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March, 2014

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New Zealand Veterinary Journal (Mar/Apr)

The serological response of working farm dogs to a vaccine containing Leptospira interrogans serovars Copenhageni and Pomona, and L. borgpetersenii serovar Hardjo
NJ Cave, AL Harland and SK Allott

AIMS: To evaluate the serological response in dogs to a commercial vaccine for use in cattle containing cultured strains of Leptospira interrogans serovars Copenhageni and Pomona, and L. borgpetersenii serovar Hardjo.

METHODS: Blood samples were obtained from 67 working farm dogs on 12 farms, and the microscopic agglutination test (MAT) was used to measure titres to the Leptospira spp. Serovars Pomona, Hardjo, and Copenhageni. Samples with a titre of <1:25 were defined as seronegative. Dogs that were seronegative to both Pomona and Hardjo (n=33) were randomised to either the vaccination (n=20) or control (n=13) groups. Seven of these dogs were seropositive to Copenhageni. Vaccinated dogs were given the three-component vaccine subcutaneously on two occasions, 4 weeks apart. MAT titres were measured again in both groups 2 weeks after the second vaccination.

RESULTS: Of the vaccinated dogs, 20/20 (100%) developed titres to serovar Pomona, and 16/20 (80%) had titres >100; for serovar Hardjo, 19/20 (95%) dogs had titres, with 18/20 (90%) being >100; and for serovar Copenhageni, 15/17 (88%) dogs that were initially seronegative had titres, with 6/17 (35%) being >100. The median titres for Pomona and Hardjo (200 (95% CI=179–359) and 200 (95% CI=176–379), respectively) were lower than for Copenhageni (50 (95% CI=26–124)) in dogs originally seronegative (p<0.001). There was no association between titres to the different serovars. Of the 13 unvaccinated dogs, two developed titres to serovar Pomona, and three to Hardjo. All titres were <100.

CONCLUSIONS: The tested vaccine was effective in raising antibodies to the three serovars, although the titres do not guarantee protection.

CLINICAL RELEVANCE: There has been a recent increase in cases of leptospirosis attributed to the serovar Pomona in dogs in New Zealand, but the vaccines licensed for use in dogs in New Zealand for the prevention of leptospirosis only protect against Copenhageni/Icterohaemorrhagiae. The vaccine tested in this study produced titres to Pomona and Hardjo that suggest the vaccine could be useful for reducing disease caused by these serovars in working dogs in New Zealand.

Journal of the American Animal Hospital Association (Mar/Apr)

Interobserver Variability of Radiographic Pulmonary Nodule Diameter Measurements in Dogs and Cats
Jackie M. Williams, John P. Graham, Chong Wang

The purpose of this study was to determine the interobserver variability of radiographic pulmonary nodule diameter measurements among readers with varying levels of experience. Because interobserver variability may lead to inaccurate estimations of nodule growth on repeat radiographic assessment, an incorrect presumption of malignant etiology or misclassification of tumor response to treatment may result. The maximum diameters of 47 pulmonary nodules from 22 dogs and 7 cats were measured. Measurements were performed using one digital thoracic radiographic projection by eight clinicians. The eight clinicians included two interns, two residents, two board-certified veterinary specialists, and two board-certified veterinary radiologists. A mixed-effect analysis of variance model was used to evaluate the contribution of reader, experience level, patient, nodule, and nodule size to the overall variability in mean pulmonary nodule diameter. The interobserver variability in diameter measurement for any given nodule was 16%, and experience level and nodule size classification did not contribute to measurement variability. Linear measurements of the diameter of a pulmonary nodule can vary significantly among a group of clinicians; however, depending on the criteria used to evaluate nodule growth or tumor response, the 16% interobserver variability reported here is likely not clinically significant.

Heather Baginski,, Garrett Davis, Richard P. Bastian

This study evaluates a series of dogs diagnosed with grade 2 cutaneous mast cell tumors (MCTs) with concurrent lymph node (LN) metastasis. All dogs had surgical excision of the primary tumor. The presence of metastasis was confirmed with either histopathology (n=35) or cytology (n=20). There was no significant difference in survival times (STs) between dogs with and without LN metastasis. Median survival time (MST) was not reached at 65.9 mo. LN palpation was a poor predictor of metastasis (sensitivity, .71; specificity, .54). Tumor location was the only prognostic factor for survival in this series of dogs. ST was greater for dogs that had removal of their metastatic LN. This study suggests that in dogs with grade 2 MCTs, outcome may not be affected by the presence of LN metastasis; however, removal of the metastatic LN may prolong survival.

Use of an Image-Guided Robotic Radiosurgery System for the Treatment of Canine Nonlymphomatous Nasal Tumors
Seth A. Glasser, Sarah Charney, Nikolaos G. Dervisis, Matthew R. Witten, Susan Ettinger, Jason Berg, Richard Joseph
An image-guided robotic stereotactic radiosurgery (SRS) system can be used to deliver curative-intent radiation in either single fraction or hypofractionated doses. Medical records for 19 dogs with nonlymphomatous nasal tumors treated with hypofractionated image-guided robotic stereotactic body radiotherapy (SBRT), either with or without adjunctive treatment, were retrospectively analyzed for survival and prognostic factors. Median survival time (MST) was evaluated using Kaplan-Meier survival curves. Age, breed, tumor type, stage, tumor size, prescribed radiation dose, and heterogeneity index were analyzed for prognostic significance. Dogs were treated with three consecutive-day, 8–12 gray (Gy) fractions of image-guided robotic SBRT. Overall MST was 399 days. No significant prognostic factors were identified. Acute side effects were rare and mild. Late side effects included one dog with an oronasal fistula and six dogs with seizures. In three of six dogs, seizures were a presenting complaint prior to SBRT. The cause of seizures in the remaining three dogs could not be definitively determined due to lack of follow-up computed tomography (CT) imaging. The seizures could have been related to either progression of disease or late radiation effect. Results indicate that image-guided robotic SBRT, either with or without adjunctive therapy, for canine nonlymphomatous nasal tumors provides comparable survival times (STs) to daily fractionated megavoltage radiation with fewer required fractions and fewer acute side effects.

**Upper Thoracic Disc Disease (T1–T9) in Large-Breed Dogs**
Kendra Hearon, Jason M. Berg, Jennifer J. Bonczynski, Cecilia Suarez, Philip Bergman

The purpose of this study was to identify large-breed dogs with intervertebral disc disease (IVDD) in the upper thoracic region (thoracic vertebrae 1–9 [T1–T9]). Medical records of all dogs that were diagnosed with IVDD on MRI between February 2008 and September 2011 were reviewed. Of 723 dogs diagnosed with IVDD based on MRI, 527 (72.9%) were small-breed dogs. There were 21 (10.7%) large-breed dogs with IVDD in the T1–T9 region, whereas no small-breed dogs were identified with lesions in that region. The most common upper thoracic lesion sites were T2–T3 (33.3%) and T4–T5 (25.9%). The majority of dogs with T1–T9 lesions were German shepherd dogs (52.4%). Larger, older dogs were more likely to have T1–T9 lesions and more likely to have multiple regions with IVDD, in particular German shepherd dogs (35.1%). Dogs with T1–T9 IVDD were more likely to have IVDD in another region (66.7%). All large-breed dogs presenting with T3–L3 myelopathy should have diagnostic imaging performed of their entire thoracic and lumbar spine.

Erin M. Scott, Renee T. Carter

Keratomycosis is rarely reported in dogs. The purpose of this study was to review the signalment, clinical characteristics, predisposing factors, and outcome of 11 cases of canine keratomycosis. Medical records of included dogs were reviewed and follow-up information was obtained by re-examination of patients following their initial diagnosis. All 11 patients possessed predisposing factors for fungal keratitis, including an underlying endocrinopathy, pre-existing corneal disease, intraocular surgery, and/or prolonged use of either topical antibiotics or corticosteroids at the time of initial examination. Diagnostic techniques included corneal cytology demonstrating yeast or hyphae in 6 of 11 eyes, and fungal cultures with positive results in 7 of 11 eyes. Fungal organisms isolated included Cladosporium spp. (n=1), Chrysosporium spp. (n=1), Curvularia spp. (n=2), Aspergillus spp. (n=1), Penicillium spp. (n=1), and Phialemonium spp. (n=1). Of the 11 patients, 6 responded to medical management alone. Two resolved after a superficial keratectomy, and three were enucleated due to either endophthalmitis or progression of corneal disease. This study identified potential risk factors for developing fungal keratitis.

**Chronic Liver Lobe Torsion in a Cat**
Alim Nazarali, Ameet Singh, Heather Chalmers, Brian Stevens, Brandon L. Plattner

A 13 yr old castrated male blue British shorthair with a 3 mo history of vomiting was diagnosed with a left lateral liver lobe mass following abdominal ultrasonography. At the time of celiotomy, liver lobe torsion (LLT) of the left lateral lobe was also present. Histopathologic evaluation of the liver mass and associated lobe revealed extensive necrosis secondary to chronic torsion. This is the second reported case of LLT in a cat. Both cases were associated with liver masses. The cat presented in this case remained clinically normal 8 mo postoperatively following lobectomy of the affected lobe.

**Emphysematous Cystitis and Pyelonephritis in a Nondiabetic Dog and a Diabetic Cat**
Rachel Moon, David S. Biller, Nicole M. Smeer

Emphysematous cystitis (EC) and emphysematous pyelonephritis (EPN) are the result of infection of the urinary bladder and kidneys by gas-producing microorganisms. Those infections are most often reported in diabetic patients and rarely occur concurrently. This article describes two cases of concurrent EC and EPN, one in a nondiabetic dog and the other in a diabetic cat. The use of diagnostic imaging is necessary in the diagnosis of emphysematous infections. Both radiography and ultrasonography were used in the diagnosis of EC and EPN in the patients described in this report.

**Emergent Presentation of a Cat with Dystrophin-Deficient Muscular Dystrophy**
Anya N. Gambino, Pamela J. Mouser, G. Diane Shelton, Nena J. Winand, This report describes a case of feline dystrophin-deficient muscular dystrophy (DDMD) with an atypical clinical presentation. A novel gene mutation is reported to be responsible for dystrophin-deficient hypertrophic muscular dystrophy. In an emergency setting, clinicians should be aware of muscular dystrophy in young cats and the importance of elevated creatine kinase (CK) activity. Muscular dystrophy is rare but can present both a diagnostic and therapeutic challenge in an emergency setting. Patients with muscular dystrophy have a progressive disease with no specific treatment and have an increased risk for death during their hospital stay.

Treatment of Ibuprofen Toxicosis in a Dog with IV Lipid Emulsion
Luiz Bolfer, Maureen McMichael, Thandeka R. Ngwenyama, Mauria A. O’Brien
A 3 yr old spayed female mixed-breed dog weighing 19.4 kg was evaluated for ingestion of 1,856 mg/kg (180 tablets) of ibuprofen, a human formulated nonsteroidal anti-inflammatory drug (NSAID). At the time of presentation, the patient was alert and hypersalivating, but her mental status rapidly declined to obtunded, stuporous, and then comatose within 30 min of presentation. Initial treatment included supportive therapy with prostaglandin analogs and antiemetics. An IV lipid emulsion (ILE) was administered as a bolus, followed by a constant rate infusion. Clinical signs began to improve approximately 3 hr after completion of the lipid infusion. The patient required supportive care for 3 days before discharge. This case report demonstrates the use of ILE for treatment of ibuprofen toxicosis in a dog. ILE infusion may be a therapeutic option for patients with toxicoses due to lipid-soluble drugs.

Pollakiuria and Stranguria in a Labrador Retriever with Penile HSA
Joanna K. Fry, Derek Burney, Heidi Hottinger, Michelle Fabiani, Clint Feagin
An approximately 8 yr old castrated male Labrador retriever presented for evaluation of weight loss, stranguria, and pollakiuria. Lysis of the proximal one-third of the os penis was diagnosed on abdominal radiographs, and a positive contrast urethrography revealed a smoothly margined filling defect along the dorsal aspect of the urethra at the level of the radiographically observed osteolysis. Regional ultrasound revealed an echogenic mass at the proximal aspect of the os penis with a severely irregular and discontinuous periosteal surface. A penile hemangiosarcoma (HSA) was confirmed on histopathologic evaluation after a penile amputation and scrotal urethrostomy were performed. Although HSA is a common malignant neoplasm in dogs, lysis of the os penis has not previously been documented. Adjunctive chemotherapy, although recommended, was declined, and the patient survived 236 days postoperatively. That survival time is considerably longer than the average survival time for patients with HSA, other than cutaneous forms of HSA. Although an uncommon presentation, HSA of the penis should be considered a differential diagnosis in older canines with signs of lower urinary tract disease, especially in breeds that have been documented to be predisposed to HSA.

Veterinary Clinics of North America (Mar/Apr)

Neonatal Resuscitation Improving the Outcome
Autumn P. Davidson
KEY POINTS
- Prudent veterinary intervention in the prenatal, parturient, and postpartum periods can increase neonatal survival by controlling or eliminating factors contributing to puppy morbidity and mortality.
- Postresuscitation or within the first 24 hours of a natural delivery, a complete physical examination should be performed by a veterinarian, technician, or knowledgeable breeder.
- Adequate ingestion of colostrum must occur promptly postpartum for puppies and kittens to acquire passive immunity.

Pediatric Clinical Pathology
Benita von Dehn
KEY POINTS
- Because of variations in enzymology and functional capacity of neonatal organ systems, care must be taken when interpreting any changes in clinical chemistry values when using standard adult reference ranges.
- Although published reference ranges are provided, based on the available research in current literature it is recommended that these ranges are used only as guidelines, owing to the lack of standardization of reference intervals among reference laboratories.
- This article is not intended to provide a fully comprehensive review of all hematologic and biochemical changes that occur from birth to 6 months of age, but to help provide a practical guideline for interpretation and useful diagnostic information in determining the state of health or cause of illness in a young dog or cat.

Pros, Cons, and Techniques of Pediatric Neutering
Margaret V. Root Kustritz
KEY POINTS
- Pediatric anesthesia and surgery are safe, with decreased surgery time and quick patient recovery.
The primary benefit of prepuberal gonadectomy in bitches and queens is decreased incidence of mammary neoplasia later in life. Detriments associated with gonadectomy at any age include various cancers, orthopaedic problems including anterior cruciate ligament injury, and obesity.

**2013 Update on Current Vaccination Strategies in Puppies and Kittens**

Gina M. Davis-Wurzler

**KEY POINTS**
- Vaccines are perhaps one of the practitioner’s greatest tools in preventing disease and maintaining individual and population health.
- Vaccines are to be used with forethought based on the risk of disease to the population and the individual, balanced with assessment of the risks associated with individual vaccines.
- It is the practitioner’s role to educate pet owners regarding actual risks associated with both undervaccination and overvaccination.
- The goal is to reach the highest level of overall animal health with the minimum number of adverse events, based on scientific and epidemiologic merit.

**Pediatric Nutrition**

Deborah S. Greco

**KEY POINTS**
- Feeding a balanced commercial diet to lactating and growing puppies and kittens provides the necessary macronutrients (protein, fat, and so forth), vitamins, minerals, and supplements required for normal growth and development.
- The most important immune-related function of good intestinal microflora is protection against infection and colonization by harmful, and sometimes pathogenic, bacteria.
- Added benefit may arise from the use of docosahexaenoic acid–supplemented diets and from the use of prebiotic fibers, colostrum, and probiotics to promote growth and development of a healthy gastrointestinal tract, microbiota, and immune system in puppies and kittens.

**Pediatric Seizure Disorders in Dogs and Cats**

James A. Lavely

**KEY POINTS**
- Seizure disorders in young animals pose different considerations as to cause and therapeutic decisions compared with adult animals.
- Infectious diseases of the nervous system are more likely in puppies and kittens compared with adults.
- The diagnosis of canine distemper is often based on clinical signs, with the combination of neurologic abnormalities, particularly myoclonus, with extraneural signs leading to a high suspicion of canine distemper in dogs less than 1 year old.
- Idiopathic epilepsy typically occurs in dogs between 1 and 5 years of age; however, inflammatory brain diseases such as necrotizing encephalitis and granulomatous meningoencephalomyelitis also commonly occur in young to middle-aged small-breed dogs.
- The choice of anticonvulsant for maintenance therapy is tailored to each individual patient.

**Canine Pediatric Dentistry**

Amy J. Fulton, Frank J.M. Verstraete

**KEY POINTS**
- Every practitioner should be comfortable with normal dental anatomy in puppies and young adult dogs.
- The first puppy examination should include a comprehensive oral examination, with special attention paid to the orthodontic evaluation as well as evaluation of any developmental defects, including cleft lips and palates.
- Several developmental anomalies can affect the teeth, such as enamel hypoplasia, and persistent deciduous teeth that may or may not have a clinical impact on the dog.
- Deciduous teeth and immature adult teeth are prone to fracture and can rapidly result in endodontal disease.
- Certain tumor types can occur in young patients, and awareness is key in early recognition of these diseases.

**Successful Management Permitting Delayed Operative Revision of Cleft Palate in a Labrador Retriever**

Autumn P. Davidson, Clare Gregory, Patricia Dedrick

**KEY POINTS**
- Affected neonates are diagnosed by visual inspection of the face and oral cavity.
- Methods to improve survival of puppies with congenital cleft palate (CP) are sought by clients; additionally, survival to reproductive age in congenitally affected dogs providing a research model for the human condition avoids the need for iatrogenic or teratogenically induced models.
Feeding dry kibble and providing water from an overhead dispenser permits dogs with CP to attain adult size before reconstructive surgery, facilitating repair.

**Pediatric Feline Upper Respiratory Disease**

Jane E. Sykes

**KEY POINTS**

- Feline upper respiratory tract disease (URTD) is an important cause of morbidity and mortality in kittens, especially those held in population-dense and unhygienic conditions.
- Multiple bacterial and viral pathogens are involved and can cause similar clinical signs.
- Caution is required when interpreting the results of diagnostic tests for feline URTD pathogens because the presence of the pathogen does not always imply disease causation.
- Famciclovir or topical cidofovir are emerging as effective antiviral treatments for kittens with severe URTD that is caused by feline herpesvirus-1, but these drugs are not effective for other causes of feline URTD and indiscriminate use may result in drug resistance.
- Reducing stress and overcrowding in combination with vaccination and proper disinfection is likely to be the most effective means to prevent feline URTD in kittens housed in population-dense environments.

**Diagnosis and Management of Urinary Ectopia**

Autumn P. Davidson, Jodi L. Westropp

**KEY POINTS**

- Ectopic ureters are the most common cause of urinary incontinence in young dogs but should be considered as a differential in any incontinent dog for which the history is not known.
- Ectopic ureters can be diagnosed with excretory urography, fluoroscopic urethrography or ureterography, abdominal ultrasonography, cystoscopy, helical computed tomography, or a combination of these diagnostic procedures. Other congenital abnormalities can also occur in dogs with ectopic ureters, including renal agenesis or dysplasia, hydronephrosis, and/or hydroureter and vestibulovaginal anomalies; therefore, the entire urinary system must be evaluated with ultrasonography if cystoscopy is the only other diagnostic tool used before surgery.
- Novel surgical techniques and adjunctive medical management have improved the prognosis for dogs with urinary ectopia.

**Holistic Pediatric Veterinary Medicine**

Lisa Pesch,

**KEY POINTS**

- An increasing number of clients are seeking holistic care for their pets.
- Holistic veterinary medicine treats the whole patient including all physical and behavioural clinical signs.
- Herbal and nutritional supplements can help support tissue healing and proper organ functioning, thereby reducing the tendency toward disease progression over time.
- Many herbal and nutraceutical companies provide support for veterinarians, assisting with proper formula selection, dosing, drug interactions, and contraindications.

**Journal of Veterinary Internal Medicine (Mar/Apr)**

**Epilepsy in Cats: Theory and Practice.**

A. Pakozdy, P. Halasz and A. Klang.

The veterinary literature on epilepsy in cats is less extensive than that for dogs. The present review summarizes the most important human definitions related to epilepsy and discusses the difficulties in applying them in daily veterinary practice. Epileptic seizures can have a wide range of clinical signs and are not necessarily typical in all cases. Whether a seizure event is epileptic can only be suspected based on clinical, laboratory, and neuroimaging findings as electroencephalography diagnostic techniques have not yet been developed to a sufficiently accurate level in veterinary medicine. In addition, the present review aims to describe other diagnoses and nonepileptic conditions that might be mistaken for epileptic seizures. Seizures associated with hippocampal lesions are described and discussed extensively, as they seem to be a special entity only recognized in the past few years. Furthermore, we focus on clinical work-up and on treatment that can be recommended based on the literature and summarize the limited data available relating to the outcome. Critical commentary is provided as most studies are based on very weak evidence.
Plasma and Urine Neutrophil Gelatinase–Associated Lipocalin (NGAL) in Dogs with Acute Kidney Injury or Chronic Kidney Disease.


Background Neutrophil gelatinase–associated lipocalin (NGAL) is a protein that is used in human medicine as a real-time indicator of acute kidney injury (AKI). Hypothesis. Dogs with AKI have significantly higher plasma NGAL concentration and urine NGAL-to-creatinine ratio (UNCR) compared with healthy dogs and dogs with chronic kidney disease (CKD). Animals 18 healthy control dogs, 17 dogs with CKD, and 48 dogs with AKI. Methods Over a period of 1 year, all dogs with renal azotemia were prospectively included. Urine and plasma samples were collected during the first 24 hours after presentation or after development of renal azotemia. Plasma and urine NGAL concentrations were measured with a commercially available canine NGAL Elisa Kit (Bioporto® Diagnostic) and UNCR was calculated. A single-injection plasma inulin clearance was performed in the healthy dogs. Results Median (range) NGAL plasma concentration in healthy dogs, dogs with CKD, and AKI were 10.7 ng/mL (2.5–21.2), 22.0 ng/mL (7.7–62.3), and 48.3 ng/mL (5.7–469.0), respectively. UNCR was $2 \times 10^{-8}$ (0–46), 1,424 $\times 10^{-8}$ (385–18,347), and 2,366 $\times 10^{-8}$ (36–994,669), respectively. Dogs with renal azotemia had significantly higher NGAL concentrations and UNCR than did healthy dogs ($P < .0001$ for both). Plasma NGAL concentration was significantly higher in dogs with AKI compared with dogs with CKD ($P = .027$). Conclusions and Clinical Importance Plasma NGAL could be helpful to differentiate AKI from CKD in dogs with renal azotemia.

Use of Tissue Plasminogen Activator in Catheters Used for Extracorporeal Renal Replacement Therapy.

C. Langston, A. Eatoff and K. Poeppel.

Background Intraluminal thrombosis of central venous catheters used for renal replacement therapy (RRT) decreases the ability to provide adequate treatment. Alteplase is a recombinant tissue plasminogen activator that has been used to improve the function of catheters used for RRT in humans. Objectives To retrospectively review alteplase instillation in dysfunctional catheters used for RRT in dogs and cats. Animals Seventeen dogs and 8 cats receiving RRT for kidney failure. Methods Medical records of patients in which alteplase was used for RRT catheter dysfunction from 2004 to 2012 were retrospectively reviewed to characterize reasons for use, improvement in function, increase in blood flow, and duration of improvement. Results Alteplase was instilled 43 times in 29 catheters, most commonly because of suspicion that the catheter would not provide sufficient flow on the next treatment ($n = 21$). The second most common reason was inability to start a dialysis treatment ($n = 12$). Catheter function improved after alteplase instillation in 34 of 43 treatments (79%). Median blood flow rate increased by 13% (18 mL/min) in the dialysis session after alteplase instillation. Seven of 29 catheters (24%) were treated with alteplase on >1 occasion (median time to second treatment, 8 days), and 1 catheter had to be replaced because of intractable dysfunction. Conclusions and Clinical Importance Alteplase is effective at improving function of central venous catheters used to provide RRT, but the results are short-lived.

Comparison of Forelimb and Hindlimb Systolic Blood Pressures and Proteinuria in Healthy Shetland Sheepdogs.

B.A. Scansen, J. Vitt, D.J. Chew, K.E. Schober and J.D. Bonagura.

Background The prevalence of systemic hypertension (SHT) in Shetland Sheepdogs has not been reported. Hypothesis/Objectives SHT is common in Shetland Sheepdogs and positively correlated with proteinuria. Measurements of forelimb and hindlimb systolic arterial pressure (SAP) are comparable. Animals Seventy-two clinically healthy, client-owned Shetland Sheepdogs. Methods Forelimb and hindlimb SAP were recorded by Doppler ultrasonography. Proteinuria was quantified by urine dipstick, microalbuminuria, and protein:creatinine ratio (UPC). The relationship of UPC, anxiety, age, weight, and heart rate with forelimb SAP was evaluated. Results The mean forelimb and hindlimb SAP were 132 ± 20 and 118 ± 20 mmHg, respectively. The SAP
exceeded 160 mmHg in 9 dogs, suggesting 13% prevalence of SHT. Four dogs had a UPC above 0.5; 2 of these had forelimb SAP exceeding 160 mmHg. Correlation of forelimb and hindlimb SAP was poor ($r^2 = 0.09; P = 0.011$). Bland–Altman plots revealed substantial bias (~14 mmHg) between limb measurements with clinically unacceptable 95% limits of agreement (~60 to 33 mmHg). There was no correlation between forelimb SAP and UPC ($P = 0.06$) or anxiety level ($P = 0.49$). Age ($P < 0.0001$) and heart rate ($P = 0.038$) were significant predictors of forelimb SAP; weight ($P = 0.73$) was not. Conclusions Prevalence of SHT was 13% and not correlated with proteinuria. Forelimb and hindlimb SAP were poorly correlated; therefore, trends in an individual animal should be monitored using the same measurement site. Additionally, values for Doppler SAP were determined in Shetland Sheepdogs.

Serologic and Urinary PCR Survey of Leptospirosis in Healthy Cats and in Cats with Kidney Disease.


Background Although there is serologic evidence of exposure of cats to Leptospira spp., clinical disease is rarely reported in cats. Objective To compare the seropositivity and urinary polymerase chain reaction (PCR) status for Leptospira spp. between healthy (H) cats and cats with kidney disease (KD), to investigate the serovars potentially involved, and to evaluate potential risk factors. Animals Two hundred and forty client-owned cats. Methods Cats were prospectively recruited and classified based on physical examination, complete blood count, serum biochemistry profile, and urinalysis (125 H and 115 KD cats). Leptospira spp. serology (titers $\geq 1:100$ considered positive) and urinary PCR were performed in all cats. Data assessing risk factors, obtained from a questionnaire, were evaluated using logistic regression models. Results Seropositivity for Leptospira spp. was statistically different between groups: 7.2% (9/125) and 14.9% (17/114) in the H and KD, respectively ($P = 0.05$). The proportion of PCR-positive cats was not. The most common serovars detected serologically were Pomona ($n = 16$) and Bratislava ($n = 8$). Risk factors for seropositivity included outdoor and hunting lifestyles ($P = 0.03$ and $P < 0.001$, respectively), the presence of another cat in the household ($P < 0.01$), and the sampling period, with the greatest number of cases identified between June and August ($P = 0.02$). Conclusions Seropositivity was significantly greater in KD cats, suggesting that the role of Leptospira spp. in KD in cats should be further investigated. The detection of urinary shedding of leptospires in several cats identifies a potential role in the transmission of the organism.


Background Previous studies have identified large breed, male, outdoor dogs of herding or working groups to be at increased risk for Leptospira infection. Exposure risk factors may change over time, altering the signalment of dogs most commonly diagnosed with leptospirosis. Objectives The objectives of this study were to evaluate possible signalment changes by decade in canine leptospirosis cases diagnosed at university veterinary hospitals in the United States and Canada using reports to the Veterinary Medical DataBase (VMDB) over a 40-year period (1970–2009). Animals One thousand and ninety-one dogs with leptospirosis diagnosed among 1,659,146 hospital visits. Methods Hospital prevalence of leptospirosis by decade was determined by age, sex, weight, and breed groups. Multivariable logistic regression models were created to evaluate the association between variables and the odds of disease for each decade. Results Veterinary Medical DataBase hospital prevalence of leptospirosis in dogs, after a marked decrease in the 1970s and low rates in the 1980s, began increasing in the 1990s. Hospital prevalence significantly increased in dogs between 2 and 9.9 years of age ($P < 0.05$) and in male dogs ($P < 0.05$) in each decade since the 1980s. Among weight groups in the most recent decade (2000–2009), dogs weighing <15 pounds had the greatest odds of being diagnosed with leptospirosis ($P = 0.03$). Conclusions and Clinical Importance Hospital prevalence rates by age, weight, sex, and breed groups differed by decade. These changes may reflect changes in exposure risk, Leptospira vaccination practices for dogs, or both.
Vaginal Microbiota of Spayed Dogs with or without Recurrent Urinary Tract Infections.


Background Limited information is available regarding the vaginal microbiota of normal spayed dogs and spayed dogs with recurrent UTIs. Vaginal lactic acid-producing bacteria (LAB) have been associated with decreased frequency of recurrent urinary tract infection in women and may have a protective role within the urinary tract of female dogs. Hypothesis/Objectives Spayed dogs with historical recurrent UTI will have decreased prevalence of LAB and increased prevalence of uropathogenic bacterial populations in the vaginal microbiota when compared with the vaginal microbiota of healthy, spayed dogs. Animals Twenty-one client-owned adult spayed female dogs with historical recurrent UTI and 23 healthy, spayed female dogs without a history of recurrent UTI. Methods Dogs were placed into a recurrent UTI group or control group in this prospective study. Bacterial populations were isolated and characterized from vaginal swabs obtained from each dog. Results The most common bacterial isolates obtained from the vaginal tract of all dogs were Escherichia coli (11/44) and S. pseudintermedius (13/44). E. coli was isolated from the vaginal tract of 8 of 21 (38%) dogs in the rUTI group and 3 of 23 (13%) dogs in the control group (P = .08). LAB were isolated from 7 of the 44 dogs. Two of these 7 dogs were in the rUTI group and 5 of the 7 dogs were in the control group. Conclusions and Clinical Importance The vaginal microbiota of spayed female dogs with recurrent UTI was similar to the control population of normal, spayed female dogs.

Serum and Urine Blastomyces Antigen Concentrations as Markers of Clinical Remission in Dogs Treated for Systemic Blastomycosis.


Background Serum and urine Blastomyces antigen concentrations can be used to diagnose blastomycosis in dogs. Objectives Blastomyces antigen concentrations correlate with clinical remission in dogs during antifungal treatment, and detect disease relapse after treatment discontinuation. Animals 21 dogs with newly diagnosed blastomycosis monitored until clinical remission (Treatment Phase), and 27 dogs monitored over 1 year from the time of antifungal discontinuation or until clinical relapse (After Treatment Phase). Methods Prospective study. Dogs were monitored monthly during treatment and every 3 months after treatment discontinuation, with a complete history, physical exam, chest radiographs, and ocular exam. Urine and serum Blastomyces antigen concentrations were measured at each visit using a quantitative enzyme immunoassay. Results At enrollment in the Treatment Phase, Blastomyces antigen was positive in all 21 urine samples (100% sensitivity; 95% CI 85–100%), and in 18 of 20 serum samples (90% sensitivity; 95% CI 70–97%). At 2–4 months of treatment, urine antigen was more sensitive for clinically detectable disease (82%; CI 60–94%) than serum antigen (18%; CI 6–41%). The sensitivity of the urine test for clinical relapse was 71% (CI 36–92%), with close to 100% specificity (CI 84–100%) during after treatment surveillance in this population. Conclusions Urine Blastomyces antigen testing has high sensitivity for active disease at the time of diagnosis and during treatment, and moderate sensitivity but high specificity for clinical relapse. Urine testing should be useful at the time of diagnosis, when treatment discontinuation is being considered, and anytime there is poor clinical response or suspicion of relapse.

Epidemiology and Ecology of H3N8 Canine Influenza Viruses in US Shelter Dogs.


Background H3N8 canine influenza virus (CIV) infection might contribute to increased duration of shelter stay for dogs. Greater understanding of factors contributing to CIV within shelters could help veterinarians identify control measures for CIV. Objectives To assess community to shelter dog CIV transmission, estimate true prevalence of CIV, and determine risk factors associated with CIV in humane shelters. Animals 5,160 dogs upon intake or discharge from 6 US humane shelters, December 2009 through January 2012. Methods A cross-sectional study was performed with prospective convenience sampling of 40 dogs from each shelter monthly.
Nasal swabs and serum samples were collected. Hemagglutination inhibition and real-time reverse transcriptase-polymerase chain reaction assays were performed for each nasal and serum sample. True prevalence was estimated by stochastic latent class analysis. Logistic regression was used to identify risk factors associated with CIV shedding and seropositivity. Results Nasal swabs were positive from 4.4% of New York (NY), 4.7% of Colorado (CO), 3.2% of South Carolina, 1.2% of Florida, and 0% of California and Texas shelter dogs sampled. Seropositivity was the highest in the CO shelter dogs at 10%, and NY at 8.5%. Other shelters had 0% seropositivity. Information-theoretic analyses suggested that CIV shedding was associated with region, month, and year (model weight = 0.95) and comingling/cohousing (model weight = 0.92). Conclusions and Clinical Importance Community dogs are a likely source of CIV introduction into humane shelters and once CIV has become established, dog-to-dog transmission maintains the virus within a shelter.

Concurrent Diseases and Conditions in Cats with Renal Infarcts.

M.C. Hickey, K. Jandrey, K.S. Farrell and D. Carlson-Bremer.

Background Renal infarcts identified without definitive association with any specific disease process. Objective Determine diseases associated with diagnosis of renal infarcts in cats diagnosed by sonography or necropsy. Animals 600 cats underwent abdominal ultrasonography, necropsy, or both at a veterinary medical teaching hospital. Methods Information obtained from electronic medical records. Cats classified as having renal infarct present based on results of sonographic evaluation or necropsy. Time-matched case-controls selected from cats that underwent the next scheduled diagnostic procedure. Results 309 of 600 cats having diagnosis of renal infarct and 291 time-matched controls. Cats 7–14 years old were 1.6 times (odds ratio, 95% CI: 1.03–2.05, P = .03) more likely to have renal infarct than younger cats but no more likely to have renal infarct than older cats (1.4, 0.89–2.25, P = .14). All P = .14 are statistically significant. Cats with renal infarcts were 4.5 times (odds ratio, 95% CI: 2.63–7.68, P < .001) more likely to have HCM compared to cats without renal infarcts. Cats with renal infaracts were 0.7 times (odds ratio, 95% CI: 0.51–0.99, P = .046) less likely to have diagnosis of neoplasia compared to cats without renal infarcts. Cats with diagnosis of hyperthyroidism did not have significant association with having renal infarct. Cats with renal infarcts were 8 times (odds ratio, 95% CI: 2.55–25.40, P ≤ .001) more likely to have diagnosis of distal aortic thromboembolism than cats without renal infarcts. Conclusions and Clinical Importance Cats with renal infarcts identified on antemortem examination should be screened for occult cardiomyopathy.

Urethral Plugs in Dogs.

A.T. Stiller, J.P. Lulich and E. Furrow.

Background Crystalline-matrix urethral plugs have not been previously reported in dogs. Objective To report the composition of urethral plugs in dogs, describe clinical features of the disease, and identify overrepresented breeds. Methods Retrospective case series. A Minnesota Urolith Center (MUC) record search was performed for urethral plugs in dogs submitted during a 6-year period. The composition of the plugs and signalment of affected dogs were recorded. Breed risk analysis was performed using a control group without plugs from the Veterinary Medical Center, University of Minnesota (VMC UMN). Breed risk was also calculated for a group of dogs with struvite (plugs and uroliths). Medical records for the subset of plug cases from the VMC UMN were reviewed and described. Results Between 2006 and 2011, 42 urethral plugs from dogs were submitted to the MUC. All came from male dogs, and the mineral component of the majority (83%) was struvite. Thirty (71%) samples were from Pugs. Pugs were overrepresented in plug submissions (OR 179; CI 88–389; P < .001), and for struvite in general (OR 14.3; CI 7.9–24.4; P < .001). Nine of the dogs were treated at VMC UMN; all were castrated male Pugs. None of these cases had bacteriuria or positive urine cultures, and no underlying cause of plug formation was identified. Conclusions and Clinical Importance When evaluating dogs with urethral obstruction, plugs need to be considered, especially in male Pugs. Further investigation into the underlying cause of plug formation in dogs is warranted.
Clinical Features, Intestinal Histopathology, and Outcome in Protein-Losing Enteropathy in Yorkshire Terrier Dogs.


Background A poorly understood protein-losing enteropathy (PLE) disorder has been reported in Yorkshire Terrier dogs. Objectives To describe clinical features, intestinal histopathology, and outcome in Yorkshire Terrier dogs with PLE, and to identify variables predictive of outcome. Animals Thirty client-owned Yorkshire Terrier dogs with PLE. Methods Retrospective study. Records of dogs with a diagnosis of PLE were reviewed. Intestinal histopathology was interpreted using the World Small Animal Veterinary Association gastrointestinal histopathology classification system. Discriminate analysis techniques were used to identify variables predictive of outcome. Results Females outnumbered males (20/30). Median age was 7 years (range 1–12). Common clinical signs were diarrhea (20/30), vomiting (11), ascites and abdominal distension (11), and respiratory difficulty (8). Histopathologic abnormalities included villous lymphatic dilatation, crypt lesions, villous stunting, and variable increases in cellularity of the lamina propria. All dogs were treated with glucocorticoids. Of 23 dogs with long-term follow-up, 9 had complete, and 3 had partial, resolution of signs, and 11 failed to respond to treatment. Median survival of responders was 44 months and of nonresponders was 12 months, with 4 dogs experiencing peracute death. Vomiting, monocytosis, severity of hypoalbuminemia, low blood urea nitrogen concentration, and villous blunting were predictive of survival <4 months. Conclusions In addition to classic GI signs, Yorkshire Terriers with PLE often show clinical signs associated with hypoalbuminemia and low oncotic pressure. Lymphatic dilatation, crypt lesions, and villous stunting are consistent histopathologic findings. Clinical outcomes are variable, but many dogs experience remission of clinical signs and prolonged survival.

Assessment of the Efficacy and Potential Complications of Transjugular Liver Biopsy in Canine Cadavers.

A.S. Levien, C. Weisse, T.A. Donovan and A.C. Berent.

Background Transjugular liver biopsy (TJLB) is used in humans at risk of bleeding. There are no reports of its use in veterinary medicine. Objective To assess the efficacy and potential complications of TJLB in canine cadavers, and compare with samples obtained via needle liver biopsy (NLB) and surgical liver biopsy (SLB). Animals Twenty-five medium and large breed canine cadavers. Methods Prospective study. TJLBs were procured through the right jugular vein. After biopsy, intravenous contrast and gross inspection were used to assess the biopsy site. Minor and major complications were recorded. NLBs and SLBs were then obtained. Histopathology was performed, and TJLB and NLB were compared for number of complete portal tracts (CPTs), length, and fragmentation. Pathologic process and autolysis were assessed in all samples. Results All TJLBs yielded liver tissue. The proportion of minor complications was 12/25 (48%), and major complications 16/25 (64%); 13/16 (81%) of the major complications were liver capsule perforation. In 21/25 (84%), the histopathology in the SLB was reflected in the TJLBs. For cases with minimal autolysis, median number of CPTs in TJLBs was 7.5, compared with 4 in NLBs (P = .018). Median length of TJLB specimen was 28 mm compared to 22 mm in NLBs (P = .007). Fragmentation rate was median of 1.25 for TJLB compared to 1.50 in NLBs (P = .11). Conclusions and Clinical Importance TJLB is technically feasible and achieves comparable results to NLB and SLB. The number of complications, in particular liver capsule perforation, was greater than expected. Further studies are indicated before clinical use is recommended.

Detection of Clinically Relevant Pain Relief in Cats with Degenerative Joint Disease Associated Pain.


Background Detection of clinically relevant pain relief in cats with degenerative joint disease (DJD) is complicated by a lack of validated outcome measures and a placebo effect. Hypothesis/Objectives To evaluate a novel approach for detection of pain relief in cats with DJD. Animals Fifty-eight client-owned cats. Methods
Prospective, double-masked, placebo-controlled, stratified, randomized, clinical study. Enrolled cats were 6–21 years of age, with owner-observed mobility impairment, evidence of pain in at least 2 joints during orthopedic examination, and overlapping radiographic evidence of DJD, and underwent a 2-week baseline period, 3-week treatment period with placebo or meloxicam, and 3-week masked washout period. Outcome measures were evaluated at days 0, 15, 36, and 57. Results Both groups significantly improved after the treatment period (day 36) on client-specific outcome measures (CSOM) and feline musculoskeletal pain index (FMPI) (P < .0001 for both); there was no difference between the groups on CSOM or FMPI score improvement. After the masked washout period, more cats that received meloxicam during the treatment period had a clinically relevant decrease in CSOM score (P = .048) and FMPI score (P = .021) than cats that received placebo. Conclusions and Clinical Importance Using both a client-specific and a general clinical metrology instrument, owners of cats with DJD were able to detect evident recurrence of clinical signs after withdrawal of active medication than after withdrawal of placebo, and that this study design might be a novel and useful way to circumvent the placebo effect and detect the efficacy of pain-relieving medications.

Cats with Inflammatory Bowel Disease and Intestinal Small Cell Lymphoma Have Low Serum Concentrations of 25-Hydroxyvitamin D.

S. Lalor, A.M. Schwartz, H. Titmarsh, N. Reed, S. Tasker, L. Boland, J. Berry, D. Gunn-Moore and R.J. Mellanby

Background Inflammatory bowel disease (IBD) and intestinal small cell lymphoma (ISCL) are common diseases in cats. The prevalence of alterations in the serum concentrations of fat soluble vitamins, such as vitamin D, in cats with IBD and ISCL is unknown. Hypothesis/Objectives The objective of this study was to measure serum 25 hydroxyvitamin D (25(OH)D) concentrations in cats with IBD or ISCL. Serum 25(OH)D also was measured in healthy cats, and in hospitalized ill cats with nongastrointestinal diseases. Animals Eighty-four cats were included in the study: 23 in the healthy group, 41 in the hospitalized ill group, and 20 in the IBD/ISCL group. Methods Retrospective study. Serum samples for vitamin D analysis were frozen at −20°C until serum 25(OH)D was measured by high-performance liquid chromatography (HPLC). Results Although there was overlap in serum 25(OH)D concentrations among the 3 groups, serum 25(OH)D concentrations were significantly lower in the cats with IBD or ISCL compared to healthy cats (P < .0001) and hospitalized ill cats (P = .014). In the IBD/ISCL group, there was a significant moderate positive correlation between serum albumin and 25(OH)D concentrations (r = 0.58, P = .018). Conclusion and Clinical Importance The median serum concentration of 25(OH)D was significantly lower in cats with IBD/ISCL than in healthy cats and in hospitalized ill cats. Additional studies are required to elucidate the mechanism of hypovitaminosis D in cats with gastrointestinal diseases, to define the best management strategy to treat this complication, and to investigate its potential prognostic implications.

Selective Intestinal Cobalamin Malabsorption with Proteinuria (Imerslund-Gräsbeck Syndrome) in Juvenile Beagles.

J.C. Fyfe, S.L. Hemker, P.J. Venta, B. Stebbing and U. Giger.

Background Selective intestinal cobalamin malabsorption with mild proteinuria (Imerslund-Gräsbeck syndrome; I-GS), is an autosomal recessive disorder of dogs caused by mutations in AMN or CUBN that disrupt cubam function and which can present as a medical emergency. Objectives To describe the clinical, metabolic, and genetic bases of I-GS in Beagles. Animals Four cobalamin-deficient and 43 clinically normal Beagles and 5 dogs of other breeds. Methods Clinical description and candidate gene genetic study. Urinary organic acid and protein excretion were determined by gas-chromatography and SDS-PAGE, respectively. Renal cubilin protein expression was assessed on immunoblots. Mutation discovery was carried out by PCR amplification and DNA sequencing of exons with flanking splice sites and cDNA of CUBN and AMN. Genotyping was performed by restriction enzyme digestion of PCR amplicons. Results Juvenile-affected Beagles exhibited failure to thrive, dyshematopoiesis with neutropenia, serum cobalamin deficiency, methylmalonic aciduria, hyperammonemia,
and proteinuria. Affected dogs' kidneys lacked detectable cubilin protein. All affected dogs were homozygous for a single-base deletion in CUBN exon 8 (CUBN c.786delC), predicting a translational frameshift, and the 2 parents tested were heterozygous. Conclusions The CUBN mutation in juvenile I-GS Beagles causes a more severe cobalamin malabsorption than in Border Collies with a different CUBN defect, but is similar to I-GS caused by AMN mutations in Giant Schnauzers and Australian Shepherds. Awareness of the disorder and breed predispositions to I-GS is crucial to precisely diagnose and promptly treat hereditary cobalamin malabsorption and to prevent disease in those dogs at risk in future generations.

Holter Monitoring of Small Breed Dogs with Advanced Myxomatous Mitral Valve Disease with and without a History of Syncope.


Background Syncope is a transient loss of consciousness occasionally occurring in dogs with advanced myxomatous mitral valve disease (MMVD). Objective (1) To study ECG changes during syncopal episodes in dogs with advanced MMVD and (2) to compare the occurrence of arrhythmias and changes in heart rate variability (HRV) between dogs with advanced MMVD with and without a history of syncope. Animals Forty-three privately owned dogs (<15 kg) with advanced MMVD: 21 with and 22 without a history of syncope. Methods Prospective study with dogs recruited for an evaluation including history, physical examination, echocardiography, and arrhythmia and HRV analysis performed on 24-hour Holter recordings. Results A syncopal episode was observed during Holter monitoring in 4 dogs: 3 dogs had sinus rhythm and 1 dog had sinus arrest followed by escape rhythm. An arrhythmia variable representing sinus arrhythmia was significantly lower in dogs with a history of syncope than in those without (P = .008). Eight of 26 HRV variables were significantly different between dogs with and without a history of syncope. Conclusions and Clinical Importance Compared with dogs without a history of syncope, dogs with advanced MMVD and a history of syncope did not have a higher occurrence of arrhythmias, but had less sinus arrhythmia, and had changes in HRV variables representing decreased overall HRV, decreased parasympathetic, and increased sympathetic modulation of heart rate.

Effect of Body Weight Loss on Cardiopulmonary Function Assessed by 6-Minute Walk Test and Arterial Blood Gas Analysis in Obese Dogs.


Background Few studies show the detrimental effect of canine obesity on cardiopulmonary function (CPF). The 6-Minute Walk Test (6MWT) is a noninvasive exercise test easy to perform in clinical settings. Objective The aim of this study was to investigate the effect of obesity and body weight loss (BWL) on CPF assessed by the 6MWT and arterial blood gas analysis. Animals Six experimental Beagles and 9 privately owned obese dogs were enrolled in a diet-induced BWL program. Methods Arterial blood gas analysis and 6MWT were repeated in obese subjects (BCS 8-9/9), in the middle of BWL (overweight, BCS 6-7/9), and in lean dogs (BCS 5/9). Heart rate (HRp) and oxygen saturation (SpO2) were measured by pulse oximetry before the 6MWT, at midtest, and during a 5-minute recovery period. Results Twelve dogs completed the BWL program (initial BW, 27.3 ± 2.9 kg; final BW, 20.85 ± 2.9, lsmeans ± SE, P ≤ .001). BWL caused a significant increase in 6MWT walked distance (WD; obese: 509 ± 35 m; overweight: 575 ± 36 m; lean: 589 ± 36 m; P ≤ .05). Resting arterial blood gas results were not influenced by BWL. Including all time points, obese dogs showed higher HRp and lower SpO2 compared to overweight and lean dogs. SpO2 at the end of the walk was significantly lower in obese dogs. Conclusion and Clinical Importance Obesity negatively affects 6MWT performances in dogs. The 6MWT may be used to demonstrate the efficacy of BWL to improve CPF and quality of life in obese dogs. Although BWL induced significant improvement of cardiopulmonary parameters before ideal BW, WD improved until the end of the BWL program.
Long-Term Outcome and Use of 6-Minute Walk Test in West Highland White Terriers with Idiopathic Pulmonary Fibrosis.


Background Idiopathic pulmonary fibrosis (IPF) is an incurable interstitial lung disease occurring mainly in West Highland White Terriers (WHWTs). The effects of IPF on survival and on exercise tolerance in WHWTs are unknown. Objectives To evaluate survival, prognostic factors, and exercise tolerance in WHWTs with IPF. Animals Privately owned WHWTs; 15 with IPF and 11 healthy controls. Methods Prospective case-control study conducted in 2007–2012. For survival, descriptive statistics and Kaplan–Meier (KM) survival curves with Cox proportional hazard ratios were performed. For the prognostic factor study, KM curves, Cox regression analysis, and logistic regression models were used. The 6-minute walk test (6MWT) was used for measurement of exercise tolerance. Results The median IPF-specific survival of deceased WHWTs (7/15) with IPF was 32 (range 2–51) months from onset of clinical signs. The risk of death from birth in WHWTs with IPF in age-adjusted Cox model was significantly higher (hazard ratio 4.6; 95% confidence interval 1.05–19.74, P = .04) than in control WHWTs. No significant prognostic factors were identified. In 6MWT, WHWTs with IPF walked a shorter distance, median 398 m (range 273–519 m), than healthy controls, median 492 m (420–568 m), P = .05, and the partial pressure of oxygen in arterial blood in diseased dogs had a moderate positive correlation with walking distance (Kendall's tau-b = 0.69, P = .06). Conclusion and Clinical Importance IPF had a negative impact on life expectancy, but individual survival varied considerably. 6MWT proved to be a well-tolerated, noninvasive test to evaluate exercise tolerance.

Dobutamine Stress Echocardiography for Assessment of Systolic Function in Dogs with Experimentally Induced Mitral Regurgitation.


Background Systolic dysfunction is associated with poor outcomes in dogs with myxomatous mitral valve disease. However, assessment of systolic variables by conventional echocardiographic methods is difficult in these dogs because of mitral regurgitation (MR). Hypothesis We hypothesized that assessment of systolic function by dobutamine stress may identify systolic dysfunction in dogs with MR, and that 2-dimensional speckle-tracking echocardiography (2D-STE) could quantitatively evaluate myocardial function. Animals Anesthetized dogs with experimentally induced MR. Methods Dogs were examined for systolic myocardial deformations using 2D-STE during dobutamine infusion before and 3 and 6 months after MR induction. We evaluated peak systolic rotation and rotation rate in each basal and apical view; peak systolic torsion and torsion rate were also calculated. Results Invasive peak positive first derivatives of left ventricular pressure (dp/dt) were significantly decreased in dogs 6 months after induction of MR compared with pre-MR results. After 3 and 6 months of MR, dogs had diminished peak systolic torsion values and torsion rates in response to dobutamine infusion compared with pre-MR results (3 months, P < .001 and P = .006; 6 months, P = .003 and P = .021). These results were significantly correlated with overall invasive dp/dt (r = 0.644, P < .001; r = 0.696, P < .001). Conclusions and Clinical Importance Decreased torsion during dobutamine infusion in dogs with MR may reflect latent systolic dysfunction. Dobutamine infusion, therefore, may be useful for the assessment of systolic function in dogs with MR.

Longitudinal Electrocardiographic Evaluation of Dogs with Degenerative Mitral Valve Disease.

J. López-Alvarez, A. Boswood, W. Moonarmart, M.J. Hezzell, N. Lotter and J. Elliott

Background Increased heart rate (HR) and decreased heart rate variability (HRV) are evident in some dogs with degenerative mitral valve disease (DMVD). Objectives Evaluation of the factors influencing HR and HRV (assessed by the vasovagal tonus index; VVTI) and their change over time in dogs with DMVD. Animals Client-owned dogs (n = 257) with DMVD recruited from first opinion practice. Methods Prospective longitudinal follow-up at six-monthly intervals of dogs with DMVD. Dogs followed up for at least 18 months (n = 102) were grouped according to their outcome as dogs dying/euthanized because of cardiac disease (n = 28; Group 1),
noncardiac disease (n = 40; Group 2) and dogs alive (n = 34; Group 3). HR and VVTI were measured on 1-minute ECG recordings. Repeated measures linear models were constructed to investigate the factors that influence HR and VVTI and their changes over time. Results Heart rate and VVTI were affected by disease severity and were different in Cavaliers compared to other breeds. Group 1 and Group 2 dogs underwent an increase in HR and decrease in VVTI, evident at least 18 months before death. Group 1 had a further decrease in VVTI followed by an increase in HR approximately 1 year and 6 months before death, respectively. Conclusions and Clinical Importance Dogs with DMVD have an increase in HR and decrease in HRV over a year before death, with greater changes in those dogs dying/euthanized because of cardiac disease. Both HR and VVTI can potentially be regarded as biomarkers for all-cause mortality.

**Long-Term Outcome in Dogs with Patent Ductus Arteriosus: 520 Cases (1994–2009).**

A.B. Saunders, S.G. Gordon, M.M. Boggess and M.W. Miller

Background Published information regarding survival and long-term cardiac remodeling after patent ductus arteriosus (PDA) closure in dogs is limited. Objectives To report outcome and identify prognostic variables in dogs with PDA, and to identify risk factors for persistent remodeling in dogs with a minimum of 12 months of follow-up after closure. Animals Five hundred and twenty client-owned dogs. Methods Retrospective review of medical records of 520 dogs with PDA. Outcome was determined by contacting owners and veterinarians. Dogs with PDA closure and ≥12 months of follow-up were asked to return for a re-evaluation. Results In multivariable analysis of 506 dogs not euthanized at the time of diagnosis, not having a PDA closure procedure negatively affected survival (HzR = 16.9, P < .001). In 444 dogs undergoing successful PDA closure, clinical signs at presentation (HzR = 17, P = .02), concurrent congenital heart disease (HD) (HzR = 4.8, P = .038), and severe mitral regurgitation (MR) documented within 24 hours of closure (HzR = 4.5, P = .028) negatively affected survival. Seventy-one dogs with ≥12 months follow-up demonstrated a significant reduction in radiographic and echocardiographic measures of heart size (P = 0) and increased incidence of acquired HD (P = .001) at re-evaluation. Dogs with increased left ventricular size and low fractional shortening at baseline were more likely to have persistent remodeling at re-evaluation. Conclusions and Clinical Importance Patent ductus arteriosus closure confers important survival benefits and results in long-term reverse remodeling in most dogs. Clinical signs at presentation, concurrent congenital HD, and severe MR negatively affect survival. Increased left ventricular systolic dimensions and systolic dysfunction at baseline correlated significantly with persistent remodeling.

**Platelet Activation in Cats with Hypertrophic Cardiomyopathy.**


Background Cats with hypertrophic cardiomyopathy (HCM) are at risk for development of systemic thromboembolic disease. However, the relationship between platelet activation state and cardiovascular parameters associated with HCM is not well described. Objectives To characterize platelet activation by flow cytometric evaluation of platelet P-selectin and semiquantitative Western blot analysis of soluble platelet-endothelial cell adhesion molecule-1 (sPECAM-1). Animals Eight normal healthy cats (controls) owned by staff and students of the School of Veterinary Medicine and 36 cats from the UC Davis Feline HCM Research Laboratory were studied. Methods Platelet-rich plasma (PRP) was used for all flow cytometry studies. Platelet surface CD41 and P-selectin expression were evaluated before and after ADP stimulation. sPECAM-1 expression was evaluated by Western blot analysis of platelet-poor plasma that had been stabilized with aprotinin. Standard echocardiographic studies were performed. Results Resting platelets from cats with severe HCM had increased P-selectin expression compared to controls, and expressed higher surface density of P-selectin reflected by their increased mean fluorescence intensities (MFI). Stimulation with ADP also resulted in significantly increased P-selectin MFI of platelets from cats with severe HCM. Increased P-selectin expression and MFI correlated with the presence of a heart murmur and end-systolic cavity obliteration (ESCO). sPECAM-1 expression from cats with moderate and severe HCM was significantly increased above those of
Relationship among Insulin Resistance, Growth Hormone, and Insulin-Like Growth Factor I Concentrations in Diestrous Swedish Elkhounds.

E.M. Strage, M.S. Lewitt, J.M. Hanson, U. Olsson, F. Norrvik, I. Lilliehöök, B.S. Holst and T. Fall. Background In the dog, the normal estrous cycle includes a prolonged luteal phase. Progesterone stimulates local canine mammary growth hormone (GH) production, which may act systemically and contribute to insulin resistance. Swedish Elkhounds are predisposed to progesterone-related diabetes mellitus, and the relationship among insulin resistance, GH, and insulin-like growth factor I (IGF-I) is of particular interest. Objective To study insulin resistance in relation to GH and IGF-I in nondiabetic Swedish Elkhounds during diestru. We also assessed whether alterations in these hormones could predict diestrus-linked diseases and all-cause mortality. Animals Eighty-four privately owned female intact Swedish Elkhounds >4 years of age. Methods Blood sampling and clinical examination during the luteal phase, with a follow-up questionnaire after 20 months. Insulin resistance was calculated by homeostasis model assessment (HOMA-IR). Results In multivariable regression analysis, GH was positively associated with HOMA-IR (P = .009). An increase in GH of 1 ng/mL was associated with a 12.7% increase in HOMA-IR. Moreover, C-peptide was positively associated with IGF-I (P = .04), and an increase in C-peptide of 0.1 ng/mL was associated with a 6.9% increase in IGF-I. Structural equation modeling supported these results. Twenty-three animals were found to have previously unrecognized mammary masses and had higher GH (P < .0001) and IGF-I (P = .007) than dogs without mammary masses (n = 61). There was no association between high GH and IGF-I concentrations at sampling and future mammary masses. Conclusion We showed that GH was strongly associated with insulin resistance in older Swedish Elkhounds during diestrus.
Background. Neutrophil gelatinase–associated lipocalin (NGAL) is released from renal tubular cells after injury and serves in humans as a real-time indicator of active kidney damage, including acute kidney injury (AKI) and chronic kidney disease (CKD). However, NGAL concentrations in dogs with naturally occurring AKI or CKD rarely have been explored in detail. Hypothesis/Objectives. The goal of this study was to evaluate whether NGAL can serve as a useful biomarker in dogs with naturally occurring renal disease. Animals. Client-owned dogs with renal disease (57) and control dogs without any disease (12) were examined. Methods. Serum NGAL (sNGAL) and urine NGAL (uNGAL) concentrations were measured in each animal by a newly developed ELISA system. Demographic, hematologic, and serum biochemical data were recorded. Survival attributable to AKI and CKD was evaluated at 30 days and 90 days, respectively. Results. Serum and urine NGAL concentrations in azotemic dogs were significantly higher than in nonazotemic dogs and were highly correlated with serum creatinine concentration (P < .05). Among CKD dogs, death was associated with significantly higher sNGAL and uNGAL concentrations compared with survivors. Receiver-operating characteristic curve (ROC) analysis showed that sNGAL was better than serum creatinine concentration when predicting clinical outcomes for CKD dogs (P < .05). The best cutoff point for sNGAL was 50.6 ng/mL, which gave a sensitivity and a specificity of 76.9 and 100%, respectively. Furthermore, dogs that had higher concentrations of sNGAL survived for a significantly shorter time. Conclusion. sNGAL is a useful prognostic marker when evaluating dogs with CKD.

Effect of Trilostane and Mitotane on Aldosterone Secretory Reserve in Dogs with Pituitary-Dependent Hyperadrenocorticism.


Background. Maximal aldosterone secretion in healthy dogs occurs 30 minutes postadrenocorticotropin (ACTH; 5 µg/kg IV) stimulation. The effect of trilostane and mitotane on aldosterone at that time is unknown. Objectives. To assess the effect of trilostane and mitotane in dogs with pituitary-dependent hyperadrenocorticism on aldosterone secretory reserve. To determine if aldosterone concentration correlates with electrolyte concentrations. Animals. Serum collected from 79 client-owned dogs and 33 stored samples. Methods. Client-owned dogs had ACTH stimulation tests with cortisol concentrations measured at 0 and 60 minutes and aldosterone concentrations measured at 0, 30, and 60 minutes. Stored samples had aldosterone concentrations measured at 0 and 60 minutes. Ten historical clinically healthy controls were included. All had basal sodium and potassium concentrations measured. Results. The aldosterone concentrations in the mitotane- and trilostane-treated dogs at 30 and 60 minutes post-ACTH were significantly lower than in clinically healthy dogs; no significant difference was detected in aldosterone concentration between 30 and 60 minutes in treated dogs. However, a significantly higher percentage of dogs had decreased aldosterone secretory reserve detected at 30 minutes than at 60 minutes. At 30 minutes, decreased secretory reserve was detected in 49% and 78% of trilostane- and mitotane-treated dogs, respectively. No correlation was detected between aldosterone and serum electrolyte concentrations. Conclusions and Clinical Importance. Decreased aldosterone secretory reserve is common in trilostane- and mitotane-treated dogs; it cannot be predicted by measurement of serum electrolyte concentrations. Aldosterone concentration at 30 minutes post-ACTH stimulation identifies more dogs with decreased aldosterone secretory reserve than conventional testing at 60 minutes.

Breed Differences in Natriuretic Peptides in Healthy Dogs.


Background. Measurement of plasma concentration of natriuretic peptides (NPs) is suggested to be of value in diagnosis of cardiac disease in dogs, but many factors other than cardiac status may influence their concentrations. Dog breed potentially is 1 such factor. Objective. To investigate breed variation in plasma concentrations of pro-atrial natriuretic peptide 31-67 (proANP 31-67) and N-terminal B-type natriuretic peptide (NT-proBNP) in healthy dogs. Animals. 535 healthy, privately owned dogs of 9 breeds were examined at 5 centers as part of the European Union (EU) LUPA project. Methods. Absence of cardiovascular disease or other
clinically relevant organ-related or systemic disease was ensured by thorough clinical investigation. Plasma concentrations of proANP 31-67 and NT-proBNP were measured by commercially available ELISA assays. Results Overall significant breed differences were found in proANP 31-67 (P < .0001) and NT-proBNP (P < .0001) concentrations. Pair-wise comparisons between breeds differed in approximately 50% of comparisons for proANP 31-67 as well as NT-proBNP concentrations, both when including all centers and within each center. Interquartile range was large for many breeds, especially for NT-proBNP. Among included breeds, Labrador Retrievers and Newfoundlands had highest median NT-proBNP concentrations with concentrations 3 times as high as those of Dachshunds. German Shepherds and Cavalier King Charles Spaniels had the highest median proANP 31-67 concentrations, twice the median concentration in Doberman Pinschers. Conclusions and Clinical Importance Considerable interbreed variation in plasma NP concentrations was found in healthy dogs. Intrabreed variation was large in several breeds, especially for NT-proBNP. Additional studies are needed to establish breed-specific reference ranges.

A Polymorphism in the Melanocortin 4 Receptor Gene (MC4R:c.92C>T) Is Associated with Diabetes Mellitus in Overweight Domestic Shorthaired Cats.

Y. Forcada, A. Holder, D.B. Church and B. Catchpole

Background Feline diabetes mellitus (DM) shares many pathophysiologic features with human type 2 DM. Human genome-wide association studies have identified genes associated with obesity and DM, including melanocortin 4 receptor (MC4R), which plays an important role in energy balance and appetite regulation. Hypothesis/Objectives To identify single nucleotide polymorphisms (SNPs) in the feline MC4R gene and to determine whether any SNPs are associated with DM or overweight body condition in cats. Animals Two-hundred forty domestic shorthaired (DSH) cats were recruited for the study. Of these, 120 diabetics were selected (60 overweight, 60 lean), along with 120 nondiabetic controls (60 overweight and 60 lean). Males and females were equally represented. Methods A prospective case-control study was performed. Genomic DNA was extracted from blood samples and used as template for PCR amplification of the feline MC4R gene. The coding region of the gene was sequenced in 10 cats to identify polymorphisms. Subsequently, genotyping by restriction fragment length polymorphism (RFLP) analysis assessed MC4R:c.92C>T allele and genotype frequencies in each group of cats. Results No significant differences in MC4R:c.92C>T allele or genotype frequencies were identified between nondiabetic overweight and lean cats. In the overweight diabetic group, 55% were homozygous for the MC4R:c.92C allele, compared to 33% of the lean diabetics and 30% of the nondiabetics. The differences between the overweight diabetic and the nondiabetics were significant (P < .01). Conclusions and Clinical Importance We identified a polymorphism in the coding sequence of feline MC4R that is associated with DM in overweight DSH cats, similar to the situation in humans.

Cardiac Biomarkers in Hyperthyroid Cats.


Background Hyperthyroidism has substantial effects on the circulatory system. The cardiac biomarkers NT-proBNP and troponin I (cTNI) have proven useful in identifying cats with myocardial disease but have not been extensively investigated in hyperthyroidism. Hypothesis Plasma NT-proBNP and cTNI concentrations are higher in cats with primary myocardial disease than in cats with hyperthyroidism and higher in cats with hyperthyroidism than in healthy control cats. Animals Twenty-three hyperthyroid cats, 17 cats with subclinical hypertrophic cardiomyopathy (HCM), and 19 euthyroid, normotensive healthy cats ≥8 years of age. Fourteen of the hyperthyroid cats were re-evaluated 3 months after administration of radioiodine (131I). Methods Complete history, physical examination, complete blood count, serum biochemistries, urinalysis, blood pressure measurement, serum T4 concentration, plasma concentrations of NT-proBNP and cTNI, and echocardiogram were obtained prospectively from each cat. Results Hyperthyroid cats and cats with HCM had plasma NT-proBNP and cTNI concentrations that were significantly higher than those of healthy cats, but there was no significant difference between hyperthyroid cats and cats with HCM with respect to the concentration of either
Biomarker. In hyperthyroid cats that were re-evaluated 3 months after 131I treatment, plasma NT-proBNP and cTNI concentrations as well as ventricular wall thickness had decreased significantly. Conclusions and Clinical Importance Although there may be a role for NT-proBNP in monitoring the cardiac response to treatment of hyperthyroidism, neither NT-proBNP nor cTNI distinguish hypertrophy associated with hyperthyroidism from primary HCM. Therefore, the thyroid status of older cats should be ascertained before interpreting NT-proBNP and cTNI concentrations.

Long-Term Survival of Dogs with Adrenal-Dependent Hyperadrenocorticism: A Comparison between Mitotane and Twice Daily Trilostane Treatment.

C. Arenas, C. Melián and M.D. Pérez-Alenza.

Background Treatment of adrenal-dependent hyperadrenocorticism (ADH) involves either surgical resection of the adrenal tumor or medical therapy. For many years, mitotane has been considered the medical treatment of choice for dogs with ADH. Objectives The aim of this study was to determine survival and prognostic factors for dogs with ADH treated with mitotane and trilostane. Animals Twenty-six dogs with ADH were included in the study. Methods Fourteen dogs were treated with mitotane and 12 dogs were treated with trilostane. Medical records were reviewed. Epidemiologic factors, signalment, clinicopathologic abnormalities, endocrine test results, and treatment protocols were evaluated to identify potential predictive factors of overall survival time. Results Survival times of dogs treated with mitotane (median, 15.6 months) or trilostane (median, 14.0 months) were not significantly different. Using univariate analysis, age and postadrenocorticotropic hormone cortisol concentrations were inversely correlated with survival time. The multivariate model also identified weakness at presentation as a negative prognostic indicator. Conclusion and Clinical Importance The type of medical treatment (mitotane versus trilostane) does not influence survival time in dogs with ADH; therefore, trilostane, a drug with less frequent and milder adverse effects, might be used as the primary medical treatment when adrenalectomy cannot be performed.

Clinical Findings, Diagnostic Test Results, and Treatment Outcome in Cats with Spontaneous Hyperadrenocorticism: 30 Cases.


Background Spontaneous hyperadrenocorticism (HAC) is rare in cats. Clinical findings, diagnostic test results, and response to various treatment options must be better characterized. Objectives To report the clinical presentation, clinicopathologic findings, diagnostic imaging results, and response to treatment of cats with HAC. Animals Cats with spontaneous HAC. Methods Retrospective descriptive case series. Results Thirty cats (15 neutered males, 15 spayed females; age, 4.0–17.6 years [median, 13.0 years]) were identified from 10 veterinary referral institutions. The most common reason for referral was unregulated diabetes mellitus; dermatologic abnormalities were the most frequent physical examination finding. Low-dose dexamethasone suppression test results were consistent with HAC in 27 of 28 cats (96%), whereas ACTH stimulation testing was suggestive of HAC in only 9 of 16 cats (56%). Ultrasonographic appearance of the adrenal glands was consistent with the final clinical diagnosis of PDH or ADH in 28 of 30 cats (93%). Of the 17 cats available for follow-up at least 1 month beyond initial diagnosis of HAC, improved quality of life was reported most commonly in cats with PDH treated with trilostane. Conclusions and Clinical Importance Dermatologic abnormalities or unregulated diabetes mellitus are the most likely reasons for initial referral of cats with HAC. The dexamethasone suppression test is recommended over ACTH stimulation for initial screening of cats with suspected HAC. Diagnostic imaging of the adrenal glands may allow rapid and accurate differentiation of PDH from ADH in cats with confirmed disease, but additional prospective studies are needed.

Longitudinal Prevalence of Hypertension, Proteinuria, and Retinopathy in Dogs with Spontaneous Diabetes Mellitus.
I.P. Herring, D.L. Panciera and S.R. Were.

Background The prevalence and progression of vascular complications of spontaneous diabetes mellitus (DM) in dogs have not been described. Objectives To investigate the effects of duration of disease, as estimated by time since DM diagnosis, and glycemic control on prevalence of systemic hypertension, proteinuria, and diabetic retinopathy in dogs with spontaneous DM. Animals Seventeen client-owned dogs with spontaneous DM. Methods Prospective, longitudinal observational study. Dogs with DM of less than 1 year's duration were recruited and evaluated once every 6 months for 24 months. Recorded measures included indirect BP, urine albumin, protein and creatinine concentrations, serial blood glucose and serum fructosamine concentrations, ophthalmic examination, and a standardized behavioral questionnaire. Results Eleven dogs completed the 2-year follow-up period, during which the highest recorded prevalence of systolic and diastolic hypertension was 55 and 64%, respectively. Prevalence of microalbuminuria and elevated urine protein:creatinine ratio (UPC) ranged up to 73 and 55%, respectively. Prevalence of retinopathy ranged up to 20%. No significant effect of time since DM diagnosis or glycemic control was detected for any of the measures examined. Additionally, no significant associations between BP, urine albumin concentration, UPC and retinopathy were detected. Conclusions and Clinical Relevance With the exception of proteinuria, which was substantial in some cases, clinically deleterious diabetic vascular complications were not identified in dogs in this study.

Qualitative and Quantitative Contrast-Enhanced Ultrasonographic Assessment of Cerulein-Induced Acute Pancreatitis in Dogs.


Background Acute pancreatitis (AP) is the most common disease of the canine exocrine pancreas, and accurate noninvasive diagnosis is challenging. Hypothesis/Objectives To determine the feasibility of using quantitative contrast-enhanced ultrasonography (CEUS) to detect pancreatic perfusional changes in cerulein-induced AP in dogs. Animals Six adult female Beagles. Methods Each dog received 2 hours of IV infusion with 7.5 µg/kg/h of cerulein diluted in saline. As control, all dogs received 2 hours of IV infusion of saline 2 weeks before cerulein infusion. CEUS of the pancreas and duodenum were performed before (0 hour), and at 2, 4, 6, and 12 hours after saline and cerulein infusion. Time-intensity curves were created from regions of interest in the pancreas and duodenum. Five perfusional parameters were measured for statistical analysis: time to initial up-slope, peak time, time to wash-out, peak intensity (PI), and area under the curve (AUC). Results In cerulein-induced AP, pancreatic PI increased at 2 and 4 hours when compared to 0 hour, and at 2, 4, and 6 hours when compared to control. AUC increased at 4 hours when compared to 0 hour, and at 2 and 4 hours when compared to control. Time to wash-out was prolonged at 4 hours when compared to control. For saline control, peak time was faster at 2 hours when compared to 0 hour. Conclusions and Clinical Importance CEUS parameters PI and AUC can provide useful information in differentiating acute pancreatitis from normal pancreas. Cerulein-induced AP was characterized by prolonged hyperechoic enhancement on CEUS.

Levetiracetam Rectal Administration in Healthy Dogs.


Background Levetiracetam is used to manage status epilepticus (SE) and cluster seizures (CS) in humans. The drug might be absorbed after rectal administration and could offer a practical adjunct to rectal administration of diazepam in managing SE and CS. Hypothesis Levetiracetam is rapidly absorbed after rectal administration in dogs and maintains target serum concentrations for at least 9 hours. Animals Six healthy privately owned dogs between 2 and 6 years of age and weighing 10–20 kg. Methods Levetiracetam (40 mg/kg) was administered rectally and blood samples were obtained immediately before (time zero) and at 10, 20, 40, 60, 90, 180, 360, and 540 minutes after drug administration. Dogs were observed for signs of adverse effects over a 24-hour period after drug administration. Results CLEV at 10 minutes was 15.3 ± 5.5 µg/mL (mean, SD) with concentrations in the target range (5–40 µg/mL) for all dogs throughout the sampling period. Cmax (36.0 ± 10.7
µg/mL) and Tmax (103 ± 31 minutes) values were calculated and 2 disparate groups were appreciated. Dogs with feces in the rectum at the time of drug administration had lower mean Cmax values (26.7 ± 3.4 µg/mL) compared with those without (45.2 ± 4.4 µg/mL). Mild sedation was observed between 60 and 90 minutes without other adverse effects noted. Conclusions and Clinical Importance This study supports the use of rectally administered levetiracetam in future studies of clinical effectiveness in the management of epileptic dogs.

Evaluation of Quality of Life in Dogs with Idiopathic Epilepsy.

A. Wessmann, H.A. Volk, T. Parkin, M. Ortega and T.J. Anderson.

Background The impact of epilepsy and its treatment on the quality of life (QoL) is considered an important part of treatment supervision in human epilepsy. Objectives To develop a list of key questions evaluating QoL in dogs with idiopathic epilepsy (IE) and their carers. Animals One hundred fifty-nine dogs with IE. Methods Cross-sectional study. An online project questionnaire was developed containing 90 QoL-associated questions that were initially allocated to 14 themes representing specific areas associated with the treatment and care of an epileptic dog. Principal component analysis was applied with the aim of refining the questionnaire to the least number of questions representing useful themes without loss of descriptive value. Carers were recruited by paper mail, primary practices, and canine epilepsy websites. Data were acquired from January to November 2011. Results Principal component analysis removed 54 questions, leaving 7 themes with 36 questions with a minimum Cronbach's alpha value of 0.7 indicating a good internal consistency: “Seizure severity and frequency”, “Adverse effects of antiepileptic drug (AED)”, “Restrictions on the carer's life”, “Frustrations over caring for a dog with IE”, “Carer distaste of AED adverse effects”, “Carer anxiety around the seizure event”, “Perceptions on rectal diazepam use”. Conclusions and Clinical Importance Principal component analysis successfully reduced the number of questions without loss in descriptive value. The remaining questions correlate well with each other in capturing valuable details about aspects of QoL and represent valuable key questions (EpiQoL) in the assessment of QoL for the carers of dogs with IE.

Breed Distribution of SOD1 Alleles Previously Associated with Canine Degenerative Myelopathy.


Background Previous reports associated 2 mutant SOD1 alleles (SOD1:c.118A and SOD1:c.52T) with degenerative myelopathy in 6 canine breeds. The distribution of these alleles in other breeds has not been reported. Objective To describe the distribution of SOD1:c.118A and SOD1:c.52T in 222 breeds. Animals DNA from 33,747 dogs was genotyped at SOD1:c.118, SOD1:c.52, or both. Spinal cord sections from 249 of these dogs were examined. Methods Retrospective analysis of 35,359 previously determined genotypes at SOD1:c.118G>A or SOD1:c.52A>T and prospective survey to update the clinical status of a subset of dogs from which samples were obtained with a relatively low ascertainment bias. Results The SOD1:c.118A allele was found in cross-bred dogs and in 124 different canine breeds whereas the SOD1:c.52T allele was only found in Bernese Mountain Dogs. Most of the dogs with histopathologically confirmed degenerative myelopathy were SOD1:c.118A homozygotes, but 8 dogs with histopathologically confirmed degenerative myelopathy were SOD1:c.118A/G heterozygotes and had no other sequence variants in their SOD1 amino acid coding regions. The updated clinical conditions of dogs from which samples were obtained with a relatively low ascertainment bias suggest that SOD1:c.118A homozygotes are at a much higher risk of developing degenerative myelopathy than are SOD1:c.118A/G heterozygotes. Conclusions and Clinical Importance We conclude that the SOD1:c.118A allele is widespread and common among privately owned dogs whereas the SOD1:c.52T allele is rare and appears to be limited to Bernese Mountain Dogs. We also conclude that breeding to avoid the production of SOD1:c.118A homozygotes is a rational strategy.
Exclusion of a Brain Lesion: Is Intravenous Contrast Administration Required after Normal Precontrast Magnetic Resonance Imaging?


Background No evidence-based guidelines are available for the administration of gadolinium-based contrast media to veterinary patients. Objective To investigate whether administration of intravenous (IV) contrast media alters the likelihood of identifying a brain lesion in dogs and cats. Animals Four hundred and eighty-seven client-owned animals referred for investigation of intracranial disease. Methods Two reviewers retrospectively analyzed precontrast transverse and sagittal T1-weighted (T1W), T2-weighted, and fluid-attenuated inversion recovery low-field MRI sequences from each patient for the presence of a clinically relevant brain lesion. All sequences subsequently were reviewed in the same manner with additional access to postcontrast T1W images. Results Of the 487 precontrast MRI studies, 312 were judged to be normal by 1 or both reviewers. Of these 312 studies, a previously undetected lesion was identified in only 6 cases (1.9%) based on changes observed on postcontrast sequences. Final diagnoses included meningoencephalitis of unknown origin (n = 1), feline infectious peritonitis (n = 1), and neoplasia (n = 2). All 4 of these cases had persistent neurological deficits suggestive of an underlying brain lesion. Contrast enhancement observed in the 2 other cases was considered falsely positive based on the results of further investigations. Conclusions and Clinical Importance In patients with normal neurological examination and normal precontrast MRI, the subsequent administration of IV gadolinium-based contrast media is highly unlikely to disclose a previously unidentified lesion, calling into question the routine administration of contrast media to these patients. However, administration still should be considered in animals with persistent neurological deficits suggestive of an underlying inflammatory or neoplastic brain lesion.

Autologous Peripheral Blood Hematopoietic Cell Transplantation in Dogs with T-Cell Lymphoma.

E.E. Warry, J.L. Willcox and S.E. Suter.

Background Peripheral blood hematopoietic cell transplantation (PBHCT) is a feasible treatment option for dogs with B-cell lymphoma. Objective To examine apheresis and PBHCT outcomes in dogs diagnosed with T-cell lymphoma (TCL). Animals Fifteen client-owned dogs diagnosed with high-grade TCL. Methods After high-dose cyclophosphamide and rhG-colony-stimulating (rhG-CSF) factor treatment, peripheral blood mononuclear cells were collected using cell separators. The harvested cells then were infused after varying doses of total body irradiation (TBI). Postirradiation adverse effects were managed symptomatically and dogs were discharged upon evidence of hematopoietic engraftment. Results More than $2 \times 10^6$ CD34+ cells/kg were harvested from 15/15 dogs. Thirteen of 15 (87%) dogs engrafted appropriately, whereas 2 (13%) of the dogs died in the hospital. One dog developed cutaneous B-cell lymphoma 120 days post-PBHCT. The median disease-free interval and overall survival (OS) of the 13 dogs transplanted in first remission from the time of PBHCT were 184 and 240 days, respectively. Stage and substage of disease at diagnosis had no effect on OS. Two of 13 (15%) dogs were alive 741 and 772 days post-PBHCT. Conclusions and Clinical Importance PBHCT may be considered as a treatment option for dogs with TCL.

Flow Cytometric Characterization and Clinical Outcome of CD4+ T-Cell Lymphoma in Dogs: 67 Cases


Background Canine T-cell lymphoma (TCL) is conventionally considered an aggressive disease, but some forms are histologically and clinically indolent. CD4 TCL is reported to be the most common subtype of TCL. We assessed flow cytometric characteristics, histologic features when available, and clinical outcomes of CD4+ TCL to determine if flow cytometry can be used to subclassify this group of lymphomas. Objective To test the hypothesis that canine CD4+ T-cell lymphoma (TCL) is a homogeneous group of lymphomas with an aggressive clinical course. Animals Sixty-seven dogs diagnosed with CD4+ TCL by flow cytometry and treated at 1 of 3 oncology referral clinics. Methods Retrospective multivariable analysis of outcome in canine CD4+...
The majority of CD4+ TCL were CD45+, expressed low class II MHC, and exhibited an aggressive clinical course independent of treatment regimen (median survival, 159 days). Histologically, CD4+ TCL were classified as lymphoblastic or peripheral T cell. Size of the neoplastic lymphocytes had a modest effect on both PFI and survival in this group. A small number of CD4+ TCL were CD45− and class II MHC high, and exhibited an apparently more indolent clinical course (median survival not yet reached).

Conclusions and Clinical Importance Although the majority of CD4+ TCL in dogs had uniform clinical and flow cytometric features and an aggressive clinical course, a subset had a unique immunophenotype that predicts significantly longer survival. This finding strengthens the utility of flow cytometry to aid in the stratification of canine lymphoma.

Concordance of c-kit Mutational Status in Matched Primary and Metastatic Cutaneous Canine Mast Cell Tumors at Baseline.


Background Mutation analysis of proto-oncogene c-kit (c-kit) is advisable before starting treatment with tyrosine kinase inhibitors in dogs with mast cell tumor (MCT), including those with metastatic disease. Testing is usually performed on primary tumors, assuming that c-kit mutation status does not change in metastasis.

Hypothesis/Objectives To give an insight into the mutational processes and to make a recommendation on the use of c-kit mutational analysis in the clinical setting. Animals Twenty-one client-owned dogs with metastatic MCT. Methods Dogs undergoing resection or biopsy for both primary and matched metastatic MCT were prospectively enrolled. Total RNA or DNA was extracted from primary MCT and corresponding metastases. Exons 8, 9, and 11 were amplified by PCR and sequenced. Genetic features between primary MCT and metastases were compared. Their correlation with clinicopathologic features was investigated. Results Concordance (mutated or wild-type) of mutational status, evaluable in 21 primary and matched metastatic (20 nodal and 1 splenic) MCTs, was 100%. Three new c-kit mutations were identified. No significant correlation was detected between c-kit mutation and clinicopathologic features. Conclusions and Clinical Importance Proto-oncogene c-kit mutational status is conserved between any primary and its matched secondary tumor, suggesting that both can be used for c-kit mutational testing. Targeted therapies might be also used to treat metastatic disease.

Comparison of Carboplatin and Doxorubicin-Based Chemotherapy Protocols in 470 Dogs after Amputation for Treatment of Appendicular Osteosarcoma.


Background Many chemotherapy protocols have been reported for treatment of canine appendicular osteosarcoma (OSA), but outcome comparisons in a single population are lacking. Objective To evaluate the effects of protocol and dose intensity (DI) on treatment outcomes for carboplatin and doxorubicin-based chemotherapy protocols. Animals Four hundred and seventy dogs with appendicular OSA. Methods A retrospective cohort study was performed comprising consecutive dogs treated (1997–2012) with amputation followed by 1 of 5 chemotherapy protocols: carboplatin 300 mg/m2 IV q21d for 4 or 6 cycles (CARBO6), doxorubicin 30 mg/m2 IV q14d or q21d for 5 cycles, and alternating carboplatin 300 mg/m2 IV and doxorubicin 30 mg/m2 IV q21d for 3 cycles. Adverse events (AE) and DI were evaluated. Kaplan–Meier survival curves and Cox proportional hazards regression were used to compare disease-free interval (DFI) and survival time (ST) among protocols. Results The overall median DFI and ST were 291 days and 284 days, respectively. A lower proportion of dogs prescribed CARBO6 experienced AEs compared to other protocols (48.4% versus 60.8–75.8%; P = .001). DI was not associated with development of metastases or death. After adjustment for baseline characteristics and prognostic factors, none of the protocols provided a significant reduction in risk of development of metastases or death. Conclusions and Clinical Importance Although choice of protocol did not result in significant differences in DFI or ST, the CARBO6 protocol resulted in a lower proportion of dogs experiencing AEs, which could be advantageous in maintaining high quality of life during treatment. DI was not a prognostic indicator in this study.
Immunohistochemical Expression of Potential Therapeutic Targets in Canine Thyroid Carcinoma.


Background Thyroid carcinoma is a common endocrine tumor in the dog. Local invasive growth frequently precludes surgical excision and, in up to 38% of dogs, the tumor has already metastasized by the time of diagnosis. Therefore, it is important to investigate new treatment modalities that may be useful for the large number of dogs with inoperable tumors or metastatic disease. Hypothesis/Objectives To investigate the immunohistochemical expression of potential therapeutic targets in canine thyroid tumors. Animals 74 dogs with thyroid neoplasia. Methods Immunohistochemistry was performed for thyroglobulin, calcitonin, vascular endothelial growth factor (VEGF), p53, cyclooxygenase-2 (cox-2), and P-glycoprotein (P-gp). Results Fifty-four (73%) tumors were classified as follicular cell thyroid carcinomas (FTCs) and 20 (27%) as medullary thyroid carcinomas (MTCs). Eighty percent of FTCs and all MTCs had a high percentage (76–100%) of neoplastic cells immunopositive for VEGF. Thirteen percent of FTCs and 50% of MTCs expressed cox-2. Seven percent of FTCs and 70% of MTCs expressed P-gp. No tumor was immunopositive for p53 expression. Expression of VEGF (P = .034), cox-2 (P = .013), and P-gp (P < .001) was significantly higher in MTCs compared to FTCs. Conclusions and Clinical Importance VEGF is a potential therapeutic target in both FTC and MTC in dogs. Cox-2 and P-gp may be useful molecular targets in canine MTC.

Coagulation Factor and Hemostatic Protein Content of Canine Plasma after Storage of Whole Blood at Ambient Temperature.


Background Standard practice in canine blood banking is to produce fresh frozen plasma (FFP) by separating and freezing plasma produced from blood within 8 hours of collection. Within canine blood donation programs, this can limit the number of units collected. Hypothesis/Objectives The aim was to compare the coagulation factor and hemostatic protein content (CF&HPC) of plasma produced from blood stored at ambient temperature for 8, 12, and 24 hours. Another aim was to compare the CF&HPC between Greyhound types and other breeds. Animals None. Methods In vitro study. A convenience sample of 58 units of canine blood from a blood donor pool was processed to prepare and freeze plasma 8, 12, or 24 hours following collection. Results Regardless of time of processing, the units contained therapeutic CF&HPC. Frozen plasma prepared after 24 hours had significantly higher factor VIII (P = .014) and factor X (P = .03) when compared with the frozen plasma prepared at 8 hours. Factor X (P < .01), fibrinogen (P < .01), and vWF (P = .04) were significantly lower in plasma collected from Greyhound types than in plasma collected from other breeds. Conclusions and Clinical Importance Storing whole blood for up to 24 hours is a suitable method for producing FFP. Lower values for some coagulation factors and hemostatic proteins in plasma produced from Greyhound types would not preclude these dogs as FFP donors.


C. Kisielewicz, I. Self and R. Bell.

Background There are no standardized guidelines for determining the likelihood that euvolemic anemic dogs will benefit from transfusion of packed red blood cells (pRBC). Objectives To report clinical and laboratory variables of dogs receiving pRBC transfusion, which could guide transfusion of other anemic dogs. Animals Twenty-four client-owned anemic dogs receiving pRBC transfusion. Methods Prospective study; 30 transfusions assessed. Clinical findings (mucosal color, pulse quality, heart rate, respiratory rate, mentation/exercise tolerance) before and after transfusion were evaluated by the anemic dog clinical assessment score (ADCAS). Hemoglobin concentration, hematocrit, venous oxygen content (CvO2), and lactate concentration were
measured from blood samples taken before and after transfusion. These results were not used for case management. Results All ADCAS variables decreased significantly with transfusion (P < .001); the total score was ≥5/12 before transfusion, and ≤3/12 in all cases that were deemed to no longer require transfusion. Hematocrit and CvO2 were <17% and <5 mL/dL, respectively, in 83% of cases before transfusion and hemoglobin concentration was <5.8 g/dL in 80%. Hemoglobin concentration, hematocrit, and CvO2 increased significantly with transfusion (P < .001); lactate concentration decreased significantly (P = .006). Conclusions and Clinical Importance Clinical and laboratory variables improved significantly after transfusion of pRBC. By identifying how transfusion affected these variables, it was possible to recognize clinical (ADCAS) and laboratory (hemoglobin, CvO2, lactate) variables, which could be useful in guiding the decision to transfuse dogs with similar presentations.

Comparison of 4 Direct Coombs’ Test Methods with Polyclonal Antiglobulins in Anemic and Nonanemic Dogs for In-Clinic or Laboratory Use.


Background Difficulties with the direct antiglobulin test (DAT) and its apparent lack of sensitivity and specificity for immune-mediated hemolytic anemia (IMHA) in dogs have raised skepticism regarding its diagnostic value. Objective To compare different DATs and other hematologic parameters in dogs. Animals Anticoagulated blood samples from 59 nonanemic and 46 anemic dogs (± IMHA) from a research colony and veterinary clinics. Methods Prospective observational study: Immunochromatographic strip, gel microcolumn, and capillary techniques were compared with standard microtiter DAT using 2 polyclonal antiglobulins. Spherocytosis, autoagglutination, osmotic fragility, and clinical data were assessed. Results Blood samples from all 59 nonanemic dogs were DAT-. Among 46 anemic dogs, 33 were suspected of IMHA, but only 20 were DAT+. Old and new DAT methods yielded comparable and consistent results even after storage of chilled blood samples for 1 week. Spherocytosis and autoagglutination (that did not persist after washing) were noted in 15 and 16 DAT+ dogs, respectively. The other 26 anemic dogs, including 21 previously transfused dogs and 4 with autoagglutination, tested DAT- by the other methods. Osmotic fragility was increased in 70% (19/27) of anemic and all 15 DAT+ dogs tested. Limited follow-up testing revealed DAT+ results for 3–70 days. Conclusions and Clinical Importance The novel strip and capillary DAT methods are promising adjunct in-clinic tools. Despite prior immunosuppressive treatment and presence of autoagglutination, the DAT was positive in anemic dogs with IMHA. Transfusion did not cause false DAT+ results. Our results support DAT as a cornerstone in the diagnosis of canine IMHA.

DEA 1 Expression on Dog Erythrocytes Analyzed by Immunochromatographic and Flow Cytometric Techniques.


Background The Dog erythrocyte antigen (DEA) 1 blood group system was thought to contain types DEA 1.1 and 1.2 (and possibly 1.3 [A3]). However, DEA 1.2+ dogs are very rare and newer typing methods reveal varying degrees of DEA 1 positivity. Objectives To assess if variation in DEA 1 positivity is because of quantitative differences in surface antigen expression. To determine expression patterns in dogs over time and effects of blood storage (4°C). To evaluate DEA 1.2+ samples by DEA 1 typing methods. Animals Anticoagulated blood samples from 66 dogs in a research colony and from a hospital, and 9 previously typed DEA 1.2+ dogs from an animal blood bank. Methods Research study: Samples were analyzed by flow cytometry and immunochromatographic strip using a monoclonal anti-DEA 1 antibody. Results Twenty dogs were DEA 1−, whereas 46 dogs were weakly to strongly DEA 1+. Antigen quantification revealed excellent correlation between strip and flow cytometry (r = 0.929). Both methods reclassified DEA 1.2+ samples as weakly to moderately DEA 1+, but they were not retyped with the polyclonal anti-DEA 1.1/1.X antibodies. Dogs and blood samples retained their relative DEA 1 antigen densities over time. Conclusions and Clinical Importance The blood group system DEA 1 is a continuum from negative to strongly positive antigen
expression. Previously typed DEA 1.2+ appears to be DEA 1+. These findings further the understanding of the DEA 1 system and suggest that all alleles within the DEA 1 system have a similarly based epitope recognized by the monoclonal antibody.

Investigation of a Commercial ELISA for the Detection of Canine Procalcitonin.


Background Rapid identification of sepsis enables prompt administration of antibiotics and is essential to improve patient survival. Procalcitonin (PCT) is a biomarker used to diagnose sepsis in people. Commercial assays to measure canine PCT peptide have not been validated. Objective To investigate the validity of a commercially available enzyme-linked immunosorbent assay (ELISA) marketed for the measurement of canine PCT. Animals Three dogs with sepsis, 1 healthy dog, 1 dog with thyroid carcinoma. Methods Experimental study. The ELISA's ability to detect recombinant and native canine PCT was investigated and intra-assay and interassay coefficients of variability were calculated. Assay validation including mass spectrometry of the kit standard solution was performed. Results The ELISA did not consistently detect recombinant canine PCT. Thyroid lysate yielded a positive ELISA signal. Intra-assay variability ranged from 18.9 to 77.4%, while interassay variability ranged from 56.1 to 79.5%. Mass spectrometry of the standard solution provided with the evaluated ELISA kit did not indicate presence of PCT. Conclusions and Clinical Importance The results of this investigation do not support the use of this ELISA for the detection of PCT in dogs.

Transarterial Coil Embolization of an Abdominal Aortocaval Fistula in a Dog


Achalasia-Like Disease with Esophageal Pressurization in a Myasthenic Dog

J. Kempf, K. Beckmann and P.H. Kook

Degenerative Liver Disease in Young Beagles with Hereditary Cobalamin Malabsorption Because of a Mutation in the Cubilin Gene

P.H. Kook, M. Drögemüller, T. Leeb, J. Howard and M. Ruetten

Salvage Cisterna Chyli and Thoracic Duct Glue Embolization in 2 Dogs with Recurrent Idiopathic Chylothorax

D.C. Clendaniel, C. Weisse, W.T.N. Culp, A. Berent and J.A. Solomon

Partial Anomalous Pulmonary Venous Connection in 2 Miniature Schnauzers


Primary Hypothyroidism and Thyroid Goiter in an Adult Cat

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Non-pharmacological treatment options for refractory epilepsy: An overview of human treatment modalities and their potential utility in dogs. Valentine Martlé, Luc Van Ham, Robrecht Raedt, Kristl Vonck, Paul Boon, Sofie Bhatti Refractory epilepsy is a common disorder both in humans and dogs and treatment protocols are difficult to optimise. In humans, different non-pharmacological treatment modalities currently available include surgery, the ketogenic diet and neurostimulation. Surgery leads to freedom from seizures in 50–75% of patients, but requires strict patient selection. The ketogenic diet is indicated in severe childhood epilepsies, but efficacy is limited and long-term compliance can be problematic. In the past decade, various types of neurostimulation have emerged as promising treatment modalities for humans with refractory epilepsy. Currently, none of these treatment options are used in routine daily clinical practice to treat dogs with the condition. Since many dogs with poorly controlled seizures do not survive, the search for alternative treatment options for canine refractory epilepsy should be prioritised. This review provides an overview of non-pharmacological treatment options for human refractory epilepsy. The current knowledge and limitations of these treatments in canine refractory epilepsy is also discussed.

Papillomaviruses in felids. John S. Munday. The ability of papillomaviruses (PVs) to cause disease in human beings and most domestic animals has long been recognised. However, disease due to PVs in cats was not reported until 1990. Since this first description of feline cutaneous viral plaques, additional feline diseases have been causally linked to PVs, and PV-induced disease has been reported in a wide range of felids. In this review, the PV replication cycle and the subsequent immune response are discussed, along with diagnostic methods to confirm intralesional infection. In domestic cats, viral plaques, Bowenoid in situ carcinomas and feline sarcoïds are thought to be caused by PV infection; the appearance, clinical behaviour and causative PVs of these diseases are discussed. Recent evidence that PVs could also be a significant cause of feline cutaneous squamous cell carcinomas is reviewed. Lastly, PV-associated diseases of exotic felids are presented.

R-R interval variations influence the degree of mitral regurgitation in dogs with myxomatous mitral valve disease. M.J. Reimann, J.E. Møller, J. Häggström, B. Markussen, A.E.W. Holen, T. Falk, L.H. Olsen. Mitral regurgitation (MR) due to myxomatous mitral valve disease (MMVD) is a frequent finding in Cavalier King Charles Spaniels (CKCSs). Sinus arrhythmia and atrial premature complexes leading to R-R interval variations occur in dogs. The aim of the study was to evaluate whether the duration of the R-R interval immediately influences the degree of MR assessed by echocardiography in dogs. Clinical examination including echocardiography was performed in 103 privately-owned dogs: 16 control Beagles, 70 CKCSs with different degree of MR and 17 dogs of different breeds with clinical signs of congestive heart failure due to MMVD. The severity of MR was evaluated in apical four-chamber view using colour Doppler flow mapping (maximum % of the left atrium area) and colour Doppler M-mode (duration in ms). The influence of the ratio between present and preceding R-R interval on MR severity was evaluated in 10 consecutive R-R intervals using a linear mixed model for repeated measurements. MR severity was increased when a short R-R interval was followed by a long R-R interval in CKCSs with different degrees of MR (P < 0.005 when adjusted for multiple testing). The relationship was not significant in control dogs with minimal MR and in dogs with severe MR and clinical signs of heart failure. In conclusion, MR severity increases in long R-R intervals when these follow a short R-R interval in CKCSs with different degrees of MR due to asymptomatic MMVD. Thus, R-R interval variations may affect the echocardiographic grading of MR in CKCSs.
Computed tomographic morphology and clinical features of extrahepatic portosystemic shunts in 172 dogs in Japan. K. Fukushima, H. Kanemoto, K. Ohno, M. Takahashi, R. Fujiwara, R. Nishimura, H. Tsujimoto. Canine extrahepatic congenital portosystemic shunts (EH-cPSS) are classified into several anatomical types, depending on the origin and termination of the shunt vessel. The aim of this retrospective study was to determine the proportion and clinical features of each anatomical shunt type in a population of dogs presented to a veterinary teaching hospital in Japan. Dogs diagnosed with EH-cPSS using computed tomographic (CT) portography were included (n = 172) and shunts were classified based on previous reports. Clinical data were collected from case records and analyzed statistically. The most common anatomical type was the spleno-phrenic shunt (n = 64), followed by the spleno-azygos (n = 38), right gastric-caval (n = 29), spleno-caval (n = 21), right gastric-caval with caudal loop (n = 9), right gastric-phrenic (n = 6), colono-caval (n = 3), spleno-phrenic and azygos (n = 1), and porto-caval (n = 1) shunts. Spleno-phrenic and spleno-azygos shunts were diagnosed more frequently in older dogs than right gastric-caval and spleno-caval shunts (P < 0.05). The portal vein/aortic (PV/Ao) ratio was significantly larger in dogs with spleno-phrenic shunts than in dogs with spleno-azygos, right gastric-caval or spleno-caval shunts (P < 0.05). The PV/Ao ratio was significantly larger in dogs with spleno-azygos shunts than in dogs with right gastric-caval shunts. Dogs with spleno-phrenic shunts had significantly lower serum alkaline phosphatase activities than those with right gastric-caval or spleno-caval shunts. Dogs with spleno-phrenic shunts had significantly lower fasting ammonia concentrations than those with spleno-caval shunts.

The potential role of myocardial serotonin receptor 2B expression in canine dilated cardiomyopathy. Sonja Fonfara, Udo Hetzel, Mark A. Oyama, Anja Kipar. Serotonin signalling in the heart is mediated by receptor subtype 2B (5-HTR2B). A contribution of serotonin to valvular disease has been reported, but myocardial expression of 5-HTR2B and its role in canine dilated cardiomyopathy (DCM) is not known. The aim of the present study was to investigate myocardial 5-HTR2B mRNA expression in dogs with DCM and to correlate results with expression of markers for inflammation and remodelling. Myocardial samples from eight healthy dogs, four dogs with DCM, five with cardiac diseases other than DCM and six with systemic non-cardiac diseases were investigated for 5-HTR2B mRNA expression using quantitative PCR (qPCR). The results were compared to mRNA expression of selected cytokines, matrix metalloproteinases (MMP) and tissue inhibitors of matrix metalloproteinase (TIMP). Laser microdissection with subsequent qPCR and immunohistochemistry were employed to identify the cells expressing 5-HTR2B. The myocardium of control dogs showed constitutive 5-HTR2B mRNA expression. In dogs with DCM, 5-HTR2B mRNA values were significantly greater than in all other groups, with highest levels of expression in the left ventricle and right atrium. Myocytes were identified as the source of 5-HTR2B mRNA and protein. A significant positive correlation of 5-HTR2B mRNA with expression of several cytokines, MMPs and TIMPs was observed. The findings suggest that serotonin might play a role in normal cardiac structure and function and could contribute to myocardial remodelling and functional impairment in dogs with DCM.

Nutritional management of inherited copper-associated hepatitis in the Labrador retriever. Hille Fieten, Vincent C. Biourge, Adrian L. Watson, Peter A.J. Leegwater, Ted S.G.A.M. van den Ingh, Jan Rothuizen. Canine hereditary copper-associated hepatitis is characterized by gradual hepatic copper accumulation eventually leading to liver cirrhosis. Therapy is aimed at creating a negative copper balance with metal chelators, of which d-penicillamine is the most commonly used. d-Penicillamine often causes gastrointestinal side effects and life-long continuous therapy may lead to a deficiency of copper and zinc. The aim of the current study was to investigate the effect of a low-copper, high-zinc diet as an alternative to continuous d-penicillamine treatment for the long-term management of canine copper-associated hepatitis. Sixteen affected Labrador retrievers were followed for a median time period of 19.1 months (range, 5.9–39 months) after being effectively treated with d-penicillamine. The dogs were maintained on a diet containing 1.3 ± 0.3 mg copper/1000 kcal and 64.3 ± 5.9 mg zinc/1000 kcal. Liver biopsies were taken every 6 months for histological evaluation and copper determination. Plasma alanine aminotransferase (ALT) and alkaline phosphatase, as well as serum albumin were determined. Dietary treatment alone was sufficient to maintain hepatic copper concentration below 800 mg/kg dry weight liver in 12 dogs during the study period. Four dogs needed re-treatment with d-penicillamine. ALT activity and albumin concentration were not associated with hepatic copper concentration, but showed a
significant association with the stage and grade of hepatitis respectively. In conclusion, a low-copper, high-zinc diet can be a valuable alternative to continuous d-penicillamine administration for long-term management of dogs with copper-associated hepatitis. The copper re-accumulation rate of an individual dog should be considered in the design of a long-term management protocol and in determining re-biopsy intervals.

**Australian Veterinary Journal**

**Diagnostic challenge: right head tilt and depression in a dog.**
Chalkley M1, Bouljihad M.
No abstract available – article available online

**Influence of needle gauge used for venipuncture on automated platelet count and coagulation profile in dogs.**
Greenwell C1, Epstein S, Brain P.
OBJECTIVE: To determine if differing gauge (G) needles used for venipuncture altered the automated platelet count and coagulation profile (prothrombin time (PT) and activated partial thromboplastin time (aPTT)) in clinically healthy dogs.
DESIGN: Prospective, observational, randomised, clinical study.
METHODS: We enrolled 20 clinically healthy dogs. Blood was collected via direct venipuncture of the jugular veins with 21G, 23G and 25G needles in a random order. Automated haematology and automated coagulation times were performed on the blood samples. Values were analysed for differences among the needle gauges and also the order of sample collection.
RESULTS: No difference was found in the automated platelet count or automated coagulation times for the three needle gauges used or the order in which the samples were collected.
CONCLUSION: Venipuncture can be performed with a 21G, 23G or 25G needle to obtain blood from dogs for automated platelet count and PT/aPTT measurement without affecting the results.

**Vaginal cytology after induction of ovulation in the queen: comparison of postoestrus and dioestrus.**
Kanca H1, Karakas K, Dalgic M, Salar S, Izgur H.
OBJECTIVE: To compare the vaginal cytology of ovulating and non-ovulating queens.
PROCEDURE: The study group comprised 15 queens showing behavioural oestrus. Ovulation was induced in 7 (dioestrus group) and 8 were left untreated (postoestrus group). Vaginal smears were collected from all animals prior to ovariohysterectomy on day 7. Epithelial cells were classified as basal-parabasal, intermediate, superficial, or anucleated superficial cells and counted using computer-assisted image analysis. From each smear, 50 representative vaginal epithelial cells were chosen. Digital images of cells were taken and cell area, cytoplasm area, nucleus area, cell diameter, cell perimeter, nucleus/cytoplasm ratio and red-green-blue (RGB) values were measured using image analysis software. Measurement data were compared between groups.
RESULTS: Ovulation induction was successful in all animals. The swabbing procedure in oestrus did not induce ovulation in any postoestrus queens. Mean duration of oestrus was 6.65 ± 0.44 and 4.71 ± 0.32 days (P > 0.05) in the postoestrus and dioestrus queens, respectively. Intermediate cell count averaged 21.43% in dioestrus cats and 10.76% in postoestrus cats (P < 0.05). Epithelial cells in the postoestrus group had higher cell area, cytoplasm area, cell diameter and cell perimeter measurements (P < 0.01). Red (90.9 ± 1.6), green (76.1 ± 1.3) and blue (83.6 ± 1.4) channel values in postoestrus were higher than the values (81.3 ± 0.8, 65.8 ± 0.9 and 74.0 ± 0.7, respectively) in dioestrus (P < 0.01).
CONCLUSION: Induction of ovulation in oestrus queens results in a significant increase in the number of intermediate cells and a significant decrease in both the dimensions and RGB values of vaginal epithelial cells on day 7.

**Journal of the American Veterinary Medical Association – March 15**

**Use of continuous electroencephalography for diagnosis and monitoring of treatment of nonconvulsive status epilepticus in a cat.**
Cuff DE1, Bush WW, Stecker MM, Williams DC.
Case Description—A 10-year-old domestic shorthair cat was evaluated because of presumed seizures. Clinical Findings—The cat had intermittent mydriasis, hyperthermia, and facial twitching. Findings of MRI and CSF sample analysis were unremarkable, and results of infectious disease testing were negative. Treatment was initiated with phenobarbital, zonisamide, and levetiracetam; however, the presumed seizure activity continued. Results of analysis of continuous electroencephalographic recording indicated the cat had nonconvulsive status epilepticus. Treatment and Outcome—The cat was treated with phenobarbital IV (6 mg/kg [2.7 mg/lb] q 30 min during a 9-hour period; total dose, 108 mg/kg [49.1 mg/lb]); treatment was stopped when a burst-suppression electroencephalographic pattern was detected. During this high-dose phenobarbital treatment period, an endotracheal tube was placed and the cat was monitored and received fluids, hetastarch, and dopamine IV. Continuous mechanical ventilation was not required. After treatment, the cat developed unclassified cardiomyopathy, azotemia, anemia, and pneumonia. These problems resolved during a 9-month period. Clinical Relevance—Findings for the cat of this report indicated electroencephalographic evidence of nonconvulsive status epilepticus. Administration of a high total dose of phenobarbital and monitoring of treatment by use of electroencephalography were successful for resolution of the problem, and treatment sequelae resolved.

Biofilm-infected wounds in a dog.
Swanson EA1, Freeman LJ, Seleem MN, Snyder PW.
Case Description—A 4-year-old spayed female Mastiff was evaluated for treatment of chronic nonhealing pressure wounds over both elbow regions resulting from attempts at hypertrophic callus excision. Clinical Findings—The wound bed granulation tissue was mottled red and yellow with hyperemic, rolled epithelial edges. The right wound communicated with a large fluid pocket along the thoracic wall. The dog had an inflammatory leukogram with a left shift. Treatment and Outcome—The wounds were debrided, and tissue specimens were collected for histologic evaluation, microbial culture, and bacterial identification by means of molecular diagnostic techniques. The left wound was closed immediately. Calcium alginate rope with silver was packed into the right wound. Vacuum-assisted closure was applied for 6 days. Debridement was repeated, and a thoracodorsal axial pattern flap was used to cover the wound. Systemic treatment with antimicrobials was initiated, and pressure over the elbow regions was relieved. Bacterial biofilms were identified histologically in tissue specimens from both wounds. Staphylococcus intermedius, Staphylococcus epidermidis, and Streptococcus canis were cultured and identified by 16S rRNA fragment sequencing. Pyrosequencing identified multiple bacterial species and no fungal organisms. Both wounds healed successfully. Clinical Relevance—Biofilms are implicated in infected orthopedic implants in veterinary patients; however, this is the first report of a bacterial biofilm in chronic wounds in a dog. In human wound care, extensive debridement is performed to disrupt the biofilm; a multimodal treatment approach is recommended to delay reformation and help clear the infection. In this case, biofilm reformation was prevented by systemic treatment with antimicrobials, by reducing local pressure on the wounds, and by wound closure.

Survey of veterinarians' perceptions of borreliosis in North Carolina.
Pultorak EL1, Breitschwerdt EB.
Objective—To evaluate the practices and perceptions of veterinarians in North Carolina regarding borreliosis in dogs in various geographic regions of the state. Design—Cross-sectional survey. Sample—Data from 208 completed surveys. Procedures—Surveys were distributed to veterinary clinics throughout North Carolina. Descriptive statistics were used to summarize perceptions pertaining to borreliosis among dogs in North Carolina. Results—A significantly higher proportion of responding veterinarians believed that borreliosis was endemic in the coastal (67.2%) and Piedmont (60.9%) areas of North Carolina, compared with more western regions (37.5%). The 3 variables found to be significantly different between the northern and southern regions of the state were the estimated number of borreliosis cases diagnosed by each responding veterinary clinic during the past year, the perception of borreliosis endemicity, and the perceptions related to the likelihood of a dog acquiring borreliosis in the state. Conclusions and Clinical Relevance—Veterinarians' perception of the risk of borreliosis in North Carolina was consistent with recent scientific reports pertaining to geographic expansion of borreliosis in the state. As knowledge of the epidemiological features of borreliosis in North Carolina continues to evolve, veterinarians should promote routine screening of dogs for Borrelia burgdorferi exposure as a simple, inexpensive form of surveillance that can be used to better educate their clients on the threat of transmission of borreliosis in this transitional geographic region.

Journal of the American Veterinary Medical Association—March 1
Technical and clinical outcomes of ureteral stenting in cats with benign ureteral obstruction: 69 cases (2006-2010).

Berent AC1, Weisse CW, Todd K, Bagley DH.

Objective-To evaluate the technical, short-term, and long-term outcomes in cats with benign ureteral obstructions treated by means of double-pigtail ureteral stent placement. Design-Retrospective case series.

Animals-69 cats (79 ureters). Procedures-The diagnosis of benign ureteral obstruction was made via abdominal ultrasonography, radiography, and ureteropyelography. Ureteral stent placement was attempted endoscopically, surgically, or both, with fluoroscopic guidance. The medical records were reviewed for pre-, intra-, and postoperative data; complications; and outcome. Results-69 cats (79 ureters) had stent placement attempted for various causes: ureterolithiasis (56/79 [71%]), stricture (10/79 [13%]), both ureterolithiasis and stricture (12/79 [15%]), or a purulent plug (1/79 [1%]). Stent placement was successful in 75 of 79 ureters (95%). Median number of stones per ureter was 4 (range, 0 to > 50), and 67 of 79 (85%) had concurrent nephrolithiasis. Preoperative azotemia was present in 95% (66/69) of cats (median creatinine concentration, 5.3 mg/dL [range, 1.1 to 25.8 mg/dL]), and 71% (49/69) remained azotemic (median, 2.1 mg/dL [range, 1.0 to 11.8 mg/dL]) after successful surgery. Procedure-related, postoperative (< 7 days), short-term (7 to 30 days), and long-term (> 30 days) complications occurred in 8.7% (6/79; 7/79 ureters), 9.1% (6/66), 9.8% (6/61), and 33% (20/60) of cats, respectively; most of these complications were minor and associated with intermittent dysuria or the need for ureteral stent exchange. The perioperative mortality rate was 7.5% (5/69), and no deaths were procedure related. The median survival time was 498 days (range, 2 to > 1,278 days). For patients with a renal cause of death, median survival time was > 1,262 days, with only 14 of 66 cats (21%) dying of chronic kidney disease. Nineteen (27%) cats needed a stent exchange (stricture in-growth [n = 10], migration [4], ureteritis [2], dysuria [2], pyelonephritis [1], or reflux [1]). No patient died of the procedure or recurrent ureteral obstruction.

Conclusions and Clinical Relevance-Results of the present study indicated that ureteral stenting is an effective treatment for benign ureteral obstructions in cats regardless of obstructive location, cause, or stone number. The perioperative morbidity and mortality rates were lower than those reported with traditional ureteral surgery. The short- and long-term complications were typically minor but may necessitate stent exchange or use of an alternative device, particularly with ureteral strictures. The prognosis for feline ureteral obstructions after ureteral stenting could be considered good when the procedure is performed by trained specialists.

Ultrasonographic, computed tomographic, and operative findings in dogs infested with giant kidney worms (Dioctophyme renale).

Rahal SC1, Mamprim MJ, Oliveira HS, Mesquita LR, Faria LG, Takahira RK, Matsubara LM, Agostinho FS.

Objective-To compare ultrasonographic, CT, and surgical findings in dogs infested with giant kidney worms (Dioctophyme renale). Design-Case series. Animals-15 crossbred dogs infected with D renale. Procedures-Immediately after ultrasonography was performed with dogs in dorsal recumbency, sequential transverse images of the abdomen were acquired with a helical CT scanner. After plain CT, contrast CT was performed with a nonionic iodinated contrast agent. Subsequently, exploratory celiotomy was performed. Results-In the corticomedullary area of the right kidney of 12 dogs, ultrasonography revealed several ring-like structures with an echogenic wall and anechoic central area in the transverse plane and arrayed as bands in the longitudinal plane. Similar structures were observed in the abdominal cavity of 10 dogs. In 13 dogs, CT revealed loss of corticomedullary differentiation in the right kidney, with discrete uptake of contrast material in the periphery of the kidney, and several ring-like or elongated structures with a hyperdense wall and hypodense center. In 11 dogs, the same structures were observed free in the abdominal cavity. Surgery revealed that 13 dogs had a damaged right kidney that required nephrectomy. Parasites were found free in the abdominal cavity of 7 dogs. Conclusions and Clinical Relevance-Ultrasonography and CT were effective imaging methods for detecting D renale in the kidney and less effective for detecting parasites in the abdominal cavity. Care should be taken to avoid erroneously interpreting normal structures as parasites, especially in the abdominal cavity.

Outbreak of Salmonella enterica serotype Infantis infection in humans linked to dry dog food in the United States and Canada, 2012.


Case Description-In April 2012, Salmonella enterica serotype Infantis was detected in an unopened bag of dry dog food collected during routine retail surveillance. PulseNet, a national bacterial subtyping network, identified
humans with Salmonella Infantis infection with the same genetic fingerprint as the dog food sample. Clinical Findings-An outbreak investigation identified 53 ill humans infected with the outbreak strain during January 1 to July 5, 2012, in 21 states and 2 provinces in Canada; 20 (38%) were children ≤ 2 years old, and 12 of 37 (32%) were hospitalized. Of 21 ill people who remembered the dog food brand, 12 (57%) reported a brand produced at a plant in Gaston, SC. Traceback investigations also identified that plant. The outbreak strain was isolated from bags of dry dog food and fecal specimens obtained from dogs that lived with ill people and that ate the implicated dry dog food. Treatment and Outcome-The plant was closed temporarily for cleaning and disinfection. Sixteen brands involving > 27,000 metric tons (> 30,000 tons) of dry dog and cat food were recalled. Thirty-one ill dogs linked to recalled products were reported through the FDA consumer complaint system. Clinical Relevance-A one-health collaborative effort on epidemiological, laboratory, and traceback investigations linked dry dog foods produced at a plant to illnesses in dogs and humans. More efforts are needed to increase awareness among pet owners, health-care professionals, and the pet food industry on the risk of illness in pets and their owners associated with dry pet foods and treats.

American Journal of Veterinary Research

Comparison of the cardiorespiratory effects of a combination of ketamine and propofol, propofol alone, or a combination of ketamine and diazepam before and after induction of anesthesia in dogs sedated with acepromazine and oxymorphone.


Objective—To evaluate the cardiorespiratory effects of IV administration of propofol (4 mg/kg), ketamine hydrochloride and propofol (2 mg/kg each; K-P), or ketamine hydrochloride (5 mg/kg) and diazepam (0.2 mg/kg; K-D) before and after induction of anesthesia (IoA) in dogs sedated with acepromazine maleate and oxymorphone hydrochloride. Animals—10 healthy adult Beagles. Procedures—Each dog was randomly allocated to receive 2 of 3 treatments (1-week interval). For instrumentation prior to each treatment, each dog was anesthetized with isoflurane. After full recovery, acepromazine (0.02 mg/kg) and oxymorphone (0.05 mg/kg) were administered IV. Fifteen minutes later (before IoA), each dog received treatment IV with propofol, K-P, or K-D. Cardiorespiratory and arterial blood gas variables were assessed before, immediately after, and 5 minutes after IoA. Results—Compared with findings before IoA, dogs receiving the K-P or K-D treatment had increased cardiac output, oxygen delivery, and heart rate 5 minutes after IoA; K-P administration did not change mean arterial blood pressure or stroke volume and decreased systemic vascular resistance. Propofol decreased mean arterial blood pressure and systemic vascular resistance immediately after IoA but did not change heart rate, cardiac output, or oxygen delivery. All treatments caused some degree of apnea, hypoventilation, and hypoxemia (Pao2 < 80 mm Hg). Conclusions and Clinical Relevance—In dogs, K-P treatment maintained mean arterial blood pressure better than propofol alone and increased heart rate, cardiac output, or oxygen delivery, as did the K-D treatment. Supplemental 100% oxygen should be provided during IoA with all 3 treatments.

Evaluation of the accuracy of neurologic data, survey radiographic results, or both for localization of the site of thoracolumbar intervertebral disk herniation in dogs.

Tsuyoshi Murakami, Daniel A. Feeney, Jennifer L. Willey, Bradley P. Carlin.

Objective—To determine the accuracy of neurologic data, survey radiographic results, or both for localization of the site of thoracolumbar intervertebral disk herniation in dogs. Sample—338 dogs with surgically confirmed intervertebral disk herniation from disk spaces T10–11 to L6–7. Procedures—Medical records and archived survey radiographs were reviewed for each case. Data were analyzed with multivariable logistic regression models. Three models were fit to develop subsets of the data consisting of survey radiographic data, neurologic examination data, and a combination of survey radiographic and neurologic examination data. The resulting models were validated by evaluating predictive performance against a validation subset of the data. Results—Models incorporating survey radiographic data and a combination of survey radiographic and neurologic data had similar predictive ability and performed better than the model based solely on neurologic data but resulted
in substantial errors in predictions. Conclusions and Clinical Relevance—A combination of neurologic examination data as recorded in the medical records and radiographic data did not enhance predictive performance of multivariable logistic regression models over models limited to radiographic data. Neurologic and radiographic findings should not be used to completely exclude areas in an abnormal spinal cord region from further evaluation with advanced imaging.

**Antiviral efficacy of nine nucleoside reverse transcriptase inhibitors against feline immunodeficiency virus in feline peripheral blood mononuclear cells.**

Anita M. Schwartz; Mary Ann McCrackin, Raymond F. Schinazi, Peter B. Hill, Thomas W. Vahlenkamp, Mary B. Tompkins, Katrin Hartmann.

Objective—To compare cytotoxic effects and antiviral efficacy of 9 nucleoside reverse transcriptase inhibitors (NRTIs) against FIV in feline peripheral blood mononuclear cells. Sample—Peripheral blood mononuclear cells obtained from 3 specific pathogen–free cats. Procedures—3 of the 9 NRTIs had not been previously assessed in feline cell lines. Cytotoxic effects were determined by colorimetric quantification of a formazan product resulting from bioreduction of a tetrazolium reagent by viable peripheral blood mononuclear cells; uninfected cells from 1 cat were used in these assays. Cells from all 3 cats were infected with a pathogenic clone of FIV, and in vitro antiviral efficacy of each NRTI was assessed with an FIV p24 antigen capture ELISA. Results—Cytotoxic effects in feline peripheral blood mononuclear cells were observed only at concentrations > 10 µM for all 9 NRTIs. Comparison of the cytotoxic effect at the highest concentration investigated (500µM) revealed that didanosine and amdoxovir were significantly less toxic than abacavir. All drugs induced a dose-dependent reduction of FIV replication. At the highest concentration investigated (10µM), there was no significant difference in antiviral efficacy among the test compounds. Conclusions and Clinical Relevance—The evaluated NRTIs had low cytotoxicity against feline peripheral blood mononuclear cells and appeared to be safe options for further in vivo evaluation for the treatment of FIV-infected cats. There was no evidence suggesting that the newly evaluated compounds would be superior to the existing NRTIs for reducing FIV burden of infected cats.

**In vitro effects of the glycoprotein IIb/IIIa receptor antagonists abciximab and eptifibatide on platelet aggregation in healthy cats.**

Aliya N. Magee, Daniel F. Hogan, Kimberly A. Sederquist, Jaylyn A. Durham.

Objective—To determine effects of the glycoprotein IIb/IIIa receptor antagonists abciximab and eptifibatide on in vitro inhibition of cat platelets. Sample—Venous blood samples from 10 healthy cats. Procedures—Blood samples were anticoagulated with hirudin. Aliquots of whole blood from each cat were allocated to 5 treatments (baseline, 50 µg of abciximab/mL, abciximab volumetric control treatment, 4µM eptifibatide, and eptifibatide volumetric control treatment). Impedance platelet aggregometry was performed with 6.5µM ADP or 32µM thrombin receptor activator peptide (TRAP). Magnitude of platelet aggregation was determined by measuring the area under the curve 15 minutes after addition of ADP or TRAP. Results—Eptifibatide caused a significant reduction in platelet aggregation, compared with baseline values, for aggregometry with both ADP (median, 50.0; range, 8 to 122 [baseline median, 306.0; baseline range, 130 to 664]) and TRAP (median, 75.5; range, 3 to 148 [baseline median, 219.0; baseline range, 97 to 578]). There was no significant difference in platelet aggregation with abciximab, the abciximab volumetric control treatment, or the eptifibatide volumetric control treatment for aggregometry with ADP or TRAP. Conclusions and Clinical Relevance—Eptifibatide caused a significant reduction in platelet aggregation in vitro, but there was no identifiable antiplatelet effect for abciximab. Eptifibatide and abciximab have different binding and inhibitory actions; therefore, it can be hypothesized that abciximab would be ineffective in cats because of a lack of receptor binding, reduced binding kinetics, or lack of downstream signaling. Eptifibatide may be useful in identifying hyperreactive platelets in cats in an in vitro platelet inhibitory assay.
Therapeutic options for the treatment of chronic pain in dogs.


Chronic pain is a widely recognised problem in humans and is being increasingly recognised as a significant problem in dogs. Whilst a large number of therapies are described and utilised to treat chronic pain in dogs, there is a severe shortage of evidence to guide practitioners in selection of treatments. Until more evidence becomes available, practitioners should adopt a cautious approach, utilising licensed treatments first when possible. Non-pharmacological therapies should be incorporated into the chronic pain management plan whenever possible. Given the probable prevalence of chronic pain in dogs there is an urgent need for research to identify effective treatments.

Comparison of the epoc and i-stat analysers for canine blood gas and electrolyte analysis.

E. West, d. Bardell and j. M. Senior.

Objectives; A prospective study to evaluate agreement and precision of a new point-of-care portable analyser, the epoc analyser, compared with the i-stat analyser in canine blood. Methods; Blood samples (68 venous and 32 arterial) were obtained from 63 client-owned dogs for clinical reasons and surplus blood was used to analyse agreement between the epoc and i-stat analysers. Precision of the epoc analyser was also assessed by repeat analysis of 20 samples. Measured analytes included ph, partial pressures of carbon dioxide and oxygen and concentrations of sodium, potassium, ionised calcium, glucose and haematocrit. Haemoglobin, base excess, bicarbonate and saturation of haemoglobin with oxygen were calculated. Results; Epoc precision was acceptable, but agreement was poor for sodium, haematocrit, haemoglobin and base excess. Overall, method comparison was poor for ph, partial pressure of oxygen, sodium, haematocrit, haemoglobin and base excess. Clinical significance; The epoc analyser is useful for dogs, although clinically significant differences between the epoc and i-stat analysers exist for some analytes, and as such these analysers should not be used interchangeably.

Characteristics of canine nasal discharge related to intranasal diseases: a retrospective study of 105 cases.

H. D. Plickert, a. Tichy and r. A. Hirt

Objectives; To compare characteristics of nasal discharge caused by different intranasal aetiologies in dogs. Methods; Medical records of 105 dogs with nasal discharge due to intranasal disease were retrospectively reviewed with special focus on composition, severity, duration and localisation of discharge. On the basis of diagnostic findings, cases were classified into different disease groups and characteristics of discharge were compared between groups. Results; Cases were classified as having non-specific rhinitis (n=42), nasal neoplasia (n=23), foreign bodies (n=21), nasal mycosis (n=7) and miscellaneous disorders (n=13). Dogs with foreign bodies or nasal mycosis were significantly younger. Mucous components of discharge occurred more often in non-specific rhinitis and nasal neoplasia, although haemorrhagic components predominated in nasal neoplasia when discharge lasted ≤14 days. Pure or mixed haemorrhagic discharge was significantly more common with nasal neoplasia, foreign bodies and nasal mycosis. Purulent components were associated with longer duration of discharge and predominantly seen in non-specific rhinitis and foreign bodies. Dogs with foreign bodies were presented earlier and sneezing was more frequent. Nasal stridor was significantly more often observed in dogs with nasal neoplasia. Clinical significance; Characteristics of nasal discharge and associated clinical signs might aid in planning the diagnostic approach, but a combination of diagnostic techniques is still required to confirm a diagnosis.
Measurement of thyroxine and cortisol in canine and feline blood samples using two immunoassay analysers.

P. Higgs, M. Costa, A. Freke and K. Papasouliotis.

Objectives: The aia-360 (tosoh corporation) is an automated immunoassay analyser. The aims of this study were to estimate the precision of thyroxine and cortisol aia-360 immunoassays in canine and feline samples and to compare the results produced with those obtained by a chemiluminescence analyser (immulite® 1000, siemens).

Methods: Blood samples from 240 clinical cases (60 dogs and 60 cats for both thyroxine and cortisol) were analysed using both instruments. Results: Deming regression calculations showed excellent correlation (thyroxine, canine $r_s = 0.94$, feline $r_s = 0.97$; cortisol, canine $r_s = 0.97$, feline $r_s = 0.97$). Agreement between the two instruments was examined by bland–altman difference plots, which identified wide confidence intervals and outliers for thyroxine (canine $n = 6$, feline $n = 4$) and cortisol (canine $n = 3$, feline $n = 4$) results. Inter/intra-run precision of the aia-360 was excellent for both cortisol and thyroxine (coefficients of variation <7%).

Clinical significance: The instrument showed excellent correlation for cortisol and thyroxine in canine and feline samples demonstrating that the aia-360 can be used in clinical practice. The agreement studies suggest that the results from the aia-360 cannot be used interchangeably with those generated by the immulite 1000 and should be interpreted using reference intervals that have been established specific to the aia-360.

Periodontal disease associated with red complex bacteria in dogs.


Objective: Red complex bacteria (*Treponema denticola, Tannerella forsythia* and *Porphyromonas gingivalis*) play a major role in the aetiology of periodontal disease in humans. This study was designed to evaluate the association of such bacteria with periodontal disease in dogs. Methods: Seventy-three subgingival samples taken from dogs ranging from 2 months to 12 years (median age 4 years) were tested for red complex bacteria using a polymerase chain reaction assay. Results: Thirty-six of 73 (49.3%) dogs were found to be positive for *T. forsythia* and *P. gingivalis*. Dogs with gingivitis or periodontitis were more likely to be infected with *T. forsythia* and *P. gingivalis* [odds ratio (OR) 5.4 (confidence interval (CI) 1.9–15.6), $p = 0.002$] than healthy animals. Only 3 (4.1%) of 73 samples were positive for red complex bacteria, but the association with periodontal disease was not significant. Conclusion and clinical relevance: The results indicate that involvement of red complex bacteria in periodontal disease in dogs is similar to that observed in humans. Only the concurrent presence of *T. forsythia* and *P. gingivalis* were correlated to periodontal disease in dogs in this study.

Description of the use of contrast-enhanced ultrasonography in four dogs with pancreatic tumours.


Canine pancreatic tumours are rare compared to human medicine and the detection and differentiation of pancreatic neoplasia is challenging with b-mode ultrasonography, which often leads to late clinical diagnosis and poor prognosis. This case report describes the findings of contrast-enhanced ultrasonography in four dogs with pancreatic adenocarcinoma or insulinoma. B-mode ultrasonography of the pancreas revealed a hypoechoic nodule in three dogs and heterogenous tissue in one dog. Contrast-enhanced ultrasonography was able to differentiate between two tumour types: adenocarcinomas showed hypoechoic and hypovascular lesions, whereas insulinomas showed uniformly hypervascular lesions. Contrast-enhanced ultrasonography findings were confirmed by cytology and/or histopathology. The results demonstrated that contrast-enhanced ultrasonography was able to establish different enhancement patterns between exocrine (adenocarcinoma) and endocrine (insulinoma) tumours in dogs.

A rare case of simple syndactyly in a puppy.
A case of non-syndromic, complete syndactyly involving all four limbs is described in a three-month-old male crossbreed dog for the first time. Syndactyly is a rare condition in most animal species, in dogs it has been infrequently reported. Findings of clinical, radiographic and cytogenetic analyses are described and demonstrate probably for the first time that numerical and structural chromosome aberrations are not involved in the pathogenesis of this case of syndactyly.