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November 2015 abstracts

Journal of the American Animal Hospital Association (Nov/Dec)

High Prevalence of Covert Infection With Gastrointestinal Helminths in Cats
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Fecal flotation is routinely used to identify feline helminth infections in clinical practice, but it is known to have limitations of sensitivity, particularly for cestodes. To determine the prevalence of helminths in a contemporary population of cats and evaluate the ability of fecal flotation to detect these infections, helminths were recovered from intestinal tracts removed from 116 adult cats humanely euthanized by an animal control shelter in northeastern Oklahoma. Results were compared to those of fecal flotation performed using both passive and centrifugal techniques. Helminths were identified in 78/116 (67.2%) cats, including Toxocara cati (48/116; 41.4%), Ancylostoma tubaeforme (8/116; 6.9%), Dipylidium caninum (40/116; 34.5%), and Taenia taeniaeformis (30/116; 25.9%). Cats with T. cati were significantly more likely to harbor T. taeniaeformis (P = .001) than cats without ascarids. Centrifugal fecal flotation with sugar solution identified 37/48 (77.1%) T. cati infections, 8/30 (26.7%) T. taeniaeformis infections, and no D. caninum infections. Proglottids were detected on external examination in 19.0% (12/63) of cats with cestodes. Cestodes were present in over half of the cats examined in this study, but the majority of these infections were not evident by the detection of external proglottids or recovery of characteristic stages on fecal flotation.

Coagulase-Positive Staphylococcus: Prevalence and Antimicrobial Resistance
Nuno Beça, DVM, MS, Lucinda Janete Bessa, PhD, Angelo Mendes, DVM, MS, Joana Santos, DVM, Liliana Leite-Martins, DVM, Augusto J.F. Matos, DVM, PhD, Paulo Martins da Costa, DVM, PhD

Staphylococcus pseudintermedius is the most prevalent coagulase-positive Staphylococcus inhabitant of the skin and mucosa of dogs and cats, causing skin and soft tissue infections in these animals. In this study, coagulase-positive Staphylococcus species were isolated from companion animals, veterinary professionals, and objects from a clinical veterinary environment by using two particular culture media, Baird-Parker RPF agar and CHROMagar Staph aureus. Different morphology features of colonies on the media allowed the identification of the species, which was confirmed by performing a multiplex polymerase chain reaction (PCR). Among 23 animals, 15 (65.2%) harbored coagulase-positive Staphylococcus, being 12 Staphylococcus pseudintermedius carriers. Four out of 12 were methicillin-resistant S. pseudintermedius (MRSP). All veterinary professionals had coagulase-positive Staphylococcus (CoPS) species on their hands and two out of nine objects sampled harbored MRSP. The antimicrobial-resistance pattern was achieved for all isolates, revealing the presence of many multidrug-resistant CoPS, particularly S. pseudintermedius. The combined analysis of the antimicrobial-resistance patterns shown by the isolates led to the hypothesis that there is a possible crosscontamination and dissemination of S. aureus and S. pseudintermedius species between the three types of carriers sampled in this study that could facilitate the spread of the methicillin-resistance phenotype.

Retrospective Evaluation of Canine Dermatitis Secondary to Corynebacterium spp.
Nicole Ann Boynosky, MS, BVMS, Laura B. Stokking, PhD, DVM, DCAVD

Corynebacterium species are considered nonpathogenic in canine dermatitis; however, potential clinical significance has been demonstrated in canine otitis externa and from a dog bite wound in a human. Objectives of this study were to identify the predominant Corynebacterium species present in lesions of canine dermatitis, assess pathogenic role, determine antimicrobial susceptibility, and evaluate clinical response. Of 37 isolates identified as Corynebacterium, 31 were Corynebacterium auriscanis. Most Corynebacterium isolates were susceptible to chloramphenicol (97%), tetracyclines (92%), and amikacin (89%); isolate susceptibilities to β-lactams, trimethoprim-sulfonamides, and fluoroquinolones were <50%. Most cultures grew mixed populations of bacteria; C. auriscanis was the only organism isolated in three patients. At recheck, 2–8 wk after initial presentation, pleomorphic rods were absent or significantly decreased in all patients. Two of three C. auriscanis isolates were obtained in pure culture and were evaluable, meaning patient had an initial exam and recheck examination. Both patients were already on antimicrobials to which C. auriscanis was resistant in vitro. Both improved after doxycycline administration. C. auriscanis may act as an opportunistic pathogen in canine dermatitis and may not respond to antimicrobial therapy based on susceptibilities for other organisms in mixed infections. Occasionally, Corynebacterium isolated alone may be pathogenic.

Seizures Associated With Hypocalcemia in a Yorkshire Terrier With Protein-Losing Enteropathy
Jim Whitehead, DVM*, Jessica Quimby, DVM, PhD, DACVIM, Danielle Bayliss, DVM, MS, DACVIM

A 7 yr old, male, castrated, Yorkshire terrier was presented on emergency for an acute onset of seizure activity. The owner also reported that the dog had previously exhibited other symptoms, including intermittent vomiting.
Surgical and Medical Treatment of Pyloric and Duodenal Pythiosis in a Dog
David Lee Dycus, DVM, MS, DACVS-SA, Cory Fisher, DVM, MS, DACVS-SA, Ryan Butler, DVM, MS, DACVS-SA
A 5 yr old, male, neutered mixed-breed dog was referred for persistent vomiting 2 wk following a pyloric biopsy for a pyloric outflow obstruction. Histopathology at the time of initial surgery was suggestive of pythiosis. Following referral, the dog underwent radical surgical treatment with a Billroth II procedure, partial pancreatectomy, and cholecystoduodenostomy. Histopathology and serology confirmed the diagnosis of pyloric and medical treatment consisting of itraconazole and terbinafine was started postoperatively. Serology titers were checked again at 8, 12, and 24 wk postoperatively revealing a positive response to treatment and no reoccurrence of pythiosis. Since surgery, the patient experienced waxing and waning elevations of liver values and laparoscopic liver biopsies 10 mo postoperatively revealed hepatic cirrhosis with fibrosis, bile duct hyperplasia, and chronic inflammation. This report documents successful treatment of pyloric/duodenal pythiosis and the long-term (17 mo) consequences associated with the Billroth II, partial pancreatectomy, and biliary rerouting in the dog.

Synchronous Diaphragmatic Flutter Secondary to Primary Hypoparathyroidism in a Dog
Daniela Vrabelova, DVM, MS, Chen Gilor, DVM, PhD, Amy Habing, DVM, Karsten E. Schober, DVM, PhD, Susan Johnson, DVM, MS
A 3 yr old, spayed, female miniature mchnauzer was presented for rhythmic, spontaneous contractions of the abdominal wall and across the costal arches. The rate of contractions coincided with the heart rate and increased during exercise. The dog was diagnosed with primary hypoparathyroidism based on low plasma ionized calcium and serum parathyroid hormone (PTH) concentrations. Fluoroscopic exam confirmed the diagnosis of a synchronous diaphragmatic flutter. Treatment of the hypocalcemia led to resolution of the diaphragmatic flutter.

GM2 Gangliosidosis Variant 0 (Sandhoff Disease) in a Mixed-Breed Dog
Moeko Kohyama, DVM, Akira Yabuki, DVM, PhD, Yasuaki Kawasaki, DVM, PhD, Hiroaki Kawaguchi, DVM, PhD, Naoki Miura, DVM, PhD, Yoshiaki Kitano, DVM, Toshinori Onitsuka, DVM, Mohammad Mahbubur Rahman, DVM, PhD, Noriaki Miyoshi, DVM, PhD, Osamu Yamato, DVM, PhD
GM2 gangliosidosis variant 0 (Sandhoff disease, SD) is a fatal, progressive, neurodegenerative lysosomal storage disease caused by simultaneous deficiencies of acid β-hexosaminidases A and B. Canine SD has so far been identified only in two purebreeds. In this article, we present the case of a 10 mo old, male dog of mixed breed that developed progressive neurological signs including ataxia, postural deficit, and visual deficits and finally died at the age of 21 mo. The dog was diagnosed with SD on the basis of the results of biochemical and histopathological analyses. This is the third report of canine SD and the first time it has been identified in a mixed breed.

An Unusual Case of Metastatic Seminoma in a Dog
Danielle R. Dugat, DACVS-SA, Emily L. Medici, DVM, DACVIM, Mark C. Rochat, DVM, MS, DACVS, Jason A. Arble, DVM, MS, DACVR, Timothy A. Snider, DVM, PhD, DACVP
An 8 yr old, reportedly castrated male Boston terrier presented with a history of generalized hyperesthesia and intermittent shifting leg lameness. Physical examination revealed a caudal abdominal mass and bilateral shoulder pain. A complete blood count, serum biochemistry panel, and urinalysis were unremarkable. Thoracic radiographs demonstrated bony proliferation and lysis of the third sternebra, an expansile lesion of the left tenth rib, and lucency in both proximal humeral metaphyses. Abdominal radiographs and ultrasound revealed a soft tissue mass within the caudoventral right abdomen. Ultrasonography also revealed an enlarged lymph node within the right retroperitoneal space. Exploratory laparotomy identified the mass as a retained testicle. A cryptorchidectomy, lymph node biopsy, and bilateral percutaneous core biopsies of the proximal humeri were
performed. Histopathologic examination revealed malignant seminoma of the testicle with metastasis to lymph node and bone. Adjuvant chemotherapy was recommended, but it was declined by the owner. All follow-up was lost. This case highlights a unique case for causative hyperesthesia secondary to a novel site of metastasis from malignant seminoma. Metastasis to bone has not been reported in humans or dogs and represents a very unusual and aberrant variant of the normally relatively benign biological behavior of seminoma in the dog.

**Treatment of Gastrin-Secreting Tumor With Sustained-Release Octreotide Acetate in a Dog**

Sangho Kim, DVM, Kenji Hosoya, DACVR, ACVIM (Oncology), Satoshi Takagi, DVM, PhD, Masahiro Okamura, DVM, PhD

An 8 yr old, intact male Shiba Inu was presented with loose stool, polydipsia, hematuria, vomiting, and anorexia. On abdominal ultrasonography, numerous nodules were detected in the hepatic parenchyma distributed diffusely throughout all lobes. Excisional biopsy of one of the nodules was performed via exploratory laparotomy. A histopathological diagnosis of the lesion was carcinoid, and the tumor cells stained positive to chromogranin A and gastrin. The serum gastrin level of the dog was 45,613 pg/mL (reference range: 160–284). In addition to medical treatment with omeprazole² and famotidine³, suppression of gastrin secretion was attempted with octreotide acetate. A test dose of octreotide acetate significantly decreased the serum gastrin level to approximately one third of the baseline in 2 hr and the effect lasted approximately for 6 hr. On day 21, treatment with sustained-release formulation of octreotide acetate (5 mg intramuscular, q 4 wk) was initiated. The serum gastrin concentration gradually decreased over 32 days and then progressively increased in parallel with the progression of the hepatic nodules. The dog gradually developed recurrence of initial clinical signs, and was lost to follow-up on day 510.

**Orbital and Subcutaneous Emphysema Following Enucleation and Respiratory Distress in a Japanese Chin**

Kara R. Gornik, DVM, Christopher G. Pirie, DVM, DACVO, Anthony F. Alario, DVM, DACVO

A 7 yr old, neutered male Japanese chin presented to the Cummings School of Veterinary Medicine at Tufts University (CSVMTU) for evaluation of chronic unilateral orbital swelling that worsened following an episode of respiratory distress. The left eye had been enucleated 5 yr previously. Intermittent mild-to-moderate left orbital swelling had been noted by the owner since the initial surgery. Examination demonstrated a moderate-to-severe, soft, fluctuant swelling involving the left orbit with erythema of the overlying skin. Crepitus was noted over the occipital tuberosity. Computed tomography revealed a large volume of gas involving the left orbit. The gas extended caudally within the subcutaneous tissues to both hemimandibles, dorsal to the cranium, and partially surrounded the cranial neck. The presence of a mucosa-lined, air-filled space with a patent nasolacrimal duct was noted on orbital exploration. The lining was removed and the duct closed. Histopathology confirmed the presence of an epithelial lining. No recurrence of the swelling was observed on examination 8 wk after surgery. This is the first report documenting acute worsening of orbital swelling following an episode of respiratory distress. This case highlights the importance of addressing the nasolacrimal duct while performing an enucleation in a brachycephalic dog.

**Juvenile Diabetes Mellitus and Concurrent Exocrine Pancreatic Insufficiency in a Labrador Retriever: Long-Term Management**

Maria Saiz Alvarez, LV MRCVS, Vicente Herrera-Bustillo, LV MRCVS, Artur Font Utset, LV DEV CIM-CA, Jorge Martínez, DVM, PhD, DECVP

An 8 yr old, intact male Labrador retriever presented with vomiting, diarrhea, polyuria, polydipsia, polyphagia, and stunted growth. Diagnostics revealed the presence of juvenile diabetes mellitus and concurrent exocrine pancreatic insufficiency. Pancreatic histopathology showed severe pancreatic atrophy. Successful treatment was achieved with a combination of insulin and pancreatic enzymes. This report describes successful long-term treatment of juvenile diabetes mellitus and concurrent exocrine pancreatic insufficiency in a dog.

**Denervation of the Tensor Veli Palatini Muscle and Effusion in the Tympanic Cavity**

Marc Kent, DACVIM (IM, Neurology), Lauren R. Talarico, DVM, DACVIM (Neurology), Eric N. Glass, MS, DVM, DACVIM (Neurology), Alexander de Lahunta, DVM, PhD, Simon R. Platt, BVMS&S, MRCVS, DACVIM (Neurology), DECVN, Allison C. Haley, DVM, MRCVS, DACVIM (Neurology),

An English springer spaniel was presented for right-sided atrophy of the muscles of mastication, analgesia and paralysis of the face, and vestibular dysfunction. Neurological signs were consistent with a lesion involving the pons and rostral medulla resulting in deficits in the function of the trigeminal, facial, and vestibular nerves. MRI disclosed a right-sided extraparenchymal mass consistent with a trigeminal nerve sheath neoplasm that was compressing and invading the pons and medulla. Atrophy of the muscles of mastication, innervated by the trigeminal nerve, was also observed on MRI. Additionally, effusion was present in the ipsilateral tympanic cavity. Gross and microscopic evaluation of the right tensor veli palatini muscle (TVPM) was consistent with
neurogenic atrophy. Effusion in the tympanic cavity was likely the result of an inability to open the auditory tube as a consequence of paralysis of the TVPM. Without the ability to open the auditory tube, gases present within the auditory tube and tympanic cavity may be absorbed, creating a negative pressure environment that leads to fluid transudation and effusion build up. To the authors' knowledge, this is the first report to document neurogenic atrophy of the TVPM with concurrent effusion in the ipsilateral tympanic cavity.

**Veterinary Clinics of North America (Nov/Dec)**

**Functional Anatomy of the Outflow Facilities**
Stefano Pizzirani, Haiyan Gong
In order to understand the pathophysiology, select optimal therapeutic options for patients and provide clients with honest expectations for cases of canine glaucoma, clinicians should be familiar with a rational understanding of the functional anatomy of the ocular structures involved in this group of diseases. The topographical extension and the structural and humoral complexity of the regions involved with the production and the outflow of aqueous humor undergo numerous changes with aging and disease. Therefore, the anatomy relative to the fluid dynamics of aqueous has become a pivotal yet flexible concept to interpret the different phenotypes of glaucoma.

**Definition, Classification, and Pathophysiology of Canine Glaucoma**
Stefano Pizzirani
Glaucoma is a common ocular condition in humans and dogs leading to optic nerve degeneration and irreversible blindness. Primary glaucoma is a group of spontaneous heterogeneous diseases. Multiple factors are involved in its pathogenesis and these factors vary across human ethnic groups and canine breeds, so the clinical phenotypes are numerous and their classification can be challenging and remain superficial. Aging and oxidative stress are major triggers for the manifestation of disease. Multiple, intertwined inflammatory and biochemical cascades eventually alter cellular and extracellular physiology in the optic nerve and trabecular meshwork and lead to vision loss.

**Genetics of Canine Primary Glaucomas**
András M. Komáromy, Simon M. Petersen-Jones
Primary glaucomas are a leading cause of incurable vision loss in dogs. Based on their specific breed predilection, a genetic cause is suspected to be responsible, and affected dogs should be excluded from breeding. Despite the high prevalence of primary glaucomas in dogs, their genetics have been studied in only a small number of breeds. The identification of canine glaucoma disease genes, and the development of genetic tests, will help to avoid the breeding of affected dogs in the future and will allow for earlier diagnosis and potentially more effective therapy.

**Clinical Signs and Diagnosis of the Canine Primary Glaucomas**
Paul E. Miller, Ellison Bentley
The diagnosis of glaucoma is highly dependent on a working understanding of the clinical signs and available diagnostic procedures. Clinical signs may be attributable to increased intraocular pressure and/or complex alterations in the physiology or molecular biology of the anterior segment, retinal ganglion cells, and optic nerve. Many diagnostic procedures seek to more fully characterize these alterations and to identify which clinical features increase the risk of overt primary angle closure glaucoma (PACG) occurring. Considerable progress has been made in identifying the anatomic features that predispose an eye to PACG, and in elucidating the role of reverse pupillary block.

**Microscopic Lesions in Canine Eyes with Primary Glaucoma**
Gillian Beamer, Christopher M. Reilly, Stefano Pizzirani
Although the clinical classification of primary glaucoma in dogs is quite simple, the phenotypes of glaucoma in most of the species are indeed multiple. Ophthalmologists can often evaluate the dynamic changes of clinical signs at different times in the course of the disease, whereas pathologists are often presented with globes that have undergone abundant therapies and are at the end stage. Therefore, an open collaboration between clinicians and pathologists can produce the most accurate interpretation in the pathology report and improve patient outcomes. This article focuses on the histomorphologic elements that characterize, and are important to, canine primary glaucomas.

**Medical Treatment of Primary Canine Glaucoma**
Anthony F. Alario, Travis D. Strong, Stefano Pizzirani
Glaucoma is a painful and often blinding group of ocular diseases for which there is no cure. Although the definition of glaucoma is rapidly evolving, elevated intraocular pressure (IOP) remains the most consistent risk factor of glaucoma in the canine patient. Therapy should be aimed at neuroprotection. The mainstay of therapy focuses on reducing IOP and maintaining a visual and comfortable eye. This article discusses the most current ocular hypotensive agents, focusing on their basic pharmacology, efficacy at lowering IOP, and recommended use in the treatment of idiopathic canine glaucoma.

**Surgical Treatment of Canine Glaucoma: Filtering and End-Stage Glaucoma Procedures**

Federica Maggio, Dineli Bras

Canine glaucoma is a common cause of vision loss associated with raised intraocular pressure, and leads to damage of the retina and optic nerve head. In most cases, medical treatment alone cannot provide long-term management of intraocular pressure control and preservation of vision. Surgical intervention is usually recommended to either decrease aqueous humor production, or increase its outflow. Among the current available procedures, filtering techniques are aimed at increasing aqueous humor outflow. Proper surgical timing and a combination of cyclodestructive and filtering procedures have been recently suggested to improve the long-term success of surgical treatment in dogs. Bleb fibrosis and surgical failure are still common occurrences in filtration surgery with relapse of glaucoma and vision loss. End stage procedures, such as enucleation, evisceration with intrascleral prosthesis, and chemical ablation of the ciliary bodies are then recommended to address chronic discomfort in buphthalmic and blind eyes.

**Surgical Treatment of Canine Glaucoma: Cyclodestructive Techniques**

Dineli Bras, Federica Maggio

Medical and surgical management of canine glaucoma can be challenging. The goal of surgical treatment is to manipulate the inflow and/or outflow of aqueous humor. This article describes the inflow-reducing, cyclodestructive techniques. Diode cyclophotocoagulation is the most common cyclodestructive procedure performed in humans and animals. Diode laser energy can be applied via a transscleral (transscleral cyclophotocoagulation [TSCP]) or an endoscopic (endoscopic cyclophotocoagulation [ECP]) approach. ECP provides direct visualization of the targeted ciliary body, allowing safer and more titratable treatment than TSCP techniques, offering a better long-term prognosis for vision and intraocular pressure control. Advancements in diode laser therapy seem promising.

**Feline Glaucoma**

Gillian J. McLellan, Leandro B.C. Teixeira

Feline glaucoma is often insidious in onset and slowly progressive with very subtle clinical signs. As a consequence, it is likely that the disease in cats is underdiagnosed. As cats typically present late in the course of disease, prognosis for long-term maintenance of vision is poor. Patient and owner compliance with frequent application of topical medications can be a limiting factor, and represents a serious clinical challenge. This review outlines the clinical features, classification, and pathophysiology of the feline glaucomas and provides current evidence on which to base the selection of appropriate treatment strategies for cats with glaucoma.

**Canine Secondary Glaucomas**

Stephanie Pumphrey

Secondary glaucomas are common in dogs, and occur due to obstruction of aqueous humor flow at the pupil, iridocorneal angle, or trabecular meshwork by numerous mechanisms. Secondary glaucoma is suspected based on examination findings, or presence of elevated IOP in an animal with a signalment inconsistent with primary glaucoma. Animals with secondary glaucoma require more diagnostic testing than animals with primary glaucoma. Management is challenging, and treatments used for primary glaucoma may be ineffective or even detrimental. Prognosis for vision and/or globe retention may be better than for primary glaucoma, particularly if underlying causes can be found and addressed promptly.

**Journal of Feline Medicine & Surgery**

**Efficacy of antiviral chemotherapy for retrovirus-infected cats: What does the current literature tell us?**

Katrin Hartmann

Global importance: The two feline retroviruses, feline immunodeficiency virus (FIV) and feline leukaemia virus (FeLV), are global and widespread, but differ in their potential to cause disease. Viral infection – FIV: FIV, a lentivirus that shares many properties with human immunodeficiency virus (HIV), can cause an acquired immune deficiency syndrome, which predisposes cats to other infections, stomatitis, neurological disorders and tumours. Although secondary infections are common, specific opportunistic infections or acquired
The quality of life is usually high over many years or lifelong. Viral infection – FeLV: FeLV, an oncenvirus, is more pathogenic than FIV. Historically, it was considered to account for more disease-related deaths and clinical syndromes in cats than any other infectious agent. Recently, the prevalence and importance of FeLV have been decreasing, mainly because of testing and eradication programmes and the use of FeLV vaccines. Progressive FeLV infection can cause tumours, bone marrow suppression and immunosuppression, as well as neurological and other disorders, and leads to a decrease in life expectancy. However, with appropriate care, many FeLV-infected cats can also live several years with a good quality of life. Practical relevance: A decision regarding treatment or euthanasia should never be based solely on the presence or absence of a retrovirus infection. Antiviral chemotherapy is of increasing interest in veterinary medicine, but is still not used commonly. Evidence base: This article reviews the current literature on antiviral chemotherapy in retrovirus-infected cats, focusing on drugs that are currently available on the market and, thus, could potentially be used in cats.

Cytauxzoonosis: Diagnosis and treatment of an emerging disease
Meredith K Sherrill and Leah A Cohn
Practical relevance: Cytauxzoonosis is a life-threatening hematoproteozoal disease with a rapidly progressive clinical course. Once considered a rare disease only relevant to a small geographic area, it is now recognized in more than about a third of the United States. The geographic range seems likely to increase with expansion of the range of the vector tick. Clinical challenges: Both disease diagnosis and treatment offer challenges. The acute illness is often recognized by characteristic parasitic cellular inclusions, but illness may occur before parasites can be identified, and parasitic inclusions may persist long after illness has resolved. Also, while infection was once considered nearly uniformly fatal, subclinical infections are now recognized. Disease prognosis has improved for many cats through implementation of new therapies, but some pathogens are resistant to these therapies and death from disease is still common. Currently, prevention strategies are limited to ectoparasite control. Global importance: Cytauxzoonosis caused by Cytauxzoon felis is limited to the Americas, and is especially problematic in southeastern and south central USA. However, other Cytauxzoon species have been recognized in Europe and Asia. Audience: This review is aimed at veterinary practitioners and focuses on the diagnosis and treatment of cytauxzoonosis. Disease management is of crucial importance in endemic regions. Furthermore, the expanding geographic range of infection, and the possibility of parasite identification in chronically infected cats with a travel history, make understanding cytauxzoonosis relevant in non-endemic regions as well. Evidence base: The authors draw on evidence from prospective clinical trials, experimental infections, retrospective clinical studies and case reports, as well as their own personal experience with the diagnosis and treatment of cytauxzoonosis.

Reference interval for rectal temperature in healthy confined adult cats
Julie K Levy, Kelly R Nutt, and Sylvia J Tucker
Objectives: Despite the common use of rectal temperature for assessing health and identifying infectious diseases in cats, there is little evidence to support frequently cited feline reference intervals for rectal temperature. Body temperature measurements are most commonly performed indoors in animal shelters and veterinary clinics. In these facilities, cats are often inactive and housed in small enclosures in a climate-controlled environment. The purpose of this study was to establish a new reference interval for rectal temperature in healthy confined adult cats. Methods: Rectal temperatures were measured in 200 healthy adult indoor cats in animal shelters, veterinary clinics and private homes. The reference interval was established using the method of the Clinical and Laboratory Standards Institute. Results: The reference interval for healthy adult cat rectal temperature was determined to range from 36.7°C (confidence interval [CI] = 36.6–36.8°C; 98.1°F [CI = 97.9–98.3°F]) at the lower limit to 38.9°C (CI = 38.8–39.1°C; 102.1°F [CI = 101.9–102.3°F]) at the upper limit. The ambient temperature ranged from 20.3–30.8°C (68.5–87.5°F). Rectal temperature was not significantly correlated with ambient temperature. Conclusions and relevance: A range of 36.7–38.9°C (98.1–102.1°F) should be considered the new reference interval for healthy adult cats for rectal temperature measured indoors in climate-controlled conditions. This range is lower than commonly reported. Use of previously published ranges could lead to overdiagnosis of hypothermia or underdiagnosis of mild pyrexia.

Cutaneous asthenia (Ehlers–Danlos-like syndrome) of Burmese cats
Naomi Hansen, Susan F Foster, Amanda K Burrows et al.

Summary of cases: A 6-month-old Burmese kitten developed focal skin lesions following a routine ovariohysterectomy. The lesions were eventually attributed to the patient struggling during catheter placement and induction of anaesthesia. The lesions were caused by fluid extravasation in the subcutis and ischaemic necrosis of the overlying dermis, giving rise to an eschar-like appearance. Such lesions have been seen previously in Burmese cats with cutaneous asthenia and it is thought that they arise due to poor collagenous support for dermal blood vessels. An increased skin extensibility index (>23%) supported a diagnosis of cutaneous asthenia (Ehlers–Danlos-like syndrome), which has been reported as an inherited condition of Burmese cats in Australia, New Zealand and Europe. An additional Burmese cat with cutaneous asthenia is presented in detail, with lifetime follow-up and further salient observations by the owner, a veterinarian. Photographs of three other affected Burmese cats are provided to illustrate the range of presentations encountered with this condition. All five affected cats were presented with eschars, atrophic alopecia and increased skin extensibility, while one cat also had skin ulcers. Routine histopathological examination, including use of special stains such as trichrome, was unhelpful in establishing the diagnosis. Clinical review: The clinical features of this genetic disease of Burmese cats are reviewed, especially in relation to the postulated ‘vasculopathy’ that gives rise to characteristic skin lesions. Long term management of this condition is discussed briefly.

Journal of the American Veterinary Medical Association – Nov 15

Kawabe M, Mori T, Ito Y, Murakami M, Sakai H, Yanai T, Maruo K.
Objective-To evaluate the characteristics and outcomes of dogs with stage I, II, III, or IV oral malignant melanoma treated by various types of radiotherapy. Design-Retrospective case series. Animals-111 dogs. Procedures-Medical records of dogs with oral malignant melanoma treated by radiotherapy (with or without adjunctive treatments) at a veterinary medical center between July 2006 and December 2012 were reviewed. Information regarding signalment, tumor location, disease stage, treatment protocols, adverse effects, and survival time were obtained from medical records and by telephone follow-up. Associations between variables of interest and outcome were analyzed. Results-Dogs received orthovoltage x-ray (n = 68), megavoltage x-ray (39), or electron beam (4) radiotherapy. Adjunctive treatments included debulking surgery (n = 18), chemotherapy (39), or both (27). Median survival times for dogs with stage I, II, III, and IV melanoma were 758 days (n = 19), 278 days (24), 163 days (37), and 80 days (31), respectively, and differed significantly between dogs with stage I disease and those with all other disease stages. Among dogs with stage III melanoma, risk of death was significantly higher in those that received orthovoltage x-ray treatment than in those that received megavoltage x-ray treatment. Severe (primary or secondary) adverse effects were identified in 9 dogs. Conclusions and Clinical Relevance-Median survival time was significantly longer for dogs with stage I oral malignant melanoma than for dogs with more advanced disease at the time of staging. The staging system used may be a useful tool for prognosis prediction in dogs undergoing similar treatment protocols for oral malignant melanomas.

Incidence rates and risk factors for owner-reported adverse events following vaccination of dogs that did or did not receive a Leptospira vaccine.
Yao PJ, Stephenson N, Foley JE, Toussieng CR, Farver TB, Sykes JE, Fleer KA.
Objective-To determine incidence rates (IRs) and potential risk factors for owner-reported adverse events (AEs) following vaccination of dogs that did or did not receive a Leptospira vaccine. Design-Observational, retrospective cohort study. Animals-130,557 dogs. Procedures-Electronic records of mobile veterinary clinics from June 2012 to March 2013 were searched to identify dogs that received ≥ 1 vaccine in a given visit. Signalment data, vaccinations received, medications administered, and owner-reported clinical signs consistent with AEs that developed ≤ 5 days after vaccination were recorded. Associations between potential risk factors and owner-reported AEs were evaluated by logistic regression analysis. Results-The IR/10,000 dogs for owner-reported postvaccination AEs was 26.3 (95% CI, 23.6 to 29.2), whereas that for dogs that received a Leptospira vaccine alone or with other vaccines was 53.0 (95% CI, 42.8 to 64.9). Significant factors for increasing or decreasing risk of AEs were as follows: receiving a Leptospira vaccine (adjusted OR, 2.13), age at vaccination 1 to < 7 or ≥ 7 years (vs a referent of < 6 months; adjusted OR, 0.54 and 0.44, respectively), and weight 13.6 to < 22.7 kg (30 to < 50 lb) and 22.7 to < 45.5 kg (50 to 100 lb) (vs a referent of < 4.5 kg [10 lb]; adjusted OR, 0.48 and 0.55, respectively). Hypersensitivity reactions were rare (IR, 6.5/10,000 dogs), and IRs for these events did
not differ significantly between dogs vaccinated with or without a Leptospira component. Conclusions and Clinical Relevance-The overall IR for owner-reported postvaccination AEs was low. Results suggested vaccination against Leptospira (an organism that can cause fatal disease) is safe in the majority of cases, slightly increasing the risk of owner-reported AEs but not associated with a significant increase in hypersensitivity reactions, compared with other vaccinations administered.

**Evaluation of an enzyme immunoassay for antibodies to a recombinant Blastomyces adhesin-1 repeat antigen as an aid in the diagnosis of blastomycosis in dogs.**

Mourning AC, Patterson EE, Kirsch EJ, Renschler JS, Wolf LA, Paris JK, Durkin MM, Wheat LJ.

Objective-To evaluate the sensitivity and specificity of an enzyme immunoassay (EIA) for antibodies to a recombinant Blastomyces adhesin-1 repeat antigen (rBAD-1) to aid in the diagnosis of blastomycosis in dogs and compare the findings with results from other tests used for this purpose. Design-Prospective analytic study. Sample-Serum and urine from 70 dogs with and without blastomycosis. Procedures-Serum and urine samples were collected from dogs with blastomycosis (n = 21), histoplasmosis (8), or nonfungal pulmonary disease (21) and from healthy control dogs living in a blastomycosis-endemic area (20). Serum was tested for antibodies against Blastomyces dermatitidis with the rBAD-1 antibody EIA and an A-antigen antibody agar gel immunodiffusion (AGID) assay. Serum and urine were tested for B dermatitidis antigen with a quantitative EIA. Results-Sensitivity of the quantitative antigen EIA was 100% in serum and urine samples from dogs with blastomycosis, with specificity of 95% in urine samples from dogs with nonfungal pulmonary disease and 100% in urine samples from healthy dogs. Sensitivity of the rBAD-1 antibody EIA (95%) was significantly greater than that of the A-antigen antibody AGID assay (65%). Specificity of the antibody EIA was 88% in dogs with histoplasmosis, 95% in healthy dogs, and 100% in dogs with nonfungal pulmonary disease. Conclusions and Clinical Relevance-The rBAD-1 antibody EIA had greater sensitivity than the A-antigen antibody AGID assay in dogs with blastomycosis. This antibody EIA may assist in distinguishing histoplasmosis from blastomycosis. Further evaluation in a larger prospective study is needed to verify these results.

**Journal of the American Veterinary Medical Association – Nov 1**

**Efficacy of endotracheal tube disinfection strategies for elimination of Streptococcus zooepidemicus and Bordetella bronchiseptica.**

Crawford S, Weese JS.

Objective-To evaluate the efficacy of various endotracheal tube disinfection strategies for elimination of Streptococcus zooepidemicus and Bordetella bronchiseptica. Design-Experimental in vitro study. Sample-12 sterile endotracheal tubes. Procedures-Endotracheal tubes were inoculated with S zooepidemicus or B bronchiseptica and subjected to 1 of 5 treatments (spraying with accelerated hydrogen peroxide solution [AHP] or soaking in one of the following: AHP, 0.5% chlorhexidine gluconate solution [CHG], 0.3% triclosan-containing soap solution, or tap water) or left untreated (controls). After 5 minutes, tubes were rinsed with water and swabbed for direct and enrichment culture. Culture results were scored semiquantitatively. Each isolate was tested separately (10 endotracheal tubes/isolate/treatment). Results-No growth was identified by direct culture of any samples collected from CHG-treated endotracheal tubes, whereas S zooepidemicus and B bronchiseptica were each identified from 1 of 10 tubes sprayed or soaked with AHP and from all tubes (10/10 each) treated by other methods or used as controls. The CHG and AHP treatments resulted in significantly lower median growth scores after direct culture than did other treatments. After enrichment culture, samples from CHG-treated tubes had significantly lower growth scores than samples from AHP-treated tubes, which had significantly lower scores than samples from other treatment groups. Conclusions and Clinical Relevance-High-level disinfection (ie, elimination of all vegetative bacterial growth) was not achieved with any treatment tested. Although optimal approaches are not known, processing of endotracheal tubes with CHG or AHP appears to be the best approach when sterilization is not feasible.

**Usefulness of whole blood, plasma, peritoneal fluid, and peritoneal fluid supernatant glucose concentrations obtained by a veterinary point-of-care glucometer to identify septic peritonitis in dogs with peritoneal effusion.**

Koenig A, Verlander LL.

Objective-To evaluate the usefulness of a veterinary point-of-care glucometer for identification of septic peritonitis in dogs with peritoneal effusion (PE). Design-Prospective clinical evaluation. Animals-39 dogs with PE. Procedures-Blood and peritoneal fluid convenience samples were collected concurrently in all dogs at the
time of initial evaluation. A veterinary point-of-care glucometer was used to measure glucose concentration in heparinized whole blood, plasma, peritoneal fluid, and peritoneal fluid supernatant samples. Seventeen dogs had confirmed septic peritonitis, and 22 dogs had nonseptic PE. Sensitivity, specificity, positive and negative predictive values, and accuracy of identification of dogs with septic peritonitis were calculated for glucose concentration differences for whole blood versus peritoneal fluid (WB-PF), plasma versus peritoneal fluid (P-PF), and plasma versus peritoneal fluid supernatant (P-PFS). Results—With a cutoff of > 20 mg/dL, the glucose concentration difference for WB-PF was an insensitive indicator of septic peritonitis (sensitivity, 41.2%; specificity, 100%). In comparison, the glucose concentration differences for P-PF and P-PFS had a higher sensitivity for septic peritonitis (88.2% and 82.4%, respectively) but a lower specificity (80% and 77.8%, respectively). With a glucose concentration difference cutoff of ≥ 38 mg/dL, specificity, positive predictive value, and accuracy of P-PF and P-PFS improved. Conclusions and Clinical Relevance—Determination of the glucose concentration difference for WB-PF with the veterinary point-of-care glucometer was not useful in identifying all dogs with septic peritonitis. A glucose concentration difference of ≥ 38 mg/dL for P-PF or P-PFS, however, supported an accurate diagnosis of septic peritonitis in dogs with PE.

The Canadian Veterinary Journal

Primary portal vein hypoplasia and SLC2A9 mutation associated with urate urolithiasis in a Spanish water dog
Laura Cosgrove, Gawain Hammond, Gerard Mclauchlan
This report describes a Spanish water dog with an ammonium urate urethrolith which was diagnosed with primary portal vein hypoplasia and was found to be homozygous for the mutated SLC2A9 gene. This is the first Spanish water dog described with the SLC2A9 mutation and the first case of concurrent portal vascular abnormalities and SLC2A9 mutation.

Successful treatment of a cat with primary hypoadrenocorticism and severe hyponatremia with desoxycorticosterone pivalate (DOCP)
Andrew D. Woolcock, Cynthia Ward
A 6-year-old, castrated male Siamese cat was diagnosed with primary hypoadrenocorticism, confirmed by an adrenocorticotopic hormone (ACTH) stimulation test documenting both hypocortisolism and hypoadosteronism. The cat was successfully treated using a combination of prednisolone and desoxycorticosterone pivalate (DOCP). This case demonstrates that DOCP can be used successfully as mineralocorticoid supplementation in cats with hypoadrenocorticism and may have a longer therapeutic duration than that in dogs.

Concurrent cranial mediastinal Blastomyces granuloma and carcinoma with cranial vena caval syndrome in a dog
Natashia A. Evans, Katrina R. Viviano
This report describes an unusual progression of blastomycosis in a dog with concurrent mediastinal carcinoma. The dog was evaluated for respiratory distress. Diagnostic results revealed chylothorax and a cranial vena caval thrombus. Histopathology of the cranial mediastinal mass diagnosed mediastinal carcinoma and fungal granuloma. Intercurrent disease may complicate the clinical presentation and clinical course of blastomycosis.

The Australian Veterinary Journal

Coastal taipan (Oxyuranus scutellatus) envenomation of a dog
Judge, P
An 8-year-old mixed-breed dog was envenomed by a juvenile coastal taipan (Oxyuranus scutellatus). The dog presented initially with coagulopathy and weakness, then developed neuromuscular paralysis and respiratory failure. Progressive myopathy peaked 3 days following admission. Taipan antivenom administration, mechanical ventilation therapy and supportive patient care resulted in complete recovery. Symptoms of neuropathy began to resolve 3 days following envenomation, with the dog discharged 6 days following envenomation.

Journal of Veterinary Internal Medicine (Nov/Dec)
Systematic Review of Brain Tumor Treatment in Dogs
H. Hu, A. Barker, T. Harcourt-Brown and N. Jeffery

Intracranial neoplasia is commonly diagnosed in dogs and can be treated by a variety of methods, but formal comparisons of treatment efficacy are currently unavailable. This review was undertaken to summarize the current state of knowledge regarding outcome after the treatment of intracranial masses in dogs, with the aim of defining optimal recommendations for owners. This review summarizes data from 794 cases in 22 previously published reports and follows PRISMA guidelines for systematic review. A Pubmed search was used to identify suitable articles. These then were analyzed for quality and interstudy variability of inclusion and exclusion criteria and the outcome data extracted for summary in graphs and tables. There was a high degree of heterogeneity among studies with respect to inclusion and exclusion criteria, definition of survival periods, and cases lost to follow-up making comparisons among modalities troublesome. There is a need for standardized design and reporting of outcomes of treatment for brain tumors in dogs. The available data do not support lomustine as an effective treatment, but also do not show a clear difference in outcome between radiotherapy and surgery for those cases in which the choice is available.

Association of Gallbladder Mucocoele Histologic Diagnosis with Selected Drug Use in Dogs: A Matched Case-Control Study

Background: The cause of gallbladder mucocoele (GBM) formation in dogs currently is unknown. Many available drugs represent a newer generation of xenobiotics that may predispose dogs to GBM formation. Objective: To determine if there is an association between the histologic diagnosis of GBM in dogs and administration of selected drugs. Animals: Eighty-one dogs with a histologic diagnosis of GBM and 162 breed, age, and admission date-matched control dogs from a single referral institution. Methods: Medical records of dogs with GBM and control dogs from 2001 to 2011 were reviewed. Owner verification of drug history was sought by a standard questionnaire. Reported use of heartworm, flea, and tick preventatives as well as nonsteroidal anti-inflammatory drugs, analgesics, corticosteroids, or medications for treatment of osteoarthritis was recorded. Results: Dogs with GBM were 2.2 times as likely to have reported use of thyroxine (as a proxy for the diagnosis of hypothyroidism) as control dogs (95% confidence interval [CI], 0.949–5.051), 3.6 times as likely to have had reported treatment for Cushing’s disease (95% CI, 1.228–10.612), and 2.3 times as likely to have had reported use of products containing imidacloprid (95% CI, 1.094–4.723). Analysis of a data subset containing only Shetland sheepdogs (23 GBM and 46 control) indicated that Shetland sheepdogs with GBM formation were 9.3 times as likely to have had reported use of imidacloprid as were control Shetland sheepdogs (95% CI, 1.103–78.239). Conclusions and Clinical Importance: This study provides evidence for an association between selected drug use and GBM formation in dogs. A larger epidemiologic study of Shetland sheepdogs with GBM formation and exposure to imidacloprid is warranted.

Association of Vitamin D Status and Clinical Outcome in Dogs with a Chronic Enteropathy

Background: Dogs with a chronic enteropathy (CE) have a lower vitamin D status, than do healthy dogs. Vitamin D status has been associated with a negative clinical outcome in humans with inflammatory bowel disease. Objectives: To examine the relationship between serum 25 hydroxyvitamin D (25(OH)D) concentrations at diagnosis and clinical outcome in dogs with a CE. Animals: Forty-one dogs diagnosed with CE admitted to the Royal Dick School of Veterinary Studies, Hospital for Small Animals between 2007 and 2013. Methods: Retrospective review. Serum 25(OH)D concentrations were compared between dogs which were alive at follow up or had died because of non-CE-related reasons (survivors) and dogs which died or were euthanized due to their CE (non-survivors). A binary logistic regression analysis was performed to determine significant predictors of death in dogs with CE. Results: Serum concentrations of 25(OH)D at the time a CE was diagnosed were significantly lower in nonsurvivors (n = 15) (median nonsurvivors 4.36 ng/mL, interquartile range 1.6–17.0 ng/mL), median survivors (n = 26) (24.9 ng/mL, interquartile range 15.63–39.45 ng/mL, P < .001). Serum 25(OH)D concentration was a significant predictor of death in dogs with CE (odds ratio 1.08 [95% CI 1.02 – 1.18]). Conclusions: Serum 25(OH)D concentrations at diagnosis are predictive of outcome in dogs with CE. The role of vitamin D in the initiation and outcome of chronic enteropathies in dogs is deserving of further study.
Comparison of Efficacy of Long-term Oral Treatment with Telmisartan and Benazepril in Cats with Chronic Kidney Disease
U. Sent, R. Gössl, J. Elliott, H. M. Syme and T. Zimmering

Background The efficacy and benefits of telmisartan in cats with chronic kidney disease (CKD) have not previously been reported. Hypothesis Long-term treatment of cats with CKD using telmisartan decreases urine protein-to-creatinine ratio (UP/C) similar to benazepril. Animals Two-hundred and twenty-four client-owned adult cats with CKD. Methods Prospective, multicenter, controlled, randomized, parallel group, blinded clinical trial with noninferiority design. Cats were allocated in a 1 : 1 ratio to either telmisartan (1 mg/kg; n = 112) or benazepril (0.5–1.0 mg/kg; n = 112) PO q24 h. The primary endpoint was prospectively defined as the change in proteinuria (benazepril:telmisartan) based on a log transformed weighted average of UP/C change from baseline as a percentage compared using a confidence interval (CI) approach. Changes of UP/C from baseline were assessed on all study days and corrected for multiple comparisons. Results Telmisartan proved noninferior to benazepril in controlling proteinuria (CI, −0.035 to 0.268). At Day 180, UP/C compared to baseline in the telmisartan group was significantly lower (−0.05 ± 0.31; P = .016), whereas in the benazepril group the change (−0.02 ± 0.48) was not statistically significant (P = .136). Similar results were obtained at all assessment points with significant decrease in UP/C occurring with telmisartan but not benazepril. Conclusion and Clinical Importance Both telmisartan and benazepril were well tolerated and safe. Telmisartan proved to be noninferior to benazepril and significantly decreased proteinuria relative to baseline at all assessment points whereas benazepril did not.

Iron Status of Cats with Chronic Kidney Disease
J. Gest, C. Langston and A. Eatoff

Background Iron deficiency is a proposed mechanism for the anemia that occurs in cats with chronic kidney disease (CKD). Minimal research investigating the iron status of these cats has been performed. Objective To compare indicators of iron status in cats with CKD versus healthy cats and cats with nonrenal illness (NRI). To compare indicators of iron status in anemic versus nonanemic cats with CKD. Animals Thirty-nine client or employee owned healthy cats, 40 cats with CKD and 34 cats with NRI included. Methods Exclusion criteria included prior iron or erythropoiesis stimulating agent administration, blood transfusion, or concurrent CKD and NRI. Complete blood counts, serum chemistries, serum iron concentrations, total iron binding capacity (TIBC), and ferritin concentrations were measured and percent transferrin saturation (TSAT) calculated on all cats. Data were analyzed using nonparametric statistical testing. Results No statistically significant differences were detected among groups for iron concentration (P = .50), ferritin concentration (P = .47), or TSAT (P = .19). TIBC was significantly lower in CKD (median 262 μg/dL; IQR 233–302; range 165–488) versus healthy cats (median 316 μg/dL; IQR 272–345, range 196–464); (P = .0030). When comparing anemic (hemoglobin <9.5 g/dL) versus nonanemic cats with CKD, TSAT was significantly lower (P = .033) in anemic (median 20.2%; IQR 17.8–34.5; range 17.6–35.9) compared to nonanemic (median 29.0%; IQR 25.5–44.1; range 11.5–94.4). No statistically significant differences found for ferritin concentration (P = .94), iron concentration (P = .21) or TIBC (P = .97). Conclusions and Clinical Importance These results indicate that an iron deficient state exists in anemic cats with CKD and is more likely functional rather than absolute.

Relationship between Plasma Fibroblast Growth Factor-23 Concentration and Survival Time in Cats with Chronic Kidney Disease
R.F. Geddes, J. Elliott and H.M. Syme

Background Fibroblast growth factor-23 (FGF-23) and parathyroid hormone (PTH) are commonly increased in cats with azotemic chronic kidney disease (CKD). Both are predictors of survival time in human patients, but these relationships have not previously been examined in the cat. Objectives To investigate the relationship between plasma FGF-23 and PTH concentrations at diagnosis of CKD in cats with survival time and with disease progression over 12 months. Animals 214 azotemic, client-owned cats (≥9 years). Methods Retrospective study: Biochemical and urinary variables at diagnosis of azotemic CKD, including plasma FGF-23 and PTH concentrations were assessed as predictors of survival time (all-cause mortality) using Cox regression, and as predictors of CKD progression over 12 months using logistic regression. Results In the final multivariable Cox regression model, survival was negatively associated with plasma creatinine (P = .002) and FGF-23 concentrations (P = .014), urine protein-to-creatinine ratio (P < .001) and age (P < .001). Survival was positively associated with PCV (P = .004). In the final multivariable logistic regression model, independent predictors of CKD progression included logFGF-23 and age. Neither plasma phosphate nor PTH was found to be an independent predictor of survival time or of CKD progression. Conclusions and Clinical Importance
Plasma FGF-23 concentration is a novel prognostic indicator in cats with CKD, independent of other factors including plasma creatinine and phosphate concentrations. Further work is required to assess if FGF-23 contributes directly to CKD progression, but regardless these findings may make FGF-23 a useful biomarker for predicting poorer outcomes in cats with CKD.

**Pulmonary Vein-to-Pulmonary Artery Ratio is an Echocardiographic Index of Congestive Heart Failure in Dogs with Degenerative Mitral Valve Disease**


Background Early recognition of left-sided congestive heart failure (CHF) in dogs with degenerative mitral valve disease (DMVD) is important because it influences medical therapy, timing of follow-up, and outcome. Hypothesis Pulmonary vein diameter-to-pulmonary artery diameter ratio (PV/PA) measured by echocardiography can predict CHF. Animals Ninety-eight client-owned dogs, 37 controls, and 61 dogs with DMVD. Methods Prospective clinical cohort study. History, physical examination and Doppler-echocardiography were performed. Dogs were classified as International Small Animal Cardiac Health Council class I, II or III. Congestive heart failure was identified in a subset of 56 dogs based on radiographic findings. The PV/PA was measured in bidimensional (2D) and M-mode by 2 investigators blinded to the radiologists’ conclusions. Results Interobserver coefficients of variation for PV/PA acquisition and measurement were <10%. The PV/PA in control dogs was approximately 1 and increased with class of heart failure. The presence of CHF could be best predicted by measuring PV/PA in 2D echocardiography (cut-off, 1.7; area under the curve, 0.98; CI, 0.97–0.98; P < .001) with a sensitivity of 96% and a specificity of 91%. Conclusion and Clinical Importance The PV/PA is a simple and reproducible echocardiographic variable that increases with class of heart failure and may help discriminate dogs in CHF from asymptomatic dogs with DMVD. Additional studies are required to determine whether PV/PA might provide additional information in the integrated interpretation of Doppler-echocardiographic indices of left ventricular filling pressures and could be used for rapid assessment of CHF in dogs in a critical care setting.

**Diagnostic Value of Selected Echocardiographic Variables to Identify Pulmonary Hypertension in Dogs with Myxomatous Mitral Valve Disease**

A. Tidholm, K. Höglund, J. Häggström and I. Ljungvall

Background Pulmonary hypertension (PH) is commonly associated with myxomatous mitral valve disease (MMVD). Because dogs with PH present without measureable tricuspid regurgitation (TR), it would be useful to investigate echocardiographic variables that can identify PH. Aim To investigate associations between estimated systolic TR pressure gradient (TRPG) and dog characteristics and selected echocardiographic variables. Animals 156 privately owned dogs. Materials and Methods Prospective observational study comparing the estimations of TRPG with dog characteristics and selected echocardiographic variables in dogs with MMVD and measureable TR. Results Tricuspid regurgitation pressure gradient was significantly (P < .05) associated with body weight corrected right (RVIDDn) and left (LVIDDn) ventricular end-diastolic and systolic (LVIDSn) internal diameters, pulmonary arterial (PA) acceleration to deceleration time ratio (AT/DT), heart rate, left atrial to aortic root ratio (LA/Ao), and the presence of congestive heart failure. Four variables remained significant in the multiple regression analysis with TRPG as a dependent variable: modeled as linear variables LA/Ao (P < .0001) and RVIDDn (P = .041), modeled as second order polynomial variables: AT/DT (P = .0039) and LVIDDn (P < .0001) The adjusted R2-value for the final model was 0.45 and receiver operating characteristic curve analysis suggested the model's performance to predict PH, defined as 36, 45, and 55 mmHg as fair (area under the curve [AUC] = 0.80), good (AUC = 0.86), and excellent (AUC = 0.92), respectively. Conclusion and Clinical Importance In dogs with MMVD, the presence of PH might be suspected with the combination of decreased PA AT/DT, increased RVIDDn and LA/Ao, and a small or great LVIDDn.

**Vitamin D Status in Different Stages of Disease Severity in Dogs with Chronic Valvular Heart Disease**


Background In humans with heart disease, vitamin D deficiency is associated with disease progression and a poor prognosis. A recent study showed that serum 25-hydroxyvitamin D [25(OH)D] concentration, the hallmark of vitamin D status, was lower in dogs with heart failure than in normal dogs, and a low concentration was associated with poor outcome in dogs with heart failure. Objectives To elucidate the vitamin D status of dogs with chronic valvular heart disease (CVHD) at different stages of disease severity. Animals Forty-three client-owned dogs with CVHD. Methods In this cross-sectional study, dogs were divided into 3 groups (14 dogs in
Stage B1, 17 dogs in Stage B2, and 12 dogs in Stage C/D) according to ACVIM guidelines. Dogs underwent clinical examination including echocardiography. Serum 25(OH)D concentrations were measured in each dog. Results Serum 25(OH)D concentration was significantly lower in Stage B2 (median, 33.2 nmol/L; range, 4.9–171.7 nmol/L) and C/D (13.1 nmol/L; 4.9–58.1 nmol/L) than in Stage B1 (52.5 nmol/L; 33.5–178.0 nmol/L) and was not significantly different between Stage B2 and Stage C/D. Among clinical variables, there were significant negative correlations between 25(OH)D concentration and both left atrial-to-aortic root ratio and left ventricular end-diastolic diameter normalized for body weight. Conclusions and Clinical Importance These results indicate that vitamin D status is associated with the degree of cardiac remodeling, and the serum 25(OH)D concentration begins to decrease before the onset of heart failure in dogs with CVHD.

**Innocent Cardiac Murmur in Puppies: Prevalence, Correlation with Hematocrit, and Auscultation Characteristics**

V. Szatmári, M.W. van Leeuwen and E. Teske

Background The aims of this study were to establish the prevalence of innocent cardiac murmurs in clinically healthy puppies, to investigate a possible correlation between the presence of an innocent murmur and hematocrit, and to describe the auscultation characteristics of innocent murmurs. Hypothesis Lower hematocrit contributes to the genesis of innocent murmurs. Animals Five hundred and eighty-four client-owned clinically healthy puppies, between 20 and 108 days old. Methods Two cross-sectional surveys with a 1-year (n = 389 pups) pilot and a half-year (n = 195 pups) principal study periods. Cardiac auscultation was performed by a single, board-certified cardiologist. Hematocrit was measured with an automatized hematology analyzer. Echocardiography was performed only on puppies with a cardiac murmur in the principal study. Results In the pilot study, 15% of the dogs had a murmur. Innocent murmur was diagnosed in 28% of the 195 dogs in the principal study. Innocent murmurs were systolic, mostly with a musical character and with a maximal intensity of 2 of 6, and mostly with the point of maximal intensity in the left cardiac base. The hematocrit was significantly lower in the group with a murmur compared to the group without (P = .023). Conclusions and Clinical Importance Innocent murmur was a common finding in puppies at the age when the first veterinary controls usually take place. Physiologic anemia contributes to the genesis of innocent murmurs in puppies. Rising hematocrit in growing puppies can explain the spontaneous disappearance of innocent murmurs with aging. Hematocrit did not differentiate innocent murmurs from abnormal murmurs.

**Cortisol Concentrations in Well-Regulated Dogs with Hyperadrenocorticism Treated with Trilostane**

J.N. Midence, K.J. Drobatz and R.S. Hess

Background There are no clear treatment guidelines for dogs with clinically well-regulated hyperadrenocorticism and cortisol concentrations <2.0 μg/dL. Objective To determine if serum cortisol concentrations measured before (Pre1) and after (Post1) ACTH stimulation at 3–6 hours after trilostane administration are significantly lower than cortisol concentrations measured before (Pre2) and after (Post2) ACTH stimulation 9–12 hours after trilostane administration, in a specific population of dogs with clinically well-regulated hyperadrenocorticism and Pre1 and Post1 <2 μg/dL. Animals Thirteen client-owned dogs with clinically well-regulated hyperadrenocorticism and Pre1 and Post1 serum cortisol concentrations <2.0 μg/dL 3–6 hours after trilostane administration. Methods Prospective study. Dogs had a second ACTH stimulation test performed 9–12 hours after trilostane administration, on the same day of the first ACTH stimulation test. cortisol concentrations before and after ACTH stimulation were compared using a paired t-test. Results Cortisol concentrations before (1.4 ± 0.3 μg/dL) and after the first stimulation (1.5 ± 0.3 μg/dL, mean ± SD) were significantly lower than cortisol concentration before the second stimulation (3.3 ± 1.6 μg/dL, P = .0012 each). Cortisol concentration before the first stimulation was also significantly lower than cortisol concentration after the second stimulation (5.3 ± 2.4 μg/dL, P = .0001). Conclusions and clinical importance In dogs with clinically well-regulated, trilostane-treated, hyperadrenocorticism, and cortisol concentrations <2 μg/dL before and after the first stimulation, a second ACTH stimulation test performed 9–12 hours after treatment can result in higher cortisol concentrations that could support continued trilostane treatment.

**Molecular Genetic Characterization of Thyroid Dyshormonogenesis in a French Bulldog**

S. Major, R.W. Pettigrew and J.C. Fyfe

Background A case of congenital hypothyroidism with goiter (CHG) in a juvenile French bulldog was identified and hypothesized to be caused by dyshormonogenesis of genetic etiology. Objectives To describe case management, unusual phenotypic aspects, and a CHG-causing mutation in a French bulldog. Animals Thyroid
tissue and blood from a CHG-affected French bulldog and 4 normal control dogs and buccal brush samples of 125 French bulldogs were studied. Methods Standard clinical assessment and laboratory tests were applied. Thyroid peroxidase (TPO) iodide oxidation activity was measured in vitro, and TPO protein was assessed on Western blots. Thyroid peroxidase exons and flanking splice sites were amplified from genomic DNA and sequenced. Thyroid peroxidase cDNA was amplified from thyroid RNA and sequenced. Results At 9 months of age, the affected dog had signs of cretinism, but near-normal skeletal maturation. The enlarged thyroid glands exhibited noninflammatory fibrosis and aberrant follicular organization. Thyroid peroxidase activity and immunocrossreactive protein were undetectable. There was a T>C mutation of the intron 12 splice donor consensus that caused abnormally spliced mRNA, consistent with absent TPO function. The mutant allele was not observed in 125 clinically normal French bulldogs. Conclusions Presumptive CHG in a French bulldog with unusual clinical presentation is described. Genetic etiology was confirmed by identifying the underlying TPO mutation.

Cortisol Response in Healthy and Diseased Dogs after Stimulation with a Depot Formulation of Synthetic ACTH

Background The ACTH stimulation test is used to evaluate the adrenocortical reserve. Recently, the availability of the synthetic ACTH formulation was limited, causing major problems in clinical practice. Objectives The objective of this study was to evaluate poststimulation peak cortisol concentrations and the duration of the stimulatory effect of a depot ACTH preparation in dogs. Animals Twenty-two healthy dogs, 10 dogs with suspected hypoadrenocorticism (HA) and 15 dogs with suspected hyperadrenocorticism (HC). Methods Prospective study. An ACTH stimulation test using a synthetic depot tetracosactide, administered intramuscularly (5 μg/kg or at least 0.1 mL) was performed. Blood samples for determination of cortisol were taken immediately before and 1, 2, 3, 4, 6, and 24 hours after stimulation. Results Peak cortisol concentrations were reached after 2–4 hours in all dogs. Cortisol concentrations 1 hour after stimulation were >9 μg/dL in all healthy dogs and >5 μg/dL in all dogs in which HA was excluded. None of the dogs with HA showed a cortisol-increase above the detection-limit of the assay. After 6 hours, cortisol concentrations had decreased in the healthy and HC group and were back to baseline after 24 hours. Conclusions and Clinical Importance The depot formulation can be used in place of the short-acting ACTH to evaluate the adrenocortical reserve. Blood for peak cortisol concentrations should be drawn 3 hours after stimulation in cases in which HC is suspected; in HA-suspected cases, blood sampling can take place after 1 hour. As the stimulatory effect is gone after 24 hours, interference with other hormonal tests is unlikely after that time.

Cohort Study of the Success of Controlled Weight Loss Programs for Obese Dogs
A.J. German, J.M. Titcomb, S.L. Holden, Y. Queau, P.J. Morris and V. Biourge

Background Most weight loss studies in obese dogs assess rate and percentage of weight loss in the first 2–3 months, rather than the likelihood of successfully reaching target weight. Objective To determine outcome of controlled weight loss programs for obese dogs, and to determine the factors associated with successful completion. Animals 143 obese dogs undergoing a controlled weight loss program. Methods This was a cohort study of obese dogs attending a referral weight management clinic. Dogs were studied during their period of weight loss, and cases classified according to outcome as “completed” (reached target weight), “euthanized” (was euthanized before reaching target weight), or “stopped prematurely” (program stopped early for other reasons). Factors associated with successful completion were assessed using simple and multiple logistic regression. Results 87/143 dogs (61%) completed their weight loss program, 11 [8%] died or were euthanized, and the remaining 45 [32%] stopped prematurely. Reasons for dogs stopping prematurely included inability to contact owner, refusal to comply with weight management advice, or development of another illness. Successful weight loss was positively associated with a faster rate (P < .001), a longer duration (P < .001), and feeding a dried weight management diet (P = .010), but negatively associated with starting body fat (P < .001), and use of dirlotapide (P = .0046). Conclusions and Clinical Relevance Just over half of all obese dogs on a controlled weight loss program reach their target weight. Future studies should better clarify reasons for success in individual cases, and also the role of factors such as activity and behavioral modification.

Clinical Features and Magnetic Resonance Imaging Findings in 7 Dogs with Central Nervous System Aspergillosis
Background Systemic aspergillosis is a manifestation of Aspergillus sp. infection that can result in central nervous system (CNS) involvement with marked alterations in CNS function. Information regarding the clinical presentation and magnetic resonance imaging (MRI) findings in cases of aspergillosis with CNS involvement is lacking, resulting in a need for better understanding of this disease. Hypothesis/Objectives The primary objectives were to describe the clinical features and MRI findings in dogs with CNS aspergillosis. The secondary objectives were to describe clinicopathologic findings and case outcome. Animals Seven dogs with CNS aspergillosis. Methods Archived records from 6 institutions were reviewed to identify cases with MRI of CNS aspergillosis confirmed with serum galactomannan enzyme immunoassay (EIA) testing, culture, or supported by histopathology. Signalment, clinical, MRI, clinicopathologic, histopathologic, and microbiologic findings were recorded and evaluated. Results Aspergillosis of the CNS was identified in 7 dogs from 3 institutions. The median age was 3 years and six were German Shepherd dogs. Five dogs had signs of vestibular dysfunction as a component of multifocal neurological abnormalities. The MRI findings ranged from normal to abnormal, including hemorrhagic infarction and mass lesions. Conclusions and Clinical Importance Until now, all reported MRI findings in dogs with CNS aspergillosis have been abnormal. We document that CNS aspergillosis in dogs, particularly German Shepherd dogs, can be suspected based on neurologic signs, whether MRI findings are normal or abnormal. Confirmatory testing with galactomannan EIA, urine, cerebrospinal fluid (CSF) or tissue culture should be performed in cases where aspergillosis is a differential diagnosis.

The Clinical and Serological Effect of a Gluten-Free Diet in Border Terriers with Epileptoid Cramping Syndrome

M. Lowrie, O.A. Garden, M. Hadjivassiliou, R.J. Harvey, D.S. Sanders, R. Powell and L. Garosi

Background: Canine epileptoid cramping syndrome (CECS) is a paroxysmal movement disorder of Border Terriers (BTs). These dogs might respond to a gluten-free diet. Objectives: The objective of this study was to examine the clinical and serological effect of a gluten-free diet in BTs with CECS. Animals: Six client-owned BTs with clinically confirmed CECS. Methods: Dogs were prospectively recruited that had at least a 6-month history of CECS based on the observed phenomenology (using video) and had exhibited at least 2 separate episodes on different days. Dogs were tested for anti-transglutaminase 2 (TG2 IgA) and anti-gliadin (AGA IgG) antibodies in the serum at presentation, and 3, 6, and 9 months after the introduction of a gluten-free diet. Duodenal biopsies were performed in 1 dog. Results: Serum TG2 IgA titers were increased in 6/6 BTs (P = .006) and AGA IgG titers were increased in 5/6 BTs at presentation compared to those of controls (P = .018). After 9 months, there was clinical and serological improvement in all BTs with CECS strictly adhering to a gluten-free diet (5/5). One dog had persistently increased antibody titers. This dog scavenged horse manure. On the strict introduction of a gluten-free diet this dog also had an improved clinical and serological response. The diet-associated improvement was reversible in 2 dogs on completion of the study, both of which suffered a relapse of CECS on the re-introduction of gluten. Conclusions: Canine epileptoid cramping syndrome in BTs is a gluten-sensitive movement disorder triggered and perpetuated by gluten and thus responsive to a gluten-free diet.

Cognitive Function, Progression of Age-related Behavioral Changes, Biomarkers, and Survival in Dogs More Than 8 Years Old

T. Schütt, N. Toft and M. Berendt

Background: Canine cognitive dysfunction (CCD) is an age-dependent neurodegenerative condition dominated by changes in behavioral patterns. Cohort studies investigating cognitive status in dogs are lacking. Objectives: To investigate cognitive function, progression of age-related behavioral changes, survival, and possible biomarkers of CCD in aged dogs. Animals: Fifty-one dogs >8 years old; 21 with no cognitive deficits, 17 with mild cognitive impairments (MCI) and 13 with CCD. Methods: Longitudinal study. Recruitment period of 12 months and an observational period of 24 months including a baseline and 3 planned subsequent assessments. Cognitive status was determined using validated questionnaires. Plasma Aβ-peptides were quantified using commercial ELISA assays and cytokines by a validated immunoassay. Results: Signs characterizing dogs with CCD were amnestic, restless wandering, staring into space, avoid getting patted, difficulty finding dropped food and anxiety. Thirty-three percent of dogs with a normal cognitive status progressed to MCI and 22% classified as MCI progressed to CCD during the study period. For 6 dogs diagnosed with CCD, signs of cognitive dysfunction increased with time. A diagnosis of CCD did not affect survival. The level of plasma Aβ42 was significantly increased (P < .05) in the CCD group (92.8 ± 24.0 pg/mL) compared to the MCI (77.0 ± 12.3 pg/mL) and normal group (74.9 ± 10.0 pg/mL), but no significant differences in concentrations of systemic inflammatory markers were detected. Conclusions: Canine cognitive dysfunction is a progressive disorder with...
an individual variability in the rate of cognitive decline and clinical signs. Plasma Aβ42 seems to be an interesting plasma biomarker of CCD.

**Infrared Thermography in Dogs with Mammary Tumors and Healthy Dogs**


Background Infrared thermography is a painless, noninvasive, nonionizing diagnostic imaging exam used in human medicine as an auxiliary tool for breast cancer diagnosis in women. Hypothesis/Objectives Define thermographic mean temperatures of healthy mammary glands and compare these temperatures with those of mammary glands with tumors in dogs. Animals Fifty client-owned female dogs were evaluated, including 20 with histopathologically confirmed mammary tumor and 30 clinically healthy (control). Methods A randomized study using infrared thermography analyzed each mammary gland of the animals from the control group and mammary glands with tumors from the tumor group, then the thermographic temperatures obtained were compared. Thermographic exam was performed in a temperature-controlled room with a cooled thermographic camera—Flir E-40 (Flir Systems®). Results There was significantly a higher temperature in the caudal abdominal and inguinal mammary glands than the other glands in the healthy group (P < .05). Dogs with mammary tumors had significantly higher thermographic temperature compared with unaffected glands regardless of the tumor size and the location (P < .05). Conclusions and clinical importance The technique seems to be able to assess for the presence of neoplasia within the mammary tissue in bitches. Further investigation is necessary to determine the impact of this technique when adopted clinically.

**The Association of Endothelin-1 Signaling with Bone Alkaline Phosphatase Expression and Protumorigenic Activities in Canine Osteosarcoma**


Background Canine osteosarcoma (OS) is an aggressive sarcoma characterized by pathologic skeletal resorption and pulmonary metastases. A number of negative prognostic factors, including bone alkaline phosphatase, have been identified in dogs with OS, but the underlying biologic factors responsible for such observations have not been thoroughly investigated. Endothelin-1-mediated signaling is active during bone repair, and is responsible for osteoblast migration, survival, proliferation, and bone alkaline phosphatase expression. Hypothesis The endothelin-1 signaling axis is active in canine OS cells, and this pathway is utilized by malignant osteoblasts for promoting cellular migration, survival, proliferation, and bone alkaline phosphatase activities. Animals 45 dogs with appendicular OS. Methods The expressions of endothelin-1 and endothelin A receptor were studied in OS cell lines and in samples from spontaneously occurring tumors. Activities mediated by endothelin-1 signaling were investigated by characterizing responses in 3 OS cell lines. In 45 dogs with OS, bone alkaline phosphatase concentrations were correlated with primary tumor osteoproductivity. Results Canine OS cells express endothelin-1 and endothelin A receptor, and this signaling axis mediates OS migration, survival, proliferation, and bone alkaline phosphatase activities. In OS-bearing dogs, circulating bone alkaline phosphatase activities were positively correlated with primary tumor relative bone mineral densities. Conclusions and Clinical Importance Canine OS cells express endothelin-1 and functional endothelin A receptors, with the potential for a protumorigenic signaling loop. Increases in bone alkaline phosphatase activity are associated with osteoblastic OS lesions, and might be an epiphenomenon of active endothelin-1 signaling or excessive osteoproduction within the localized bone microenvironment.

**Neutrophil Gelatinase-Associated Lipocalin in Dogs With Sepsis Undergoing Emergency Laparotomy: A Prospective Case–Control Study**

S. Cortellini, L. Pelligand, H. Syme, Y.M. Chang and S. Adamantos

Background Neutrophil gelatinase-associated lipocalin (NGAL) is an early indicator of acute kidney injury (AKI) in dogs and its use has not been evaluated in dogs with sepsis. Animals Fifteen dogs with sepsis requiring laparotomy (study dogs) and 10 dogs undergoing surgery for intervertebral disc disease (control dogs). Objective To determine whether NGAL increases in dogs with sepsis undergoing emergency laparotomy and whether it is correlated with development of AKI and survival. Methods Longitudinal study conducted at a referral teaching hospital. Serum neutrophil gelatinase-associated lipocalin (sNGAL), urinary NGAL normalized to urinary creatinine concentration (UNCR), and serum creatinine concentration were measured at 4 time points (admission, after anesthesia, and 24 and 48 hours postsurgery). Development of AKI (increase in serum creatinine concentration of 0.3 mg/dL) and in-hospital mortality were recorded. Linear mixed-model analysis was employed to assess differences between groups over time. Mann–Whitney U-test was performed for comparison of continuous variables between groups and Chi square or Fisher's exact tests were used to
assess correlation between discrete data. Results Serum NGAL and UNCR were significantly higher in study dogs across all time points (P = .007 and P < .001, respectively) compared with controls. Urinary NGAL normalized to creatinine in the study group was not significantly different between survivors (n = 12) and nonsurvivors (n = 3). Dogs that received hydroxyethyl starch had significantly higher UNCR across all time points (P = .04) than those that did not. Discussion—Conclusion Serum neutrophil gelatinase-associated lipocalin and UNCR are increased in dogs with sepsis requiring emergency laparotomy. Additional studies are needed to evaluate its role as a marker of AKI in this population.

Predicting Outcome in dogs with Primary Immune-Mediated Hemolytic Anemia: Results of a Multicenter Case Registry
Background Outcome prediction in dogs with immune-mediated hemolytic anemia (IMHA) is challenging and few prognostic indicators have been consistently identified. Objectives An online case registry was initiated to: prospectively survey canine IMHA presentation and management in the British Isles; evaluate 2 previously reported illness severity scores, Canine Hemolytic Anemia Score (CHAOS) and Tokyo and to identify independent prognostic markers. Animals Data from 276 dogs with primary IMHA across 10 referral centers were collected between 2008 and 2012. Methods Outcome prediction by previously reported illness-severity scores was tested using univariate logistic regression. Independent predictors of death in hospital or by 30-days after admission were identified using multivariable logistic regression. Results Purebreds represented 89.1% dogs (n = 246). Immunosuppressive medications were administered to 88.4% dogs (n = 244), 76.1% (n = 210) received antithrombotics and 74.3% (n = 205) received packed red blood cells. Seventy-four per cent of dogs (n = 205) were discharged from hospital and 67.7% (n = 187) were alive 30-days after admission. Two dogs were lost to follow-up at 30-days. In univariate analyses CHAOS was associated with death in hospital and death within 30-days. Tokyo score was not associated with either outcome measure. A model containing SIRS-classification, ASA classification, ALT, bilirubin, urea and creatinine predicting outcome at discharge was accurate in 82% of cases. ASA classification, bilirubin, urea and creatinine were independently associated with death in hospital or by 30-days. Conclusions and clinical importance Markers of kidney function, bilirubin concentration and ASA classification are independently associated with outcome in dogs with IMHA. Validation of this score in an unrelated population is now warranted.

Clinical Features and Outcome of Dogs with Epiglottic Retroversion With or Without Surgical Treatment: 24 Cases
S.C. Skerrett, J.K. McClaran, P.R. Fox and D. Palma
Hypothesis/Objectives To describe clinical features, comorbidities, outcome of surgical versus medical treatment and long-term follow-up for dogs with ER. We hypothesized that dogs with ER would have upper airway comorbidities and that surgical management (epiglottopexy or subtotal epiglottectomy) would improve long-term outcome compared to medical management alone. Animals Twenty-four client-owned dogs. Methods Retrospective review of medical records to identify dogs with ER that underwent surgical or medical management of ER. Results Dogs with ER commonly were middle-aged to older, small breed, spayed females with body condition score (BCS) ≥6/9. Stridor and dyspnea were the most common presenting signs. Concurrent or historical upper airway disorders were documented in 79.1% of cases. At last evaluation, 52.6% of dogs that underwent surgical management, and 60% of dogs that received medical management alone, had decreased severity of presenting clinical signs. In dogs that underwent surgical management for ER, the incidence of respiratory crisis decreased from 62.5% before surgery to 25% after surgical treatment. The overall calculated Kaplan–Meier median survival time was 875 days. Conclusion and clinical importance Our study indicated that a long-term survival of at least 2 years can be expected in dogs diagnosed with epiglottic retroversion. The necessity of surgical management cannot be determined based on this data, but dogs with no concurrent upper airway disorders may benefit from a permanent epiglottopexy to alleviate negative inspiratory pressures.

Agreement Among Radiographs, Fluoroscopy and Bronchoscopy in Documentation of Airway Collapse in Dogs
L.R. Johnson, M.K. Singh and R.E. Pollard
Background Airway collapse is a common finding in dogs with chronic cough, yet the diagnosis can be difficult to confirm without specialty equipment. Hypothesis Bronchoscopic documentation of tracheobronchial collapse will show better agreement with fluoroscopic imaging than with standard radiography. Animals Forty-two dogs
prospectively evaluated for chronic cough. Methods In this prospective study, three-view thoracic radiographs were obtained followed by fluoroscopy during tidal respiration and fluoroscopy during induction of cough. Digital images were assessed for the presence or absence of collapse at the trachea and each lobar bronchus. Bronchoscopy was performed under general anesthesia for identification of tracheobronchial collapse at each lung segment. Agreement of imaging tests with bronchoscopy was evaluated along with sensitivity and specificity of imaging modalities as compared to bronchoscopy. Results Airway collapse was identified in 41/42 dogs via 1 or more testing modalities. Percent agreement between pairs of tests varied between 49 and 87% with poor–moderate agreement at most bronchial sites. Sensitivity for the detection of bronchoscopically identified collapse was highest for radiography at the trachea, left lobar bronchi, and the right middle bronchus, although specificity was relatively low. Detection of airway collapse was increased when fluoroscopy was performed after induction of cough compared to during tidal respiration. Conclusions Radiography and fluoroscopy are complementary imaging techniques useful in the documentation of bronchial collapse in dogs. Confirming the presence or absence of tracheal or bronchial collapse can require multiple imaging modalities as well as bronchoscopy.

**Dissolution of Urinary Bladder Clots in a Dog with Alteplase**  
C. Pineda, A. Guisado, E. Aguilera-Tejero and I. Lopez

**Heparin-Induced Hyperkalemia in a Dog Receiving Continuous Renal Replacement Treatment**  
B. Geesaman, J. Bach and K. Monaghan

**Coextensive Meningioma and Cholesterol Granuloma in the Forebrain of a Cat**  
P. Chawla L. Cook, L. Himmell, L. Zekas and M. Oglesbee

**Efficacy and Complications of Palliative Irradiation in Three Scottish Fold Cats with Osteochondrodysplasia**  
A. Fujiwara-Igarashi, H. Igarashi, D. Hasegawa and M. Fujita

**The Veterinary Journal**

**Molecular cloning of canine co-chaperone small glutamine-rich tetratricopeptide repeat-containing protein α (SGTA) and investigation of its ability to suppress androgen receptor signalling in androgen-independent prostate cancer**  
Yuiko Kato, Kazuhiko Ochiai, Masaki Michishita, Daigo Azakami, Rei Nakahira, Masami Morimatsu, Toshina Ishiguro-Onouma, Yasunaga Yoshikawa, Masato Kobayashi, Makoto Bonkobara, Masanori Kobayashi, Kimimasa Takahashi, Masami Watanabe, Toshinori Omi

Although the morbidity of canine prostate cancer is low, the majority of cases present with resistance to androgen therapy and poor clinical outcomes. These pathological conditions are similar to the signs of the terminal stage of human androgen-independent prostate cancer. The co-chaperone small glutamine-rich tetratricopeptide repeat-containing protein α (SGTA) is known to be overexpressed in human androgen-independent prostate cancer. However, there is little information about the structure and function of canine SGTA. In this study, canine SGTA was cloned and analysed for its ability to suppress androgen receptor signalling. The full-length open reading frame (ORF) of the canine SGTA gene was amplified by RT-PCR using primers designed from canine-expressed sequence tags that were homologous to human SGTA. The canine SGTA ORF has high homology with the corresponding human (89%) and mouse (81%) sequences. SGTA dimerisation region and tetratricopeptide repeat (TPR) domains are conserved across the three species. The ability of canine SGTA to undergo homodimerisation was demonstrated by a mammalian two-hybrid system and a pull-down assay. The negative impact of canine SGTA on androgen receptor (AR) signalling was demonstrated using a reporter assay in androgen-independent human prostate cancer cell lines. Pathological analysis showed overexpression of SGTA in canine prostate cancer, but not in hyperplasia. A reporter assay in prostate cells demonstrated suppression of AR signalling by canine SGTA. Altogether, these results suggest that canine SGTA may play an important role in the acquisition of androgen independence by canine prostate cancer cells.

**Detection of feline upper respiratory tract disease pathogens using a commercially available real-time PCR test**

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An analysis of the relative frequencies of reported adverse events associated with NSAID administration in dogs and cats in the United Kingdom

James R. Hunt, Rachel S. Dean, Giles N.D. Davis, Joanna C. Murrell

This study aimed to analyse UK pharmacovigilance data to quantify adverse events (AEs) associated with the non-steroidal anti-inflammatory drug (NSAID) molecules found in veterinary medicines authorised for use in dogs and cats. It was hypothesised that the frequency of AEs would be lower when associated with cyclo-oxygenase-2 selective (coxib), compared to non-selective (non-coxib) NSAIDs. The UK Veterinary Medicines Directorate (VMD) supplied frequencies of AEs derived from Periodic Safety Update Reports subdivided by formulation and species for each NSAID molecule. Frequencies of AEs were similar between species. The five most reported AEs were emesis, death, anorexia, lethargy, and diarrhoea. Reported frequency of emesis, renal insufficiency and death was higher with injectable compared to oral NSAIDs (P = 0.043). Reported frequency of emesis, lethargy and death was higher with coxib, compared to non-coxib NSAIDs (P = 0.029). Median (range) interval since authorisation was shorter for coxibs at 5 (2.5–9) years compared to non-coxibs at 15 (12–25) years. A negative correlation between time elapsed since authorisation and the frequency of AEs was identified (rs = −0.11 to −0.94). Higher frequency of reported AEs with injectable NSAIDs may be related to perioperative administration. The AE frequency associated with coxib and non-coxib NSAIDs may be confounded by changes in reporting habits over time. This study highlights the value of interrogating passive surveillance data to identify low frequency AEs and the need to facilitate improvement in recording and collecting AEs in small animal practice.

Significance of caveolin-1 and matrix metalloproteinase 14 gene expression in canine mammary tumours


Canine mammary tumours (CMTs) are the most common neoplasms affecting female dogs. There is an urgent need for molecular biomarkers that can detect early stages of the disease in order to improve accuracy of CMT diagnosis. The aim of this study was to examine whether caveolin-1 (Cav-1) and matrix metalloproteinase 14 (MMP14) are associated with CMT histological malignancy and invasion. Sixty-five benign and malignant CMT samples and six normal canine mammary glands were analysed using quantitative reverse transcription–polymerase chain reaction. Cav-1 and MMP14 genes were highly expressed in CMT tissues compared to normal tissues. Cav-1 especially was overexpressed in malignant and invasive CMT tissues. When a CMT cell line was cultured on fluorescent gelatin-coated coverslips, localisation of Cav-1 was observed at invadopodia-mediated degradation sites of the gelatin matrix. These findings suggest that Cav-1 may be involved in CMT invasion and that the markers may be useful for estimating CMT malignancy.

Inconsistent identification of pit bull-type dogs by shelter staff


Shelter staff and veterinarians routinely make subjective dog breed identification based on appearance, but their accuracy regarding pit bull-type breeds is unknown. The purpose of this study was to measure agreement among
shelter staff in assigning pit bull-type breed designations to shelter dogs and to compare breed assignments with DNA breed signatures. In this prospective cross-sectional study, four staff members at each of four different shelters recorded their suspected breed(s) for 30 dogs; there was a total of 16 breed assessors and 120 dogs. The terms American pit bull terrier, American Staffordshire terrier, Staffordshire bull terrier, pit bull, and their mixes were included in the study definition of ‘pit bull-type breeds.’ Using visual identification only, the median inter-observer agreements and kappa values in pair-wise comparisons of each of the staff breed assignments for pit bull-type breed vs. not pit bull-type breed ranged from 76% to 83% and from 0.44 to 0.52 (moderate agreement), respectively. Whole blood was submitted to a commercial DNA testing laboratory for breed identification. Whereas DNA breed signatures identified only 25 dogs (21%) as pit bull-type, shelter staff collectively identified 62 (52%) dogs as pit bull-type. Agreement between visual and DNA-based breed assignments varied among individuals, with sensitivity for pit bull-type identification ranging from 33% to 75% and specificity ranging from 52% to 100%. The median kappa value for inter-observer agreement with DNA results at each shelter ranged from 0.1 to 0.48 (poor to moderate). Lack of consistency among shelter staff indicated that visual identification of pit bull-type dogs was unreliable.

Quality of life assessment in domestic dogs: An evidence-based rapid review
Z. Belshaw, L. Asher, N.D. Harvey, R.S. Dean
Assessment of quality of life (QoL) is an important, increasingly popular outcome measure in veterinary research and practice, particularly in dogs. In humans, QoL is commonly assessed by self-reporting and since this is not possible for animals, it is crucial that instruments designed to measure QoL are tested for reliability and validity. Using a systematic, replicable literature search strategy, the aim of this study was to find published, peer-reviewed instruments for QoL assessment in dogs and to assess the quality of these. CAB Abstracts and PubMed were searched in July 2013 using terms relevant to dogs, wellbeing and QoL. Inclusion and exclusion criteria were applied. When instruments were not published in full, authors were contacted to obtain them. Criteria were applied to assess the quality, validity and reliability of the 52 instruments obtained. Twenty-seven additional instruments used in peer-reviewed publications were not included because they had not been fully described in the publication or were not provided by authors upon request. Most of the instruments reviewed (48/52) were disease-specific rather than generic. Only four publications provided a definition of QoL or wellbeing. Only 11/52 instruments demonstrated evidence of assessing reliability or validity, and the quality of these instruments was variable. Many novel, unvalidated instruments have been generated and applied as clinical outcomes before it was known whether they measured QoL. This rapid review can be used to identify currently available and validated canine QoL instruments, and to assess the validity and quality of new or existing instruments.

Detection by ELISA of C-terminal proBNP in plasma from cats with cardiomyopathy
Philip F. Solter, Mark A. Oyama, Maggie C. Machen, Dennis J. Trafny, D. David Sisson
The B-type natriuretic peptide prohormone (proBNP) is enzymatically cleaved into an inactive N-terminal peptide and a biologically active C-terminal peptide with many beneficial cardiorenal effects. The purpose of this study was to develop and test in cats with cardiomyopathy an immunoassay to quantify the concentrations of C-terminal proBNP in feline plasma. An anti-canine proBNP monoclonal antibody (UI-1021) was shown to have adequate binding affinity to proBNP 80–106 for use in a solid-phase immunoassay, and by epitope mapping to bind within positions 84–87 of feline proBNP. UI-1021 was paired with an affinity-purified rabbit polyclonal detection antibody to feline proBNP 100–106, in a sandwich ELISA with feline proBNP 80–106 standard. The linearity and analytical range and sensitivity of the assay were confirmed from 1.4 to 85 pmol/L. Spike recovery averaged 106.5% (95% confidence interval 78–135%). Within run and intra-assay coefficients of variation were <12%. A protease inhibitor mixture preserved proBNP 80–106 immunoreactivity for at least 5 days in plasma. Clinical verification of the ELISA was done using plasma from 13 cats with cardiomyopathy, whose C-terminal proBNP concentrations ranged from 1.7 to 78.8 pmol/L vs. <1.4–1.8 pmol/L in plasma from 18 healthy cats. Concentrations were found to be substantially lower than reported N-terminal proBNP concentrations, and similar to those of human heart failure patients where relative C-terminal BNP deficiencies have been proposed as contributory to the progression of the disease.

Peripheral blood lymphocyte/monocyte ratio as a useful prognostic factor in dogs with diffuse large B-cell lymphoma receiving chemoimmunotherapy
Laura Marconato, Valeria Martini, Damiano Stefanello, Pierangelo Morett, Roberta Ferrari, Stefano Comazzi, Paola Laganga, Fulvio Riondato, Luca Aresu
Diffuse large B-cell lymphoma (DLBCL) is the most frequent canine lymphoid neoplasm. Despite treatment, the majority of dogs with DLBCL experience tumour relapse and consequently die, so practical models to characterise dogs with a poor prognosis are needed. This study examined whether the lymphocyte-monocyte ratio (LMR) can predict outcome in dogs with newly diagnosed DLBCL with regard to time-to-progression (TTP) and lymphoma specific survival (LSS). A retrospective study analysed the prognostic significance of LMR obtained at diagnosis by flow cytometry (based on morphological properties and CD45 expression) in 51 dogs that underwent complete staging and received the same treatment, comprising multi-agent chemotherapy and administration of an autologous vaccine. Dogs with an LMR ≤ 1.2 (30% of all cases) were found to have significantly shorter TTP and LSS, and it was concluded that LMR was a useful independent prognostic indicator with biological relevance in dogs with DLBCL treated with chemoimmunotherapy.

**Characterization of kidney damage using several renal biomarkers in dogs with naturally occurring heatstroke**

G. Segev, S. Daminet, E. Meyer, J. De Loor, A. Cohen, I. Aroch, Y. Bruchim

Heatstroke is often associated with acute kidney injury (AKI). The objectives of this study were to characterize the kidney damage occurring in canine heatstroke using routine and novel biomarkers and to assess their diagnostic and prognostic performance. Thirty dogs with naturally occurring heatstroke were enrolled prospectively. Blood and urine specimens were collected at presentation, at 4 h post-presentation and every 12 h until discharge or death. The glomerular filtration rate (GFR) and electrolyte fractional excretion (FE) at 4 h post-presentation were also calculated, based on urinary clearances. AKI was further characterized by evaluating urine neutrophil gelatinase-associated lipocalin/creatinine ratio (UNGAL), urine retinol-binding protein/creatinine ratio (URBP), urine C-reactive protein/creatinine ratio (UCRP) and urine protein to creatinine ratio (UPC). These biomarkers were compared to those for 13 healthy dogs. Thirteen dogs (43%) died and 17 (57%) survived. Median serum creatinine concentration at presentation was 1.69 mg/dL (range, 0.5–4.7 mg/dL), while concurrent GFR was markedly decreased (median 0.60 mL/min/kg; range, 0.00–3.10 mL/min/kg). Median Na fractional excretion was 0.08 (range, 0.01–0.41) and was an accurate predictor of AKI (area under curve 0.89; 95% confidence intervals 0.76–1.00). Median UPC at presentation was 4.8 (range, 0.4–46.0). Median UCRP, URBP and UNGAL were increased in all dogs with heatstroke, and were mean 232, 133, and 1213-fold higher than healthy control dogs, respectively. In conclusion, although AKI occurs invariably in dogs with heatstroke, it is often subclinical at presentation. Damage occurs in both the renal tubules and the glomeruli. Novel kidney function tests for the characterization of renal injury and its severity are superior to conventional markers and could be used to facilitate early diagnosis of AKI.

**American Journal of Veterinary Research**

**Risk factors for carriage of antimicrobial-resistant Salmonella spp and Escherichia coli in pet dogs from volunteer households in Ontario, Canada, in 2005 and 2006**

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**OBJECTIVE** To determine pet-related management factors associated with the carriage of antimicrobial-resistant Salmonella spp and Escherichia coli in a population of pet dogs. **SAMPLE** 138 dogs from 84 households in Ontario, Canada. **PROCEDURES** From October 2005 through May 2006, dogs and households in Ontario, Canada, were recruited to participate in a cross-sectional study. Fecal samples were submitted for culture of Salmonella spp and E coli, which provided 515 bacterial isolates for antimicrobial susceptibility testing. Multilevel logistic regression models with random effects for household and dog were created to identify pet-related management factors associated with antimicrobial resistance. **RESULTS** Bacterial species, feeding a homemade diet or adding homemade food to the diet, feeding a raw diet or adding anything raw to the diet, feeding a homemade raw food diet, and feeding raw chicken in the past week were significant risk factors for antimicrobial resistance in this population of dogs. **CONCLUSIONS AND CLINICAL RELEVANCE** In this study, several potentially important pet-related risk factors for the carriage of antimicrobial-resistant Salmonella spp and E coli in pet dogs were identified. Further evaluation of risk factors for antimicrobial resistance in dogs may lead to development of evidence-based guidelines for safe and responsible dog ownership and management to protect the public, especially pet owners who are immunocompromised.

**Effect of leukoreduction on concentrations of interleukin-8, interleukin-1β, and tumor necrosis factor-α in canine packed red blood cells during storage.**
Sarah L. Purcell, Melissa Claus, Giselle Hosgood, Lisa Smart.

OBJECTIVE To measure changes in interleukin-8 (IL-8), interleukin-1β (IL-1β), and tumor necrosis factor-α (TNF-α) concentrations in stored canine packed RBCs (PRBCs) over time and assess the effect of leukoreduction on these cytokine concentrations. ANIMALS 12 anesthetized healthy Greyhounds.

PROCEDURES 1 unit of whole blood from each dog was processed into PRBCs. Half of each PRBCs unit was passed through a leukoreduction filter to produce a leukoreduced unit, and the remaining blood was kept as a nonleukoreduced unit. All units had a CBC performed on day 0 (day of collection) and were stored at 2° to 6°C. Samples were collected from leukoreduced and nonleukoreduced units on days 0, 10, 20, 30, and 37 and centrifuged; the supernatant was stored at −80°C until analysis. Canine TNF-α and IL-8 concentrations were measured by ELISA. RESULTS Leukocyte counts were decreased by ≥ 99.9% in all leukoreduced units. Median TNF-α and IL-1β concentrations were not significantly different between leukoreduced and nonleukoreduced units and did not change significantly during storage; median IL-8 concentration was significantly higher in nonleukoreduced versus leukoreduced units on all days, and was greater at all time points after ≥ 10 days of storage than on day 0. Median IL-8 concentration in leukoreduced units did not increase during storage. CONCLUSIONS AND CLINICAL RELEVANCE Results indicated that leukoreduction was effective for the removal of leukocytes from canine PRBCs and prevented significant increases in IL-8 concentration during storage. Further studies are needed to evaluate whether leukoreduction reduces cytokine-associated complications of transfusion.

Serum α-1 acid glycoprotein and serum amyloid A concentrations in cats receiving antineoplastic treatment for lymphoma.


OBJECTIVE To characterize serum α-1 acid glycoprotein (AGP) and serum amyloid A (SAA) concentrations at diagnosis and during treatment in cats with lymphoma. ANIMALS 16 cats with various anatomic forms of lymphoma and 25 healthy cats. PROCEDURES Blood samples were collected from healthy cats once and from cats with lymphoma at diagnosis and 2-week intervals until the 12th week of antineoplastic treatment. Serum harvested from blood samples was assessed for AGP and SAA concentrations. Differences in serum AGP and SAA values were investigated between healthy cats and cats with lymphoma (at diagnosis) and, for cats with lymphoma, between diagnosis and various points during treatment. RESULTS Serum AGP and SAA concentrations were higher in cats with lymphoma at diagnosis (median, 832.60 and 1.03 μg/mL, respectively), compared with those in healthy cats (median, 269.85 and 0.10 μg/mL). Treatment resulted in a gradual decrease in serum AGP concentration after 4 weeks and in SAA concentration after 8 weeks of treatment, and these concentrations returned to values comparable with those of healthy cats by 12 weeks of treatment, by which point all cats had achieved complete remission of the disease. CONCLUSIONS AND CLINICAL RELEVANCE Serum AGP and SAA concentrations in cats with lymphoma were higher at diagnosis than after antineoplastic treatment. Decreases to values established for healthy cats corresponded with achievement of complete disease remission. Serum AGP and SAA may be useful protein markers for monitoring of antineoplastic treatment in cats with lymphoma.

Iron metabolism following intravenous transfusion with stored versus fresh autologous erythrocyte concentrate in healthy dogs.

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OBJECTIVE To determine effects of IV transfusion with fresh (3-day-old) or stored (35-day-old) autologous erythrocyte concentrate on serum labile iron concentration, iron-binding capacity, and protein interaction with iron in dogs. ANIMALS 10 random-source healthy dogs. PROCEDURES Dogs were randomly assigned to receive autologous erythrocyte concentrate stored for 3 days (n = 5) or 35 days (5). One unit of whole blood was collected from each dog, and erythrocyte concentrates were prepared and stored as assigned. After erythrocyte storage, IV transfusion was performed, with dogs receiving their own erythrocyte concentrate. Blood samples were collected from each dog before and 5, 9, 24, 48, and 72 hours after transfusion. Serum was harvested for measurement of total iron, labile iron, transferrin, ferritin, hemoglobin, and haptoglobin concentrations. RESULTS For dogs that received fresh erythrocytes, serum concentrations of the various analytes largely remained unchanged after transfusion. For dogs that received stored erythrocytes, serum concentrations of total iron, labile iron, hemoglobin, and ferritin increased markedly and serum concentrations of transferrin and haptoglobin decreased after transfusion. CONCLUSIONS AND CLINICAL RELEVANCE Transfusion with
autologous erythrocyte concentrate stored for 35 days resulted in evidence of intravascular hemolysis in healthy dogs. The associated marked increases in circulating concentrations of free iron and hemoglobin have the potential to adversely affect transfusion recipients.

Journal of Small Animal Practice

Contamination of multidose butorphanol vials in small animal general practices.
A. Bell, T. T. Yamaoka, L. Akil, D. Watson and C. Devine

OBJECTIVES; To assess and quantify medetomidine contamination of butorphanol multidose vials in small animal general practices and determine if practice policies and procedures regarding drug handling, as determined by questionnaire, impact upon contamination level. METHODS; Samples of butorphanol were withdrawn from in-use vials in participating practices in June and July 2013. Samples were analysed using high-performance liquid chromatography and mass spectrometry. RESULTS; Forty-one samples were obtained from 31 practices. Contamination was detected in 29 samples from 10 mL vials. The mean (SD) contamination was 0.275 (0.393) µg/mL; maximum contamination in any vial was 2.034 µg/mL. There was no correlation between volume of the vial used and the level of contamination. None of the survey factors predicted contamination levels of the vials. CLINICAL SIGNIFICANCE; Contamination of butorphanol multidose vials with medetomidine was common but the level of contamination was insufficient to cause detrimental effects in dogs if butorphanol were to be administered alone. The potential for sporadic higher levels of contamination must be taken into account, especially when using 50 mL vials when sedating critically ill cases, because there is a risk of clinical side effects.

Assessment of mitral regurgitation in dogs: comparison of results of echocardiography with magnetic resonance imaging.

OBJECTIVES; Echocardiography is used routinely to assess mitral regurgitation severity, but echocardiographic measures of mitral regurgitation in dogs have not been compared with other quantitative methods. The study aim was to compare echocardiographic measures of mitral regurgitation with cardiac magnetic resonance imaging-derived mitral regurgitant fraction in small-breed dogs. METHODS; Dogs with myxomatous mitral valve disease scheduled for magnetic resonance imaging assessment of neurological disease were recruited. Correlations were tested between cardiac magnetic resonance imaging-derived mitral regurgitant fraction and the following echocardiographic measures: vena contracta/aortic diameter, transmitral E-wave velocity, amplitude of mitral prolapse/aortic diameter, diastolic left ventricular diameter:aortic diameter, left atrium:aortic diameter, mitral regurgitation jet area ratio and regurgitant fraction calculated using the proximal isovelocity surface area method. RESULTS; Measurement of cardiac magnetic resonance imaging-derived mitral regurgitant fraction was attempted in 21 dogs. Twelve consecutive, complete studies were obtained and 10 dogs were included in the final analysis: vena contracta/aortic diameter (r = 0.89, p = 0.001) and E-wave velocity (r = 0.86, p = 0.001) had the strongest correlations with cardiac magnetic resonance imaging-derived mitral regurgitant fraction. E velocity had superior repeatability and could be measured in all dogs. The presence of multiple jets precluded vena contracta/aortic diameter measurement in one dog. CLINICAL SIGNIFICANCE; Measurement of cardiac magnetic resonance imaging-derived mitral regurgitant fraction is feasible but technically demanding. The echocardiographic measures that correlated most closely with cardiac magnetic resonance imaging-derived mitral regurgitant fraction were vena contracta/aortic diameter and E-wave velocity.

Primary pulmonary neoplasia in cats: assessment of computed tomography findings and survival.

OBJECTIVE; To identify variables with a preoperative computed tomography scan that influence survival of cats undergoing surgical removal of a primary lung tumour. A secondary objective was to determine whether histologic type and or grade of feline pulmonary tumours affects long term survival. METHODS; Medical records were retrospectively reviewed for cats with preoperative computed tomography scans and surgical resection of primary lung tumours. Pulmonary carcinomas were reviewed for histologic diagnosis using two different approaches, histologic grade as well as major histologic pattern. RESULTS; Median survival time of all (n = 28) cats was 156 days. Median survival time for cats with lymph node enlargement was 65 days versus 498 days for cats without lymph node enlargement on preoperative computed tomography scan. Median survival
time for cats with preoperative pleural effusion was 2.5 days versus 467 days for cats without pleural effusion. Cats with low or intermediate grade tumours had a median survival time of 730 days versus 105 days for cats with high grade tumours. CLINICAL SIGNIFICANCE; Cats with preoperative lymph node enlargement and pleural effusion have shorter survival times than cats without.

**Portal vein anatomy in the dog: comparison between computed tomographic angiography (CTA) and intraoperative mesenteric portovenography (IOMP).**

A. T. Parry and R. N. White  
OBJECTIVES; To compare and contrast the findings of intra-operative mesenteric portovenography (IOMP) and computed tomography angiography (CTA) for the visualisation and identification of the extrahepatic and intrahepatic portal venous system in the normal dog. METHODS; Retrospective study of dogs with raised post-prandial bile acids concentrations, normal portal venous pressures and grossly normal portal vasculature that had undergone both CTA and IOMP was performed. Images and video were compared with the published anatomic literature. RESULTS; Ten dogs met the inclusion criteria. CTA documented the portal vein and its tributaries in all 10 dogs. IOMP documented the portal vein and the cranial mesenteric vein in all 10 dogs and the splenic vein in 1 dog but failed to show the caudal mesenteric and gastroduodenal veins in any dog. CTA documented more extrahepatic portal venous tributaries than IOMP. Both techniques documented the intrahepatic portal vasculature completely with equal clarity. CLINICAL SIGNIFICANCE; There was a large difference between the ability of the two techniques to delineate the normal portal vasculature; CTA consistently visualised the extrahepatic portal vasculature more completely than the IOMP and, as such, might be considered the modality of choice for imaging the normal portal vasculature in the dog.

**Surgical management of canine refractory retrobulbar abscesses: six cases**

G. Tremolada, M. Milovancev, W. T. N. Culp and J. A. Bleedorn.  
OBJECTIVE; To report the clinical presentation, surgical treatment and outcomes of dogs with retrobulbar abscesses refractory to intra-oral lancing and antibiotics. METHODS; Medical records from January 2006 through September 2014 were reviewed and dogs with retrobulbar abscesses failing treatment with antibiotics and intra-oral lancing were included. Clinicopathologic, imaging and surgical details were extracted from the medical records. Referring veterinarians and owners were interviewed via telephone for follow-up data. RESULTS; A total of six dogs were included in the study. The most common clinical signs were pain upon opening of the mouth, exophthalmos and prolapsed nictitans. Computed tomography was performed in five dogs, ultrasound in four and magnetic resonance imaging in one. Imaging identified an abscess in all dogs, with a suspected foreign body in four dogs. Surgical approach was a modified lateral orbitotomy in five dogs. No foreign body was identified during surgery in all dog. All dogs surviving to discharge did not have recurrence of clinical signs (follow-up time range: 27 to 95 months). CLINICAL SIGNIFICANCE; Dogs with retrobulbar abscesses refractory to standard therapy can experience long-term resolution of clinical signs with surgical treatment, most commonly via a modified lateral orbitotomy.