the USA, and based on the findings from case 1, D insignis may be the species associated with both infections.

First case of peritoneal cystic echinococcosis in a domestic cat caused by Echinococcus granulosus sensu stricto (genotype 1) associated to feline immunodeficiency virus infection.
A new cystic echinococcosis case in a cat in Uruguay is reported herein. The cat was taken to a veterinary clinic in Rocha city, Uruguay due to dyspnea, constipation and abdominal enlargement. During surgery a large quantity of cysts was retrieved from the abdominal cavity. The cysts were morphologically studied and confirmed as E. granulosus sensu stricto (genotype 1) by molecular tools using cytochrome oxidase submit 1 and small subunit ribosomal RNA gene as target genes. Moreover, for the first time an associated feline immunodeficiency virus infection (FIV) was detected. FIV-induced immunosuppression could be a determining factor in the development of cystic echinococcosis in cats.

Feline trombiculosis: a retrospective study in 72 cats.
BACKGROUND: Trombiculosis is the infestation of a host by the larval form of mites belonging to the Trombiculidae family. Few data are available regarding this infestation in cats.
HYPOTHESIS/OBJECTIVES: The aim of this retrospective study was to report data, clinical signs, diagnostic and therapeutic features of feline trombiculosis. METHODS: Clinical records of cats
presented for dermatological examination or annual vaccination in Italy, from 2002 to 2012, were retrospectively searched using the key words trombiculosis, cat and Neotrombicula. RESULTS: Seventy-two indoor/outdoor domestic short-hair cats with infestation by Neotrombicula autumnalis were enrolled. Pruritus was reported by the owners in 43% of cases, while 57% of cats were asymptomatic. The most common clinical signs included sudden onset of pruritus and the appearance of orange-coloured granules on the skin. Mites were found incidentally in 12 cats. The larvae were localized in multiple sites in 68% of cases. The most frequently affected area was the ear (80.5% of cases). Mites were more often identified in autumn (41 cases). Eleven cats were diagnosed during winter, 13 in spring and seven in summer. CONCLUSIONS AND CLINICAL IMPORTANCE: This retrospective study suggests that feline trombiculosis is probably underestimated as a cause of pruritus and dermatological lesions. Epidemiological data regarding this infestation in cats are still lacking, and it will be interesting to perform a multicentre study to increase knowledge of this disease.


Feline thelaziosis caused by Thelazia callipaeda in Portugal.
Thelazia callipaeda (Spirurida, Thelaziidae) is a nematode that lives in the conjunctival sac of domestic and wild carnivores, rabbits and humans causing mild to severe symptoms (e.g., conjunctivitis, lacrimation, epiphora, blepharospasm, keratitis and even corneal ulceration) in infected animals. This report describes an autochthonous case of thelaziosis in a cat from the central region of Portugal, representing the most occidental record of thelaziosis in Europe. Adult nematodes recovered from alive animal were morphological identified as T. callipaeda. A portion of the mitochondrial cytochrome c oxidase subunit 1 gene (cox 1) from nematode specimens was amplified by PCR. Cox1 sequences of all specimens were identical to T. callipaeda haplotype 1. Additionally to these findings, a recent description of thelaziosis in the northern region of Portugal suggests that T. callipaeda has successully established in Portugal.


Feline serum amyloid A protein as an endogenous Toll-like receptor 4 agonist.
Serum amyloid A (SAA) is one of the major acute phase proteins and a biomarker of infection or inflammation in humans and cats. In humans, cytokine-like functions of SAA protein have been determined, and SAA is considered to be an important factor in immune responses. However, there are no reports about the functions of SAA protein in cats. In the present study, the functions of feline SAA protein on peripheral monocytes were investigated by using TNF-alpha production as an indicator. In feline peripheral blood monocytes, SAA protein stimulated the transcription of TNF-alpha within 2h and induced TNF-alpha secretion in time- and dose-dependent manners. The production of TNF-alpha by SAA stimulation in feline monocytes was found to be mediated by the activation of nuclear factor-kappa B (NF-kappaB). Moreover, SAA-stimulated TNF-alpha production was prevented by a Toll-like receptor 4 (TLR4) antagonist. On the basis of these results, feline SAA was demonstrated to be an endogenous agonist of TLR4 for the stimulation of TNF-alpha production and secretion by peripheral monocytes. These results suggest that feline SAA can play an important role in the regulation of inflammation and immune responses as it does in humans.

**Feline reference intervals for the Sysmex XT-2000iV and the ProCyte DX haematology analysers in EDTA and CTAD blood specimens.**

Laser-based haematology analysers are routinely used in veterinary clinical pathology laboratories, and are available to practitioners. However, feline haematological reference intervals (RIs) determined according to international recommendations, are, to our knowledge, not available. Furthermore, platelet count RI is difficult to establish in cats because of the frequent occurrence of platelet aggregation in blood specimens. The purpose of this study was to establish feline haematological RIs with the Sysmex XT-2000iV and ProCyte DX analysers, in ethylenediamine tetra-acetic acid (EDTA) and in citrate, theophylline, adenosine and dipyridamole (CTAD), which is a combination of anticoagulants limiting platelet aggregation. Blood specimens from 120 healthy cats were analysed in duplicate, and the degree of platelet aggregation was assessed on blood smears. After exclusion of inadequate specimens, 81 sets of results (from 44 males and 37 females, aged from 6 to 116 months) were available for the determination of RIs by the non-parametric method. The effects of the anticoagulant, analyser and aggregation score were assessed. When the aggregation effect was significant, the RIs were determined using the subgroup of blood specimens with no or little aggregation. The effects of sex, age and weight were also investigated, but were moderate. The different RIs obtained with the Sysmex XT-2000iV and ProCyte DX analysers, and the two anticoagulants, were very similar to previous RIs established in EDTA with the ADVIA 120, another laser-based analyser, except for the platelet count in CTAD specimens. Its lower reference limit was higher in CTAD vs EDTA specimens, which confirms the interest of this anticoagulant in cats.


**Feline non-flea induced hypersensitivity dermatitis: clinical features, diagnosis and treatment.**

PRACTICAL RELEVANCE: Hypersensitivity dermatitis (HD) is often suspected in cats and is mostly caused by insect bites, food or environmental allergens. Cats with non-flea induced HD are reported to present frequently with one or more of the following cutaneous reaction patterns: miliary dermatitis, eosinophilic dermatitis, self-induced symmetrical alopecia or head and neck excoriations/pruritus.

CLINICAL CHALLENGES: None of the above patterns are, however, pathognomonic for non-flea induced HD and the diagnosis of this condition is based on exclusion of diseases presenting similarly and an adequate response to treatment. Therapeutic approaches to affected cats include use of immunomodulatory drugs (ciclosporin, glucocorticoids, antihistamines), hypoallergenic diets and allergen-specific immunotherapy. EVIDENCE BASE: This review provides an update on the clinical signs, diagnosis and treatment of feline non-flea induced HD. It draws on the findings of a recent large-scale study that described the clinical signs of numerous cats with non-flea HD and has proposed criteria to facilitate the diagnosis of the condition.


**Feline lungworms: what a dilemma.**

Aelurostrongylus abstrusus is regarded as the major lungworm infecting Felis catus, although other, albeit poorly studied, nematodes have been described from the respiratory system of domestic cats. Recent records of these neglected parasites have renewed the attention of the scientific community, but their actual role in respiratory disease in cats is blurred. The epidemiology, pathogenic role, and diagnosis of Troglostrongylus spp., Oslerus rostratus, and Capillaria aerophila in domestic cats are far
from being clarified. Indeed, recent studies have provided novel information but have also given rise to relevant doubts. We discuss here the state of current knowledge regarding felid lungworms together with the dilemmas recently roused in the scientific literature.

**Feline exocrine pancreatic carcinoma: a retrospective study of 34 cases.**
Thirty-four cases were reviewed in this retrospective study for information on clinical presentation, prognostic indicators, survival time and response to various therapies. The most common presenting clinical signs were weight loss, decreased appetite, vomiting, palpable abdominal mass and diarrhoea. Metastatic disease was confirmed in 11 cats. The overall median survival was 97 days. The median survival times for patients who received chemotherapy or had their masses surgically removed was 165 days. Those patients who had an abdominal effusion present at the time of diagnosis survived a median of 30 days. Cats that received non-steroidal anti-inflammatory drug therapy had a median survival of 26 days. This study confirms that exocrine pancreatic carcinoma in cats is an aggressive tumour with a high metastatic rate and poor prognosis, although three patients survived over 1 year. Fifteen percent of the patients were diabetic, which raises the question as to what the link between diabetes and pancreatic cancer in people and cats may be.

**Feline endometrial adenocarcinoma in females <1 year old: a description of four cases.**
Uterine neoplasms of epithelial origin are rare in cats and most often are described in older females. Yet, in less than 2 years, four ovariohysterectomy specimens were submitted from different practices to the Laboratory of Histology and Anatomical Pathology, at UTAD (Vila Real, Portugal), that emitted a diagnosis of feline endometrial adenocarcinoma. Untypically, all the females were aged <1 year old at the surgery. Access to the clinical files was requested to document the clinical features of the four cases, including any complementary data available, to construct the present case reports. The clinical situation developed with discrete signs, but vulvar discharge was present in three cases, ranging from bloody to brownish or colourless, and from purulent to mucous. The females were in dioestrus, although the oestrus remained unperceived in most cases. In this study, the four clinical situations are described and discussed on the basis of available literature, highlighting the aspects that may impair an early diagnosis and that may favour the progression of the disease and also that age should not be an excluding criteria when analysing the differential diagnosis list.

**Feline drug metabolism and disposition: pharmacokinetic evidence for species differences and molecular mechanisms.**
Although it is widely appreciated that cats respond differently to certain drugs compared with other companion animal species, the causes of these differences are poorly understood. This article evaluates published evidence for altered drug effects in cats, focusing on pharmacokinetic differences between cats, dogs, and humans, and the molecular mechanisms underlying these differences. More work is needed to better understand drug metabolism and disposition differences in cats, thereby enabling more rational prescribing of existing medications, and the development of safer drugs for this species.
**Feline cutaneous nerve sheath tumours: histological features and immunohistochemical evaluations.**  
Feline cutaneous nerve sheath tumours (CNSTs) are uncommonly reported in the skin, since they are underestimated relative to the more common spindle cell tumours of soft tissue. In this study, 26 nerve sheath tumours selected from 337 skin neoplasms of cats were examined. Histologically, they were classified into malignant (MPNSTs) and benign tumours (BPNSTs) based on degree of cellular atypia and polymorphism as well as mitotic rate and diffuse necrosis. CPNSTs were typically characterised by Antoni A pattern, in some cases associated with Antoni B pattern. In the malignant peripheral nerve sheath tumours (MPNSTs) the polymorphism was marked, while it was mild to moderate in the benign forms (BPNSTs). In the MPNSTs the mitotic activity was generally higher than in the BPNSTs. In five cases, including three MPNSTs and two BPNSTs, there were multinucleated giant cells. Necrotic foci occurred in a BPNST and in two MPNSTs, while osseous/chondroid metaplasia was found in two cases. Immunohistochemically, all the tumours showed a marked diffuse vimentin expression. S-100 protein was expressed in 17 cases, including 81.8% of BPNSTs and 57.14% of MPNSTs. Twenty-five tumours expressed NSE and twenty-four cases showed immunoreaction for laminin. Thirteen tumours were positive for GFAP, while five tumours were positive for SMA. PGP 9.5 expression was detected in all cases, except for two MPNSTs. NGFR was expressed in eleven cases, including four MPNSTs and seven BPNSTs. Ki67 was expressed in twenty tumours without any relationship with morphologic malignancy of the neoplasm. In this case series we confirmed neoplastic spindleoid cells with wavy cytoplasm arranged in compact areas, with occasional nuclear palisading or whirls, and interchanged with loosely arranged areas, as the morphological features supporting a diagnosis of CPNST. A constant concurrent expression of vimentin, NSE, and laminin might confirm the diagnosis of PNST in the absence of clear S-100 protein positivity, especially in the malignant forms. In this study, conclusive data were not obtained on the diagnostic relevance of NGFR- and PGP 9.5-expression in feline CPNSTs.

**Feline cutaneous mycobacteriosis: a review of clinical, pathological and molecular characterization of one case of Mycobacterium microti skin infection and nine cases of feline leprosy syndrome from France and New Caledonia.**  
BACKGROUND: Ten cats with skin lesions characteristic of cutaneous mycobacteriosis were included in this retrospective clinical, pathological and molecular study. HYPOTHESIS/OBJECTIVES: The aim of this study was to identify the causative agent and to compare the clinicopathological features of these cases with those of previous studies. METHODS: Cats were from the south east of France (eight cases), central France (one case) and New Caledonia (South Pacific; one case). Criteria for inclusion were histological evidence of granulomatous dermatitis and/or panniculitis, with acid-fast bacilli within macrophages or extracellularly in regions of tissue necrosis. PCR targeting the 16S-23S internal transcribed spacer region and sequence analysis were performed using DNA extracted from formalin-fixed, paraffin-embedded tissues from all cases. RESULTS: All cats were presented with a history of alopecic to ulcerated nodules. Most cases had limited disease, with one to few nodules, while others (three cats) showed a more aggressive clinical course. Lesions from eight cats yielded a sequence consistent with Mycobacterium lepraemurium, while Mycobacterium microti was identified postmortem from the cutaneous lesion in the cat originating from central France and euthanized for its debilitating condition. No PCR product could be amplified from the remaining specimen.
CONCLUSIONS AND CLINICAL IMPORTANCE: Based on this geographically restricted case series, feline leprosy in southern France is most likely to be caused by M. lepraemurium and presents as a generally self-limiting disease. Molecular testing is essential to assess zoonotic potential, because M. microti-induced cutaneous mycobacteriosis can resemble feline leprosy syndrome.


Feline CKD: Pathophysiology and risk factors--what do we know?
PRACTICAL RELEVANCE: Chronic kidney disease (CKD) is one of the most frequently encountered disorders in cats, having increased in prevalence in recent decades. Although the underlying cause is rarely identified, the common final outcome of feline CKD is tubulointerstitial fibrosis. Knowledge of CKD pathophysiology is necessary for optimal individualised patient management, especially with regard to diagnosis and treatment of extrarenal complications. PATIENT GROUP: CKD is most common in senior and geriatric cats, but should be considered in any feline patient with ureterolithiasis, hyperthyroidism, retrovirus infection, systemic hypertension, cardiovascular disease or urinary tract infection. EVIDENCE BASE: Most of our knowledge of the pathogenesis of CKD is extrapolated from human nephrology and experimental animal studies. There is, therefore, a need for further studies in cats. The prevalence of clinical signs in feline CKD is well documented. Several concurrent diseases associated with CKD have also been reported in cats, especially in the geriatric population, but there is no or only limited published evidence demonstrating a cause-and-effect relationship between most of these conditions and CKD. Studies performed over the past 15 years have nevertheless allowed identification of major risk factors (proteinuria, plasma phosphate and plasma creatinine) influencing the progression of feline CKD. CLINICAL CHALLENGES: Clinical signs occur in the late stages of renal disease, so populations at higher risk of CKD should be screened routinely. CKD-associated complications (systemic hypertension, secondary renal hyperparathyroidism, hypokalaemia, anaemia, metabolic acidosis) must not be overlooked as they may affect the progression of disease. Disease progression is itself unpredictable and renal function may remain stable for extended periods. Most cats with early CKD do not progress to end-stage CKD before they die. AUDIENCE: General practitioners play a major role in screening feline patients at risk of development or progression of CKD.


Feline CKD: New horizons - where do we go from here?
PRACTICAL RELEVANCE: Chronic kidney disease (CKD) is common in humans as well as in cats, and is a significant human health problem. In feline medicine, despite recent research and improvements in our understanding of the condition, management remains limited by late diagnosis and an inadequate ability to prevent progression of disease. Investigation of future treatments that both delay the progression of CKD and manage clinical signs, and that are also easy and cost effective to administer, is desirable. To this end, we may learn from our colleagues in the medical profession. AUDIENCE: CKD is commonly encountered in general practice and so all practitioners dealing with cats will benefit from understanding future treatment possibilities and interventions in the management of CKD. EVIDENCE BASE: Large-scale medical studies have been performed to provide an evidence base for treatment decisions in human CKD. Several studies in cats have looked at various aspects of treatment and prognosis, but large-scale studies are needed to assess the benefits of treatments such as angiotensin-converting enzyme inhibitors and angiotensin receptor blockers. CLINICAL CHALLENGES: Providing treatment that is effective, easy to administer and not cost-prohibitive is the challenge currently faced by clinicians in the management of feline CKD.
Feline CKD: Diagnosis, staging and screening - what is recommended?  
PRACTICAL RELEVANCE: Feline chronic kidney disease (CKD) is frequently encountered by veterinarians. Timely diagnosis and staging may facilitate the initiation of adequate therapy and improve the prognosis for patients. CLINICAL CHALLENGES: Feline CKD is diagnosed based on the presence of compatible clinical signs and renal azotaemia, which implies that urinalysis (particularly urine specific gravity) is mandatory to confirm the diagnosis. Although the diagnosis of advanced feline CKD and associated complications is usually straightforward, based on complete blood and urine examination, all routine blood and urine tests have their limitations in detecting early CKD. Therefore, diagnosing early or non-azotaemic CKD is much more challenging. Although determination of glomerular filtration rate (GFR) would be ideal to identify early kidney dysfunction, practical limitations hamper its routine use in clinical practice. PATIENT GROUP: CKD is typically a disease of aged cats, but may affect cats of all ages. Conclusive breed and sex predispositions for feline CKD are not reported. AUDIENCE: This review is directed at practising veterinarians and provides an overview of the required diagnostic tests, the classification system established by the International Renal Interest Society, and the importance of and possible techniques for early detection of CKD. EVIDENCE BASE: Staging of cats with CKD is essential as it directs management and provides a prognostic guide. Given that diagnosis at early disease stages is associated with more prolonged survival times, simple, inexpensive and accurate methods for early CKD diagnosis are needed. Techniques currently under investigation include limited sampling strategies to estimate GFR, clearance marker cut-off concentrations to identify cats with low GFR, new indirect GFR markers and urinary biomarkers.

Feline CKD: Current therapies - what is achievable?  
PRACTICAL RELEVANCE: Treatment of feline chronic kidney disease (CKD) tends to focus on minimising the adverse effects of reduced renal function, rather than addressing an underlying cause. Despite this, and the progressive nature of CKD, treatment can improve quality of life and enable many cats to have long survival times. EVIDENCE BASE: Strong evidence supports the provision of renal diets, which are protein and phosphorus restricted; compliance is improved by gradual dietary transition. Additional phosphorus restriction is achieved by the use of phosphate binding agents, although it is unknown if these yield similar survival benefits to those provided by renal diets. Interventions to control hypokalaemia and hypertension in affected cats are important to prevent serious complications. Administration of benazepril to cats with proteinuric kidney disease has been shown to significantly improve their appetite but not their survival. As CKD progresses, many cats will benefit from treatment to control clinical signs of uraemic gastroenteritis and anaemia.

Fecal estradiol-17beta and testosterone in prepubertal domestic cats.  
The aim of this article was to describe the time course of prepubertal sexual steroids in domestic cats. Fourteen newborn kittens were followed up until puberty (physical, behavioral, and hormonal changes). Fecal testosterone [T; males] and E estradiol 17-beta [E2; females] concentrations were analyzed by repeated measures ANOVA and two consecutive time windows (TWs) were used to compare changes in both male (postnatal weeks 1-4 vs. 5-14) and females (postnatal weeks 1-5 vs. 6-
Puberty was achieved 14.3 +/- 0.3 and 13.3 +/- 0.4 weeks after birth in male and female cats, respectively. In both genders, during TW-1 fecal steroids concentrations were similar (males) or even higher (females) to that previously described for mature cats. Fecal T (P < 0.01) and E2 (P < 0.01) varied throughout the weeks. Differences were found when hormonal concentrations of TW-1 were compared with those of TW-2 both for male (61.4 +/- 7.9 vs. 16.9 +/- 2.2 ng/g; P < 0.01) and female (78.2 +/- 12.5 vs. 11.2 +/- 4.0 ng/g; P < 0.01) cats. It is concluded that in domestic cats there is a sexual steroid surge during the first 4 and 5 postnatal weeks in male and female animals, respectively.


Failure of efficacy and adverse events associated with dose-intense diminazene diaceturate treatment of chronic Cytauxzoon felis infection in five cats.

Cytauxzoon felis is a hemoprotozoan parasite of cats. While many infected cats die of acute illness, some enter a chronic carrier state. To date, no treatment has been documented to clear the chronic carrier state, leaving recovered cats to act as a potential indirect source of infection via a tick vector. Diminazene diaceturate is an anti-protozoal therapy that has been suggested for use in the treatment of acute cytauxzoonosis, but which failed to clear the carrier state at the dose used in acute illness. We hypothesized that a dose-intensified regimen of diminazene could reduce or eliminate parasitemia from five domestic cats naturally infected with C felis. Cats were administered 4 mg/kg of diminazene diaceturate intramuscularly for 5 consecutive days. Clearance of the organism was assessed via semi-quantitative polymerase chain reaction and light microscopy 1, 3, 6 and 10 weeks after starting treatment. Additionally, cats were monitored for adverse drug reactions by daily observation and examination. Complete blood count, biochemical profile and urinalysis were performed at 1, 3 and 10 weeks. Adverse events were common and included profuse salivation and nausea at the time of injection, monoparesis in the injected leg, proteinuria and potential hepatotoxicity. Severity of parasitemia was not reduced. Diminazene diaceturate cannot be recommended for elimination of the carrier state of C felis infection.


Extemporaneous compounding in veterinary practice: A New Zealand perspective.

AIMS: The aims of this study were to explore the extent of extemporaneous compounding in veterinary centres throughout New Zealand and to determine whether pharmacists could collaborate with veterinarians to improve this service in New Zealand. METHODS: Questionnaires were sent to 200 randomly selected veterinarians in New Zealand. Semi-structured interviews were also conducted with selected participants from four animal facilities (zoos, research facilities and animal shelters) and two compounding pharmacies. RESULTS: Of the 200 veterinarian questionnaire recipients, 99 responded. Ten replies were withdrawn from the study giving a response rate of 44.5%. Of these 89, 33 (37%) compounded in their practice. Of the 33 compounding professionals, 3 (9%) compounded daily for animals under their care; 11 (34%) weekly, 18 (54%) monthly and 1 (3%) compounded yearly. Compounding was done by 29/33 (88%) veterinarians, 16/33 (48%) veterinary nurses or 6/33 (18%) others. It was carried out due to the unavailability of commercial products, or the need for dose adjustment to ease administration or improve compliance. The animals most commonly requiring veterinary compounding were dogs (21/33; 64%), cats (19/33; 58%) or cattle (15/33; 46%). Products which were commonly compounded included cyclosporin eye drops, methimazole gels and potassium bromide solutions. Issues commonly faced when compounding included unavailability of dosage forms...
(18/33; 55%) or appropriate ingredients (14/33; 42%), stability (12/33; 36%), time constraints (10/33; 30%) or unavailability of equipment (9/33; 27%). Reasons given for not compounding included medicines being commercially available (38/56; 68%), pharmacy compounding for those particular practices (24/56; 43%), lack of training (21/56; 38%), ingredients (16/56; 29%) or equipment (15/56; 11%). All participants who worked with a pharmacist (11/33; 33%) described this relationship as beneficial and indicated they would continue to do so in the future. CONCLUSIONS: Veterinary extemporaneous compounding exists in New Zealand. As pharmacists have extensive knowledge in formulating medications and compounding they could be of greater value to veterinarians and their patients. Educating both professions on the opportunities available to them from this collaboration could be an important step forward. CLINICAL RELEVANCE: This study provides new information regarding extemporaneous compounding for veterinary patients in New Zealand.

Evaluation of the efficacy of selamectin spot-on in cats infested with Aelurostrongylus abstrusus (Strongylida, Filarioididae) in a Central Italy cat shelter.
In recent years Aelurostrongylus abstrusus has often been reported in Italy. This lungworm is very common in cat colonies due to its route of transmission. Deciding a therapeutic approach can be difficult in such colonies, because there is no certainty whether oral medicines administered with food, or with what dose, will be taken. In this field study, stool samples were taken from 42 cats and analysed for A. abstrusus L1 larvae with Baermann technique. Ten cats testing positive were treated with a spot-on formulation of selamectin 45 mg. Clinical examinations and laboratory tests, repeated four times in two months, demonstrated the success of the treatment in 9 of the 10 cats. Improvements in respiratory signs and general clinical condition were reported after treatment.

Evaluation of routine hematology profile results and fructosamine, thyroxine, insulin, and proinsulin concentrations in lean, overweight, obese, and diabetic cats.
OBJECTIVE: To compare results of hematologic testing in nondiabetic and diabetic cats to identify possible indicators of alterations in long-term glucose control. DESIGN: Cross-sectional study. ANIMALS: 117 client-owned cats (76 nondiabetic cats [25 with normal body condition, 27 overweight, and 24 obese] and 41 naive [n = 21] and treated [20] diabetic cats). PROCEDURES: Signalment and medical history, including data on feeding practices, were collected. A body condition score was assigned, and feline body mass index was calculated. Complete blood counts and serum biochemical analyses, including determination of fructosamine, thyroxine, insulin, and proinsulin concentrations, were performed. Urine samples were obtained and analyzed. RESULTS: Glucose and fructosamine concentrations were significantly higher in the naive and treated diabetic cats than in the nondiabetic cats. Insulin and proinsulin concentrations were highest in the obese cats but had great individual variation. Few other variables were significantly different among cat groups. Most cats, even when obese or diabetic, had unlimited access to food. CONCLUSIONS AND CLINICAL RELEVANCE: Results suggested that cats at risk of developing diabetes (ie, overweight and obese cats) could not be distinguished from cats with a normal body condition on the basis of results of isolated hematologic testing. A longitudinal study is indicated to follow nondiabetic cats over a period of several years to identify those that eventually develop diabetes. Findings also suggested that dietary education of cat owners might be inadequate.

**Evaluation of risk factors associated with recurrent obstruction in cats treated medically for urethral obstruction.**

**OBJECTIVE:** To determine risk factors for short-term recurrent urethral obstruction in cats after treatment by means of urinary catheterization and hospitalization.

**DESIGN:** Prospective case series.

**ANIMALS:** 83 client-owned cats.

**PROCEDURES:** Physical examination findings, laboratory abnormalities, treatment decisions, and environmental changes were evaluated as risk factors for recurrent urethral obstruction in the 30 days following hospital discharge.

**RESULTS:** Of the 68 cats with completed follow-up surveys, 10 had an episode of recurrent urethral obstruction. Older cats were significantly more likely to have recurrent urethral obstruction. No specific laboratory abnormalities were associated with the risk of recurrent urethral obstruction. Longer duration of catheterization was significantly associated with a decreased risk of recurrent urethral obstruction. Duration of hospitalization and volume of IV fluids delivered were not significantly associated with recurrent urethral obstruction. Increasing water availability after discharge was associated with a decreased risk of recurrent urethral obstruction.

**CONCLUSIONS AND CLINICAL RELEVANCE:** Results of this study suggested that longer duration of catheterization may be associated with a lower probability of short-term recurrent urethral obstruction in male cats. Older cats were at higher risk for recurrent obstruction. Owners should be encouraged to increase water availability after discharge in cats treated for urethral obstruction to decrease the likelihood of recurrence.


**Evaluation of hair loss in cats occurring after treatment with a topical flea control product.**

**BACKGROUND:** A formulation containing 39.6% spinetoram resulted in a higher than anticipated number of reports of alopecia at the site of application in the first months following commercial product launch.

**HYPOTHESIS/OBJECTIVES:** To determine the cause of the alopecia using histopathology, including assessment for inflammation, follicular findings of physical trauma (plucking/pulling behaviour) and changes in follicular cycling.

**ANIMALS:** Twenty-four flea-free, male and female adult domestic short hair cats within a private research colony.

**METHODS:** Cats were treated with a single application of 39.6% spinetoram on day 0; personnel were not blinded. Observations of the skin and hair coat began immediately and were repeated at 30 min and 1, 2, 3, 4, 6, 8 and 12 h post-application and then on subsequent days at the same time as initial dosing and at 2, 4, 6, 8 and 12 h after that time, until day 5. If hair thinning or loss was observed, a skin biopsy sample was collected. Two cats not exhibiting abnormalities were biopsied on day 6.

**RESULTS:** Thirty-eight per cent of cats (nine of 24) developed hair thinning and alopecia of sufficient severity within 78 h post-application of the product to warrant skin biopsy. Abnormalities in the skin were limited to the application site and were consistent with physical trauma (pulling or plucking) to the hair.

**CONCLUSIONS AND CLINICAL IMPORTANCE:** Microscopic changes in the hair follicles of affected cats were consistent with self-induced trauma or barbering behaviour. All changes were reversible and paralleled findings associated with well-established, topical flea control products.


**Evaluation of crural release and ischial osteotomy for relief of tension in the repair of large
segmental urethral defects in male cats.

OBJECTIVE: To examine if the tension at the site of a urethral anastomosis can be relieved by performing either a crural release technique or an ischial osteotomy technique. STUDY DESIGN: Cadaveric study and 2 case reports. ANIMALS: Adult male cat cadavers (n = 18). METHODS: Cats were divided into 2 groups; crural release (n = 9) and ischial osteotomy (n = 9). In each group, 20%, 25%, and 30% of the pelvic urethra was excised in 3 cats. The length of the urethral defect was measured after excision of the urethral segment, and after approximation, before and subsequent to the tension relieving technique performed. Two clinical cases are described. RESULTS: Both crural release and ischial osteotomy were effective in relieving the tension encountered at the urethral anastomosis after removal of 20% of the urethral length. In the ischial osteotomy group, apposition without tension after removing up to 30% of the intrapelvic urethral length was easily achieved. A similar technique was successfully used in 2 clinical cases. CONCLUSION: Crural release and ischial osteotomy techniques allow approximation and tension free anastomosis of large segmental defects of the pelvic urethra in cats.


BACKGROUND: Measurements of immunoglobulins (Igs) in companion animals can be useful to detect deficiencies of the humoral immune system, that can be associated with opportunistic or chronic infections, or other immune-mediated disorders including B-cell neoplasms. OBJECTIVE: The purpose of this study was to evaluate commercially available automated immunoturbidimetric assays designed for human IgG, M, and A measurements in canine and feline serum using species-specific calibrators. METHODS: Canine and feline serum samples with different IgG, M, and A concentrations were used for the analytical validation of the assays. Intra- and inter-assay precision, linearity under dilution, spiking recovery, and limit of detection were determined. In addition, effects of lipemia, hemolysis, and bilirubinemia were evaluated. Finally, Ig concentrations were determined in small groups of diseased dogs and cats, and compared with healthy groups. RESULTS: Spiking recovery and linearity under dilution tests showed that the assays measured Igs in canine and feline serum samples precisely and accurately. Intra- and inter-assay imprecisions were lower than 15% in all cases. Significantly higher IgG, IgM, and IgA levels were observed in dogs with leishmaniasis, while dogs with pyometra showed a statistically significant increase in IgM and IgA concentrations in comparison with healthy dogs. Significantly higher IgG and IgM levels were observed in FIV-infected cats compared with healthy ones. CONCLUSIONS: The automated human Ig assays showed adequate precision and accuracy with serum samples from dogs and cats. Also, they were able to discriminate different concentrations of Igs in healthy and diseased animals.


Evaluation of accelerated collagen cross-linking for the treatment of melting keratitis in ten cats.

OBJECTIVES: Melting keratitis is a serious condition presenting a high risk of permanent blindness and is caused by infectious or noninfectious factors. In humans, the clinical efficacy of collagen cross-linking (CXL) has been described in the treatment of refractory infectious keratitis by arresting keratomalacia. The aim of this study was to evaluate the efficacy of accelerated CXL for the treatment of melting keratitis in cats. ANIMALS STUDIED: Ten cats were treated for unilateral melting keratitis
by accelerated CXL. PROCEDURE: Corneas were irradiated by UVA (370 nm) at 30 mW/cm(2) irradiance for 3 min after soaking with 0.1% riboflavin in 20% dextran for 30 min (D1). Follow-up was conducted 3, 7, 14, and 30 days after treatment. RESULTS: Pain improvement was noted for all cases at D4 examination. Epithelial healing was observed at D8 for 9 of 10 cases and at D15 for 1 of 10 cases. Resolution of cellular infiltration was observed for all cases at D8 examination. The corneal vascularization was reduced for 9 of 10 cats by D31. At D31, all cases presented a variable degree of corneal fibrosis, but all eyes had visual function. No recurrent infection was observed. CONCLUSION: Accelerated CXL appears to be a valuable option for the treatment of melting keratitis in cats. All the cases have reached a satisfactory outcome despite the individual differences in the conditions prior to the CXL treatment and the variable presence of infectious agents.


Objective-To evaluate angiotensin I and angiotensin II rapid pressor response tests in healthy cats. Animals-6 purpose-bred sexually intact male cats. Procedures-Telemetric blood pressure (BP) implants were placed in all cats. After 2 weeks, cats were anesthetized for challenge with exogenous angiotensin I or angiotensin II. Continuous direct arterial BP was recorded during and immediately after IV administration of boluses of angiotensin I or angiotensin II at increasing doses. Blood pressure responses were evaluated for change in systolic BP (SBP), change in diastolic BP (DBP), and rate of increase of SBP by 4 observers. Results-Following IV angiotensin I and angiotensin II administration, transient, dose-dependent increases in BP (mean +/- SEM change in SBP, 25.7 +/- 5.2 and 45.0 +/- 9.1; change in DBP, 23.4 +/- 4.7 mm Hg and 36.4 +/- 7.8 mm Hg; for 100 ng of angiotensin I/kg and angiotensin II/kg, respectively) and rate of increase of SBP were detected. At angiotensin I and II doses < 2.0 ng/kg, minimal responses were detected, with greater responses at doses ranging from 20 to 1,000 ng/kg. A significant effect of observer was not found. No adverse effects were observed. Conclusions and Clinical Relevance-The rapid pressor response test elicited dose-dependent, transient increases in SBP and DBP. The test has potential as a means of objectively evaluating the efficacy of various modifiers of the renin-angiotensin-aldosterone system in cats. Ranges of response values are provided for reference in future studies.


BACKGROUND: Cardiac troponins are established as the gold standard biomarkers for acute cardiac injury. As even small elevations of cardiac troponins have prognostic relevance in people, it is important to investigate the performance of sensitive assays for use in veterinary medicine. OBJECTIVES: The aim of this study was to evaluate analytical and overlap performance of a high-sensitivity cardiac troponin I (cTnI) assay, the ADVIA Centaur CP TnI-Ultra assay, in dogs and cats. METHODS: Serum samples from dogs and cats with cardiac disease or arrhythmias, along with samples of purified canine free cTnI and complexed cTnI, T, and C (cTnI-T-C) were used in the assay validation study. Intra- and inter-assay variation, linearity under dilution, spike-and-recovery analysis, and detection limit were investigated to assess analytical performance. Overlap performance was evaluated based on the ability of the assay to discriminate between healthy animals and animals with cardiac disease or arrhythmias. RESULTS: Intra-assay variation of cTnI in canine and feline serum
ranged from 3.9 to 6.4% and from 4.0 to 4.8%, respectively. Inter-assay variation ranged from 2.7 to 4.7% and from 4.0 to 7.8%, respectively. The assay demonstrated acceptable linearity under dilution within a clinically relevant range of cTnI concentrations. Spike-and-recovery analysis showed excessive recovery in the range 150.7%-242.0% for free cTnI and 121.1%-196.3% for complexed cTnI-T-C, partly due to a matrix effect. Overlap performance was acceptable as animals with cardiac disease or arrhythmias (n = 45 dogs, n = 53 cats) had significantly higher cTnI concentrations than healthy controls (P <.0001). CONCLUSIONS: The results confirm the ADVIA Centaur CP TnI-Ultra assay as a valuable tool for assessing cTnI and thus myocardial injury in dogs and cats.


BACKGROUND: Bacterial infection of the urinary tract is a common disorder in dogs and cats. Although microscopic examination of urine sediment is routinely used to screen for infection, this test can lack sensitivity or require expertise. A reliable in-clinic screening test would be a useful adjunct for the identification of dogs and cats with bacterial urinary tract infection (UTI). HYPOTHESIS: That a catalase-based urine test (Accutest Uriscreen) is a more sensitive screening test for UTI in dogs and cats than urine microscopic sediment examination. ANIMALS: One hundred and sixty client-owned dogs and cats. METHODS: Surplus urine from animals presented to a veterinary teaching hospital was used in this prospective observational study. A routine urinalysis, aerobic bacterial culture, and the Uriscreen test were performed on cystocentesis samples. Sensitivity and specificity with 95% confidence intervals and positive and negative likelihood ratios were calculated for Uriscreen and microscopic sediment examination using culture results as the gold standard. RESULTS: Bacterial culture was positive in 27/165 (16.4%) samples. The sensitivity, specificity, and positive and negative likelihood ratios for the Uriscreen were 89%, 71%, 3.0, and 0.15, respectively. Sensitivity, specificity, and positive and negative likelihood ratios for urine sediment microscopic examination were 78%, 90%, 7.8, and 0.24, respectively. CONCLUSIONS AND CLINICAL IMPORTANCE: The Uriscreen is a more sensitive screening test for UTI in dogs and cats than sediment examination; however, the urine sediment examination was more specific. A negative Uriscreen result helps exclude UTI; however, urine bacterial culture is still necessary to exclude or confirm UTI in all cases.


The aim of this study was to evaluate the efficacy and safety of electrochemotherapy with bleomycin for treatment of squamous cell carcinoma (SCC) in cats. Between March 2008 and October 2011, 11 cats with 17 superficial SCC nodules in different clinical stages (ranging from Tis to T4), located on nasal planum (6/11), pinnae (3/11) and both locations (2/11), were included in a prospective non-randomised study. Sixteen of 17 SCC nodules were treated with electrochemotherapy (ECT) (15/16 with single session and in one case with two sessions); one nodule was surgically removed. Altogether, complete response (CR) was achieved for 81.8% (9/11) cats and 87.5% (14/16) nodules, lasting from 2 months up to longer than 3 years. Only 2/9 cats in which CR was initially observed, had recurrence 2 and 8 months after the ECT procedure. In the remaining two cats with highly infiltrative spread into adjacent tissues, progression of the disease was observed, despite ECT, and both were euthanased 4 and 5 months after the procedure. ECT in cats was well tolerated and no evident local or systemic side
effects were observed. The results of this study suggest that ECT is a highly effective and safe method of local tumour control of feline cutaneous SCCs. It should be considered as an alternative treatment option, especially when other treatment approaches are not acceptable by the owners, especially owing to their invasiveness, mutilation or high cost.


**Ejaculation training, seminal alkaline phosphatase and semen preservation through cooling in a milk-based extender in domestic cats.**

The purpose of this report is to describe (1) the training of domestic cats in ejaculation into an artificial vagina (AV), (2) alkaline phosphatase (AP) concentrations in whole ejaculates, and (3) the in vitro effect of a skimmed-milk plus egg yolk (SM-Y) extender on feline spermatozoa incubated at 4°C. Five post-pubertal cats were trained to ejaculate into an AV three times a week for 20 mins in the presence of a teaser queen. Fifty AV-obtained ejaculates were macro- and microscopically assessed, and the AP therein measured by an optimized colorimetry. Eighty AV-obtained ejaculates were pooled, diluted in SM-Y extender [80% (v/v) skimmed milk, 20% (v/v) egg yolk, and antibiotics], stored at 4 degrees C and evaluated daily for 6 days. All the animals could be trained to ejaculate, although the interval up to the first AV ejaculation varied from 1.5 to 5.5 months (mean 3.9 months). The final performance at collection ranged from excellent to poor and was inversely related to the training period required in all cases. The mean AP concentration in whole ejaculates was 20,645.6 +/- 4405U/l, which was not correlated with the concentration of spermatozoa. Most seminal parameters [(%); total (77 +/- 2.3) and progressive (62.7 +/- 3.4) motility, live sperm (91.8 +/- 1.2), intact plasmalemma (83.5 +/- 2.6), normal acrosomes (83.5 +/- 2.6), pH (6.6 +/- 0.0) and osmolarity (mOsm/l; 321 +/- 5.2)], though decreasing during storage in the cold, remained within values compatible with in vivo fertilization for 2 days.


**Efficacy of two commercially available, low-magnesium, urine-acidifying dry foods for the dissolution of struvite uroliths in cats.**

OBJECTIVE: To compare the efficacy and safety of using 2 commercially available, low-magnesium, urine-acidifying dry foods to dissolve sterile struvite uroliths in cats. DESIGN: Prospective, multicenter, randomized clinical trial. SAMPLE: 37 cats with presumed struvite uroliths. PROCEDURES: Cats were randomly assigned to be fed 1 of 2 low-magnesium, urine-acidifying dry foods (food A or B). For each cat, physical examination, urinalysis, and abdominal radiography were performed weekly to assess treatment response. RESULTS: 32 cats had complete urolith dissolution. Mean +/- SD times for a 50% reduction in urolith size (0.69 +/- 0.1 weeks) and complete urolith dissolution (13.0 +/- 2.6 days) were significantly shorter for cats fed food A, compared with those (1.75 +/- 0.27 weeks and 27.0 +/- 2.6 days, respectively) for cats fed food B. At study termination, mean +/- SD urine pH (6.083 +/- 0.105) for cats fed food A was lower than that (6.431 +/- 0.109) for cats fed food B. In 5 cats, uroliths did not dissolve and were subsequently determined to be composed of 100% ammonium urate (n = 4) or 100% calcium oxalate (1). Adverse events associated with diet were not observed in any of the cats. CONCLUSIONS AND CLINICAL RELEVANCE: Results indicated that dietary dissolution is safe and effective for eradication of sterile struvite uroliths in cats. Cats fed food A had faster urolith dissolution than did cats fed food B. Lack of a reduction in urolith size at 2 weeks after diet initiation was indicative of misdiagnosis or noncompliance.
Effects of potassium chloride and potassium bicarbonate in the diet on urinary pH and mineral excretion of adult cats.

Low dietary K levels have been associated with increasing renal Ca excretion in humans, indicating a higher risk of calcium oxalate (CaOx) urolith formation. Therefore, the present study aimed to investigate whether dietary K also affects the urine composition of cats. A total of eight adult cats were fed diets containing 0.31 % native K and 0.50, 0.75 and 1.00 % K from KCl or KHCO3 and were evaluated for the effects of dietary K. High dietary K levels were found to elevate urinary K concentrations (P< 0.001). Renal Ca excretion was higher in cats fed the KCl diets than in those fed the KHCO3 diets (P= 0.026), while urinary oxalate concentrations were generally lower in cats fed the KCl diets and only dependent on dietary K levels in cats fed the KHCO3 diets (P< 0.05). Fasting urine pH increased with higher dietary K levels (P= 0.022), reaching values of 6.38 (1.00 % KCl) and 7.65 (1.00 % KHCO3). K retention was markedly negative after feeding the cats with the basal diet (- 197 mg/d) and the 0.50 % KCl diet (- 131 mg/d), while the cats tended to maintain their balance on being fed the highest-KCl diet (- 23.3 mg/d). In contrast, K from KHCO3 was more efficiently retained (P= 0.018), with K retention being between - 82.5 and 52.5 mg/d. In conclusion, the dietary inclusion of KHCO3 instead of KCl as K source could be beneficial for the prevention of CaOx urolith formation in cats, since there is an association between a lower renal Ca excretion and a generally higher urine pH. The utilisation of K is distinctly influenced by the K salt, which may be especially practically relevant when using diets with low K levels.


OBJECTIVE: To evaluate the effect of pneumoperitoneum on cardiorespiratory variables and working space during experimental induction of 3 intra-abdominal pressures (IAPs) in cats. ANIMALS: 6 healthy young adult neutered male domestic shorthair cats. PROCEDURES: All cats were anesthetized through use of a standardized protocol. A catheter was placed in the right femoral artery for blood pressure and blood gas monitoring. A thermodilution catheter was placed in the right jugular vein via fluoroscopic guidance. Cardiopulmonary variables were measured before (baseline) and 2 and 30 minutes after initiation of pneumoperitoneum at IAPs of 4, 8, and 15 mm Hg; these were created through the use of a mechanical insufflator. At each IAP, abdominal dimensions (height, width, and circumference) were measured at a standardized location. RESULTS: At 4 mm Hg and 8 mm Hg IAP, no clinically important changes were identified in cardiorespiratory values. Heart rate, cardiac index, and stroke volume index remained unchanged throughout the study at all IAPs. Mean arterial blood pressure began to increase at 8 mm Hg and was significantly higher, compared with baseline, at both time points at 15 mm Hg. At 15 mm Hg, Paco2 was significantly higher and cats were more acidic than at baseline. Working space was subjectively greater at 8 mm Hg than at 4 mm Hg IAP; however, at 15 mm Hg, no clinically important enlargement of the working space was identified, compared with at 8 mm Hg. CONCLUSIONS AND CLINICAL RELEVANCE: Values of cardiopulmonary variables were largely unchanged by induction of pneumoperitoneum in healthy cats up to an IAP of 8 mm Hg, and no clinically important increases in working space were evident at an IAP of 15 versus 8 mm Hg. These findings provide little justification for use of IAPs > 8 mm Hg in healthy cats undergoing laparoscopic procedures; however, whether the situation is similar in diseased or elderly cats remains to be determined.

Effects of high-fat and high-carbohydrate diets on fat and carbohydrate oxidation and plasma metabolites in healthy cats.

High-fat (HF) or high-carbohydrate (HC) diets (30% fat, 18.9% carbohydrate; HF and 10% fat, 46.3% carbohydrate; HC) and lengths of adaptation were investigated in cats (Felis catus; 10 +/- 2 months, 3.6 +/- 0.3 kg). Cats randomly received each treatment for 14 days in a crossover design with a 14-day washout period between each diet. Three 22-h indirect calorimetry studies were conducted after acute (day 0), semichronic (day 4) and chronic (day 13) dietary exposure. Blood samples were collected after a 24-h fast on days 1, 5 and 14. When cats consumed the HC and HF diet, oxidation of the restricted nutrient exceeded intake while oxidation of the nutrient in excess matched intake. Mean max energy expenditure (EE) of cats consuming the HF and HC diet were 107 and 102 kcal/kg0.67 /day and occurred at a mean of 4 and 12 h post-feeding respectively. Maximal fat (0.90 g/h) and carbohydrate (carbohydrate; 1.42 g/h) oxidation were attained at 26 min and 10.4 h post-feeding respectively. The changes observed in macronutrient oxidation and EE suggest that cats adapt whole-body nutrient metabolism in response to changes in dietary macronutrient content, but may require longer than 14 day to adapt to a macronutrient that is present at a lower concentration in the diet.


Effects of an iodine-restricted food on client-owned cats with hyperthyroidism.

The objective of this prospective, multicentre, non-controlled, open-label study was to evaluate the effects of an iodine-restricted food on circulating total thyroxine (TT4) concentrations and clinical parameters in client-owned cats with hyperthyroidism. Two hundred and twenty-five cats were enrolled in the study and adapted to the iodine-restricted food. Data from physical examinations, questionnaires completed by veterinarians and owners, and circulating concentrations of TT4, urea and creatinine were recorded at weeks 0, 4 and 8. The study group included 136 female and 89 male cats (median age 15 years, range 4-21 years). Group 1 (n = 113) had been on previous anti-thyroid medication, while group 2 (n = 112) consisted of newly diagnosed cats. No differences were found between the two groups at any time point. Circulating TT4 concentrations had decreased (P <0.0001) at week 4 and did not change significantly from week 4 to week 8. Circulating TT4 concentration was within the reference range in 56/88 cats at week 4 and in 51/68 cats at week 8. Clinical parameters (vomiting, polyuria, polydipsia, hyperactivity, polyphagia, weight loss, hair coat quality, and quality of life) had improved (P <0.0001) by week 4. Circulating creatinine concentration decreased (P = 0.001) from week 0 to 4. Side effects associated with feeding the iodine-restricted food were not observed. In conclusion, in client-owned cats with hyperthyroidism an iodine-restricted food is a valuable management option to normalise circulating TT4 concentrations, and improve clinical signs of hyperthyroidism within 4 weeks. This applies to newly diagnosed cats, as well as to previously diagnosed cats receiving anti-thyroid drugs.


Effects of age and reproductive status on postoperative pain after routine ovariohysterectomy in cats.

A prospective clinical trial to compare the effects of age and reproductive status on postoperative pain was conducted in 145 female cats undergoing ovariohysterectomy using injectable anaesthesia. The
cats were grouped appropriately: 60 kittens <4 months old (K), 85 adults >4 months old (A) and, within the adult group, 57 normal adults (nA) and 28 adults who were either pregnant or in oestrus (rA). Pain was assessed using a simple descriptive scale (SDS; 0-3), a dynamic and interactive visual scale (DIVAS; 0-100 mm) and mechanical nociceptive thresholds (MNT; N, 2 mm diameter probe) preoperatively and at 4 and 24 h postoperatively. Kittens had lower DIVAS areas under the time curve and SDS than adults (P <0.05), but similar MNT (K: 3.3 +/- 2.6, A: 4.3 +/- 2.5 N at 4 h, P >0.05). Data from nA and rA were not different (P >0.05). Kittens had similar wound tenderness, but less affective pain than adults, and reproductive status had no effect.

Effect of syringe and aggregate filter administration on survival of transfused autologous fresh feline red blood cells.

OBJECTIVE: To assess the effect of transfusion using a syringe and microaggregate filter on short-term survival and circulating half-life of autologous feline RBCs. DESIGN: Prospective, internally controlled, observational study. SETTING: A University Teaching Hospital ANIMALS: Six apparently healthy, owned cats. INTERVENTIONS: Blood collection by jugular venipuncture. Transfusion with labeled, autologous, fresh RBCs. MEASUREMENTS AND MAIN RESULTS: Anticoagulated whole blood (35 mL/cat) was collected in 2 equal aliquots. RBCs were washed and labeled at 2 different biotin densities, before suspension in autologous plasma. Labeled RBCs were then transfused using 2 methods, gravity flow and pump delivery using a 20 mL syringe and 18 mum microaggregate filter. Whole blood samples were collected from each cat at 2-hour intervals for 12 hours following completion of the transfusions. Additional samples were collected at weekly intervals up to 6 weeks to assess circulating half-life of the transfused cells. Cell survival was assessed via flow cytometry. The proportion of transfused cells remaining in each of the 2 populations was measured. Biotinylated RBCs were readily detected in all cats over the 6-week sampling period. There was a significant decrease in both populations of labeled cell losses over the 6-week period (P < 0.01), as expected. There was no difference in probability that the RBCs would survive up to 12 hours immediately following transfusion, and no significant difference in survival between the 2 groups over 6 weeks. The average half-life of all labeled cells was approximately 23 days. CONCLUSIONS: We conclude that, in contrast to findings from dogs, transfusion of autologous feline RBCs using a syringe + aggregate filter method does not significantly impact short- or long-term survival of the transfused cells.

Effect of single-cat versus multi-cat home history on perceived behavioral stress in domestic cats (Felis silvestrus catus) in an animal shelter.

This study investigates the effect of living with other cats in a prior home on stress levels of cats recently surrendered to an animal shelter. A total of 63 cats was evaluated using a Cat-Stress-Score and an approach test. Cats were categorized in terms of previous home history with or without other cats. No significant difference was found in stress scores between cats from single-cat households and those from multiple-cat households, although single cats that had been in the shelter less than 4 days demonstrated higher stress levels. No significant difference was found between the two groups in terms of approach results. Results of this study suggest that, in traditional individual cage settings, cats that are not accustomed to living with other cats may experience more stress in the initial few days of attempting to adjust to shelter existence. Through the use of such assessments, shelter personnel may
develop an increased awareness to the needs of these cats and attempt to provide measures to improve their well-being within the shelter environment.

Effect of neutering and breed on femoral and tibial physeal closure times in male and female domestic cats.
The timing of physeal closure is dependent upon many factors, including gonadal steroids, and previous studies have shown that early neutering delays physeal closure. Pelvic and femoral radiographs of 808 cats were analysed and physes at the greater trochanter, proximal femur, distal femur and proximal tibia were recorded as being open or closed. Date of birth, gender, neuter status and breed of cases were recorded. Each physis was analysed individually at a specific age. The number of male entire (ME), male neutered (MN), female entire (FE), female neutered (FN), pedigree and non-pedigree cases at each of these ages was recorded. The number of cases that was open or closed at each stated age was compared between the neutered and entire, the female and male, and the pedigree and non-pedigree groups using a Fischer’s exact test, with P < 0.05 being considered significant. Seven hundred and eighty-three radiographs were included: 359 MN, 95 ME, 237 FN and 92 FE. Ninety-six cats were pedigree and 687 were non-pedigree. A statistically significant effect was shown with physes closing later in MN than in ME cats for the greater trochanter (P = 0.0037), distal femur (P = 0.0205) and tibial tuberosity (P = 0.0003). No effect was shown for the proximal tibial or proximal femoral physes, nor for any physis when comparing FE with FN cats. No statistically significant effect of breed or sex was noted. Physeal closure will occur later in MN cats than in ME cats for the greater trochanteric, distal femoral and tibial tuberosity physes, and the potential clinical consequences of this should be evaluated further.

Effect of dietary carbohydrate, fat, and protein on postprandial glycemia and energy intake in cats.
BACKGROUND: Reducing carbohydrate intake is recommended in diabetic cats and might also be useful in some healthy cats to decrease diabetes risk. OBJECTIVE: To compare postprandial glucose and insulin concentrations and energy intakes between cats fed diets high in protein, fat, or carbohydrate. ANIMALS: Twenty-four lean cats with normal glucose tolerance. METHODS: In a prospective randomized study, each of 3 matched groups (n = 8) received a different test diet for 5 weeks. Diets were high in either protein (46% of metabolizable energy [ME]), fat (47% ME), or carbohydrate (47% ME). Glucose and insulin were measured during glucose tolerance, ad libitum, and meal-feeding tests. RESULTS: During ad libitum feeding, cats fed the high-carbohydrate diet consumed 25% and 18% more carbohydrate than cats fed diets high in fat and protein, respectively, and energy intake was highest when the high-fat and high-protein diets were fed. Regardless of the feeding pattern, cats fed the high-carbohydrate diet had 10-31% higher peak and mean glucose compared with both other diets; peak glucose in some cats reached 10.4 mmol/L (188 mg/dL) in cats fed 47% ME carbohydrate and 9.0 mmol/L (162 mg/dL) in cats fed 23% ME. CONCLUSIONS AND CLINICAL IMPORTANCE: High-carbohydrate diets increase postprandial glycemia in healthy cats compared with diets high in fat or protein, although energy intake is lower. Avoidance of high- and moderate-carbohydrate diets can be advantageous in cats at risk of diabetes. Maintenance energy requirements should be fed to prevent weight gain when switching to lower carbohydrate diets.
Ectoparasites in urban stray cats in Jerusalem, Israel: differences in infestation patterns of fleas, ticks and permanent ectoparasites.
In a period cross-sectional study performed to examine ectoparasites on 340 stray cats in Jerusalem, Israel, 186 (54.7%) were infested with the cat flea, Ctenocephalides felis (Siphonaptera: Pulicidae), 49 (14.4%) with the cat louse, Felicola subrostratus (Phthiraptera: Trichodectidae), 41 (12.0%) with the ear mite, Otodectes cynotis (Astigmata: Psoroptidae), three (0.9%) with the fur mite, Cheyletiella blakei (Trobidiformes: Cheyletidae), two (0.6%) with the itch mite Notoedres cati (Astigmata: Sarcoptidae), and 25 (7.3%) with ticks of the species Rhipicephalus sanguineus sensu lato (Ixodida: Ixodidae), Rhipicephalus turanicus or Haemaphysalis adleri (Ixodida: Ixodidae). A higher number of flea infestations was observed in apparently sick cats (P < 0.05) and in cats aged < 6 months (P < 0.05). The proportion of flea-infested cats (P < 0.01), as well as the number of fleas per infested cat (P < 0.01), was higher in autumn than in other seasons. By contrast with findings in cats with flea infestations, rates of infestation with ticks were higher amongst cats with clinical signs (P < 0.01) and cats aged >= 6 months (P < 0.05). The high rates of ectoparasite infestation in the cats studied constitute a risk for the spread of vector-borne infections of zoonotic and veterinary importance.

Doppler Echocardiographic Evaluation of Midventricular Obstruction in Cats with Hypertrophic Cardiomyopathy.
BACKGROUND: Hypertrophic cardiomyopathy (HCM) is heterogeneous in both people and cats, with variability in the distribution of hypertrophy, hemodynamic characteristics, and Doppler echocardiographic findings. OBJECTIVES: To document the Doppler echocardiographic characteristics of midventricular obstruction in some cats with HCM. ANIMALS: Eight cats with hypertrophic cardiomyopathy. MATERIALS AND METHODS: Retrospective case series. The medical records of cats presenting to the cardiology service at Colorado State University between February 2009 and January 2012 were reviewed. All cats had a physical examination; Doppler systolic blood pressure measurement; and transthoracic two-dimensional (2D), M-mode, and Doppler echocardiography were performed. A more thorough evaluation of the echocardiographic images and measurements was performed. Cats included in this study had echocardiograms of adequate quality to confirm the diagnosis of midventricular obstruction by documentation of left midventricular concentric hypertrophy; a midventricular turbulent Doppler color flow pattern; and high velocity, late-peaking flow at the area of turbulence. Cats with evidence of systemic hypertension defined as a systolic Doppler blood pressure of greater than 170 mmHg were excluded. RESULTS: All 8 cats had left ventricular hypertrophy at the level of the papillary muscles; left, midventricular hypertrophy; and in 4/8 cats there was apical hypertrophy or basilar hypertrophy of the interventricular septum. Color flow Doppler revealed turbulent flow in 8/8 cats and spectral Doppler (continuous and pulsed wave) revealed increased flow velocities and late-peaking flow profiles at the level of the left midventricle. Two of 8 cats had a bifid midventricular flow profile in which there was a midystolic decline in left ventricular velocities with elevated velocities extending into early diastole. The peak left ventricular outflow velocity in all 8 cats was normal. CONCLUSIONS AND CLINICAL IMPORTANCE: A variant of HCM characterized by hypertrophy at the level of the papillary muscles with midventricular obstruction is present in some cats. Recognition of this variant of feline HCM allows identification of HCM in cats with murmurs where the more classic features of HCM are not present.
**Domestic cat microsphere immunoassays: detection of antibodies during feline immunodeficiency virus infection.**  
Microsphere immunoassays (MIAs) allow rapid and accurate evaluation of multiple analytes simultaneously within a biological sample. Here we describe the development and validation of domestic cat-specific MIAs for a) the quantification of total IgG and IgA levels in plasma, and b) the detection of IgG and IgA antibodies to feline immunodeficiency virus (FIV) capsid (CA) and surface (SU) proteins, and feline CD134 in plasma. These assays were used to examine the temporal antibody response of domestic cats infected with apathogenic and pathogenic FIVs, and domestic cats infected with parental and chimeric FIVs of varying pathogenicity. The results from these studies demonstrated that a) total IgG antibodies increase over time after infection; b) alpha-CA and alpha-SU IgG antibodies are detectable between 9 and 28 days post-infection and increase over time, and these antibodies combined represent a fraction (1.8 to 21.8%) of the total IgG increase due to infection; c) measurable alpha-CD134 IgG antibody levels vary among individuals and over time, and are not strongly correlated with viral load; d) circulating IgA antibodies, in general, do not increase during the early stage of infection; and e) total IgG, and alpha-CA and alpha-SU IgG antibody kinetics and levels vary with FIV viral strain/pathogenicity. The MIAs described here could be used to screen domestic cats for FIV infection, and to evaluate the FIV-specific or total antibody response elicited by various FIV strains/other diseases.

**Distribution, seasonality and risk factors for tick paralysis in Australian dogs and cats.**  
Tick paralysis is a serious and potentially fatal condition of Australian companion animals induced by the paralysis ticks, Ixodes holocyclus and Ixodes cornuatus. Limited published information is available on the distribution, seasonality and risk factors for tick paralysis mortality in dogs and cats. This study describes 3479 cases of canine and feline tick paralysis in Australia using data extracted from a real-time disease surveillance program. Risk factors for mortality were identified, and maps of the distribution of cases were generated. Cluster analysis was performed using a space-time permutation scan statistic. Tick paralysis was found to be distinctly seasonal, with most cases reported during spring. Most cases were located on the eastern coast of Australia with New South Wales and Queensland accounting for the majority of reported cases. A cluster of cases was identified on the south coast of New South Wales. Dogs were found to be at significantly higher risk (P<0.05) of death if less than 6 months of age or if a toy breed. No significant risk factors for mortality were identified for cats. Some animals receiving chemoprophylactic treatment for tick infestation experienced tick paralysis during the products’ period of effectiveness. There is a high risk of tick paralysis in dogs and cats on the eastern coast of Australia during the spring months. The risk factors for mortality identified can be used by veterinarians to determine prognosis in cases of canine tick paralysis and potentially to improve the treatment of cases. Daily tick searches of pets - particularly in high risk areas and during high risk periods - are recommended since the prevention of tick paralysis via chemoprophylaxis is not 100% guaranteed across the whole population.

Differentiating between feline pleural effusions of cardiac and non-cardiac origin using pleural fluid NT-proBNP concentrations.

OBJECTIVE: To assess whether pleural fluid and urine amino terminal proB-type natriuretic peptide (NT-proBNP) can distinguish cardiac from non-cardiac causes of pleural effusion. METHODS: Blood, urine and pleural fluid were prospectively collected from cats presenting with pleural effusion categorised as cardiac or non-cardiac in origin. NT-ProBNP concentrations were measured using a feline-specific enzyme-linked immunosorbent assay. Groups were statistically compared and receiver operating characteristic curves constructed to determine cut-offs to distinguish cardiac from non-cardiac pleural effusion in plasma, pleural fluid and urine. RESULTS: Forty cats with pleural effusion (22 cardiac and 18 non-cardiac) were studied. NT-proBNP concentrations in plasma and pleural fluid were strongly correlated. Plasma (P<0.001) and pleural fluid (P<0.001) NT-proBNP concentrations and urinary NT-proBNP/creatinine ratios (P=0.035) were significantly higher in the cardiac group. After receiver operating characteristic curve analysis a plasma NT-proBNP cut-off of 214.3 pmol/mL was suggested [sensitivity=86.4% (95% CI: 66.7 to 95.3%), specificity=88.9% (95% CI: 67.2 to 96.9%)] and a pleural fluid NT-proBNP cut-off of 322.3 pmol/mL was suggested [sensitivity=100% (95% CI: 85.1 to 100%), specificity=94.4% (95% CI: 74.2 to 99.0%)]. No cut-off with adequate sensitivity and specificity for urinary NT-proBNP/creatinine ratios was suggested. CLINICAL SIGNIFICANCE: Measurement of NT-proBNP in pleural fluid distinguishes cardiac from non-cardiac causes of pleural effusion in cats.


Differential expression of circulating microRNAs in diabetic and healthy lean cats.

MicroRNAs (miRNAs) regulate gene expression and play a role in the pathogenesis of human type 2 diabetes mellitus. This study investigated whether miRNA expression profiles differ between healthy and diabetic cats. Total RNA was extracted from sera of healthy lean cats, newly diagnosed diabetic cats and cats in diabetic remission. Microarrays representing 1079 mouse miRNA targets were used to measure miRNA expression in serum samples from eight healthy lean and seven newly diagnosed diabetic cats; 227 distinct miRNAs could be detected. Nineteen miRNAs were differentially expressed in newly diagnosed diabetic cats compared to healthy lean cats, with a false discovery rate of 10%. Hierarchical cluster analysis of these 19 miRNAs grouped healthy lean and newly diagnosed diabetic cats into separate clusters. After correction for multiple testing, only miR-122 and miR-193b reached statistical significance (P<0.05), with a false discovery rate of 1%. Specific quantitative real-time PCR assays for three target miRNAs (miR-122, miR-193b and miR-483(*)) were applied to four samples from each of the three groups. miR-122 expression was >40-fold higher in newly diagnosed diabetic cats compared to healthy lean cats and cats in diabetic remission, whereas miR-193b showed >14-fold higher expression. MiR-483(*) was expressed sixfold higher in newly diagnosed diabetic cats compared to both other groups.


Diagnostic utility of a direct immunofluorescence test to detect feline coronavirus antigen in macrophages in effusive feline infectious peritonitis.

The antemortem diagnosis of feline infectious peritonitis (FIP) remains challenging in clinical practice, since current testing methods have suboptimal diagnostic accuracy. Immunohistochemical testing of biopsy specimens and postmortem examination are the standard diagnostic methods, although direct
immunofluorescence (DIF) testing to detect feline coronavirus in macrophages in effusion specimens has been reported to have 100% specificity and has been recommended as an antemortem confirmatory test. The aim of this study was to compare the results of DIF testing in antemortem feline effusions with postmortem results using field samples. Effusion specimens were collected antemortem from 17 cats and tested by DIF, followed by postmortem examination. Histopathological examination of specimens collected at postmortem confirmed FIP in 10/17 cases and ruled out FIP in 7/17 cases. Antemortem DIF testing was positive in all 10 cases confirmed as FIP at postmortem examination. In the seven cats where FIP was ruled out at postmortem examination, DIF was negative in five cases and positive in the remaining two cases. The calculated sensitivity of DIF testing was 100% and the specificity was 71.4%. Duplicate effusion specimens from eight cats that were initially DIF positive were stored refrigerated (4 degrees C) or at room temperature (22-25 degrees C) and subjected to serial DIF testing to determine the duration of positive results. DIF-positive specimens stored at both temperatures retained their positive status for at least 2 days.

Diagnostic Immunohistochemistry of Canine and Feline Intracalvarial Tumors in the Age of Brain Biopsies.
The focus of immunohistochemistry as applied to nervous system tumors is in identifying the neoplasm present and evaluating margins between normal and neoplastic tissue. Although not always utilized by specialists in neuropathology, immunohistochemistry remains useful to resolve concerns about the differentiation and rate of tumor growth. The aims of this review are to discuss the utility of immunohistochemical reagents currently used in diagnosis of canine and feline intracalvarial tumors, to indicate the applicability of some tests currently used in human nervous system tumors for domestic species, and to evaluate a few less commonly used reagents. A panel of biomarkers is usually needed to confirm a diagnosis, with groups of reagents for leptomeningeal, intraparenchymal, and ventricular neoplasms. In the future, signature genetic alterations found among feline and canine brain tumors-as correlated prospectively with diagnosis, rate of enlargement, or response to treatment-may result in new immunohistochemical reagents to simplify the task of diagnosis. Prospective studies determining the type and proportion of stem cell marker expression on patient longevity are likely to be fruitful and suggest new therapies. Due to increased frequency of biopsy or partial resection of tumors from the living patient, biomarkers are needed to serve as accurate prognostic indicators and assist in determining the efficacy of developing therapeutic options in nervous system tumors of dogs and cats.

Diagnosis of small intestinal disorders in dogs and cats.
Laboratory tests are an important part of the workup of small intestinal diseases in dogs and cats. Especially in chronic cases, when extragastrointestinal causes need to be ruled out, it is important to adhere to a systematic workup. This article details the newest available data on tests to aid this diagnostic process. Once the diagnosis of a chronic enteropathy is made, there are many laboratory tests that can help in monitoring the disease and providing prognostic information. Several new tests being evaluated for clinical usefulness are discussed.

Diagnosis of feline acute intermittent porphyria presenting with erythrodontia requires molecular analyses.

Erythrodontia is the hallmark of human congenital erythropoietic porphyria (CEP), but is also a major phenotypic feature of acute intermittent porphyria (AIP) in cats. In this study, detailed biochemical and molecular analyses were performed on two unrelated cats with autosomal dominant AIP that presented with erythrodontia, yellow-brown urine and mild changes in erythrocytes. The cats had elevated concentrations of urinary 5-aminolevulinic acid and porphobilinogen, and half normal erythrocytic hydroxymethylbilane synthase (HMBS) activity. Two novel HMBS mutations were detected; one cat had a deletion (c.107_110delACAG) and one cat had a splicing alteration (c.826-1G>A), both leading to premature stop codons and truncated proteins (p.D36Vfs(*)6 and p.L276Efs(*)6, respectively). These studies highlight the importance of appropriate biochemical and molecular genetic analyses for the accurate diagnoses of porphyrias in cats and extend the molecular genetic heterogeneity of feline AIP. Thus, although erythrodontia is a classic sign of congenital erythropoietic porphyria in human beings, cats with erythrodontia may have acute intermittent porphyria, a hepatic porphyria.


Diagnosis of disorders of iron metabolism in dogs and cats.

Iron is an essential element and is used by every cell in the body. This article summarizes iron metabolism and disorders associated with iron metabolism in dogs and cats. The diagnostic tests currently in use for assessing iron status are discussed.


Diagnosis of chronic small bowel disease in cats: 100 cases (2008-2012).

Objective-To determine whether a diagnosis of chronic small bowel disease could be established in a subset of cats that had clinical signs of chronic vomiting, chronic small bowel diarrhea, weight loss, or a combination of these, combined with ultrasonographically determined thickening of the small bowel. Design-Retrospective case series. Animals-100 client-owned domestic cats. Procedures-Medical records of cats with clinical signs of chronic vomiting, chronic small bowel diarrhea, weight loss, or a combination of these, combined with ultrasonographically determined small bowel thickening, that underwent laparotomy and multiple small bowel biopsies between 2008 and 2012 were examined. Biopsy specimens were submitted for histologic evaluation, immunohistochemical evaluation, and, when findings were ambiguous, PCR assay for antigen receptor rearrangement. Results-Chronic small bowel disease was diagnosed in 99 of the 100 cats. The most common diagnoses were chronic enteritis and intestinal lymphoma. Conclusions and Clinical Relevance-Results suggested that cats with clinical signs of chronic small bowel disease should undergo detailed diagnostic testing because they are likely to have clinically important, diagnosable, treatable disease. Clinical signs of small bowel disease, especially weight loss and chronic or recurrent vomiting, are extremely common in cats. These signs should not be considered a normal condition and should not be ignored, regardless of common explanations given by owners, and cats with these signs should undergo appropriate diagnostic testing.


Development of an ultrasound-guided technique for pudendal nerve block in cat cadavers.
The objective of this prospective experimental cadaveric study was to develop an ultrasound-guided technique to perform an anaesthetic pudendal nerve block in male cats. Fifteen fresh cadavers were used for this trial. A detailed anatomical dissection was performed on one cat in order to scrutinise the pudendal nerve and its ramifications. In a second step, the cadavers of six cats were used to test three different ultrasonographic approaches to the pudendal nerve: the deep dorso-lateral, the superficial dorso-lateral and the median transperineal. Although none of the approaches allowed direct ultrasonographical identification of the pudendal nerve branches, the deep dorso-lateral was found to be the most advantageous one in terms of practicability and ability to identify useful and reliable landmarks. Based on these findings, the deep dorso-lateral approach was selected as technique of choice for tracer injections (0.1 ml 1% methylene blue injected bilaterally) in six cat cadavers distinct from those used for the ultrasonographical study. Anatomical dissection revealed a homogeneous spread of the tracer around the pudendal nerve sensory branches in all six cadavers. Finally, computed tomography was performed in two additional cadavers after injection of 0.3 ml/kg (0.15 ml/kg per each injection sites, left and right) contrast medium through the deep dorso-lateral approach in order to obtain a model of volume distribution applicable to local anaesthetics. Our findings in cat cadavers indicate that ultrasound-guided pudendal nerve block is feasible and could be proposed to provide peri-operative analgesia in clinical patients undergoing perineal urethrostomy.


Development and clinical evaluation of rapid diagnostic kit for feline leukemia virus infection. Feline leukemia virus (FeLV) causes a range of neoplastic and degenerative diseases in cats. For the more sensitive and convenient diagnosis of the disease, we prepared monoclonal antibodies specific to the FeLV p27 to develop a rapid diagnostic test with enhanced sensitivity and specificity. Among these antibodies, we identified two clones-hybridomas 8F8B5 and 8G7D1 that specifically bound to FeLV and were very suitable for application to a diagnostic kit. The affinity constants of 8F8B5 and 8G7D1 were 0.35 x 109 and 0.86 x 109, respectively. To investigate the diagnostic characteristics of the rapid kit based on these antibodies, we carried out several clinical studies. In an experiment of analytical sensitivity, the detection threshold of the rapid diagnostic test was 2 ng/mL for recombinant p27 and was 12.5 x 104 IU/mL for FeLV. In an evaluation using 252 cases of cat’s sera, the kit showed 0.88 kappa value compared with PCR, indicating a significant correlation between the rapid diagnostic test and PCR method. The sensitivity and specificity of the kit were 95.2% (20/21) and 98.5% (257/261), respectively. Thus, the rapid diagnostic test would be a suitable diagnostic tool for rapid detection of FeLV progressive infection in cats.


Detection of serum antibodies against Bartonella species in cats with sporotrichosis from Rio de Janeiro, Brazil. Cat scratch disease is a zoonosis caused by Bartonella species, transmitted to humans through scratches or bites from infected cats and via direct contact with infected feces. Sporotrichosis, caused by the fungal complex Sporothrix, is transmitted by traumatic inoculation of the fungus. Cats are important in zoonotic transmission. Serum samples from 112 domestic cats with sporotrichosis and 77 samples from healthy cats were analyzed by indirect immunofluorescence assay (IFA), using the commercial kit Bartonella henselae IFA IgG (Bion). The presence of antibodies against feline leukemia virus (FeLV)
and of feline immunodeficiency virus (FIV) core antigens was detected using the commercial kit Snap Combo FIV-FeLV (Idexx). The group of animals with sporotrichosis contained 93 males with a median age of 22 months, eight (7.1%) of which were positive for FIV and 15 (13.4%) for FeLV. The group of animals without sporotrichosis contained 36 males with a median age of 48 months, 10 (13.0%) of which were positive for FIV and eight (10.4%) for FeLV. Of the 112 cats with sporotrichosis and 77 cats without mycosis, 72 (64.3%) and 35 (45.5%), respectively, were IFA reactive. No association was found between age, sex, FIV/FeLV and the presence of antibodies to Bartonella species. The results suggest that the study population can be considered a potential source of zoonotic infection by both diseases.

Objective. To determine prevalence of MAP in intestinal and nodal tissue from dogs and cats at necropsy at Kansas State University and to determine if an association existed between presence of MAP and gastrointestinal inflammation, clinical signs, or rural exposure. Procedures. Tissue samples were collected from the duodenum, ileum, and mesenteric and colic nodes of adult dogs (73) and cats (37) undergoing necropsy for various reasons. DNA was extracted and analyzed for insertion sequence 900 using nested PCR. Positive samples were confirmed with DNA sequencing. An online mapping system was used to determine if patients lived in an urban or rural environment based on the home address. Medical records were reviewed for clinical signs and histological findings at necropsy. Results. MAP was identified from 3/73 (4.1%) dogs and 3/37 (8.1%) cats. There was no documented association between presence of MAP and identification of histologic-confirmed gastrointestinal inflammation, gastrointestinal clinical signs, or exposure to a rural environment. Conclusion and Clinical Relevance. MAP-specific DNA can be identified within the intestinal and nodal tissue of dogs and cats that do not have pathological lesions or clinical signs consistent with gastrointestinal disease. The significance of this organism’s presence without associated gastrointestinal pathology is unknown.

Escherichia coli are gut microbiota bacteria that can cause disease in some humans and other animals, including dogs and cats that humans often keep as pets. Diarrheagenic E. coli (DEC) strains are classified into six categories: enteropathogenic (EPEC), enterotoxigenic (ETEC), Shiga toxin-producing (STEC), enteroinvasive (EIEC), enteroaggregative (EAEC), and diffuse-adhering E. coli (DAEC). In this study 144 and 163 E. coli colonies were isolated from the fecal samples of 50 dogs and 50 cats, respectively, with and without diarrhea from a Veterinary Hospital (clinical isolates). The virulence factors were determined using multiplex Polymerase Chain Reaction. Adherence assays, antibacterial susceptibility and serotyping (somatic or flagellar antigens) were performed on DEC isolates. We found 25 (17.4%) and 4 (2.5%) DEC strains isolated from dogs and cats, respectively. Only the EPEC and EAEC pathotypes were found in both animals. Meanwhile, genes from other pathotypes (STEC, EIEC, and ETEC) were not found in these clinical isolates. All of the DEC strains showed mannose-resistant adherence to HEp-2 and HeLa cells, and aggregative adherence was predominant in these isolates. Multiresistant strains to antimicrobials were found in most DEC strains including usual and unusual antimicrobials in veterinary practices. The serotypes of these DEC isolates
were variable. The ONT serotype was predominant in these isolates. Some serotypes found in our study were described to human DEC. Here, we demonstrate that pets carry virulent DEC genes, which are mainly strains of EPECs and EAECs. The presence of these virulence factors in isolates from animals without diarrhea suggests that pets can act as a reservoir for human infection.

Detection of ascitic feline coronavirus RNA from cats with clinically suspected feline infectious peritonitis.
Ascitic feline coronavirus (FCoV) RNA was examined in 854 cats with suspected feline infectious peritonitis (FIP) by RT-PCR. The positivity was significantly higher in purebreds (62.2%) than in crossbreds (34.8%) (P<0.0001). Among purebreds, the positivities in the Norwegian forest cat (92.3%) and Scottish fold (77.6%) were significantly higher than the average of purebreds (P=0.0274 and 0.0251, respectively). The positivity was significantly higher in males (51.5%) than in females (35.7%) (P<0.0001), whereas no gender difference has generally been noted in FCoV antibody prevalence, indicating that FIP more frequently develops in males among FCoV-infected cats. Genotyping was performed for 377 gene-positive specimens. Type I (83.3%) was far more predominantly detected than type II (10.6%) (P<0.0001), similar to previous serological and genetic surveys.

Cutaneous lesions associated with dual infection caused by canine distemper virus and orthopoxvirus in a domestic cat.
BACKGROUND: Within the context of an increased epidemiological pressure caused by canine distemper virus (CDV) in Switzerland together with a potential re-emergence of endemic pathogens such as orthopoxviruses (OPXV), dual infections are possible among susceptible species.
OBJECTIVE: To describe a case of concurrent CDV and OPXV infection in a cat. ANIMAL: A 5-year-old, neutered male cat was presented with erythema, crusts and ulcerations around the left eye. High-grade pruritus and a severe conjunctivitis were also present. METHODS: Formalin-fixed skin biopsy samples were obtained from lesional skin. Histopathology, CDV immunohistochemistry and CDV and OPXV RT-PCR were performed. RESULTS: Histopathological examination showed severe epidermal necrosis extending to the follicular walls and a dermal infiltration, predominantly eosinophilic. Intranuclear and intracytoplasmic eosinophilic inclusion bodies were visible in the wall of affected hair follicles, with occasional formation of syncytia. The RT-PCR revealed the contextual presence of both CDV and OPXV. Scattered cells stained positive for CDV by immunohistochemistry.
CONCLUSION AND DISCUSSION: Dual infections with CDV and OPXV, although rare, may occur and represent additional differential diagnoses for ulcerative skin lesions in cats.

Current diagnostic trends in coagulation disorders among dogs and cats.
The diagnostic workup to differentiate hemorrhage caused by vascular injury from a systemic hemostatic imbalance typically involves a combination of broad screening tests and specific assays. The characterization of 3 overlapping phases of primary hemostasis, secondary hemostasis, and fibrinolysis provides a simple diagnostic framework for evaluating patients with clinical signs of hemorrhage. New techniques such as flow cytometry, thrombin-generation assays, thrombelastography,
and anticoagulant drug monitoring are under investigation for veterinary patients; however, their ability to improve diagnosis or treatment requires further study in clinical trials.

Gullo, F. P., S. A. Rossi, C. Sardi Jde, V. L. Teodoro, M. J. Mendes-Giannini, and A. M. Fusco-Almeida (2013) Eur J Clin Microbiol Infect Dis 32:1377-1391. **Cryptococcosis: epidemiology, fungal resistance, and new alternatives for treatment.** Cryptococcosis is an important systemic mycosis and the third most prevalent disease in human immunodeficiency virus (HIV)-positive individuals. The incidence of cryptococcosis is high among the 25 million people with HIV/acquired immunodeficiency syndrome (AIDS), with recent estimates indicating that there are one million cases of cryptococcal meningitis globally per year in AIDS patients. In Cryptococcus neoformans, resistance to azoles may be associated with alterations in the target enzyme encoded by the gene ERG11, lanosterol 14alpha-demethylase. These alterations are obtained through mutations, or by overexpressing the gene encoding. In addition, C. gattii and C. neoformans present a heteroresistance phenotype, which may be related to increased virulence. Other species beyond C. neoformans and C. gattii, such as C. laurentii, have been diagnosed mainly in patients with immunosuppression. Infections of C. albidus have been isolated in cats and marine mammals. Recent evidence suggests that the majority of infections produced by this pathogen are associated with biofilm growth, which is also related with increased resistance to antifungal agents. Therefore, there is a great need to search for alternative antifungal agents for these fungi. The search for new molecules is currently occurring from nanoparticle drugs of plant peptide origin. This article presents a brief review of the literature regarding the epidemiology of cryptococcosis, as well as fungal resistance and new alternatives for treatment.


Zhang, T. T., L. Wang, D. B. Wang, Z. J. Huang, Y. H. Li, and J. P. Lu (2013) Pancreatology 13:491-497. **Correlation between secretin-enhanced MRCP findings and histopathologic severity of chronic pancreatitis in a cat model.** BACKGROUND/OBJECTIVES: To evaluate the usefulness of secretin-enhanced magnetic resonance cholangiopancreatography (S-MRCP) in chronic pancreatitis (CP), we compared the severity of disease determined histopathologically with that indicated by S-MRCP imaging parameters in an induced CP cat model. MATERIALS AND METHODS: An experimental group of randomly chosen cats (n = 24) underwent ligation of the pancreatic duct to induce CP, and cats in a similarly chosen control group (n = 8) were sham-operated. MRCP was performed prior to secretin stimulation, and 5 and 15 min afterward, noting in particular the pancreatic duct caliber change (PDC) and the increasing degree of fluid volume (IDFV). Histopathological changes were observed in pancreatic samples processed for hematoxylin-eosin and Sirius red staining, and CP was classified as normal, minimal, moderate, or advanced. Correlations were investigated between these groups and the PDC at 5 min and the IDFV at 15 min. RESULTS: Between cats with minimal CP and the controls, the differences in mean IDFV and PDC were not significant although diseased cats showed a downward trend in both parameters.
However, compared with the control group both the mean IDFV and PDC were significantly lower in cats with moderate (IDFV, $P = 0.001$; PDC, $P = 0.013$) or advanced (IDFV, $P = 0.013$; PDC, $P = 0.001$) CP. CONCLUSION: The S-MRCP parameters IDFV and PDC correlated with the histopathological severity of induced CP. S-MRCP could be used to evaluate the severity of CP, although it is somewhat insensitive for depicting very early disease.


PURPOSE: To investigate contralateral optic neuropathy and retinopathy following enucleation in 6 cats. METHODS: Retrospective study. The medical records of cats with contralateral visual and afferent pupillomotor dysfunction following enucleation presented to the Animal Health Trust (AHT), Newmarket, UK, between January 1994 and January 2010 were reviewed. Information recorded included history, signalment, ophthalmic findings, electroretinography (ERG) (2/6) and MRI (3/6) findings and long-term outcome. Pearson’s chi-square tests were used to compare breed proportions ($P < 0.05$). RESULTS: Six cats aged 1.5 to 11 (median 5.5) years presented with mydriasis and/or visual deficits noted immediately following enucleation. Enucleation involved optic nerve (ON) ligation in all of the four cases for which this information was available. Ophthalmic findings included mydriasis with absent pupillary light reflex (PLR) (4/6), incomplete PLRs (2/6), absence of dazzle reflex (4/6) and absence of menace response (4/6). Funduscopy initially revealed multifocal peripapillary retinal lesions, with subsequent progressive optic nerve head (ONH) and retinal atrophy. ERG recordings revealed normal outer retinal function at 6 and 22 weeks (2/2). On MRI, the optic chiasm (OC) ipsilateral to the enucleation could not be identified and the contralateral OC was atrophied (3/3). CONCLUSIONS: The acute afferent ON deficits following enucleation, progressive ONH atrophy, normal outer retinal function and MRI demonstrating OC pathology are consistent with chiasmal injury due to traction on the ON during enucleation. Rostral traction on the globe to facilitate ON ligation is contraindicated in cats.


Retroviruses are classified as exogenous and endogenous retroviruses according to the mode of transmission. Endogenous retroviruses (ERVs) are retroviruses which have been integrated into germ-line cells and inherited from parents to offspring. Most ERVs are inactivated by deletions and mutations; however, certain ERVs maintain their infectivity and infect the same host and new hosts as exogenous retroviruses. All domestic cats have infectious ERVs, termed RD-114 virus. Several canine and feline attenuated vaccines are manufactured using RD-114 virus-producing cell lines such as Crandell-Rees feline kidney cells; therefore, it is possible that infectious RD-114 virus contaminates live attenuated vaccines. Recently, Japanese and UK research groups found that several feline and canine vaccines were indeed contaminated with infectious RD-114 virus. This was the first incidence of contamination of ‘infectious’ ERVs in live attenuated vaccines. RD-114 virus replicates efficiently in canine cell lines and primary cells. Therefore, it is possible that RD-114 virus infects dogs following inoculation with contaminated vaccines and induces proliferative diseases and immune suppression, if it adapts to grow efficiently in dogs. In this review, we summarize the incidence of contamination of RD-114 virus in live attenuated vaccines and potential risks of infection with RD-114 virus in dogs.
Conditioning laboratory cats to handling and transport.

As research subjects, cats have contributed substantially to our understanding of biological systems, from the development of mammalian visual pathways to the pathophysiology of feline immunodeficiency virus as a model for human immunodeficiency virus. Few studies have evaluated humane methods for managing cats in laboratory animal facilities, however, in order to reduce fear responses and improve their welfare. The authors describe a behavioral protocol used in their laboratory to condition cats to handling and transport. Such behavioral conditioning benefits the welfare of the cats, the safety of animal technicians and the quality of feline research data.

Comparison of wet-mount, Wright-Giemsa and Gram-stained urine sediment for predicting bacteriuria in dogs and cats.

This study assessed the standard urinalysis technique and sediment stain techniques as predictors of bacterial culture results for canine and feline urine. Canine (n = 111) and feline (n = 79) urine samples were evaluated using unstained wet-mount and air-dried Gram and Wright-Giemsa stained sediment; results were compared to aerobic bacterial culture. Eleven canine and 7 feline urine samples were culture positive. Unstained wet-mount and stained sediment had sensitivities of 89% and 83% and specificities of 91% and 99%, respectively. The specificity of using either stain was higher (P < 0.01) than wet-mount examination for detecting bacteriuria. There were significant differences among 3 technologists in detecting true positives (P < 0.01). Association of sediment and culture results used 112 canine and 81 feline samples. There was a negative association (P < 0.01) between lipid detection and wet-mount identification of bacteria.

Comparison of the diagnostic quality of computed tomography images of normal ocular and orbital structures acquired with and without the use of general anesthesia in the cat.

OBJECTIVE: To compare the diagnostic quality of computed tomography (CT) images of normal ocular and orbital structures acquired with and without the use of general anesthesia in the cat.

ANIMAL STUDIED: Eleven privately owned cats with nasal disease presenting to a single referral hospital. PROCEDURES: All cats received a complete ophthalmic examination. A 16 multislice helical CT system was utilized to acquire images of the skull and neck with and without the use of general anesthesia. Images were acquired before and after the administration of intravenous iodinated contrast. Images of normal ocular and orbital structures were evaluated via consensus by two board-certified radiologists. Visibility of ocular and orbital structures, degree of motion, and streak artifact were assessed and scored for each image set in the transverse, dorsal, and sagittal planes. RESULTS: The use of general anesthesia did not significantly affect the diagnostic quality of images. No motion artifact was observed in any CT image. Streak artifact was significantly increased in scans performed in the transverse orientation but not in the dorsal orientation or sagittal orientation and did not affect the diagnostic quality of the images. Contrast enhancement did not significantly enhance the visibility of
any ocular or orbital structures. CONCLUSION: Diagnostic CT images of normal ocular and orbital structures can be acquired without the use of general anesthesia in the cat.


Comparison of surgical variables in cats undergoing single-incision laparoscopic ovariectomy using a LigaSure or extracorporeal suture versus open ovariectomy.

OBJECTIVE: To evaluate the applicability of single-incision laparoscopic ovariectomy (SILOVE) in cats using a single-incision laparoscopic port (SILP); to compare surgical time, complications, and postoperative pain after SILOVE using a LigaSure (SILOVE-LS) or extracorporeal suture (SILOVE-ECS), and open ovariectomy (open-OVE). STUDY DESIGN: Randomized, blinded, prospective study. ANIMALS: Healthy, domestic female cats (n = 24). METHODS: Cats underwent physical examination, packed cell volume, total solids and blood urea nitrogen analysis. Cats were randomly assigned to 1 of 3 groups: SILOVE-LS (n = 8), SILOVE-ECS (8) or open-OVE (8). Surgical time, complications, and postoperative pain scores were recorded. RESULTS: Single-incision laparoscopic ovariectomy was successful in (n = 8) SILOVE-LS cats and (n = 5) SILOVE-ECS cats. Surgical time was significantly longer for the SILOVE-ECS group compared with the SILOVE-LS (P <.0001) and open-OVE (P <.0001) groups, which were not different (P =.55). Complications were more frequent in the SILOVE-ECS group and removal of the SILP was required to complete ovariectomy in 3 cats. Cumulative 4-hour pain scores were not different between groups. CONCLUSIONS: Single-incision laparoscopic ovariectomy using a SILP is a feasible method for OVE in cats. Single-incision laparoscopic ovariectomy using an extracorporeal suture is more time consuming and associated with more complications than either the SILOVE-LS or open-OVE methods.


Comparison of perioperative analgesic efficacy between methadone and butorphanol in cats.

OBJECTIVE: To compare the perioperative analgesic effect between methadone and butorphanol in cats. DESIGN: Randomized controlled clinical trial. ANIMALS: 22 healthy female domestic cats. PROCEDURES: Cats admitted for ovariohysterectomy were allocated to a butorphanol group (n = 10) or methadone group (12) and premedicated with butorphanol (0.4 mg/kg [0.18 mg/lb], SC) or methadone (0.6 mg/kg [0.27 mg/lb], SC), respectively, in combination with acepromazine (0.02 mg/kg [0.01 mg/lb], SC). Anesthesia was induced with propofol (IV) and maintained with isoflurane in oxygen. A multidimensional composite scale was used to conduct pain assessments prior to premedication and 5, 20, 60, 120, 180, 240, 300, and 360 minutes after extubation or until rescue analgesia was given. Groups were compared to evaluate isoflurane requirement, propofol requirement, pain scores, and requirement for rescue analgesia. RESULTS: Propofol and isoflurane requirements and preoperative pain scores were not different between groups. During recovery, dysphoria prevented pain evaluation at 5 minutes. Pain scores at 20 minutes were significantly lower in the methadone group, and 6 of 10 cats in the butorphanol group received rescue analgesia, making subsequent pain score comparisons inapplicable. After 6 hours, only 3 of 12 cats in the methadone group had received rescue analgesia. CONCLUSIONS AND CLINICAL RELEVANCE: In the present study, methadone appeared to be a better postoperative analgesic than butorphanol and provided effective analgesia for 6 hours following ovariohysterectomy in most cats.

**Comparison of meloxicam and a glucosamine-chondroitin supplement in management of feline osteoarthritis. A double-blind randomised, placebo-controlled, prospective trial.**

Objective: To compare the efficacy of meloxicam and a glucosamine-chondroitin (Glu-Ch) supplement in the management of feline osteoarthritis (OA). Methods: Prospective, blinded, randomized clinical trial. Cats over eight years of age with clinical signs of chronic OA were assigned to one of two groups and Glu-Ch or meloxicam was administered orally for 70 days, followed by a placebo until day 98. Cats were assessed by a veterinarian on five occasions and the owner completed an assessment form at the same time. Results: Data were collected from thirty cats. Pre-treatment disease scores were significantly higher in the meloxicam group for owner mobility (p = 0.01) and veterinary lameness (p = 0.02). Owner mobility scores at day 14 (p = 0.01) and day 42 (p = 0.002) were significantly improved compared to pre-treatment scores for the meloxicam group. When meloxicam and Glu-Ch were discontinued and the placebo commenced, a significant proportion of the meloxicam group showed worsening of all the owner-assessed scores between day 70 and day 98, when compared to the Glu-Ch group (mobility p = 0.01; activity p = 0.02; temperament p = 0.04; lifestyle p = 0.01). Conclusions: Treatment with meloxicam resulted in a significant improvement in mobility and activity levels of cats with OA until the placebo was introduced. A greater proportion of cats receiving meloxicam medication showed a significant worsening of owner assessment scores once the placebo was introduced, when compared to the Glu-Ch group.


**Comparison of direct and indirect bronchoprovocation testing using ventilator-acquired pulmonary mechanics in healthy cats and cats with experimental allergic asthma.**

Airway hyperresponsiveness (AHR) is a key feature of asthma and can be measured using bronchoprovocation. Direct (methacholine, MCh) or indirect (adenosine-5-monophosphate, AMP; or mannitol) bronchoprovocants are used in human patients, the latter inducing AHR only with pre-existing airway inflammation. The present study compared the responses to direct (MCh) and indirect (mannitol, AMP) bronchoprovocation in healthy and asthmatic cats (n=6/group). The order of bronchoprovocant was randomized using a published table of random numbers and there was a 1-month washout before crossover to the next treatment. Pulmonary mechanics were measured in anesthetized and mechanically ventilated cats using a critical care ventilator. Saline at baseline and increasing doses of each bronchoprovocant were aerosolized for 30s, followed by 4min of data collection between doses. The endpoint for each bronchoprovocant was reached when airway resistance exceeded 200% of baseline values (EC200Raw). There was a significant difference (P<0.001) in the airway response of asthmatic vs. healthy cats over the range of MCh concentrations, despite there being no significant difference in the EC200Raw between the groups. Response to MCh was significantly greater (P<0.05) in asthmatic than in healthy cats at MCh concentrations as low as 0.0625mg/mL. For AMP, a small subset of asthmatics (n=2/6) responded at low concentrations; four asthmatic cats and all healthy cats failed to respond even to the highest concentrations of AMP. One asthmatic cat but no healthy cats responded to mannitol. In conclusion, MCh discriminated asthmatic from healthy cats but neither AMP nor mannitol was an effective bronchoprovocant in this model.


**Common and Emerging Infectious Diseases in the Animal Shelter.**

The beneficial role that animal shelters play is unquestionable. An estimated 3 to 4 million animals are
cared for or placed in homes each year, and most shelters promote public health and support responsible pet ownership. It is, nonetheless, inevitable that shelters are prime examples of anthropogenic biological instability: even well-run shelters often house transient, displaced, and mixed populations of animals. Many of these animals have received minimal to no prior health care, and some have a history of scavenging or predation to survive. Overcrowding and poor shelter conditions further magnify these inherent risks to create individual, intraspecies, and interspecies stress and provide an environment conducive to exposure to numerous potentially collaborative pathogens. All of these factors can contribute to the evolution and emergence of new pathogens or to alterations in virulence of endemic pathogens. While it is not possible to effectively anticipate the timing or the pathogen type in emergence events, their sites of origin are less enigmatic, and pathologists and diagnosticians who work with sheltered animal populations have recognized several such events in the past decade. This article first considers the contribution of the shelter environment to canine and feline disease. This is followed by summaries of recent research on the pathogenesis of common shelter pathogens, as well as research that has led to the discovery of novel or emerging diseases and the methods that are used for their diagnosis and discovery. For the infectious agents that commonly affect sheltered dogs and cats, including canine distemper virus, canine influenza virus, Streptococcus spp, parvoviruses, feline herpesvirus, feline caliciviruses, and feline infectious peritonitis virus, we present familiar as well as newly recognized lesions associated with infection. Preliminary studies on recently discovered viruses like canine circovirus, canine bocavirus, and feline norovirus indicate that these pathogens can cause or contribute to canine and feline disease.

Clinicopathologic and MRI characteristics of presumptive hypertensive encephalopathy in two cats and two dogs.
Two dogs and two cats were evaluated for the acute-onset of abnormal mentation, recumbency, and blindness. All cases had systemic hypertension, ranging from 180 mm Hg to 260 mm Hg. MRI of the brain disclosed noncontrast-enhancing, ill-defined, T2-weighted (T2W) hyperintensities in the white matter of the cerebrum in the areas of the frontal, parietal, temporal, and occipital lobes. Lesions were also observed in the caudate nuclei and thalamus (n = 1 in each). Intracranial hemorrhage was observed in one animal. Diffusion-weighted imaging (DWI) was consistent with vasogenic edema in two animals. Retinal lesions were observed in three animals. Hypertension was secondary to renal disease in three animals. A primary underlying disorder was not identified in one animal. Normalization of blood pressure was achieved with amlodipine either alone or in combination with enalapril. In one cat, hypertension spontaneously resolved. In three cases, neurologic improvement occurred within 24-48 hr of normalization of blood pressure. The presumptive diagnosis of hypertensive encephalopathy was supported by the MRI findings and neurologic dysfunction coincident with systemic hypertension in which the neurologic dysfunction improved with treatment of hypertension. The prognosis appears good for the resolution of neurologic deficits with normalization of blood pressure in animals with hypertensive encephalopathy.

Clinical evaluation of the 3M Littmann Electronic Stethoscope Model 3200 in 150 cats. 
Detection of murmurs and gallops may help to identify cats with heart disease. However, auscultatory findings may be subject to clinically relevant observer variation. The objective of this study was to
evaluate an electronic stethoscope (ES) in cats. We hypothesized that the ES would perform at least as well as a conventional stethoscope (CS) in the detection of abnormal heart sounds. One hundred and fifty consecutive cats undergoing echocardiography were enrolled prospectively. Cats were ausculted with a CS (WA Tycos Harvey Elite) by two observers, and heart sounds were recorded digitally using an ES (3M Littmann Stethoscope Model 3200) for off-line analysis. Echocardiography was used as the clinical standard method for validation of auscultatory findings. Additionally, digital recordings (DRs) were assessed by eight independent observers with various levels of expertise, and compared using interclass correlation and Cohen’s weighted kappa analyses. Using the CS, a heart murmur (n = 88 cats) or gallop sound (n = 17) was identified in 105 cats, whereas 45 cats lacked abnormal heart sounds. There was good total agreement (83-90%) between the two observers using the CS. In contrast, there was only moderate agreement (P < 0.001) between results from the CS and the DRs for murmurs, and poor agreement for gallops. The CS was more sensitive compared with the DRs with regard to murmurs and gallops. Agreement among the eight observers was good-to-excellent for murmur detection (81%). In conclusion, DRs made with the ES are less sensitive but comparably specific to a CS at detecting abnormal heart sounds in cats.

Clinical comparison of the TonoVet rebound tonometer and the Tono-Pen Vet applanation tonometer in dogs and cats with ocular disease: glaucoma or corneal pathology.
OBJECTIVE: To compare the TonoVet(R) rebound tonometer with the Tono-Pen Vet(R) applanation tonometer in a larger number of glaucomatous eyes and to evaluate the effect of different corneal pathologies on both tonometers. PROCEDURE: In 26 eyes with clinical signs of glaucoma, intraocular pressure (IOP) was measured using the TonoVet(R) followed by the Tono-Pen Vet(R). In 29 eyes with focal corneal pathology (e.g., corneal scarring, edema, pigmentation), both tonometers were used successively to measure IOP in one unaffected area of the cornea, as well as on the lesion itself. Impact on measurement results was assessed comparing the deviation in IOP readings of each tonometer between the two localizations. Statistical data analysis included paired t-tests and regression analysis using sas software (version 9.2; SAS Institute, Cary, NC). RESULTS: In glaucomatous eyes, the TonoVet(R) consistently yielded higher values of IOP than the Tono-Pen Vet(R) as can be quantified by the regression equation IOP (TonoVet(R)) [mmHg] = 1.12 * IOP (Tono-Pen Vet(R)) [mmHg] + 11.5 with R2 = 0.91 and P < 0.0001. Depending on the type and degree of corneal pathology, the deviation in IOP resulting from measurements on altered cornea ranged from -6 to 16 mmHg for the TonoVet(R) and -7 to 20 mmHg for the Tono-Pen Vet(R), respectively. On average, the effect of corneal disease on IOP measurements was lower for the TonoVet(R) by 1.14 mmHg.
CONCLUSIONS: Rebound tonometry appears to be a valuable alternative to established applanation tonometry in patients with ocular disease such as glaucoma and corneal disorders. In patients suffering from glaucoma, the same type of tonometer should be used for follow-up examinations, as measurement results of the TonoVet(R) and the Tono-Pen Vet(R) differ substantially with increasing IOP. Corneal pathology has considerable influence on both tonometers with the degree of over- or underestimation of IOP depending on the alteration of biomechanical properties of the cornea inflicted by various corneal pathologies.

Clinical Characterization of Epilepsy of Unknown Cause in Cats.
BACKGROUND: The diagnosis of feline epilepsy of unknown cause (EUC) requires a thorough diagnostic evaluation, otherwise the prevalence of EUC could be overestimated. HYPOTHESIS: Feline EUC is a clinically defined disease entity, which differs from feline hippocampal necrosis by the absence of magnetic resonance imaging (MRI) signal alteration of the hippocampus. The objectives of this study were (1) to evaluate the prevalence of EUC in a hospital population of cats by applying well-defined inclusion criteria, and (2) to describe the clinical course of EUC. ANIMALS: Eighty-one cats with recurrent seizures. METHODS: Retrospective study-medical records were reviewed for cats presented for evaluation of recurrent seizures (2005-2010). Inclusion criteria were a defined diagnosis based on laboratory data, and either MRI or histopathology. Final outcome was confirmed by telephone interview with the owner. Magnetic resonance images were reviewed to evaluate hippocampal morphology and signal alterations. RESULTS: Epilepsy of unknown cause was diagnosed in 22% of cats with epilepsy. Physical, neurologic, and laboratory examinations, and either 1.5 T MRI and cerebrospinal fluid analysis or postmortem examination failed to identify an underlying cause. Cats with EUC had a higher survival rate (P <.05) and seizure remission occurred frequently (44.4%). CONCLUSION AND CLINICAL IMPORTANCE: A detailed clinical evaluation and diagnostic imaging with MRI is recommended in any cat with recurrent seizures. The prognosis of cats with normal MRI findings and a clinical diagnosis of EUC are good. Standardized imaging guidelines should be established to assess the hippocampus in cats.


Clinical approach to advanced renal function testing in dogs and cats.
Serum creatinine concentration is insensitive for detecting kidney injury and does not assist in differentiation between glomerular versus tubular damage. Advanced renal function tests, including glomerular filtration rate testing, determining fractional excretion of electrolytes, and assay of urine biomarkers, may allow earlier detection of reduced renal function mass, differentiation of renal from non-renal causes of azotemia, and assist with localization of damage. This article reviews the principles, indications, and limitations of these tests and describes their use in sample clinical scenarios.

Durham, A. C., A. D. Mariano, E. S. Holmes, and L. Aronson (2013) J Comp Pathol
Characterization of Post Transplantation Lymphoma in Feline Renal Transplant Recipients.
The development of malignant neoplasia following solid organ transplantation and immunosuppression is well recognized in man. Post-transplantation malignant tumours include non-melanoma skin cancers, non-Hodgkin’s lymphoma and Kaposi’s sarcoma and many of these cancers have a known or suspected viral cause. A similar increased incidence of cancer is seen in cats that have received a renal transplant and lymphoma is the predominant neoplasm in this population. This study examines a population of cats that received renal transplants at the University of Pennsylvania School of Veterinary Medicine and subsequently developed neoplasia. From 1998 to 2010, 111 cats were transplanted and 25 cats developed cancer (22.5%). Fourteen of the 25 cats were diagnosed with lymphoma (56%), making it the most common tumour in this patient population. The median interval between transplantation and diagnosis of lymphoma was 617 days and the median survival time (MST) following the diagnosis of lymphoma was 2 days. Tissues from seven of these cats were available for histopathological review as either samples collected at necropsy examination (n = 5) or biopsy submissions (n = 2). Five of these cats had multiorgan involvement with sites including the liver, spleen, peripheral and mesenteric lymph nodes, small intestine, urinary bladder, heart, mesenteric fat and body wall. Four of the cats with
multiorgan disease had involvement of the renal allograft two of which also had lymphoma of the native kidney. All lymphomas were classified as mid to high grade, diffuse large B-cell lymphoma, which is also the most common lymphoma subtype in human cases of post-transplantation lymphoproliferative disorders.

Characterization of Neuronal Ceroid-Lipofuscinosis in 3 Cats.
Three young domestic shorthair cats were presented for necropsy with similar histories of slowly progressive visual dysfunction and neurologic deficits. Macroscopic examination of each cat revealed cerebral and cerebellar atrophy, dilated lateral ventricles, and slight brown discoloration of the gray matter. Histologically, there was bilateral loss of neurons within the limbic, motor, somatosensory, visual, and, to a lesser extent, vestibular systems with extensive astrogliosis in the affected regions of all 3 cases. Many remaining neurons and glial cells throughout the entire central nervous system were distended by pale yellow to eosinophilic, autofluorescent cytoplasmic inclusions with ultrastructural appearances typical of neuronal ceroid-lipofuscinoses (NCLs). Differences in clinical presentation and neurological lesions suggest that the 3 cats may have had different variants of NCL. Molecular genetic characterization in the 1 cat from which DNA was available did not reveal any plausible disease-causing mutations of the CLN1 (PPT1), CLN3, CLN5, CLN8, and CLN10 (CTSD) genes. Further investigations will be required to identify the mutations responsible for NCLs in cats.

Changes in serum chemistry values in shelter cats treated with 21 consecutive days of oral itraconazole for dermatophytosis.

Changes in electromyography and F wave responses in two cats with presumed local tetanus: implications for diagnosis and prognosis.
Two cases of focal tetanus in the cat are described. Clinical findings included severe muscular spasms of the pelvic limbs in one cat, and involvement of the thoracic limbs and muscles of the neck and face in the other. Electromyography in both cats showed spontaneous activity characterised by the presence of motor unit potentials. F waves, never previously reported in focal tetanus in animals, showed significantly increased F/M amplitude ratio in both cats and increased F wave duration in one cat. The electrodiagnostic findings provided relevant diagnostic and, possibly, prognostic information.

Change in mRNA expression of sirtuin 1 and sirtuin 3 in cats fed on high fat diet.
BACKGROUND: Mammalian sirtuins are homologs to the yeast silent information regulator 2 (Sir2), which is an NAD-dependent deacetylase. Sirtuins are comprised of 7 proteins, and each has different target proteins. Sirtuin 1 (SIRT1) plays important roles in maintaining metabolic functions and immune responses, and SIRT3 protects cells from oxidative stress-induced cell death. Both SIRT1 and SIRT3
are regulated by metabolic status and aging. Hence, SIRT1 and SIRT3 have been researched in metabolic diseases, such as type 2 diabetes mellitus (DM), fatty liver, and heart diseases. Although these diseases have been increasing, there is little information about relation between the diseases and SIRT1 and SIRT3 in cats. Therefore we cloned SIRT1 and SIRT3 cDNA, examined mRNA expression in cat tissues, and investigated the changes in SIRT1 and SIRT3 mRNA expression in peripheral blood leukocyte of cats fed on HFD for 6 weeks. RESULTS: Cat SIRT1 and SIRT3 contained a catalytic core region and showed high sequence homology with other vertebrate SIRT1 (>61.3%) and SIRT3 (>65.9%) amino acids. Real-time polymerase chain reaction analyses revealed that high expression levels were observed in the liver and skeletal muscle for SIRT1 and in the heart for SIRT3 in cats. In addition, both cat SIRT1 and SIRT3 expression levels in the pancreas were different between individuals. Cat SIRT1 mRNA expression in peripheral blood leukocytes was significantly elevated in obese cats fed on HFD (P < 0.05). CONCLUSIONS: Cat SIRT1 and SIRT3 genes are highly conserved among vertebrates, and HFD feeding may be related to SIRT1 mRNA expression mechanisms in cat peripheral blood leukocytes.

Guevar, J., R. Gutierrez-Quintana, G. Peplinski, J. R. Helm, and J. Penderis (2013) J Feline Med Surg Cavernous sinus syndrome secondary to intracranial lymphoma in a cat. Cavernous sinus syndrome is characterised by internal and external ophthalmoplegia and sensory deficits over the head due to combined deficits of the three cranial nerves (CNs) responsible for the eye movements and pupil function (CN III, IV, VI) and at least one branch of the trigeminal nerve (CN V). It has rarely been described in cats and may occur secondary to inflammatory, infectious or neoplastic lesions within the region of the cavernous sinus on the ventral aspect of the calvarium. This report describes the clinical and magnetic resonance imaging findings in a 14-year-old domestic shorthair cat with neurological deficits compatible with cavernous sinus syndrome caused by presumptive extranodal lymphoma. Treatment with chemotherapy resulted in clinical and imaging remission. Identification of the neurological deficits in cavernous sinus syndrome allows accurate neuroanatomical localisation in order to target diagnostic imaging studies.

Hoenig, M., N. Pach, K. Thomaseth, A. Le, D. Schaeffer, and D. C. Ferguson (2013) Obesity (Silver Spring) 21:E407-E414. Cats differ from other species in their cytokine and antioxidant enzyme response when developing obesity. OBJECTIVES: Obese cats show many similarities to obese people, including insulin resistance and an increased diabetes risk. However, atherosclerosis and cardiovascular disease are not seen in cats. In people, they are associated with the development of an inflammatory response, which, we hypothesized, does not occur in cats. DESIGN AND METHODS: Twenty neutered cats of equal gender distribution were allowed to gain weight by offering food ad libitum and were examined before and at 10, 30, 60, and 100% weight gain. All cats reached 60% of weight gain, 12 cats gained 100% in 12 months. RESULTS: Fat was equally distributed between subcutaneous and visceral depots. Insulin-independent glucose uptake increased and insulin sensitivity decreased with increasing adiposity. However, baseline glucose concentrations were unchanged suggesting a decrease in EGP. Inflammatory cytokines (IL-1, IL-6, TNFa) and catalase, superoxide dismutase, glutathione peroxidase did not change. Insulin, proinsulin, and leptin were positively and adiponectin negatively correlated with adiposity. Heat production increased with obesity, but became less when body weight gain was > 60%. CONCLUSIONS: This indicates that metabolism adapts more appropriately to the higher intake
of calories in the initial phase of obesity but slows at higher body fat content. This likely contributes to the difficulty to lose weight.


Case-control risk factor study of methicillin-resistant Staphylococcus pseudintermedius (MRSP) infection in dogs and cats in Germany.

Methicillin-resistant Staphylococcus pseudintermedius (MRSP) has emerged as a highly drug-resistant small animal veterinary pathogen. Although often isolated from outpatients in veterinary clinics, there is concern that MRSP follows a veterinary-hospital-associated epidemiology. This study’s objective was to identify risk factors for MRSP infections in dogs and cats in Germany. Clinical isolates of MRSP cases (n=150) and methicillin-susceptible S. pseudintermedius (MSSP) controls (n=133) and their corresponding host signalment and medical data covering the six months prior to staphylococcal isolation were analysed by multivariable logistic regression. The identity of all MRSP isolates was confirmed through demonstration of S. intermedius-group specific nuc and mecA. In the final model, cats (compared to dogs, OR 18.5, 95% CI 1.8-188.0, P=0.01), animals that had been hospitalised (OR 104.4, 95% CI 21.3-511.6, P<0.001), or visited veterinary clinics more frequently (>10 visits OR 7.3, 95% CI 1.0-52.6, P=0.049) and those that had received topical ear medication (OR 7.3, 95% CI 1.0-52.6, P=0.049) or glucocorticoids (OR 22.5, 95% CI 7.0-72.6, P<0.001) were at higher risk of MRSP infection, whereas S. pseudintermedius isolates from ears were more likely to belong to the MSSP-group (OR 0.09, 95% CI 0.03-0.34, P<0.001). These results indicate an association of MRSP infection with veterinary clinic/hospital settings and possibly with chronic skin disease. There was an unexpected lack of association between MRSP and antimicrobial therapy; this requires further investigation but may indicate that MRSP is well adapted to canine skin with little need for selective pressure.


Cardiovascular and respiratory effects, and quality of anesthesia produced by alfaxalone administered intramuscularly to cats sedated with dexmedetomidine and hydromorphone.

The cardiovascular and respiratory effects, and the quality of anesthesia of alfaxalone administered intramuscularly (IM) to cats sedated with dexmedetomidine and hydromorphone were evaluated. Twelve healthy adult cats were anesthetized, with six cats receiving dexmedetomidine (0.01 mg/kg IM) followed by alfaxalone (5 mg/kg IM; group DA) and six receiving dexmedetomidine (0.01 mg/kg IM) plus hydromorphone (0.1 mg/kg IM) followed by alfaxalone (5 mg/kg IM; group DHA). Cardiorespiratory (pulse rate, blood pressure, respiratory rate, saturation of oxygen with hemoglobin, end tidal carbon dioxide partial pressure) and bispectral index (BIS) data were collected every 10 mins for 90 mins starting immediately after intubation. The quality of anesthesia was scored by a blinded researcher at induction and at 5 and 60 mins after extubation. Recovery scores ranged from 1 (prolonged struggling) to 4 (no struggling). There were no clinically significant (P >0.05) differences in any data between groups or over time. Physiologic parameters were within normal limits for cats at all times. BIS values were consistent with light anesthesia in both groups. However, recovery was prolonged and marked with excitement, ataxia and hyper-reactivity in all cats. Thus, although cardiovascular and respiratory parameters are stable following IM injection of alfaxalone to cats sedated with dexmedetomidine and hydromorphone, recovery is extremely poor and this route of administration is not recommended for anesthesia in cats.

**Carcinosarcoma of the biliary system in a cat.**
A 12-year-old, mixed-breed domestic cat was diagnosed with a multicystic hepatic mass via ultrasonographic examination and computer tomography scan. The tumor associated with the left medial liver lobe, and connected by a thin stalk to the hilar region, was surgically removed. The mass was firm, encapsulated, mottled white to red black, multinodular, and cystic. Histologic diagnosis was carcinosarcoma supported by positive immunohistochemistry for cytokeratins and vimentin of atypical neoplastic cell populations. On the basis of morphology, the origin was considered to be in the biliary tract. Biliary carcinosarcoma is a rare neoplasm that occurs in people. The epidemiology and risk factors have not yet been determined, and the prognosis is poor except for cases in which curative resection is performed.


**Canine and feline dermatophytosis due to Microsporum gypseum: a retrospective study of clinical data and therapy outcome with griseofulvin.**
OBJECTIVE: Microsporum gypseum is a common inhabitant of the soil, occasionally responsible for human and animal ringworm. Few reports describe the treatment of dermatologic diseases due to M. gypseum. The objective of this study was to evaluate retrospectively cases of M. gypseum infection in dogs and cats. MATERIAL AND METHODS: The occurrence of infection by this dermatophyte was retrospectively evaluated in dermatological specimens from 15,684 dogs and cats dermatologically diseased from Italy. Clinical outcome after treatment with griseofulvin combined with topical enilconazole was evaluated in 41 dogs and, out of label, 10 cats. Furthermore, in vitro susceptibility to griseofulvin and enilconazole was evaluated on 31 clinical isolates of M. gypseum. RESULTS: One hundred and eighty-five specimens out of 15,684 (1.1%) scored positive for M. gypseum. The treatment failed to achieve both mycological and clinical cure in 16 dogs (39%) and four cats (40%), as well as fungal isolates demonstrated a very poor in vitro sensitivity when tested versus griseofulvin: the MIC value was 150 μg/mL. The ED50 value was calculated at 66 μg/mL. CONCLUSION: Blind treatments with griseofulvin in ringworm due to M. gypseum should be avoided.


**Biomarkers in the assessment of acute and chronic kidney diseases in the dog and cat.**
In both human and veterinary medicine, diagnosing and staging renal disease can be difficult. Measurement of glomerular filtration rate is considered the gold standard for assessing renal function but methods for its assessment can be technically challenging and impractical. The main parameters used to diagnose acute and chronic kidney disease include circulating creatinine and urea concentrations, and urine-specific gravity. However, these parameters can be insensitive. Therefore, there is a need for better methods to diagnose and monitor patients with renal disease. The use of renal biomarkers is increasing in human and veterinary medicine for the diagnosis and monitoring of acute and chronic kidney diseases. An ideal biomarker would identify site and severity of injury, and correlate with renal function, among other qualities. This article will review the advantages and limitations of renal biomarkers that have been used in dogs and cats, as well as some markers used in humans that may be adapted for veterinary use. In the future, measuring a combination of biomarkers will likely be a useful approach in the diagnosis of kidney disorders.

**Biological variation and reference change values of feline plasma biochemistry analytes.**

This is the first report concerning biological variation and reference change values of feline plasma biochemistry components in the peer-reviewed literature. Biological variation refers to inherent physiological variation of analytes. The ratio of individual biological variation to group biological variation is referred to as an analyte’s index of individuality. This index determines the suitability of an analyte to be assessed in relation to population- or subject-based reference intervals. A subject-based reference interval is referred to as a reference change value or critical difference, and is calculated from individual biological variation. Fourteen cats were sampled for plasma biochemistry analysis once weekly for 6 weeks. Samples were stored and then tested at the same time. Results were assessed in duplicate and coefficients of variation for each analyte were isolated to distinguish variation within each subject, between all subjects and by the analyser. From these results, an index of individuality and reference change values were determined for each analyte. Five plasma biochemistry analytes (alkaline phosphatase, alanine aminotransferase, cholesterol, creatinine and globulin) had high individuality and therefore subject-based reference intervals are more appropriate; only one analyte (sodium) had low individuality, indicating that population-based reference intervals are appropriate. Most analytes had intermediate individuality so population-based reference intervals should be assessed in relation to subject-based reference intervals. The results of this study demonstrate high individuality for most analytes and, therefore, that population-based reference intervals are of limited utility for most biochemical analytes in cats.


**Bioavailability of morphine, methadone, hydromorphone, and oxymorphone following buccal administration in cats.**

Buccal administration of buprenorphine is commonly used to treat pain in cats. It has been argued that absorption of buprenorphine through the buccal mucosa is high, in part due to its pKa of 8.24. Morphine, methadone, hydromorphone, and oxymorphone have a pKa between 8 and 9. This study characterized the bioavailability of these drugs following buccal administration to cats. Six healthy adult female spayed cats were used. Buccal pH was measured prior to drug administration. Morphine sulfate, 0.2 mg/kg IV or 0.5 mg/kg buccal; methadone hydrochloride, 0.3 mg/kg IV or 0.75 mg/kg buccal; hydromorphone hydrochloride, 0.1 mg/kg IV or 0.25 mg/kg buccal; or oxymorphone hydrochloride, 0.1 mg/kg IV or 0.25 mg/kg buccal were administered. All cats received all treatments. Arterial blood was sampled immediately prior to drug administration and at various times up to 8 h thereafter. Bioavailability was calculated as the ratio of the area under the time-concentration curve following buccal administration to that following IV administration, each indexed to the administered dose. Mean +/- SE (range) bioavailability was 36.6 +/- 5.2 (12.7-49.5), 44.2 +/- 7.9 (18.7-70.5), 22.4 +/- 6.9 (6.4-43.4), and 18.8 +/- 2.0 (12.9-23.5)% for buccal administration of morphine, methadone, hydromorphone, and oxymorphone, respectively. Bioavailability of methadone was significantly higher than that of oxymorphone.


**BDNF treatment and extended recovery from optic nerve trauma in the cat.**

PURPOSE: We examined the treatment period necessary to restore retinal and visual stability
following trauma to the optic nerve. METHODS: Cats received unilateral optic nerve crush and no treatment (NT), treatment of the injured eye with brain-derived neurotrophic factor (BDNF), or treatment of the injured eye combined with treatment of visual cortex for 2 or 4 weeks. After 1-, 2-, 4-, or 6-week survival periods, pattern electroretinograms (PERGs) were obtained and retinal ganglion cell (RGC) survival determined. RESULTS: In the peripheral retina, RGC survival for NT, eye only, and eye + cortex animals was 55%, 78%, and 92%, respectively, at 1 week, and 31%, 60%, and 93%, respectively, at 2 weeks. PERGs showed a similar pattern of improvement. After 4 weeks, RGC survival was 7%, 29%, and 53% in each group, with PERGs in the dual-treated animals similar to the 1- to 2-week animals. For area centralis (AC), the NT, eye only, and eye + cortex animals showed 47%, 78%, and 82% survival, respectively, at 2 weeks, and 13%, 54%, and 81% survival, respectively, at 4 weeks. Removing the pumps at 2 weeks resulted in ganglion cell survival levels of 76% and 74% in the AC at 4 and 6 weeks postcrush, respectively. The PERGs from 2-week treated, but 4- and 6-week survival animals were comparable to those of the 2-week animals. CONCLUSIONS: Treating the entire central visual pathway is important following optic nerve trauma. Long-term preservation of central vision may be achieved with as little as 2 weeks of treatment using this approach.


Abstract To determine the occurrence of feline bartonellosis in Israel, blood samples were collected from 179 stray and 155 domestic cats from 18 cities or villages in central and northcentral Israel. Samples were screened for Bartonella infection by culture isolation and molecular detection using high-resolution melt (HRM) real-time PCR assay targeting the 16S-23S rRNA internal transcribed spacer (ITS). All positive samples were confirmed by two additional HRM real-time PCR assays targeting two fragments of the beta-subunit of RNA polymerase (rpoB) and the 16S rRNA genes. The prevalence of Bartonella spp. infection in the general tested population was 25.1% (84/334). A higher prevalence was detected in the stray (30.7%; 55/179) than the domestic cats (18.7%; 29/155). Bartonella henselae, Bartonella claridgeiae, and Bartonella koehlerae were highly prevalent in both cat populations, however their distribution among the two populations varied significantly (p=0.016). B. claridgeiae and B. koehlerae were found to be more prevalent in stray than domestic cats, whereas B. henselae was evenly distributed. Co-infection with two or more different Bartonella spp. was determined in 2.1% (7) of the cats. The ITS HRM real-time PCR assay used in this study was shown to have a greater screening power than bacterial isolation, detecting 94.0% (79/84) compared to 35.7% (30/84), respectively, of all positive samples. The high prevalence of these zoonotic Bartonella species, coupled with the overpopulation of stray cats, and increased numbers of domestic cats in the major urban centers in Israel represent a significant threat for the public health in this country.


In Argentina, data on the presence of members of the genus Bartonella is scarce. To increase knowledge about these zoonotic pathogens in this country, the presence and variability of Bartonella spp. was investigated in cats and dogs from Buenos Aires. Bartonella spp. was detected in 17.8% of cats, while all dogs tested negative by PCR and Reverse Line Blot. B. henselae was the most frequent
species, being detected in 11.9% (14/101), while B. clarridgeiae was found in only 5.9% (6/101) of the cats. Afterwards, B. henselae isolates and positive blood samples were characterized by Multiple Locus Sequence Typing (MLST) and Multiple Locus Variable Number Tandem Repeats Analysis (MLVA). As result, four different MLST sequence types (ST) and eight MLVA profiles were identified. ST 1 was the most frequent variant found in cats, followed by ST 8. Interestingly, some of the MLVA profiles that were detected in this study have been previously associated with human disease, and represents a potential risk of infection. Veterinarians and physicians should consider the presence of these emerging pathogens in their diagnostic routine.


**Bartonella and toxoplasma infections in stray cats from Iraq.**

Abstract. Because of overpopulation, stray/feral cats were captured on military bases in Iraq as part of the US Army Zoonotic Disease Surveillance Program. Blood samples were collected from 207 cats, mainly in Baghdad but also in North and West Iraq, to determine the prevalence of Bartonella and Toxoplasma infections. Nine (4.3%) cats, all from Baghdad, were bacteremic with B. henselae type I. Seroprevalence was 30.4% for T. gondii, 15% for B. henselae, and 12.6% for B. clarridgeiae. Differences in Bartonella prevalence by location were statistically significant, because most of the seropositive cats were from Baghdad. There was no association between T. gondii seropositivity and either of the two Bartonella species surveyed. This report is the first report on the prevalence of Bartonella and T. gondii among stray cats in Iraq, which allows for better evaluation of the zoonotic risk potential to the Iraqi people and deployed military personnel by feral cat colonies.


**Audiogenic reflex seizures in cats.**


**Atrioventricular septal defects: Natural history, echocardiographic, electrocardiographic, and radiographic findings in 26 cats.**

OBJECTIVES: To evaluate signalment, echocardiographic, electrocardiographic, and radiographic findings as well as natural history in a group of cats with atrioventricular septal defects (AVSD). ANIMALS: 26 client owned cats. METHODS: Medical records were reviewed retrospectively for signalment, morphologic type of AVSD, presence of concurrent congenital heart disease (ConcCHD), diagnostic findings, and natural history. RESULTS: Seventeen cats had an isolated AVSD: 13/17 had a partial and 4/17 had a complete AVSD. Double outlet right atrium (DORA) was diagnosed in 4/17 cats. Of those with a partial AVSD, 7/13 had an atrial communication while 6/13 had a ventricular communication. Congestive heart failure (CHF) developed in 5/17 cats; all 3 cats diagnosed with a DORA not lost to follow-up developed pulmonary edema. Sudden death was documented in 4/17 (23.5%). The 5 year survival was 53.0% (9/17). Concurrent congenital heart disease was identified in 9/26 cats with 7/9 having a conotruncal abnormality. Electrocardiography was performed in 14 cats with 11/14 diagnosed with a conduction disturbance. CONCLUSIONS: Overall the echocardiographic and electrocardiographic findings with AVSD are similar to that seen in humans. Cats may have a higher prevalence than humans of partial AVSD with ventricular communication only as well as a
higher prevalence of DORA. Cats with an AVSD have an overall guarded prognosis although some can live for a protracted time.


Assessment of Persistence of Bartonella henselae in Ctenocephalides felis.
Bartonella henselae (Rhizobiales: Bartonellaceae) is a Gram-negative fastidious bacterium of veterinary and zoonotic importance. The cat flea Ctenocephalides felis (Siphonaptera: Pulicidae) is the main recognized vector of B. henselae, and transmission among cats and humans occurs mainly through infected flea feces. The present study documents the use of a quantitative molecular approach to follow the daily kinetics of B. henselae within the cat flea and its excreted feces after exposure to infected blood for 48 h in an artificial membrane system. B. henselae DNA was detected in both fleas and feces for the entire life span of the fleas (i.e., 12 days) starting from 24 h after initiation of the blood meal.

Assessment of behavioural changes in domestic cats during short-term hospitalisation.
We evaluated behavioural changes in domestic cats during short-term hospitalisation using a novel cat demeanour scoring system. Thirty-five healthy, client-owned cats admitted for neutering were enrolled. Cats were housed in a standardised cat ward for a short-term hospitalisation period (3-5 days) and demeanour scores were recorded once daily. The scoring system classified cats into one of five behavioural groupings: friendly and confident, friendly and shy, withdrawn and protective, withdrawn and aggressive, and overtly aggressive. Total demeanour score decreased over time (P <0.001) and the demeanour category improved (P <0.001). The intra-class correlation was 0.843 (P <0.001) and kappa was 0.606 (P <0.001), suggesting good repeatability and agreement among investigators. The demeanour scoring system was effective in detecting a change in behaviour in healthy cats undergoing short-term hospitalisation. The findings suggest that healthy cats require 2 days to acclimatise to hospitalisation.

Arterial Thromboembolism in 250 Cats in General Practice: 2004-2012.
BACKGROUND: Population characteristics and outcome of cats with arterial thromboembolism (ATE) managed in general practice (GP) have been poorly described. HYPOTHESIS: Cats with ATE presenting to GP are usually euthanized at presentation, but survival times >1 year are possible. ANIMALS: Cats with ATE managed by 3 GP clinics in the United Kingdom. METHODS: Records of cases presenting to GP over a 98-month period (2004-2012) were reviewed. Cats with an antemortem diagnosis of limb ATE were included. Outcome information was obtained. RESULTS: Over 98 months, 250 cats were identified with ATE. Prevalence was approximately 0.003%. At presentation, 153 cats (61.2%) were euthanized, with 68/97 (70.1%) of the remaining cats (27.2% of the total population) surviving >24 hours after presentation. Of these, 30/68 (44.1%) survived for at least 7 days. Hypothermia (HR, 1.44; 95% CI, 1.002-2.07; P =.049) and management by Clinic 2 (HR, 5.53; 95% CI, 1.23-24.8; P =.026) were independent predictors of 24-hour euthanasia or death. For cats surviving >24 hours, hypothermia (HR, 2.25; 95% CI, 1.12-4.48; P =.021) and failure to receive aspirin, clopidogrel, or both (HR, 8.26; 95% CI, 1.39-50; P =.001) were independent predictors of euthanasia or
death within 7 days. For cats that survived \( \geq 7 \) days, median survival time was 94 (95% CI, 42-164) days, with 6 cats alive 1 year after presentation. CONCLUSIONS: Although 153/250 cats were euthanized at presentation, 6 cats survived >12 months. No factors were identified that predicted euthanasia on presentation.


Are cats (Felis catus) from multi-cat households more stressed? Evidence from assessment of fecal glucocorticoid metabolite analysis.

Given the social and territorial features described in feral cats, it is commonly assumed that life in multi-cat households is stressful for domestic cats and suggested that cats kept as single pets are likely to have better welfare. On the other hand, it has been hypothesized that under high densities cats can organize themselves socially thus preventing stress when spatial dispersion is unavailable. This study was aimed at comparing the general arousal underpinning emotional distress in single housed cats and in cats from multi-cat households (2 and 3-4 cats) on the basis of fecal glucocorticoid metabolites (GCM) measured via enzyme immunoassay (EIA). GCM did not significantly vary as a function of living style (single, double or group-housing); highly stressed individuals were equally likely in the three groups. Young cats in multi-cat households had lower GCM, and overall cats that tolerate (as opposed to dislike) petting by the owners tended to have higher GCM levels. Other environmental aspects within cat houses (e.g. relationship with humans, resource availability) may play a more important role in day to day feline arousal levels than the number of cats per se.


Amino acid, iodine, selenium, and coat color status among hyperthyroid, Siamese, and age-matched control cats.

BACKGROUND: Hyperthyroidism is common among older cats, but its pathogenesis remains poorly understood. Siamese and Himalayan cats have a reduced risk of hyperthyroidism compared with domestic short-hair cat breeds. A mechanism of risk reduction in pointed-coat breeds is unknown. OBJECTIVES: To determine if tyrosine, phenylalanine, iodine, or selenium blood concentrations are altered in hyperthyroid cats and to describe the plasma amino acid profiles of client-owned cats with naturally occurring hyperthyroidism. ANIMALS: Twenty-seven client-owned cats with (n = 12) and without (n = 15) hyperthyroidism were studied. METHODS: Cross-sectional study. Hyperthyroid cats were prospectively recruited among cats presenting for radioiodine therapy. Control cats were recruited among pets of hospital personnel. Blood was collected for total thyroxine, plasma amino acid, selenium, and iodine determination. Coat color (8 white or pointed; 19 dark), breed, and diet history were recorded. RESULTS: Tyrosine, phenylalanine, iodine, and selenium levels were not significantly different among light or dark cats or cats with or without hyperthyroidism (\( P > .05 \)). Plasma amino acid profiles of hyperthyroid cats and control cats were similar, and neither group was deficient in any of the amino acids. L-glutamine was significantly lower in cats with hyperthyroidism (mean +/- SD: 648 +/- 193) compared with control cats (816 +/- 134; \( P < .05 \)). CONCLUSIONS AND CLINICAL IMPORTANCE: Altered tyrosine, iodine, and selenium metabolism were not associated with coat color or hyperthyroidism in pointed or light coat-colored cats.
Altered expression of adhesion molecules on peripheral blood leukocytes in feline infectious peritonitis.

Feline infectious peritonitis (FIP) is a fatal, coronavirus-induced systemic disease in domestic and wild felids. The pathology associated with FIP (multifocal granulomatous vasculitis) is considered to be elicited by exaggerated activation and subsequent extravasation of leukocytes. As changes in the expression of adhesion molecules on circulating leukocytes precede their margination and emigration, we reasoned that the expression of leukocyte adhesion molecules may be altered in FIP. In present study, the expression of principal adhesion molecules involved in leukocyte transmigration (CD15s, CD11a, CD11b, CD18, CD49d, and CD54) on peripheral blood leukocytes from cats with naturally occurring FIP (n=15) and controls (n=12) was quantified by flow cytometry using a formaldehyde-based rapid leukocyte preparation technique. T- and B-lymphocytes from FIP patients exhibit higher expression of both subunits (CD11a and CD18) composing the beta2 integrin lymphocyte function-associated antigen (LFA)-1. In addition, the expression of the alpha4 subunit (CD49d) of the beta1 integrin very late antigen (VLA)-4 was elevated on B-lymphocytes from FIP patients. The expression of CD11b and CD18, that combine to form the beta2 integrin macrophage-1 antigen (Mac-1), was elevated on monocytes, whereas the density of CD49d was reduced on this population in FIP. Granulocytes of FIP cats displayed an increased expression of the alpha chain of Mac-1 (CD11b). These observations suggest that leukocytes from FIP patients show signs of systemic activation causing them to extravasate into surrounding tissues and ultimately contribute to pyogranuloma formation seen in FIP.

Agreement of the serum Spec fPL and 1,2-o-dilauryl-rac-glycero-3-glutaric acid-(6'-methylresorufin) ester lipase assay for the determination of serum lipase in cats with suspicion of pancreatitis.

BACKGROUND: Serum lipase activities measured by catalytic assays are claimed to be of limited utility for diagnosing pancreatitis in cats. The Spec fPL assay currently is believed the most sensitive test; however, studies comparing different lipase assays are lacking. 1,2-o-dilauryl-rac-glycero-3-glutaric acid-(6'-methylresorufin) ester (DGGR) assay for the determination of lipase activity has been evaluated in dogs, but no information is available in cats. OBJECTIVES: To investigate the agreement of DGGR-lipase activity and Spec fPL concentration in cats with clinical signs consistent with pancreatitis. ANIMALS: Two hundred fifty-one client-owned cats. METHODS: DGGR-lipase activity and Spec fPL concentration measured from the same blood sample in cats undergoing investigation for pancreatitis. The agreement between DGGR-lipase and Spec fPL at different cutoffs was assessed using Cohen’s kappa coefficient (kappa). Sensitivity and specificity were calculated for 31 cases where pancreatic histopathology was available. RESULTS: DGGR-lipase (cutoff, 26 U/L) and Spec fPL (cutoff, >5.3 mug/L) had a kappa of 0.68 (standard error [SE] 0.046). DGGR-lipase (cutoff, 26 U/L) and Spec fPL (cutoff, >3.5 mug/L) had a kappa of 0.60 (SE, 0.05). The maximum kappa at a Spec fPL cutoff >5.3 mug/L was found when the DGGR-lipase cutoff was set >34 U/L and calculated as 0.755 (SE, 0.042). Sensitivity and specificity were 48% and 63% for DGGR-lipase (cut-off, 26 U/L) and 57% and 63% for Spec fPL (>5.3 mug/L), respectively. CONCLUSIONS AND CLINICAL IMPORTANCE: Both lipase assays agreed substantially. DGGR assay seems a useful and cost-efficient method compared to the Spec fPL test.

**Acquisition and persistence of antimicrobial-resistant bacteria isolated from dogs and cats admitted to a veterinary teaching hospital.**

**OBJECTIVE:** To assess antimicrobial resistance among bacteria isolated from dogs and cats admitted to a veterinary teaching hospital (VTH), determine the incidence of acquisition of and frequency of persistent colonization by antimicrobial-resistant organisms among these animals, and identify risk factors associated with these variables. **DESIGN:** Prospective longitudinal study. **ANIMALS:** 622 dogs and 92 cats admitted to a VTH and expected to stay >/= 48 hours. **PROCEDURES:** Samples were collected with rectal and nasal or oropharyngeal swabs at admission and discharge. Isolates of enterococci, staphylococci, and Escherichia coli were tested for antimicrobial resistance via microbroth dilution methods. A subset of isolates was analyzed with pulsed-field gel electrophoresis and multilocus sequence typing. Significant trends in proportions of organisms with antimicrobial resistance over the 3-year study period were assessed. **RESULTS:** The proportion of staphylococci with antimicrobial resistance increased, whereas the proportion of E coli with resistance decreased, over time; resistance among enterococci was more variable. For 506 dogs with paired admission and discharge samples, multidrug-resistant (MDR) E coli was acquired by 40 (8%) and methicillin-resistant Staphylococcus aureus (MRSA) was acquired by 7 (1.4%); hospitalization for > 3 days was significantly associated with both variables. Most (5/7 isolates) acquired MRSA was of sequence type (ST) 5. **CONCLUSIONS AND CLINICAL RELEVANCE:** Extended hospitalization was associated with increased risk of acquiring MDR E coli or MRSA, although few animals acquired MRSA. It is unclear whether associations were confounded by illness severity or use of infection control measures. Additionally, MRSA of ST5, which has been associated with small animal medicine, was the most commonly acquired MRSA in this study.


**Absorption of Transdermal and Oral Cyclosporine in Six Healthy Cats.**

Cyclosporine is commonly used orally to treat feline dermatoses. Due to difficulties administering oral medications, veterinarians sometimes prescribe compounded transdermal cyclosporine, despite studies showing limited absorption. The study objective was to compare cyclosporine blood concentrations after oral administration to concentrations after transdermal application of cyclosporine (prepared in pluronic lecithin organogel [PLO]) in six cats using a controlled, cross-over design with a 2 wk washout period. Cats were dosed at 5.1-7.4 mg/kg of cyclosporine q 24 hr either per os for 7 days or transdermally for 21 days. Cyclosporine blood concentrations were measured q 7 days and after the washout period. A monoclonal-based immunoassay (lower limit of quantitation was 25 ng/mL) was used. Median concentrations on the seventh day were 2,208 ng/mL (range, 1,357-3,419 ng/mL) 2 hr after orally administered cyclosporine and 37 ng/mL (range, 25-290 ng/mL) 2 hr after transdermally applied cyclosporine. Median concentration on day 21 was 58 ng/mL (range, 51-878 ng/mL) 2 hr after transdermally applied cyclosporine. Concentrations were quantifiable for transdermally applied cyclosporine, but considered therapeutic in only one of six cats. Based on those results, transdermally applied cyclosporine was not recommended in cats because of inconsistent absorption.

Aberrant expression of sLex and sLea as candidate prognostic factors for feline mammary gland tumour.

Expression of the carbohydrate antigens sialyl Lewis x (sLex) and a (sLea) was evaluated in feline mammary gland tumours (FMGT). Immunohistochemical analysis of tissues from 21 FMGT patients and 11 healthy cats revealed significantly higher sLex and sLea antigen expression in adenocarcinoma tissues compared with that of normal mammary tissues (P < 0.01). Serum concentration of sLex was evaluated using an enzyme-linked immunosorbent assay and was significantly higher in the 11 FMGT patients (4.71 +/- 10.1 U/ml) than the 22 patients with other disease (2.69 +/- 1.59 U/ml) (P = 0.03) and the 22 healthy cats (3.71 +/- 1.10 U/ml), although the latter difference was not significant. Although the number of cases examined in this study was small, our findings suggest that aberrant expression of sLe antigens may be induced by tumourigenesis in FMGT and that sLe antigens are potential prognostic tumour markers for FMGT.


A systematic review of sevoflurane and isoflurane minimum alveolar concentration in domestic cats.

OBJECTIVE: The purpose of this systematic review is to summarize the results of studies which have determined the minimum alveolar concentration (MAC) of isoflurane and sevoflurane in domestic cats. STUDY DESIGN: Systematic review. ANIMALS: Cats. METHODS USED: A comprehensive search of research literature was performed without language restriction. The search utilized the Pubmed, Google Scholar, and CAB Abstracts electronic databases using a combination of free text terms ‘Minimum alveolar concentration’, ‘sevoflurane’, ‘isoflurane’, ‘anesthetic’, ‘cat’, ‘cats’ or ‘feline’. The search was conducted from November 2010 to June 2012. RESULTS: The MAC for isoflurane ranged from 1.20 +/- 0.13% to 2.22 +/- 0.35% and the MAC for sevoflurane ranged from 2.5 +/- 0.2% to 3.95 +/- 0.33%. The average MAC for isoflurane was 1.71 +/- 0.07% and for sevoflurane was 3.08 +/- 0.4%. CONCLUSIONS & CLINICAL RELEVANCE: The average MAC for isoflurane was 1.71 +/- 0.07% and for sevoflurane was 3.08 +/- 0.4%. Methodology differed among studies, and particular attention should be paid in the future to appropriate reporting of methods to allow sound conclusions to be made from the results.


A Retrospective Study of Feline Gastric Lymphoma in 16 Chemotherapy-Treated Cats.

The purposes of this study were to describe cases of feline gastric lymphoma with regards to signalment, clinical presentation, laboratory and ancillary study findings, response to therapy, and outcomes and to identify prognostic variables. Sixteen cats with stage I and II gastric lymphoma treated with chemotherapy were included in this study. Seventy-five percent of cats experienced remission. Overall, first remission duration was 108 days. Response to treatment was prognostic as in other types of feline lymphoma. Cats with a complete remission (CR) had longer survival times compared with cats with a partial remission (PR). Sex and treatment with a rescue protocol were found to be prognostic with castrated males having longer survivals than spayed females. Cats that received rescue chemotherapy had shorter first remission durations than those that did not. Prior treatment with steroids and stage were not found to be significant prognostic variables. This study characterizes gastric lymphoma treated with chemotherapy in cats. Further studies are needed to determine the comparative efficacy of surgical and chemotherapeutic treatments for feline gastric lymphoma.

A retrospective analysis of urethral rupture in 63 cats.
The aim of this study was to investigate the short- and long-term morbidity and mortality associated with urethral rupture in cats. Medical records were reviewed from four veterinary hospitals. Diagnosis was made from retrograde urethrography or direct visualisation during surgery. Location of rupture was categorised as pre-, intra- or post-pelvic. Follow-up data were collected from referring veterinarians. Sixty-three cats were included in the study of which, males predominated (88.9%). Trauma was the most common cause (n = 35; 55.6%) with the remainder due to iatrogenic injury. Forty-eight cats (88.9%) were treated surgically and six (11.1%) managed conservatively. Significant differences between cats suffering traumatic versus iatrogenic injury included the presence of musculoskeletal injuries (P <0.001); the location of rupture (P <0.001); the degree of rupture (P <0.001); definitive management (P <0.001) and short-term complications (P = 0.026). Short-term complications were significantly associated with the following: musculoskeletal injuries (P = 0.012); uroabdomen/uroretroperitoneum (P = 0.004); azotaemia (P = 0.021); postoperative urinary diversion (P = 0.036) and >1 surgery performed (P = 0.006). Forty-seven cats (74.6%) survived to discharge. Prognostic factors associated with survival to discharge included the presence of musculoskeletal injuries (P = 0.017); cause of rupture (P = 0.017); location of rupture (P = 0.039) and definitive management (P = 0.020). Twenty-four cats (57.1%) suffered short-term complications and 10 (27.0%) suffered long-term complications. Of those cats surviving to discharge 30 (71.4%) had a good outcome. Median follow-up was 16 months. Outcome was significantly associated with cause of rupture (P = 0.04); short-term complications (P = 0.03) and long-term complications (P <0.001). In conclusion, a significantly greater proportion of cats with iatrogenic injuries survived to discharge and had a good outcome compared with those that suffered trauma.


A laboratory diagnostic approach to hepatobiliary disease in small animals.
Routine biochemical tests generally include serum enzymes, proteins, and other markers useful for identifying hepatobiliary disease in dogs and cats. Obtaining results outside the reference intervals can occur with direct hepatocellular injury, enzyme induction by hepatocytes or biliary epithelium, or decreased hepatic function. However, detection of biochemical abnormalities does not necessarily indicate clinically significant disease. For a comprehensive approach to detection and treatment of hepatobiliary disease, the laboratory results must be correlated with the history and physical examination findings, diagnostic imaging results, and other assays.


A case in Europe of feline histoplasmosis apparently limited to the skin.
BACKGROUND: Histoplasma capsulatum has a worldwide distribution, but reports in Europe remain rare. We present the second report of histoplasmosis in a cat in Europe and, to the best of our knowledge, the first case of feline histoplasmosis infection apparently limited to the skin. CASE REPORT: A 6-year-old male castrated outdoor cat was presented to the dermatology service with a history of skin lesions evolving over 1 month and consisting of multiple papules and nodules on the head and neck. General examination was unremarkable. Cytological examination of the ulcerated nodules revealed a pyogranulomatous infiltrate, with numerous macrophages containing oval yeast-like cells, 2-5 mum in size, with a central, lightly basophilic core surrounded by a clear halo. A tentative
diagnosis of fungal infection was made, and skin biopsy specimens were taken. Histological examination confirmed the cytology findings, and Grocott staining showed numerous organisms suggestive of Histoplasma within macrophages. Thoracic radiographs, abdominal ultrasound and routine laboratory testing were unremarkable. Fungal culture of a nodule was negative. PCR of total DNA extracted from the infected tissue and subsequent sequencing confirmed the diagnosis of H. capsulatum var. capsulatum. Surgical excision of the other nodules was performed, and the cat was treated with oral itraconazole 5 mg/kg once daily; 12 weeks after initial consultation, no lesions were visible. No recurrence was observed during an 8 month follow-up period. CONCLUSIONS AND CLINICAL IMPORTANCE: Histoplasmosis should be included in the differential diagnosis of nodular diseases of cats worldwide.


2014 AAHA Weight Management Guidelines for Dogs and Cats.
Communicating and implementing a weight management program for dogs and cats can be a challenging endeavor for veterinarians, but a rewarding one. An effective individualized weight loss program provides a consistent and healthy rate of weight loss to reduce risk of disease, prevent malnutrition, and improve quality of life. Weight loss is achieved with appropriate caloric restriction, diet selection, exercise, and strategies to help modify behavior of both the pet and client. This document offers guidelines and tools for the management of weight loss and long-term maintenance of healthy weight.