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January 2014 abstracts

New Zealand Veterinary Journal (Jan/Feb)

The prevalence of ocular lesions associated with hypertension in a population of geriatric cats in Auckland, New Zealand
JM Carter, AC Irving, JP Bridges and BR Jones

AIMS: To provide an estimate of the prevalence of ocular lesions associated with hypertension in geriatric cats in Auckland, New Zealand and to evaluate the importance of examination of the ocular fundi of cats over eight years of age. METHODS: A total of 105 cats ≥ 8 years of age were examined and clinical signs recorded. Blood was collected for the laboratory measurement of the concentrations of blood urea nitrogen (BUN), glucose and creatinine in serum, urine was collected for determination of urine specific gravity (USG), and blood pressure (BP) was measured using high definition oscillometry equipment. A cat was determined to have systemic hypertension with a systolic BP ≥ 160 mm Hg and a diastolic BP ≥ 100 mm Hg. Each animal had an ocular fundic examination using a retinal camera to diagnose ocular lesions associated with hypertension, including retinopathies, choroidopathies and optic neuropathies. RESULTS: Blood pressure was successfully recorded in 73 cats. Of these, 37 (51%) had no hypertensive ocular lesions and no underlying disease diagnosed, 24 (33%) had no hypertensive ocular lesions detected, but underlying disease such as chronic kidney disease, hyperthyroidism or diabetes mellitus was diagnosed, and 12 (16%) cats had evidence of hypertensive ocular lesions. Ten of the cats with hypertensive ocular lesions were hypertensive at the time of the first visit and two were normotensive. One additional cat had hypertensive ocular lesions, but it was not possible to obtain consistent BP readings in this animal. Chronic kidney disease was the most commonly diagnosed concurrent disease in cats with hypertensive ocular lesions (n=6). Mean systolic BP for cats with hypertensive ocular lesions (168.0 (SE 6.29) mm Hg) was higher than for those with no ocular lesions (144.7 (SE 3.11) mm Hg) or those with no lesions but with underlying disease (146.0 (SE 4.97) mm Hg) (p=0.001). CONCLUSIONS: Ocular fundic examination of cats over eight years of age allows identification of cats with hypertensive ocular lesions, often before the owner or veterinarian is aware the cat has a problem with its vision. This may result in diagnosis of systemic hypertension allowing early treatment and resolution of lesions. CLINICAL RELEVANCE: The current study demonstrates that ocular lesions resulting from hypertension occur frequently enough in cats in Auckland to support the recommendation for fundic examination in cats over eight years of age as part of the routine physical examination.

Journal of the American Animal Hospital Association (Jan/Feb)

2014 AAHA Weight Management Guidelines for Dogs and Cats
Dawn Brooks, Julie Churchill, Karyn Fein, Deborah Linder, Kathryn E. Michel, Ken Tudor, Ernie Ward, Angela Witzel

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

Postoperative Adjuvant Combination Therapy with Doxorubicin and Nontoxic Suramin in Dogs with Appendicular Osteosarcoma

Although conventional treatment of dogs with osteosarcoma (OSA) by amputation and chemotherapy results in reported survival times (STs) of 262–413 days, no major improvements in STs have occurred in the past 2 decades. Suramin is a polysulfonated naphtylurea, which at nontoxic concentrations in vitro, increases tumor sensitivity to chemotherapy, including doxorubicin. The study authors evaluated the combination of nontoxic suramin and doxorubicin after amputation in dogs with OSA. The hypothesis was that treatment of dogs with appendicular OSA with amputation, adjuvant doxorubicin, and nontoxic suramin would be well tolerated and result in STs at least comparable to those of doxorubicin alone. Forty-seven dogs received 6.75 mg/kg of suramin IV followed by 30 mg/m2 of doxorubicin IV 4 hr later. Treatment was repeated q 2 wk for five doses. The median disease free time (DFI) was 203 days (range, 42–1,5801 days) and the median ST for all dogs was 369 days (range, 92–1,6161 days). There was no statistical difference in ST and DFI between greyhounds and nongreyhounds. Adjuvant doxorubicin and nontoxic suramin was well tolerated in dogs with OSA following amputation. Additional studies are needed to determine if this combination treatment protocol provides additional clinical benefit compared with doxorubicin alone.
Comparison of Propofol and Propofol/Ketamine Anesthesia for Evaluation of Laryngeal Function in Healthy Dogs
Kelci L. McKeirnan, Marjorie E. Gross, Mark Rochat, Mark Payton,
Thiopental is an excellent choice for evaluation of laryngeal function. Unfortunately, thiopental is no longer manufactured. In its absence, the ideal anesthetic protocol for laryngoscopy has not been determined. Propofol and propofol/ketamine were compared for the evaluation of laryngeal function in 48 healthy dogs. Laryngeal exposure was moderate to excellent in all dogs and not significantly different between protocols. Saturation of peripheral O2 (SPO2) readings were decreased in the propofol/ketamine group, and deeper respirations were more likely to correlate with normal laryngeal function regardless of treatment group. Doxapram was administered to apneic patients to stimulate respiration and allow for evaluation of laryngeal function. No significant difference in frequency of doxapram administration between groups was noted. Doxapram resulted in higher respiratory scores and significantly increased the ability to determine normal laryngeal function. Ketamine did not allow for a reduction in propofol dose and caused increased respiratory depression, making ketamine a poor addition to propofol for laryngeal function examination. Regardless of the protocol used, laryngeal function should be determined in conjunction with the respiratory phase and depth of respirations. Patients with either absent or shallow respirations should receive doxapram for accurate evaluation of laryngeal function.

The Cardiovascular Effects of Sevoflurane and Isoflurane After Premedication of Healthy Dogs Undergoing Elective Surgery
Janan M. Abed, Fred S. Pike, Monica C. Clare, Benjamin M. Brainard
Sevoflurane and isoflurane are commonly used in veterinary anesthesia. The objective of this prospective, randomized, open-label clinical study was to compare the cardiovascular effects of sevoflurane and isoflurane via direct arterial blood pressure measurements and the lithium dilution cardiac output (LDCO) on premedicated healthy dogs undergoing elective tibial plateau leveling osteotomy (TPLO). Nineteen client-owned dogs were included. All dogs were premedicated with hydromorphone (0.05 mg/kg IV and glycopyrrolate 0.01 mg/kg subcutaneously). Ten dogs were anesthetized with sevoflurane and nine dogs were anesthetized with isoflurane. Eighteen dogs were instrumented with a dorsal pedal arterial catheter, and one dog had a femoral arterial catheter. All dogs had continuous, direct systolic (SAP), diastolic (DAP), and mean arterial (MAP) blood pressure readings as well as heart rate (HR), cardiac output (CO), cardiac index (CI), systemic vascular resistance (SVR), systemic vascular resistance index (SVRI), stroke volume variation (SVV), and pulse pressure variation (PPV) recorded q 5 min during the surgical procedure. There was no significant statistical difference in all parameters between the sevoflurane and isoflurane treatment groups. Both sevoflurane and isoflurane inhalant anesthetics appear to have similar hemodynamic effects when used as part of a multimodal anesthetic protocol in premedicated healthy dogs undergoing an elective surgical procedure.

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

A Retrospective Study of Feline Gastric Lymphoma in 16 Chemotherapy-Treated Cats
Tanya L. Gustafson, Armando Villamil, Bonnie E. Taylor, Andrea Flory
The purposes of this study were to describe cases of feline gastric lymphoma with regards to signalment, clinical presentation, laboratory and ancillary study findings, response to therapy, and outcomes and to identify prognostic variables. Sixteen cats with stage I and II gastric lymphoma treated with chemotherapy were included in this study. Seventy-five percent of cats experienced remission. Overall, first remission duration was 108 days. Response to treatment was prognostic as in other types of feline lymphoma. Cats with a complete
remission (CR) had longer survival times compared with cats with a partial remission (PR). Sex and treatment with a rescue protocol were found to be prognostic with castrated males having longer survivals than spayed females. Cats that received rescue chemotherapy had shorter first remission durations than those that did not. Prior treatment with steroids and stage were not found to be significant prognostic variables. This study characterizes gastric lymphoma treated with chemotherapy in cats. Further studies are needed to determine the comparative efficacy of surgical and chemotherapeutic treatments for feline gastric lymphoma.

Use of Linezolid to Treat MRSP Bacteremia and Discospondylitis in a Dog
Jonathan D. Foster, Lauren A. Trepanier, Jennifer A. Ginn,
A 1.5 yr old male German shepherd dog was evaluated for recurrent intermittent episodes of fever and lethargy. Clinicopathologic abnormalities were suggestive of a discospondylitis at the seventh and eighth thoracic vertebrae. Blood and urine cultures yielded growth of methicillin-resistant Staphylococcus pseudintermedius (MRSP) that was resistant to all commonly used antibiotics. Extralabel antibiotic susceptibility testing demonstrated susceptibility of both blood and urine isolates to linezolid. The prescribed dose was extrapolated from pharmacokinetic (PK) studies and the isolate’s plasma minimum inhibitory concentration (MIC). Linezolid was administered for 23 wk and resulted in successful resolution of bacteremia, bacteriuria, and discospondylitis. When justified, linezolid should be considered to treat methicillin-resistant infections.

Use of IV Lipid Emulsion for Treatment of Ivermectin Toxicosis in a Cat
James H. Kidwell, Gareth J. Buckley, Ashley E. Allen, Carsten Bandt
Ivermectin toxicosis in cats is infrequently reported. IV lipid emulsion (ILE) is a novel treatment in veterinary medicine that has been used for amelioration of adverse effects seen with multiple lipid soluble compounds. Previously, ILE has been investigated in experimental models with rats, rabbits, pigs, and dogs, mainly for resuscitation of cardiopulmonary arrest and treatment of hypotension due to local anesthetic drug overdose. There are few case reports in veterinary medicine of using ILE for drug toxicity. Only one feline case has been reported, with IV lipids used for treatment of lidocaine toxicity. This report describes a case of ivermectin toxicosis in a 1 yr old domestic shorthair that was safely and successfully treated using ILE.

Canine Giant Hypertrophic Gastritis Treated Successfully with Partial Gastrectomy
Denty P. Vaughn, Jason Syrcle, Jim Cooley
A 4 yr old castrated male Jack Russell terrier was presented with a 2 mo history of vomiting, anorexia, and weight loss. Abdominal radiographs and ultrasound supported the diagnosis of gastric outflow obstruction. Celiotomy and gastrotomy revealed a large, narrowly based mass originating from the mucosa of the dorsal gastric body, occupying the lumen of the stomach and protruding through the pylorus into the duodenum. A partial gastrectomy was performed to excise the mass along with a 1 cm margin of grossly normal tissue. Giant hypertrophic gastritis was diagnosed via histopathology of the excised tissue. Giant hypertrophic gastritis is a rarely diagnosed disease of canines, characterized by giant gastric folds, hypoalbuminemia, and mucosal hypertrophy. Long-term treatment success has not been previously reported. In the case described herein, surgical excision of the affected gastric tissue provided complete resolution of clinical signs. Twelve mo following surgery, no recurrence of either vomiting or weight loss had been noted and the dog was clinically normal.

Hemorrhagic Cystitis in a Dog Receiving Carboplatin
Valerie MacDonald, Ryan Dickinson
An 8 yr old castrated male Labrador retriever mixed-breed dog with osteosarcoma (OSA) of the left proximal humerus receiving carboplatin presented 10 days after the third chemotherapy treatment with hematuria, stranguria, and pollakiuria. A presumptive diagnosis of hemorrhagic cystitis was made based on clinical signs, urinalysis, and cytologic analysis of a traumatic catheterization sample. Carboplatin was removed from the chemotherapy treatment plan and was substituted with doxorubicin. The dog was treated with meloxicam for pain, and the cystitis signs subsided over a period of 4 wk. Carboplatin is commonly used as adjuvant chemotherapy for dogs with OSA following amputation and is not known to cause hematuria in dogs, although there are reports of this occurring in humans. To the authors’ knowledge, there are no reports in the veterinary literature of this toxicity.

Combined Use of Intravesicular Ureteroneocystostomy Techniques to Correct Ureteral Ectopia in a Male Cat
Francesca M. Di Mauro, Ameet Singh, Debbie Reynolds, Alice Defarges
A 2 yr old castrated male Himalayan presented for evaluation and treatment of persistent urinary incontinence that had been present since birth. Ultrasonographic evaluation of the urinary tract revealed suspected bilateral, extramural, ureteral ectopia that was confirmed at the time of surgical exploration. Marked left hydroureter and a normal right ureter were found entering the urethra 2 cm caudal to the bladder neck. An intravesicular mucosal apposition (modified Leadbetter-Politano) and “dropin” ureteroneocystostomy techniques were used for reimplantation of the left and right ureter, respectively. Postoperatively, the cat gained urinary continence and remained continent and clinically normal 6 mo following surgery.

Veterinary Clinics of North America (Jan/Feb)

Updates on Pulmonary Function Testing in Small Animals
Anusha Balakrishnan, Lesley G. King
KEY POINTS
- Lung function tests can be divided broadly into those that measure lung mechanics and those that measure gas exchange capabilities.
- Pulmonary function tests do not identify specific diagnoses but instead are used to quantify the severity of respiratory system dysfunction.
- In some cases, these tests are used to determine the anatomic location of disease in the respiratory tract; for example, upper versus lower airway disease.
- The most widely available tool for assessment of pulmonary function is pulse oximetry; however, it provides only a crude assessment of oxygenation.

Laryngeal Disease in Dogs and Cats
Catriona MacPhail
KEY POINTS
- The most common disease process involving the larynx is laryngeal paralysis, which occurs much more frequently in dogs than in cats.
- Diagnosis of laryngeal paralysis requires close attention to anesthetic plane and coordination of respiratory effort with laryngeal motion.
- Surgical arytenoid lateralization improves respiration and quality of life in dogs with laryngeal paralysis; however, aspiration pneumonia is a recognized complication, and generalized neuropathy can progress.
- Laryngeal collapse can result from any cause of chronic upper airway obstruction, but is most often associated with unaddressed brachycephalic airway syndrome.
- Laryngeal neoplasia, while generally uncommon, occurs more frequently in cats than in dogs. Histologic confirmation is required to exclude inflammatory laryngeal disease.

Chronic Rhinitis in the Cat
Nicki Reed
KEY POINTS
- Feline chronic rhinitis and/or rhinosinusitis is the second most common cause of feline rhinitis, accounting for approximately 35% of cases.
- Proposed causes relate to initial turbinate damage by feline herpesvirus-1 likely combined with an impaired or deranged immune response, allowing establishment of recurring secondary bacterial infections.
- Bacteria commonly identified are typically commensal to the oropharynx; the role of Bordetella bronchiiseptica and Mycoplasma spp as primary agents is unclear at this time.
- Repeated short courses of antibacterials may result in selection for Pseudomonas spp.
- Treatment is primarily supportive, comprising antibacterials, mucolytics or decongestants, antiviral therapies, and in severe cases surgery. Nasal flushing to remove mucus is often beneficial.
- Owners need to be counseled that cure is unlikely. Treatment aims to reduce the frequency and severity of episodes.

Feline Aspergillosis
Vanessa R. Barrs, Jessica J. Talbot
KEY POINTS
- There are two forms of upper respiratory tract aspergillosis (URTA): sinonasal aspergillosis (SNA) and sino-orbital aspergillosis (SOA). Both infections start in the nasal cavity, and SOA is the most common form (65% of cases).
- Brachycephalic breeds of cats, especially Persian and Himalayan, are predisposed to URTA.
- Feline SNA can be invasive or noninvasive. Noninvasive disease resembles SNA in dogs. The most common causes of SNA are Aspergillus fumigatus and Aspergillus niger.
- The most common cause of SOA is a recently described novel species, A felis, which is an A fumigatus-like fungus. Molecular identification is required to differentiate A felis from A fumigatus.
The prognosis for SNA is favorable with topical antifungal therapy alone, or combined with systemic antifungals. Disseminated and non-URT focal forms of invasive aspergillosis are uncommon in cats, with little known about the etiologic agents. Young to middle-aged cats are affected. Concurrent immunosuppressive diseases have been identified in some cats.

**Canine Nasal Disease**
Leah A. Cohn

**KEY POINTS**
- For dogs with epistaxis unaccompanied by mucoid or mucopurulent nasal discharge, assessment of coagulation status and blood pressure should precede diagnostic investigation aimed at identifying nasal disease.
- Investigation of oral health, including dental probing and dental radiographs as needed, is warranted before more expensive or invasive diagnostics are undertaken in dogs with nasal discharge.
- Primary bacterial rhinitis is uncommon as a cause of nasal disease signs, but antibiotics often result in temporary improvement in signs related to secondary bacterial infections.
- In retrospective studies, nasal neoplasia is often the most common cause of chronic nasal discharge or epistaxis in dogs.
- If the dog’s owners are willing to undertake expensive therapies (eg, radiation therapy for nasal carcinoma), should they be indicated, computed tomography or magnetic resonance imaging is indicated early in the disease evaluation.

**Update on Feline Asthma**
Julie E. Trzil, Carol R. Reinero

**KEY POINTS**
- Feline asthma is an important chronic lower airway disease of cats; however, definitive diagnosis is challenging because of overlapping clinicopathologic features with other lower airway disorders.
- Discriminating asthma from other chronic lower airway diseases (eg, infectious or chronic bronchitis or a variety of parasitic infections) is necessary because of differences in pathogenesis, novel treatments, and prognosis.
- Emerging diagnostics including thoracic CT scans and pulmonary function testing may help differentiate feline asthma from other chronic lower airway diseases.
- Therapy for feline asthma using glucocorticoids and bronchodilators might be inadequate or contraindicated in some cats; novel treatments investigated in experimental models of feline asthma could be beneficial in refractory cases or as adjuncts for glucocorticoid sparing effects.

**Canine Chronic Bronchitis**
Elizabeth Rozanski

**KEY POINTS**
- Chronic cough is a syndrome not a final diagnosis.
- Evaluation of potential underlying causes is important to exclude more treatable and curable diseases.
- Chronic bronchitis is an inflammatory disease, and glucocorticoids tapered to the lowest possible dose to control signs are most commonly required.

**Tracheal and Airway Collapse in Dogs**
Ann Della Maggiore

**KEY POINTS**
- Tracheal collapse is characterized by dorsoventral flattening of tracheal rings.
- Tracheal collapse affects the cervical and/or intrathoracic trachea and is seen most commonly in middle-aged to older toy and miniature breed dogs.
- Airway collapse or bronchomalacia affects large bronchi that contain cartilage and could be associated with similar cartilage defects to those seen with tracheal collapse.
- Medical management can include reduction of stress, weight loss, antitussives, bronchodilators, and possibly glucocorticoids and antibiotics.
- Surgical and minimally invasive treatment options are available when medical management fails.

**Idiopathic Pulmonary Fibrosis in West Highland White Terriers**
Henna P. Heikkilä-Laurila, Minna M. Rajamäki

**KEY POINTS**
- Canine idiopathic pulmonary fibrosis (CIPF) is a chronic, progressive, interstitial lung disease of unknown cause affecting mainly middle-aged and old West Highland white terriers.
- Typical findings are cough, exercise intolerance, Velcro crackles, an abdominal breathing pattern, and hypoxemia.
Bronchial changes are present in many dogs and bronchoalveolar lavage fluid analysis usually shows an increased total cell count. Diagnosis is one of exclusion and often requires either high-resolution CT imaging or histopathology of the lung tissue, which is seldom performed on living dogs. CIPF shares several clinical findings with human idiopathic pulmonary fibrosis (IPF); however, in histopathology, CIPF has features of human IPF but also of human nonspecific interstitial pneumonia. No effective treatment exists, but corticosteroids and theophylline can ease clinical signs in dogs. Pirfenidone is the only licensed drug to treat IPF in humans, but it does not result in cure.

**Bacterial Pneumonia in Dogs and Cats**

Jonathan D. Dear

**KEY POINTS**

- Bacterial pneumonia is recognized much more commonly in dogs than in cats.
- Viral infection followed by bacterial invasion is common in young dogs, whereas aspiration pneumonia and foreign body pneumonia seem to be more common in older dogs.
- Clinical signs can be acute or chronic and do not always reflect a primary respiratory condition.
- Definitive diagnosis requires detection of intracellular bacteria in airway cytology or clinically significant bacterial growth from an airway sample, although relevant clinical findings are often used.
- Treatment requires identification of underlying diseases associated with pneumonia, appropriate antibiotic therapy, and control of airway secretions.

**Exudative Pleural Diseases in Small Animals**

Steven E. Epstein

**KEY POINTS**

- Exudative pleural effusions have high total protein and high nucleated cell counts.
- Hemothorax is most frequently caused by trauma or a coagulopathy, with neoplasia, infectious causes, and lung-lobe torsion implicated less commonly.
- Pyothorax in dogs and cats can be successfully managed medically or surgically. Surgical indications include migrating foreign bodies or pulmonary abscessation.
- Chylothorax is a rare disease, and idiopathic effusion is the most common diagnosis. Surgical intervention is typically needed for resolution, and involves thoracic-duct ligation with pericardectomy or cisterna chyli ablation for optimal chances of success.

**American Journal of Veterinary Research**

**Evaluation of tissue oxygen saturation with near-infrared spectroscopy during experimental acute hemorrhagic shock and resuscitation in dogs**

Noah D. Pavlisko, Natalia Henao-Guerrero, Maria B. Killos, Carolina Ricco, Andre C. Shih, Carsten Bandt, Stephen R. Were.

Objective—To evaluate tissue oxygen saturation (Sto2) by use of near-infrared spectroscopy in experimental acute hemorrhagic shock and resuscitation in dogs. Animals—14 healthy adult purpose-bred Beagles. Procedures—Dogs were anesthetized with isoflurane via facemask, anesthesia was maintained with propofol and rocuronium bromide, and dogs were mechanically ventilated to maintain normocapnia. Dogs were studied under normovolemia (baseline), hypovolemia with target mean arterial blood pressure < 40 mm Hg achieved and maintained steady for 10 minutes (hypovolemia T1), then 20 minutes later (hypovolemia T2), following resuscitation with shed blood (after transfusion), and after administration of 20 mL of hetastarch/kg (hypervolemia). Conditions were executed sequentially during a single anesthetic episode, allowing stabilization between states (10 minutes). Hemoglobin concentration, mean arterial blood pressure, arterial blood gas concentrations, cardiac index, oxygen delivery indexed to body surface area, and Sto2 were monitored. Results—From baseline to hypovolemia T1, there was a significant reduction in mean ± SD oxygen delivery index (619 ± 257 mL/min/m2 to 205 ± 76 mL/min/m2) and Sto2 (94 ± 4.4% to 78 ± 12.2%). Following resuscitation, Sto2 (80 ± 8.5% vs 92 ± 6.45%) and oxygen delivery index (211 ± 73 mL/min/m2 vs 717 ± 221 mL/min/m2) significantly increased, returning to baseline values. Hypervolemia had no effect on Sto2 or oxygen delivery index. A strong correlation (r = 0.97) was detected between mean oxygen delivery index and Sto2 across all time points. Conclusions and Clinical Relevance—Under the conditions of this study, there was a strong correlation between Sto2 and oxygen delivery, suggesting that Sto2 may be used to estimate oxygen delivery.
**Analysis of the atrial repolarization wave in dogs with third-degree atrioventricular block.** Manuela Perego, Stefano Skert, Roberto A. Santilli.

Objective—To characterize the electrocardiographic features of the atrial repolarization (Ta) wave in dogs with third-degree atrioventricular (AV) block. Sample—ECGs of 36 dogs with third-degree AV block and no identifiable structural heart diseases. Procedures—Standard 12-lead ECGs were acquired with a digital system, and measurements were manually edited. Results—A Ta wave was detectable in all dogs for at least 1 ECG lead. The Ta wave had negative polarity in leads I, II, III, and aVF and positive polarity in leads aVL and aVR, with a mean electrical axis of $-114.26^\circ$. Mean duration and mean amplitude of the Ta wave in lead II were 140.2 milliseconds and $-0.09$ mV, respectively, with the ratio for the Ta-to-P wave duration of $2.3$ and the ratio of Ta-to-P wave amplitude of $-0.35$. Significant correlations were found between the Ta wave duration and duration of the P-Ta interval, Ta wave amplitude and the ECG lead, Ta wave duration and body weight, and duration of the P-Ta interval and atrial rate. Measurements of the Ta wave were repeatable. Conclusions and Clinical Relevance—Measurements of the Ta wave in dogs with third-degree AV block were repeatable. The values for the Ta wave reported here can be used as reference values for dogs with AV conduction disturbances and an echocardiographically normal atrial size. Further studies are needed to validate these results in dogs with structural heart diseases.

**Feasibility and reproducibility of echocardiographic assessment of regional left atrial deformation and synchrony by tissue Doppler ultrasonographic imaging in healthy dogs.** Marco BaronToaldo, Carlo Guglielmini, Alessia Diana, Fabio Sarcinella, Mario Cipone.

Objective—To assess the feasibility and reproducibility of longitudinal tissue Doppler ultrasonographic imaging with regard to determination of velocity, strain, and strain rate (SR) of the left atrium (LA) and use those data to characterize LA synchrony (LAS) for a group of healthy dogs. Animals—15 healthy dogs. Procedures—For each dog, apical 4- and 2-chamber echocardiographic views were obtained. Peak velocity, strain, and SR and time to peak value during systole, early diastole, and late diastole were measured for each of the 4 LA walls. To characterize LAS, mean and SD maximal late diastolic time difference (LAD) among the 4 walls were calculated on the basis of time to peak for velocity, strain, and SR; for each, the 95% confidence interval (mean ± 2SD) was calculated. Within-day and between-day intraobserver variability was calculated. Results—For all dogs, tissue velocity and SR had peak positive values during systole and 2 negative peaks during early and late diastole. Atrial strain had a peak positive value during systole, positive values during early diastole, and a negative peak value during late diastole. Reproducibility was acceptable for most variables. Diastolic strain and SR had the highest variability, but times to peak values were always reproducible. For velocity, strain, and SR, the 95% confidence interval for the maximal LAD was < 50 milliseconds and that for the SD of the LAD was < 23 milliseconds. Conclusions and Clinical Relevance—Longitudinal tissue Doppler imaging of LA deformation was feasible in healthy dogs, and its application may be useful for understanding atrial pathophysiologic changes associated with various cardiac diseases in dogs.

**Microcirculatory effects of a hyperviscous hemoglobin-based solution administered intravenously in dogs with experimentally induced hemorrhagic shock.** Ann M. Peruski, Edward S. Cooper, Amy L. Butler.

Objective—To determine whether increasing the viscosity of a standard hemoglobin-based oxygen-carrying solution (HBOC) would offset its associated vasoconstrictive effects and result in improved microvascular perfusion in healthy splenectomized dogs with experimentally induced hemorrhagic shock.

Animals—12 male American Foxhounds. Procedures—Each dog underwent anesthesia and splenectomy. Shock was induced by controlled hemorrhage until a mean arterial blood pressure of 40 mm Hg was achieved and maintained for 60 minutes. Dogs were then randomly assigned to receive either a standard or hyperviscous HBOC (6 dogs/group). Sidestream dark-field microscopy was used to assess the effects of shock and HBOC administration on the microcirculation of the buccal mucosa and the jejunal serosa. Video recordings of the

Objective—To compare bronchoalveolar lavage (BAL) fluid obtained by manual aspiration (MA) with a handheld syringe with that obtained by suction pump aspiration (SPA) in healthy dogs. Animals—13 adult Beagles. Procedures—Each dog was anesthetized and bronchoscopic BAL was performed. The MA technique was accomplished with a 35-mL syringe attached to the bronchoscope biopsy channel. The SPA technique was achieved with negative pressure (5 kPa) applied to the bronchoscope suction valve with a disposable suction trap. Both aspiration techniques were performed in each dog in randomized order on opposite caudal lung lobes. Two 1 mL/kg aliquots of warm saline (0.9% NaCl) solution were infused per site. For each BAL fluid sample, the percentage of retrieved fluid was calculated, the total nucleated cell count (TNCC) and differential cell count were determined, and semiquantitative assessment of slide quality was performed. Comparisons were made between MA and SPA techniques for each outcome. Results—1 dog was removed from the study because of illness. The mean percentage of fluid retrieved (mean difference, 23%) and median TNCC (median distribution of differences, 100 cells/µL) for samples obtained by SPA were significantly greater than those for samples obtained by MA. Conclusions and Clinical Relevance—In healthy dogs, BAL by SPA resulted in a significantly higher percentage of fluid retrieval and samples with a higher TNCC than did MA. Further evaluation of aspiration techniques in dogs with respiratory tract disease is required to assess whether SPA improves the diagnostic yield of BAL samples.

Prevalence of circumcaval ureters and double caudal vena cava in cats

Régine Bélanger, Cindy L. Shmon, Peter J. Gilbert, Kathleen A. Linn.

Objective—To determine the prevalence of circumcaval ureters and other caudal vena cava variations in cats and determine whether circumcaval ureters were associated with macroscopic evidence of ureteral obstruction. Sample—301 domestic cat cadavers obtained from an animal shelter. Procedures—All cat cadavers were examined, and anatomic variations of the ureters and caudal vena cava were recorded. In cadavers with a circumcaval ureter, kidney length, width, and height were measured, and the ureters were examined macroscopically to determine whether there was gross evidence of ureteral obstruction in cats with circumcaval ureters. Results—At least 1 circumcaval ureter was present in 106 of the 301 (35.2%) cats, with a right circumcaval ureter identified in 92 (30.6%) cats, a left circumcaval ureter identified in 4 (1.3%), and bilateral circumcaval ureters identified in 10 (3.3%). Twenty-one (7.0%) cats had a double caudal vena cava, including 2 cats in which the double caudal vena cava was the only anatomic abnormality identified. No sex predilection for anatomic abnormalities was found. Mean right kidney length was significantly greater than mean left kidney length in cats with a right circumcaval ureter. Conclusions and Clinical Relevance—Circumcaval ureter was present in approximately a third of cats in this study. Variation in the development of the caudal vena cava is the proposed cause. The clinical relevance of this variation is unknown.
Best practice for the pharmacological management of hyperthyroid cats with antithyroid drugs.


Pharmacological management of feline hyperthyroidism offers a practical treatment option for many hyperthyroid cats. Two drugs have been licensed for cats in the last decade: methimazole and its pro-drug carbimazole. On the basis of current evidence and available tablet sizes, starting doses of 2.5 mg methimazole twice a day and 10 to 15 mg once a day for the sustained release formulation of carbimazole are recommended. These doses should then be titrated to effect in order to obtain circulating total thyroxine (TT4) concentrations in the lower half of the reference interval. Treated cases should be monitored for side-effects, especially during the first months of treatment. Some side-effects may require discontinuation of treatment. At each monitoring visit, clinical condition and quality of life should also be evaluated, with special attention to possible development of azotaemia, hypertension and iatrogenic hypothyroidism. When euthyroidism has been achieved, monitoring visits are recommended after 1 month, 3 months and biannually thereafter. Cats with pre-existing azotaemia have shorter survival times. However, development of mild azotaemia during the initial course of treatment, unless associated with hypothyroidism, does not appear to decrease survival time. The long-term effects of chronic medical management require further study.

The inheritance of extra-hepatic portosystemic shunts and elevated bile acid concentrations in Maltese dogs.


Objectives; To determine the heritability of extra-hepatic portosystemic shunts and elevated post-prandial serum bile acid concentrations in maltese dogs. Materials and methods; Maltese dogs were recruited and investigated by a variable combination of procedures including dynamic bile acid testing, rectal ammonia tolerance testing, ultrasonography, portal venography, surgical inspection or necropsy. In addition, nine test matings were carried out between affected and affected dogs, and affected and unaffected dogs. Results; In 135 variably related maltese, shunt status could be confirmed in 113, including 19 with an extra-hepatic portosystemic shunt (17 confirmed at surgery, 2 at necropsy). Rectal ammonia tolerance testing results and post-prandial serum bile acid concentrations were retrievable for 50 and 88 dogs, respectively. Pedigree information was available for these 135 and an additional 164 related dogs. Two consecutive test matings were carried out between two affected animals (whose shunts had been attenuated), with 2 of 8 (25%) of offspring having an extra-hepatic portosystemic shunt. Six test matings were carried out between an affected and an unaffected animal, with 2 of 22 (9%) offspring affected. Heritability of extra-hepatic portosystemic shunt was 0.61 calculated using variance components analysis [95% confidence interval (ci) 0.14 to 1.0, \( p=0.001 \)]. The best fitting model from segregation analysis was a common, partially penetrant, recessive model (allele frequency 0.34, penetrance 0.99, ci 0.09 to 1.0). The heritability of elevated post-prandial serum bile acid (and thus likely portal vein hypoplasia) was 0.81 (ci 0.43 to 1.0, \( p=0.2 \)) after logarithmic transformation of post-prandial serum bile acid concentrations. Clinical significance; There is strong support for extra-hepatic portosystemic shunts and elevated post-prandial serum bile acid concentrations both being inherited conditions in maltese.

Outcome following liver lobectomy using thoracoabdominal staplers in cats.


Objectives; To present outcomes and complications following liver lobectomy using thoracoabdominal staplers in cats, to identify factors associated with survival time and to confirm safety and feasibility. Methods; Retrospective analysis of case records (n=18) of cats that underwent liver lobectomy with a thoracoabdominal
Results; Fourteen of the 18 cats (78%) survived to discharge. Median survival time was 136·5 days. On log-rank univariate analysis, preoperative abdominal fluid (p=0·002), preoperative anaemia (p=0·03) and perioperative transfusion (p=0·01) were associated with decreased survival time. Perioperative anaemia was common (89%), and rate of transfusion during hospitalisation was 61%. Clinical signs of illness, azotaemia, elevated liver enzyme activities and malignant neoplasia did not appear to impact survival; however, anaemia, abdominal fluid and transfusion may be associated with decreased survival time. Clinical significance; Liver lobectomy using thoracoabdominal staplers was effective in removal of hepatic lesions and all cats survived surgery. Outcome was negatively associated with preoperative abdominal fluid (haemorrhagic and non-haemorrhagic), preoperative anaemia or perioperative transfusion. Surgeons should be prepared to employ ancillary methods of haemostasis to augment the staple line, and need for blood transfusion should be anticipated.

Cytological and histological correlation in diagnosing feline and canine mediastinal masses.


Objectives; The aim of this study was to evaluate the agreement between cytological and histological diagnosis of canine and feline mediastinal masses to assess the utility of cytological examination in accurately diagnosing and classifying mediastinal lesions. Methods; A retrospective review of 58 cases of mediastinal masses from 21 dogs and 37 cats were performed. Histopathology was used as the diagnostic reference standard. The agreement between cytological and histological diagnosis was calculated. Results; The complete agreement between cytological and histological classification ranged from substantial (k = 0·72, ci: 0·64 to 0·80) to almost perfect (k = 0·89, ci: 0·82 to 0·96) depending on how the cytological diagnoses classified as suspicious were used for statistical calculations. Clinical significance; Cytological examination of canine and feline mediastinal masses is a relatively easy, low-cost procedure, with good agreement with final histological diagnoses.

Purring in cats during auscultation: how common is it, and can we stop it?

C. J. L. Little, l. Ferasin, h. Ferasin and m. A. Holmes.

Objectives; When cats purr during examination it is difficult to perform auscultation. The objective of this study was to determine the prevalence of purring in cats during examination, and identify interventions that could be used to stop purring. Methods; Cats seen at a first opinion clinic were enrolled in the study and their purring status recorded. Thirty of the purring cats were exposed to up to three different interventions in an attempt to stop purring in a randomised controlled trial including blowing at the ear, use of an ethanol-based aerosol near the cat and proximity to a running tap. Results; The 30 cats in the trial were subjected to a total of 54 attempts to stop purring, proximity to a running tap caused 17 of 21 (81%) cats to stop purring, blowing at the cat's ears worked in 2 of 15 (13%) cats, spraying an aerosol close to the cat was effective in 9 of 18 (50%) cases. In 2 cats (7%), none of the interventions interrupted purring. Clinical significance; This study provides evidence that placing a purring cat near a running tap and in proximity to the discharge of an ethanol-based aerosol are effective measures to stop purring in order to allow auscultation.

Monitoring acute phase proteins in retrovirus infected cats undergoing feline interferon-ω therapy.

R. O. Leal, s. Gil, n. Sepúlveda, d. Mcgahie, a. Duarte, m.m.r.e. niza and l. Tavares.

Objectives; Recombinant feline interferon-ω therapy is an immunomodulator currently used in the treatment of different retroviral diseases including feline immune deficiency virus and feline leukaemia virus. Although its mechanism of action remains unclear, this drug appears to potentiate the innate response. Acute phase proteins are one of the key components of innate immunity and studies describing their use as a monitoring tool for the immune system in animals undergoing interferon-ω therapy are lacking. This study aimed to determine whether
interferon-ω therapy influences acute phase protein concentrations namely serum amyloid-a, α-1-glycoprotein and c-reactive protein. Methods; A single-arm study was performed using 16 cats, living in an animal shelter, naturally infected with retroviruses and subjected to the interferon-ω therapy licensed protocol. Samples were collected before (d0), during (d10 and d30) and after therapy (d65). Serum amyloid-a and c-reactive protein were measured by specific enzyme-linked immunosorbent assay kits and α-1-glycoprotein by single radial immunodiffusion. Results; All the acute phase proteins significantly increased in cats undergoing interferon-ω therapy (d0/d65: p<0·05). Clinical significance; Acute phase proteins appear to be reasonable predictors of innate-immune stimulation and may be useful in the individual monitoring of naturally retroviral infected cats undergoing interferon-ω therapy.

Presentation and management of trapped neutrophil syndrome (tns) in uk border collies.

S. L. Mason, r. Jepson, m. Maltman and d. J. Batchelor.

Three uk bred border collie puppies were presented for investigation of pyrexia and severe lameness with associated joint swelling. Investigations revealed neutropenia, radiographic findings suggesting metaphyseal osteopathy, and polyarthritis and all dogs were subsequently confirmed with trapped neutrophil syndrome. Clinical improvement was seen after treatment with prednisolone and antibiotics and the dogs all survived to adulthood with a good short- to medium-term outcome. Trapped neutrophil syndrome is an important differential diagnosis for young border collie dogs in the uk presenting with pyrexia, neutropenia and musculoskeletal signs.

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Oral Cyclosporine Treatment in Dogs: A Review of the Literature.


Cyclosporine is an immunomodulatory drug used to treat an increasing spectrum of diseases in dogs. Cyclosporine is a calcineurin inhibitor, ultimately exerting its inhibitory effects on T-lymphocytes by decreasing production of cytokines, such as interleukin-2. Although, in the United States, oral cyclosporine is approved in dogs only for treatment of atopic dermatitis, there are many other indications for its use. Cyclosporine is available in 2 oral formulations: the original oil-based formulation and the more commonly used ultramicronized emulsion that facilitates oral absorption. Ultramicronized cyclosporine is available as an approved animal product, and human proprietary and generic preparations are also available. Bioavailability of the different formulations in dogs is likely to vary among the preparations. Cyclosporine is associated with a large number of drug interactions that can also influence blood cyclosporine concentrations. Therapeutic drug monitoring (TDM) can be used to assist in attaining consistent plasma cyclosporine concentrations despite the effects of varying bioavailability and drug interactions. TDM can facilitate therapeutic success by guiding dose adjustments on an individualized basis, and is recommended in cases that do not respond to initial oral dosing, or during treatment of severe, life-threatening diseases for which a trial-and-error approach to dose adjustment is too risky. Pharmacodynamic assays that evaluate individual patient immune responses to cyclosporine can be used to augment information provided by TDM.

Evaluation of Hemostatic Abnormalities in Canine Spirocercosis and Its Association with Systemic Inflammation.

P. Pazzi1, A. Goddard, A.T. Kristensen, E. Dvir. Background:
Canine spirocercosis is caused by the nematode Spirocerca lupi and is characterized by esophageal fibro-inflammatory nodules that may undergo neoplastic transformation. No sensitive and specific laboratory assays other than histopathology have been reported to differentiate non-neoplastic from neoplastic disease.

Hypothesis/Objectives: Dogs with spirocercosis will have evidence of hypercoagulability based on thromboelastography (TEG)-derived maximal amplitude (MA); increased MA will be correlated with increased acute phase protein (APP) concentrations (C-reactive protein [CRP] and fibrinogen); increased MA and APPs will be exacerbated with neoplastic spirocercosis.

Animals: Thirty-nine client-owned dogs with naturally occurring spirocercosis and 15 sex-matched healthy controls.

Methods: A prospective comparative study evaluating TEG, activated partial thromboplastin time, prothrombin time, antithrombin (AT) activity, platelet count and D-dimer concentration, and APPs of dogs with non-neoplastic (n = 24) and neoplastic (n = 15) spirocercosis compared to control dogs.

Results: Median MA was significantly increased in the non-neoplastic group (P < .01) and neoplastic group (P < .01) compared to the controls. Both APPs were significantly increased in the neoplastic group compared to the non-neoplastic and control groups. MA was strongly correlated with fibrinogen (r = 0.85, P < .001) and CRP (r = 0.73, P < .001). An MA >76 mm provided 96% specificity and 73% sensitivity for differentiation of disease state.

Conclusions and Clinical Importance: Canine spirocercosis is associated with increased TEG variables, MA and α, and decreased AT activity, which may indicate a hypercoagulable state seemingly more severe with neoplastic transformation. MA was correlated with APP in dogs with spirocercosis and can be used as an adjunctive test to support the suspicion of neoplastic transformation.

Evaluation of the Effects of a Therapeutic Renal Diet to Control Proteinuria in Proteinuric Non-Azotemic Dogs Treated with Benazepril.


Background: Angiotensin-converting enzyme inhibitors (ACEIs) are currently used to control proteinuria in dogs with chronic kidney disease. Renal diets (RDs) have beneficial effects in the management of azotemic dogs, but its role in proteinuric non-azotemic (PNAz) dogs has been poorly documented. Hypothesis: Administration of a RD to PNAz dogs treated with benazepril (Be) improves proteinuria control compared with the administration of a maintenance diet (MD).

Animals: Twenty-two PNAz (urine protein/creatinine ratio [UPC] >1) dogs.

Methods: Randomized open label clinical trial design. Dogs were assigned to group-MD (5.5 g protein/100 kcal ME)/Be or to group-RD (3.7 g protein/100 kcal ME)/Be group during 60 days. Dogs with serum albumin (Alb) <2 g/dL received aspirin (1 mg/kg/12 hours). A physical examination, systolic blood pressure (SBP) measurement, complete blood count (CBC), biochemistry panel, urinalysis, and UPC were performed at day 0 (D0) and day 60 (D60). Results: At D0, there were no significant differences between groups in the evaluated variables. During the study, logUPC (geometric mean (95% CI) and SBP (mean±SD mmHg) significantly decreased (paired t-test, P = 0.001) in Group-RD (logUPCD0 = 3.16[1.9–5.25]; UPCD60 = 1.20 [0.59–2.45]; SBPD0 = 160 ± 17.2; SBPD60 = 151 ± 15.8), but not in Group-MD (UPCD0 = 3.63[2.69–4.9]; UPCD60 = 2.14 [0.76–6.17]; SBPD0 = 158 ± 14.7; SBPD60 = 153 ± 11.5). However, RM-ANOVA test did not confirm that changes were consequence of dietary modification. Weight and Alb concentration did not change significantly in any group. Conclusion and Clinical Relevance: The administration of a RD to PNAz dogs treated with Be might help to control proteinuria and SBP compared with the administration of a MD, without inducing clinically detectable malnutrition, but more studies are warranted.

Analysis of Seroreactivity against Cell Culture–Derived Bartonella spp. Antigens in Dogs.


Background: Little is known about the specificity of Bartonella spp. immunofluorescent antibody (IFA) assays in dogs. Bacteremia in sick dogs most often has been associated with Bartonella henselae (Bh), Bartonella vinsonii subspecies berkholffii (Bvb), and Bartonella koehleri (Bk). Clarification of the diagnostic utility of IFA serology when testing against these organisms is needed. Objective: To evaluate the specificity of
Bartonella IFA assays utilizing 6 cell culture–grown antigen preparations. Animals: Archived sera from SPF dogs (n = 29) and from dogs experimentally infected with Bvb (n = 10) and Bh (n = 3). Methods: Antibodies (Abs) to Bvb genotypes I, II, and III, Bh serotype I, strains H-1 and SA2, and to Bk were determined by IFA testing. Results: Serum from naïve SPF dogs shown to be negative for Bartonella bacteremia did not react with any of the 6 Bartonella antigens by IFA testing. Dogs experimentally infected with Bvb genotype I developed Abs against homologous antigens, with no cross-reactivity to heterologous Bvb genotypes, Bh H-1, SA2 strains, or to Bk. Dogs experimentally infected with Bh serotype I developed Abs against Bh H-1, but not to Bh SA2 strain with no cross-reactive Abs to Bvb genotypes I–III or to Bk. Conclusions and Clinical Importance: Bartonella spp. Ab responses during acute experimental infections are species and type specific.

Measurement of IL-12 (p40, p35), IL-23p19, and IFN-γ mRNA in Duodenal Biopsies of Cats with Inflammatory Enteropathy.


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


V.E. Watson, M.M. Hobday, A.C. Durham.

Background: Lipogranulomatous lymphangitis is inflammation of the intestinal lymphatic vessels and surrounding tissues caused by chronic leakage of lipid-laden chyle. Grossly, lipogranulomas are typically disseminated small masses on the serosa and surrounding lymphatic vessels and consist of epithelioid macrophages, multinucleated giant cells, and cholesterol. Lipogranulomatous lymphangitis is occasionally seen in patients with lymphangiectasia and protein-losing enteropathy (PLE). Objectives: To characterize the historical features, clinical signs, treatment, histopathology, and outcome of dogs with focal lipogranulomatous lymphangitis. Animals: Six dogs with ultrasonographic evidence of focal, regional small intestinal masses, often with involvement of the adjacent mesentery, and a diagnosis of focal lipogranulomatous lymphangitis based on histopathology of biopsied masses. Results: The median age of dogs was 6.9 years (range 3–10 years). All dogs had total protein, globulin, and albumin concentrations within the reference range at initial presentation and had intestinal masses identified on abdominal ultrasound examination. Histopathologic evaluation of lesions identified severe mural and mesenteric lipogranulomatous lymphangitis. Lymphangiectasia was noted in 5 cases and only in sections within the mass-like lesion; tissue without lipogranulomas had minimal lymphangiectasia, suggesting a localized phenomenon. Postoperative outcomes ranged from remission of clinical signs with no subsequent treatment for 10–12 months in 2 dogs, postoperative management with medical and nutritional management in 3 dogs, and no outcome for 1 case. Conclusions and Clinical Importance: This case series
describes a unique mass-like manifestation of intestinal lipogranulomatous lymphangitis and should be considered as a possible differential diagnosis in dogs with an intestinal mass.

Endoscopically Visualized Lesions, Histologic Findings, and Bacterial Invasion in the Gastrointestinal Mucosa of Dogs with Acute Hemorrhagic Diarrhea Syndrome.


Background: Etiology of hemorrhagic gastroenteritis (HGE) syndrome in dogs is unknown and histopathologic and microbial investigations have only been performed post mortem. Objective: To identify characteristic intra vitam endoscopic and histologic mucosal lesions, as well as bacterial species, within the mucosa of dogs with HGE. Animals: Ten dogs diagnosed with HGE were included. Eleven dogs with gastroduodenoscopy and different intestinal diseases were used as controls for microbial changes. Dogs pretreated with antibiotics or diagnosed with any disease known to cause bloody diarrhea were excluded from the study. Methods: In this prospective study, gastrointestinal biopsies were collected from 10 dogs with HGE. Endoscopic and histologic changes were assessed according to WSAVA guidelines. Biopsies from the stomach, duodenum, ileum, and colon were investigated by histology and by immunohistochemistry for the presence of Clostridium spp. and parvovirus. The first duodenal biopsy taken with a sterile forceps was submitted for bacterial culture. Results: Acute mucosal lesions were only found in the intestines, not in the stomach. Clostridium spp., identified as Clostridium perfringens in 6/9 cases, were detected on the small intestinal mucosa in all dogs with HGE, either by culture or immunohistopathology. In the control group, C. perfringens could only be cultured in one of 11 dogs. Conclusions and Clinical Importance: The results of this study demonstrate an apparent association between C. perfringens and the occurrence of acute hemorrhagic diarrhea. The term “HGE,” which implies the involvement of the stomach, should be renamed as “acute hemorrhagic diarrhea syndrome.”

Fecal Microbiota of Cats with Naturally Occurring Chronic Diarrhea Assessed Using 16S rRNA Gene 454-Pyrosequencing before and after Dietary Treatment.

Z. Ramadan, H. Xu, D. Laflamme, G. Czarnecki-Maulden, Q.J. Li, J. Labuda, B. Bourqui.

Background: The gastrointestinal (GI) microbiota has a strong impact on the health of cats and these populations can be altered in GI disease. Little research has been done to associate improvement in diarrhea with changes in GI microbiota. Objective: To evaluate GI microbiota changes associated with diet change and related improvement in diarrhea in cats with chronic naturally occurring diarrhea. Animals: Fifteen adult Domestic Shorthair cats with naturally occurring chronic diarrhea. Methods: Controlled crossover dietary trial for management of diarrhea. Fecal microbiome was assessed using 454-pyrosequencing. Relationships among fecal score (FS), diet, and microbiome were explored using partial least square method, partial least square method – discriminant analysis, and orthogonal partial least square method with discriminant analysis (OPLS-DA). Results: Dominant bacterial phyla included the Firmicutes and Bacteroidetes, followed by Fusobacteria, Proteobacteria, Tenericutes, and Actinobacteria. Orthogonal partial least squares (OPLS-DA) clustering showed significant microbial differences within cats when fed Diet X versus Diet Y, and with Diet Y versus baseline. Significant correlations were found between the microbiome and FSs. Those bacteria with the strongest correlation with FS included Coriobacteriaceae Slackia spp., Campylobacter upsaliensis, Enterobacteriaceae Raoultella spp., Coriobacteriaceae Collinsella spp., and bacteria of unidentified genera within the families of Clostridiales Lachnospiracea and Aeromonadales Succinivibrionaceae, suggesting that increased numbers of these organisms may be important to gut health. Conclusions and Clinical Importance: Alterations in intestinal microbiota were associated with improvement in diarrhea, but, from our data we cannot conclude if changes in the microbiome caused the improvement in diarrhea, or vice versa.

Diagnostic Yield of Cytologic Analysis of Pericardial Effusion in Dogs.

Background: Pericardial effusion cytology is believed by many to be of limited value, yet few studies have evaluated its diagnostic utility. Objectives: To determine the diagnostic utility of cytologic analysis of pericardial effusion in dogs and to determine if consideration of additional data could improve the diagnostic yield. Animals: Two hundred and fifty-nine dogs with cytologic analysis of pericardial effusion performed between April 1990 and June 2012. Methods: Electronic medical records from a university teaching hospital were retrospectively reviewed; signalment, complete blood count, serum biochemistry, cytologic analysis of pericardial effusion, and echocardiographic data were recorded. Cytology was classified as diagnostic (infectious or neoplastic) or nondiagnostic (hemorrhagic or other) and groups were compared with multiple Student’s t-tests. Results: Cytology was grouped as nondiagnostic (92.3%) or diagnostic (7.7%) and characterized as hemorrhagic (90%), neoplastic (4.6%), infectious (3.1%), or other (2.3%). Overall cytologic analysis of pericardial effusion diagnostic utility was 7.7% and increased to 20.3% if the effusion hematocrit (HCT) <10%; echocardiographic evidence of a mass did not result in a significant increase in the diagnostic utility. Conclusions and Clinical Importance: The diagnostic utility of cytologic analysis of canine pericardial effusion is variable depending on the underlying etiology. In this group of dogs, the diagnostic yield of cytologic analysis was greater for pericardial effusion samples in which the HCT was less than 10%.

Bioequivalence of Orally Administered Generic, Compounded, and Innovator-Formulated Itraconazole in Healthy Dogs.


Background: Itraconazole is commonly used to treat systemic fungal infections in dogs, but problems exist with absorption and cost. Objective: To determine oral bioequivalence of generic and compounded itraconazole compared to original innovator (brand name) itraconazole in healthy dogs. Animals: Nine healthy, adult research Beagle dogs. Methods: A randomized, 3-way, 3-period, crossover design with an 8-day washout period. After a 12-hour fast, each dog received 100 mg (average: 10.5 mg/kg) of either innovator itraconazole, an approved human generic capsule, or compounded itraconazole (compounded using a commercially available compounding vehicle) with a small meal. Plasma was collected at predetermined intervals for high pressure liquid chromatography analysis. Concentration data were analyzed using noncompartmental pharmacokinetics to determine area under the curve (AUC), peak concentration (CMAX), and terminal half-life. Bioequivalence tests compared generic and compounded itraconazole to the reference formulation. Results: Average ratios of compounded and generic formulations to the reference formulation of itraconazole for AUC were 5.52% and 104.2%, respectively, and for CMAX were 4.14% and 86.34%, respectively. A test of bioequivalence using 2 one-sided tests and 90% confidence intervals did not meet bioequivalence criteria for either formulation. Conclusion and Clinical Importance: Neither generic nor compounded itraconazole is bioequivalent to the reference formulation in dogs. However, pharmacokinetic data for generic formulation were similar enough that therapeutic concentrations could be achieved. Compounded itraconazole produced such low plasma concentrations, it is unlikely to be effective; therefore, compounded itraconazole should not be used in dogs.


J. A. Stern, Y. Reina-Doreste, L. Chhid, K. M. Meurs.

Background: Cyclic guanosine monophosphate (cGMP)-specific phosphodiesterase (PDE5A) is the target of phosphodiesterase inhibitors such as sildenafil. Polymorphisms in the PDE5A gene that may predict response to therapy with sildenafil and nitric oxide, be linked to disease progression, and aid in risk assessment have been identified in human beings. Identification of polymorphisms in PDE5A could affect the physiologic actions of PDE5A and the effects of phosphodiesterase type 5 inhibitor drugs. Hypothesis/Objective: Functional polymorphisms exist in the canine PDE5A gene. Specific objectives were to identify PDE5A polymorphisms and evaluate their functional relevance. Animals: Seventy healthy dogs. Methods: The exonic, splice-site, 3’ and 5’ untranslated regions of the canine PDE5A gene were sequenced in 15 dogs and aligned with the canine
reference sequence. Identified polymorphisms were evaluated in 55 additional, healthy, unrelated dogs of 20 breeds. Plasma was collected from 51 of these dogs and cGMP was measured. An unpaired t-test and one-way ANOVA with Dunnett’s test of multiple comparisons were used to evaluate the effect of genotype on cGMP.

Results: A common exonic polymorphism was identified that changed glutamic acid to lysine and resulted in significantly lower cGMP concentrations in the group with polymorphism versus the wild type group (P = .014). Additionally, 6 linked single nucleotide polymorphisms in the 3’ untranslated region were identified that did not alter cGMP concentrations. Conclusions and Clinical Importance: A polymorphism exists in the canine PDE5A gene that is associated with variable circulating cGMP concentrations in healthy dogs and warrants investigation in diseases such as pulmonary hypertension.

Serum C-Reactive Protein as a Diagnostic Biomarker in Dogs with Bacterial Respiratory Diseases.


Background: C-reactive protein (CRP) is a major acute-phase protein in dogs. Serum concentrations are low in healthy animals, but increase rapidly after inflammatory stimuli. Objective: The aim of the study was to investigate CRP concentrations in various respiratory diseases of dogs and to determine if CRP can be used as a biomarker in the diagnosis of bacterial respiratory diseases. Animals: A total of 106 privately owned dogs with respiratory diseases (17 with bacterial tracheobronchitis [BTB], 20 with chronic bronchitis [CB], 20 with eosinophilic bronchopneumopathy [EBP], 12 with canine idiopathic pulmonary fibrosis [CIPF], 15 with cardiogenic pulmonary edema [CPE], and 22 with bacterial pneumonia [BP]) and 72 healthy controls. Methods: The study was conducted as a prospective cross-sectional observational study. CRP was measured in serum samples. Diagnosis was confirmed by clinical and laboratory findings, diagnostic imaging, and selected diagnostic methods such as cytological and microbiological analysis of respiratory samples, echocardiography, and histopathology. Results: Dogs with BP had significantly higher CRP concentrations (median, 121 mg/L; interquartile range, 68–178 mg/L) than dogs with BTB (23, 15–38, P = .0003), CB (13, 8–14, P < .0001), EBP (5, 5–15, P < .0001), CIPF (17, 10–20, P < .0001), or CPE (19, 13–32, P < .0001) and healthy controls (14, 8–20, P < .0001). Dogs with BTB had significantly higher CRP concentrations than dogs with CB (P = .001) or EBP (P < .0001) and healthy controls (P = .029). Conclusion and Clinical Importance: These results indicate that CRP has potential for use as an additional biomarker, especially in the diagnostics of BP.

Change in β-Catenin Localization Suggests Involvement of the Canonical Wnt Pathway in Boxer Dogs with Arrhythmogenic Right Ventricular Cardiomyopathy.


Background: Arrhythmogenic right ventricular cardiomyopathy (ARVC) is an inherited myocardial disease with high prevalence in the Boxer dog population. It is characterized by replacement of the myocardium with fatty or fibro-fatty tissue. Several mechanisms for the development of ARVC have been suggested, including dysfunction of the canonical Wnt pathway, which is linked to many cellular functions, including growth and differentiation of adipocytes. Hypothesis: Wnt pathway dysfunction is involved in the development of ARVC in the Boxer as evidenced by mislocalization of β-catenin, an integral Wnt pathway modulator, and striatin, a known Wnt pathway component. Animals: Five dogs without ARVC and 15 Boxers with ARVC were identified by 24-hour Holter monitoring and histopathologic examination of the heart. Methods: Right ventricular samples were collected and examined using confocal microscopy, Western blots, and quantitative (q) PCR. Results: Confocal microscopy indicated that β-catenin localized at sites of cell-to-cell apposition, and striatin localized in a diffuse intracellular pattern in hearts without ARVC. In hearts affected with ARVC, both β-catenin and striatin were colocalized with the endoplasmic reticulum (ER) marker calreticulin. Western blots identified a 50% increase in the amount of β-catenin in ARVC samples. No change in β catenin mRNA was detected using qPCR. Conclusions: Our data suggest that trafficking of Wnt pathway proteins from the ER to their proper location within the cell is inhibited in Boxers with ARVC. These results suggest that disturbances in the Wnt pathway may play a role in the development of ARVC in the Boxer.
Arterial Thromboembolism in 250 Cats in General Practice: 2004–2012.


Background: Population characteristics and outcome of cats with arterial thromboembolism (ATE) managed in general practice (GP) have been poorly described. Hypothesis: Cats with ATE presenting to GP are usually euthanized at presentation, but survival times >1 year are possible. Animals: Cats with ATE managed by 3 GP clinics in the United Kingdom. Methods: Records of cases presenting to GP over a 98-month period (2004–2012) were reviewed. Cats with an antemortem diagnosis of limb ATE were included. Outcome information was obtained. Results: Over 98 months, 250 cats were identified with ATE. Prevalence was approximately 0.3%. At presentation, 153 cats (61.2%) were euthanized, with 68/97 (70.1%) of the remaining cats (27.2% of the total population) surviving >24 hours after presentation. Of these, 30/68 (44.1%) survived for at least 7 days. Hypothermia (HR, 1.44; 95% CI, 1.002–2.07; P = .049) and management by Clinic 2 (HR, 5.53; 95% CI, 1.23–24.8; P = .026) were independent predictors of 24-hour euthanasia or death. For cats surviving >24 hours, hypothermia (HR, 2.25; 95% CI, 1.12–4.48; P = .021) and failure to receive aspirin, clopidogrel, or both (HR, 8.26; 95% CI, 1.39–50; P = .001) were independent predictors of euthanasia or death within 7 days. For cats that survived ≥7 days, median survival time was 94 (95% CI, 42–164) days, with 6 cats alive 1 year after presentation. Conclusions: Although 153/250 cats were euthanized at presentation, 6 cats survived >12 months. No factors were identified that predicted euthanasia on presentation.

Relation of Vitamin D Status to Congestive Heart Failure and Cardiovascular Events in Dogs.


Background: Vitamin D plays a pivotal role in cardiac function, and there is increasing evidence that vitamin D deficiency is associated with the development of congestive heart failure (CHF) in people. Hypothesis: Serum vitamin D concentration is lower in dogs with CHF compared with unaffected controls and serum vitamin D concentration is associated with clinical outcome in dogs with CHF. Animals” Eighty-two client-owned dogs. Methods: In this cross-sectional study, we examined the association between circulating 25-hydroxyvitamin D [25(OH)D], a measure of vitamin D status, and CHF in dogs. In the prospective cohort study, we examined whether 25(OH)D serum concentration was associated with clinical outcome in dogs with CHF. Results: Mean 25(OH)D concentration (100 ± 44 nmol/L) in 31 dogs with CHF was significantly lower than that of 51 unaffected dogs (123 ± 42 nmol/L; P = .023). The mean calculated vitamin D intake per kg of metabolic body weight in dogs with CHF was no different from that of unaffected dogs (1.37 ± 0.90 µg/kg metabolic body weight versus 0.98 ± 0.59 µg/kg body weight, respectively, P = .097). There was a significant association of serum 25(OH)D concentration on time to clinical manifestation of CHF or sudden death (P = .02). Conclusion and Clinical Relevance: These findings suggest that low concentrations of 25(OH)D may be a risk factor for CHF in dogs. Low serum 25(OH)D concentration was associated with poor outcome in dogs with CHF. Strategies to improve vitamin D status in some dogs with CHF may prove beneficial without causing toxicity.


P. Smets, S. Daminet, G. Wess.

Background: Boxer dogs are predisposed to congenital and adult onset cardiac diseases. Breed-specific reference values for M-mode and Doppler echocardiographic measurements previously have been established. Left ventricular (LV) end-systolic (ESV) and end-diastolic volumes (EDV) can be measured by M-mode or two-dimensional methods, such as Simpson's method of discs (SMOD). Reference ranges for SMOD-derived LV volumes are lacking. Objectives: To determine reference intervals for EDV and ESV in Boxer dogs. Animals: Previously collected data from 85 healthy Boxers (37 males and 48 females) were used for analysis. Methods:
Simpson's method of discs-derived EDV and ESV were measured using offline analysis by 1 observer, in both the right parasternal and the left apical views. Measurements were compared between both views and between male and female dogs using a t-test. Reference intervals were established using the mean ± 2 × SD. Results: Measurements obtained from both views showed good agreement, and mean EDV1 and ESV1, indexed to body surface area (BSA), were calculated. Reference intervals were 49–93 mL/m² for EDV1, and 22–50 mL/m² for ESV1. EDV and ESV were significantly higher in males compared with females, when indexing to body weight. Conclusion and Clinical Importance: The upper limit for ESV1 exceeds the previously suggested cut-off of 30 mL/m² for detection of systolic dysfunction. The reference intervals generated in this study should be useful clinically in the assessment of LV size and function in Boxer dogs.

Sphericity Index and E-Point-to-Septal-Separation (EPSS) to Diagnose Dilated Cardiomyopathy in Doberman Pinschers.

P.J. Holler, G. Wess.

Background: E-point-to-septal-separation (EPSS) and the sphericity index (SI) are echocardiographic parameters that are recommended in the ESVC-DCM guidelines. However, SI cutoff values to diagnose dilated cardiomyopathy (DCM) have never been evaluated. Objectives: To establish reference ranges, calculate cutoff values, and assess the clinical value of SI and EPSS to diagnose DCM in Doberman Pinschers. Animals: One hundred seventy-nine client-owned Doberman Pinschers. Methods: Three groups were formed in this prospective longitudinal study according to established Holter and echocardiographic criteria using the Simpson method of disk (SMOD): control group (97 dogs), DCM with echocardiographic changes (75 dogs) and “last normal” group (n = 7), which included dogs that developed DCM within 1.5 years, but were still normal at this time point. In a substudy, dogs with early DCM based upon SMOD values above the reference range but still normal M-Mode measurements were selected, to evaluate if EPSS or SI were abnormal using the established cutoff values. Results: ROC-curve analysis determined <1.65 for the SI (sensitivity 86.8%; specificity 87.6%) and >6.5 mm for EPSS (sensitivity 100%; specificity 99.0%) as optimal cutoff values to diagnose DCM. Both parameters were significantly different between the control group and the DCM group (P < 0.001), but were not abnormal in the “last normal” group. In the substudy, EPSS was abnormal in 13/13 dogs and SI in 2/13 dogs. Conclusions and Clinical Importance: E-point-to-septal-separation is a valuable additional parameter for the diagnosis of DCM, which can enhance diagnostic capabilities of M-Mode and which performs similar as well as SMOD.


M. Krofič Žel, N. Tozon, A. Nemec Svete.

Background: Serum selenium concentrations and the activity of plasma glutathione peroxidase (GPx) decrease with the progression of chronic kidney disease (CKD) in human patients. Selenium is considered a limiting factor for plasma GPx synthesis. Plasma total antioxidant capacity (TAC) is decreased in CKD cats in comparison to healthy cats. Hypothesis: Serum selenium concentrations and plasma and erythrocyte GPx activity in cats with CKD are lower than in healthy cats. Serum selenium concentrations, the activity of enzymes, and plasma TAC progressively decrease with the progression of kidney disease according to IRIS (International Renal Interest Society) classification. Animals: Twenty-six client-owned cats in IRIS stages I–IV of CKD were compared with 19 client-owned healthy cats. Methods: A CBC, serum biochemical profile, urinalysis, plasma and erythrocyte GPx activity, serum selenium concentration, and plasma TAC were measured in each cat. Results: Cats in IRIS stage IV CKD had a significantly higher (P = .025) activity of plasma GPx (23.44 ± 6.28 U/mL) than cats in the control group (17.51 ± 3.75 U/mL). There were no significant differences in erythrocyte GPx, serum selenium concentration, and plasma TAC, either among IRIS stages I–IV CKD cats or between CKD cats and healthy cats. Conclusions and Clinical Importance: Erythrocyte GPx activity, serum selenium concentration, and plasma TAC do not change in CKD cats compared with healthy cats. Selenium is
not a limiting factor in feline CKD. Increased plasma GPx activity in cats with stage IV CKD suggests induction of antioxidant defense mechanisms. Antioxidant defense systems might not be exhausted in CKD in cats.

**Treatment of Aldosterone-Secreting Adrenocortical Tumors in Cats by Unilateral Adrenalectomy: 10 Cases (2002–2012).**


Background: Primary hyperaldosteronism (PHA) in cats occurs as a consequence of excessive hormone production by an adrenocortical tumor. Median survival time, association between tumor type and prognosis, and the likelihood that cats require continued medical therapy after surgery have not been systematically evaluated. Objectives: To determine the median survival time of cats with PHA treated by unilateral adrenalectomy. To examine if tumor type, anesthesia time, or tumor location (left or right side) affect survival and if affected cats require continued postoperative treatment for persistent hypertension or hypokalemia. Animals: Ten client-owned cats. Methods: Retrospective study. Cats were diagnosed with PHA based on clinical signs, increased plasma aldosterone concentration, and advanced imaging. Cats underwent unilateral adrenalectomy. Survival time (days alive after surgery) was determined for each cat. Factors affecting median survival time were investigated, including histopathology, anesthesia time, and location (side) of the tumor. Results: Eight of 10 cats survived to discharge from the hospital post adrenalectomy. Overall median survival was 1,297 days (range 2–1,582 days). The only significant factor affecting median survival time was anesthesia time >4 hours. Tumor type and location (side) did not significantly affect median survival time. No cats required continued medical treatment for PHA. Conclusions and Clinical Importance: Although PHA in cats is still considered an uncommon condition, it should be considered in middle to older aged cats with hypokalemic polymyopathy and systemic hypertension. Surgical correction by unilateral adrenalectomy is a viable approach to definitive treatment of PHA with no need for continued medical management.

**Plasma Renin Activity and Aldosterone Concentrations in Hypertensive Cats with and without Azotemia and in Response to Treatment with Amlodipine Besylate.**


Background: Role of renin-angiotensin aldosterone system (RAAS) in feline systemic hypertension is poorly understood. Objectives: Examine plasma renin activity (PRA) and plasma aldosterone concentrations (PAC) in normotensive and hypertensive cats with variable renal function and in response to antihypertensive therapy. Animals: One hundred and ninety-six cats >9 years from first opinion practice. Methods: PRA, PAC, and aldosterone-to-renin ratio (ARR) were evaluated in cats recruited prospectively and grouped according to systolic blood pressure (SBP) and renal function (nonazotemic normotensive [Non-Azo-NT], nonazotemic hypertensive [Non-Azo-HT], azotemic normotensive [Azo-NT], azotemic hypertensive [Azo-HT]). Changes in PRA and PAC were evaluated with antihypertensive therapy (amlodipine besylate). Results: Plasma renin activity (ng/mL/h; P = .0013), PAC (pg/mL; P < .001), and ARR (P = 0.0062) differed significantly among groups. PRA (ng/mL/h) was significantly lower in hypertensive (Non-Azo-HT; n = 25, median 0.22 [25th percentile 0.09, 75th percentile 0.39], Azo-HT; n = 44, 0.33 [0.15, 0.48]) compared with Non-Azo-NT cats (n = 57, 0.52 [0.28, 1.02]). Azo-HT cats had significantly higher PAC (n = 22, 149.8 [103.1, 228.7]) than normotensive cats (Non-Azo-NT; n = 26, 45.4 [19.6, 65.0], Azo-HT; n = 18, 84.1 [38.6, 137.8]). ARR was significantly higher in Azo-HT (n = 20, 503.8 [298.8, 1511]) than Azo-NT cats (n = 16, 97.8 [77.0, 496.4]). Significant increase in PRA was documented with antihypertensive therapy (pretreatment [n = 20] 0.32 [0.15–0.46], posttreatment 0.54 [0.28, 1.51]), but PAC did not change. Conclusions and Clinical Importance: Hypertensive cats demonstrate significantly increased PAC with decreased PRA. PRA significantly increases with antihypertensive therapy. Additional work is required to determine the role of plasma aldosterone concentration in the pathogenesis of hypertension and whether this relates to autonomous production or activation of RAAS without demonstrable increase in PRA.

**Evaluation of Aldosterone Concentrations in Dogs with Hypoadrenocorticism.**

Background: Some dogs with primary hypoadrenocorticism (HA) have normal sodium and potassium concentrations, a phenomenon called atypical Addison's disease. The assumption that the zona glomerulosa and aldosterone secretion in these dogs are normal seems widely accepted; however, aldosterone measurements are missing in most published cases. Objectives: To measure aldosterone in dogs with HA with and without electrolyte abnormalities and to determine the time point of aldosterone peak concentrations during ACTH stimulation. Animals: Seventy dogs with HA, 22 dogs with diseases mimicking HA, and 19 healthy dogs. Methods: Prospective study. Blood samples were taken before and 60 minutes after injection of 250 µg ACTH in all dogs. Additional blood samples were taken 15, 30, and 45 minutes after ACTH in 7 dogs with HA and in 22 with diseases mimicking HA. Results: Baseline and ACTH-stimulated aldosterone was significantly lower in dogs with HA than in the other groups. Aldosterone was low or undetectable in 67/70 dogs with HA independently of sodium and potassium levels. In 3 dogs, sodium/potassium concentrations were normal; in 1 dog, sodium was normal and potassium decreased. In all 4, ACTH-stimulated aldosterone concentrations were below the detection limit of the assay. Aldosterone concentrations were not different at 30, 45, or 60 minutes after ACTH administration. Conclusion and Clinical Importance: Cortisol and aldosterone secretion is compromised in dogs with HA with and without electrolyte abnormalities. The term atypical Addison's disease, used for dogs with primary HA and normal electrolytes, must be reconsidered; other mechanisms allowing normal electrolyte balance without aldosterone should be evaluated in these dogs.

Effect of Trilostane on Hormone and Serum Electrolyte Concentrations in Dogs with Pituitary-Dependent Hyperadrenocorticism.

C. Griebsch, C. Lehnert, G.J. Williams, K. Failing, R. Neiger.

Background: The effects of trilostane on key hormones and electrolytes over 24 hours in dogs with pituitary-dependent hyperadrenocorticism (PDH) are unknown. Objectives: To determine the plasma concentration of cortisol, endogenous adrenocorticotropic hormone (ACTH), aldosterone, sodium, potassium, and ionized calcium concentrations, and plasma renin activity over a 24-hour period after administration of trilostane to dogs with well-controlled PDH. Animals: Nine dogs (mean age 9.3 ± 0.67 years, mean weight 31.9 ± 6.4 kg) with confirmed PDH. Methods: Prospective study. Thirty days after the first administration of trilostane, blood samples were taken at −30, 0 (baseline), 15, 30, 60, and 90 minutes, and 2, 3, 4, 6, 8, 12, 16, 20, and 24 hours after administration of trilostane and plasma concentration of cortisol, endogenous ACTH, aldosterone, sodium, potassium, ionized calcium, and renin activity were determined. Results: Cortisol concentrations decreased significantly (P < .001) 2–4 hours after trilostane administration. From baseline, there was a significant (P < .001) increase in endogenous ACTH concentrations between hours 3–12, a significant increase (P < .001) in aldosterone concentration between hours 16–20, and a significant (P < .001) increase in renin activity between hours 6–20. Potassium concentration decreased significantly (P < .05) between hours 0.5–2. Conclusion and Clinical Importance: Treatment with trilostane did not cause clinically relevant alterations in plasma aldosterone and potassium concentration. Results suggest that in dogs with PDH, the optimal time point for an ACTH-stimulation test to be performed is 2–4 hours after trilostane dosing. Future studies are necessary to establish interpretation criteria for a 2- to 4-hour postpill ACTH-stimulation test.

Effects of Pioglitazone on Insulin Sensitivity and Serum Lipids in Obese Cats.

M. Clark, K. Thomas, L. Dirikolu, D. C. Ferguson, M. Hoenig.

Background: Pioglitazone is a thiazolidinedione (TZD) insulin sensitizer approved for use in human type 2 diabetes mellitus. Therapeutic options for diabetes in cats are limited. Objective: To evaluate the effects of pioglitazone in obese cats, which are predisposed to insulin resistance, to assess its potential for future use in feline diabetes mellitus. Animals: A total of 12 obese purpose-bred research cats (6 neutered males and 6 spayed females, 5–7 years of age, weighing 5.4–9.8 kg). Methods: Randomized, placebo-controlled 3-way crossover study. Oral placebo or pioglitazone (Actos™; 1 or 3 mg/kg) was administered daily for 7-week periods, with IV
glucose tolerance testing before and after each period. Results: Three mg/kg pioglitazone significantly improved insulin sensitivity (geometric mean [95% CI] 0.90 [0.64–1.28] to 2.03 [1.49–2.78] min−1pmol−1L; P = .0014 versus change with placebo), reduced insulin area under the curve during IVGTT (geometric mean [range] 27 [9–64] to 18 [6–54] min−1nmol/L; P = .0031 versus change with placebo), and lowered serum triglyceride (geometric mean [range] 71 [29–271] to 48 [27–75] mg/dL; P = .047 versus change with placebo) and cholesterol (geometric mean [range] 187 [133–294] to 162 [107–249] mg/dL; P = .0042 versus change with placebo) concentrations in the obese cats. No adverse effects attributable to pioglitazone were evident in the otherwise healthy obese cats at this dosage and duration. Conclusions and Clinical Importance: Results of this study support a positive effect of pioglitazone on insulin sensitivity and lipid metabolism in obese cats, and suggest that further evaluation of the drug in cats with diabetes mellitus or other metabolic disorders might be warranted.

Signalment, Clinical Presentation, and Diagnostic Findings in 122 Dogs with Spinal Arachnoid Diverticula.


Background: Most information about spinal arachnoid diverticula (SADs) in dogs has been retrieved from relatively small case series. The aim of this study was to describe this disease in a larger number of dogs.

Objectives: Description of the signalment, clinical presentation, and imaging findings of a large number of dogs with SADs. Animals: One hundred and twenty-two dogs with SADs. Methods: Retrospective case series study. All medical records were searched for a diagnosis of SAD. The diagnosis was made based on myelography, computed tomography myelography (CT-m), or magnetic resonance imaging (MRI). Results: In the 122 dogs, 125 SADs were identified. Sixty-five were located in the cervical region and 60 in the thoracolumbar region. A higher body weight was significantly associated with a cervical localization of the SAD (P < .001). Ninety-five dogs were male and 27 dogs were female. Male dogs were significantly overrepresented (P < .0001). The most commonly affected breed was the Pug dog. Previous or concurrent spinal disorders, in the near proximity of the diagnosed SAD, were seen in 26 dogs. Eight of 13 French Bulldogs and 7 of 21 Pug dogs with SADs had a previous or concurrent spinal disease, whereas other spinal disorders occurred in only 1 of 17 Rottweilers with SADs. Conclusions and Clinical Importance: Pug dogs and French Bulldogs might have a predisposition for SAD development. In a large percentage of these dogs, a concurrent spinal disorder, which might predispose to SAD formation, was diagnosed. The high prevalence in male dogs warrants further investigation.

Clinical Characterization of Epilepsy of Unknown Cause in Cats.


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


Background: Deep brain stimulation (DBS) together with concurrent EEG recording has shown promise in the treatment of epilepsy. A novel device is capable of combining these 2 functions and may prove valuable in the treatment of epilepsy in dogs. However, stereotactic implantation of electrodes in dogs has not yet been evaluated. Objective: To evaluate the feasibility and safety of implanting stimulating and recording electrodes in the brain of normal dogs using the Brainsight system and to evaluate the function of a novel DBS and recording device. Animals: Four male intact Greyhounds, confirmed to be normal by clinical and neurologic examinations and hematology and biochemistry testing. Methods: MRI imaging of the brain was performed after attachment of fiducial markers. MRI scans were used to calculate trajectories for electrode placement in the thalamus and hippocampus, which was performed via burr hole craniotomy. Postoperative CT scanning was performed to evaluate electrode location and accuracy of placement was calculated. Serial neurologic examinations were performed to evaluate neurologic deficits and EEG recordings obtained to evaluate the effects of stimulation. Results: Electrodes were successfully placed in 3 of 4 dogs with a mean accuracy of 4.6 ± 1.5 mm. EEG recordings showed evoked potentials in response to stimulation with a circadian variation in time-to-maximal amplitude. No neurologic deficits were seen in any dog. Conclusions and Clinical Importance: Stereotactic placement of electrodes is safe and feasible in the dog. The development of a novel device capable of providing simultaneous neurostimulation and EEG recording potentially represents a major advance in the treatment of epilepsy.

Necrotizing Meningoencephalitis in Atypical Dog Breeds: A Case Series and Literature Review.


Background: Canine necrotizing meningoencephalitis (NME) is a fatal, noninfectious inflammatory disease of unknown etiology. NME has been reported only in a small number of dog breeds, which has led to the presumption that it is a breed-restricted disorder. Hypothesis/Objectives: Our objective was to describe histopathologically confirmed NME in dog breeds in which the condition has not been reported previously and to provide preliminary evidence that NME affects a wider spectrum of dog breeds than previously reported. Animals: Four dogs with NME. Methods: Archives from 3 institutions and from 1 author's (BS) collection were reviewed to identify histopathologically confirmed cases of NME in breeds in which the disease has not been reported previously. Age, sex, breed, survival from onset of clinical signs, and histopathologic findings were evaluated. Results: Necrotizing meningoencephalitis was identified in 4 small dog breeds (Papillon, Shih Tzu, Coton de Tulear, and Brussels Griffon). Median age at clinical evaluation was 2.5 years. Histopathologic abnormalities included 2 or more of the following: lymphoplasmacytic or histiocytic meningoencephalitis or encephalitis, moderate-to-severe cerebrocortical necrosis, variable involvement of other anatomic locations within the brain (cerebellum, brainstem), and absence of detectable infectious agents. Conclusions and Clinical Importance: Until now, NME has only been described in 5 small dog breeds. We document an additional 4 small breeds previously not shown to develop NME. Our cases further illustrate that NME is not a breed-restricted disorder and should be considered in the differential diagnosis for dogs with signalment and clinical signs consistent with inflammatory brain disease.

Comparative Analysis of mRNA Expression of Surface Antigens between Histiocytic and Nonhistiocytic Sarcoma in Dogs.

Background: Definitive diagnosis of histiocytic sarcoma (HS) in dogs is relatively difficult by conventional histopathological examination because objective features of HS are not well defined. Hypothesis: Quantitative analysis of mRNA expression of selected cellular surface antigens (SAs) specific to HS in dogs can facilitate objective and rapid diagnosis. Animals: Dogs with HS (n = 30) and dogs without HS (n = 36), including those with other forms of lymphoma (n = 4), inflammatory diseases (n = 6), and other malignant neoplasias (n = 26). Methods: Retrospective clinical observational study. Specimens were collected by excisional biopsy, needle core biopsy, or fine needle aspiration. To determine HS detection efficacy, mRNA expression levels of selected SAs specific to HS in dogs, including MHC class IIα, CD11b, CD11c, and CD86, were quantitatively analyzed using real-time quantitative polymerase chain reaction. Results: Each SA mRNA expression level was significantly higher in HS dogs than in non-HS dogs (P = .0082). Cutoff values for discriminating between HS and non-HS dogs based on these expression levels were calculated on the basis of receiver-operating characteristic analysis. Accuracy of the cutoff values, including MHC class IIα, CD11b, CD11c, and CD86, was 87.9, 86.4, 86.4, and 84.8%, respectively. Conclusions and Clinical Importance: Our results suggest that quantitative analysis of mRNA expression of the selected SAs could be an adjunctive diagnostic technique with high diagnostic accuracy for HS in dogs. Substantial investigation is required for exclusion of diseases with similar cell types of origin to lymphoma.

Iron Status in Blood Donor Dogs.


Background: Despite the popularity of canine blood donor (BD) programs, there is scarce scientific information regarding iron status in this canine population of dogs. Objective: To assess iron status in dogs used in a blood donor program. Animals: A total of 130 healthy dogs (75 BD, 55 controls [C]) were included. A subset of dogs (n = 12) were used to evaluate the effects of repetitive donations by having a second and more recent sample analyzed. Methods: Serum iron concentration (SI), unsaturated iron-binding capacity (UIBC), total iron-binding capacity (TIBC), and percentage transferrin saturation (%SAT) were obtained. Values were compared using a 2-way ANOVA (factors: BD status, breed). For the subset of BD, the first sample (less frequent donors -LD-, after a mean of 3.8 donations) was compared to a second sample (experienced donors -ED-, mean 13.6 donations) using a paired t-test. Results: SI (183.7 ± 55.3 µg/dL) and %SAT (55.7 ± 17.4%) were higher and UIBC (152.6 ± 73.3 µg/dL) was lower in BD dogs than in C (153.9 ± 51.7 µg/dL, 43.8 ± 17.8%, and 224.1 ± 120.6 µg/dL, respectively). Also, UIBC and TIBC were lower, and %SAT higher in Greyhounds when compared with non-Greyhounds. ED had decreased %SAT and increased UIBC and TIBC when compared with LD. Conclusions and Clinical Importance: Our canine BD population did not have iron deficiency and had higher SI concentration than C. However, ED (~14 consecutive blood donations every ~8 weeks) developed a mild iron deficiency, although values were still within canine reference intervals. Greyhounds have higher %SAT than non-Greyhounds, which might be a breed-specific peculiarity.

Sarcolemmal Specific Collagen VI Deficient Myopathy in a Labrador Retriever.


The Veterinary Journal

Is the metabolic syndrome a useful clinical concept in dogs? A review of the evidence.

Kurt R. Verkest.

The metabolic syndrome is a set of risk factors for the development of type 2 diabetes, atherosclerosis, coronary heart disease and stroke in human beings. The term has recently been applied to dogs that exhibit components of
the human metabolic syndrome, specifically visceral obesity, hypercholesterolaemia, hypertriglyceridaemia, hypertension and fasting hyperglycaemia. Obese dogs, like obese humans, are known to develop resistance to the glucose-lowering effects of insulin, and develop increased circulating concentrations of triglycerides, cholesterol and blood pressure. Unlike humans, however, obese dogs do not develop fasting hyperglycaemia or atherogenic hyperlipidaemia. Importantly, there is no evidence that dogs develop type 2 diabetes. Atherosclerosis, coronary heart disease and stroke are rare and not known to be associated with obesity in dogs. On the basis of current knowledge, the use of the term ‘metabolic syndrome’ in dogs does not appear to have merit.

The association between gall bladder mucoceles and hyperlipidaemia in dogs: A retrospective case control study.


The diagnosis of gall bladder mucoceles (GM) in dogs has become increasingly frequent in veterinary medicine. Primary breed-specific hyperlipidaemia is reported in Shetland Sheepdogs and Miniature Schnauzers, breeds in which GM are known to occur more frequently than in other breeds. The objective of this study was to evaluate the association between GM and hyperlipidaemia in dogs. The study design was a retrospective case control study. Medical records of dogs diagnosed with GM at the Veterinary Medical Centre of The University of Tokyo between 1 April 2007 and 31 March 2012, were reviewed. Fifty-eight dogs with GM and a record of either serum cholesterol, triglyceride, or glucose concentrations were included in the study. Hypercholesterolaemia (15/37 cases; odds ratio [OR]: 2.92; 95% confidence interval [CI]: 1.02–8.36) and hypertriglyceridaemia (13/24 cases; OR: 3.55; 95% CI:1.12–15.91) showed significant association with GM. Pomeranians (OR: 10.69), American Cocker Spaniels (OR: 8.94), Shetland Sheepdogs (OR: 6.21), Miniature Schnauzers (OR: 5.23), and Chihuahuas (OR: 3.06) were significantly predisposed to GM. Thirty-nine out of 58 cases had at least one concurrent disease, including pancreatitis (five cases), hyperadrenocorticism (two cases), and hypothyroidism (two cases). A significant association between GM and hyperlipidaemia was confirmed, suggesting that hyperlipidaemia may play a role in the pathogenesis of GM.

Phenotypic and functional properties of feline dedifferentiated fat cells and adipose-derived stem cells.

Shota Kono, Tomohiko Kazama, Koichiro Kano, Kayoko Harada, Masami Uechi, Taro Matsumoto

It has been reported that mature adipocyte-derived dedifferentiated fat (DFAT) cells show multilineage differentiation potential similar to that observed in mesenchymal stem cells. Since DFAT cells can be prepared from a small quantity of adipose tissue, they could facilitate cell-based therapies in small companion animals such as cats. The present study examined whether multipotent DFAT cells can be generated from feline adipose tissue, and the properties of DFAT cells were compared with those of adipose-derived stem cells (ASCs). DFAT cells and ASCs were prepared from the floating mature adipocyte fraction and the stromal vascular fraction, respectively, of collagenase-digested feline omental adipose tissue. Both cell types were evaluated for growth kinetics, colony-forming unit fibroblast (CFU-F) frequency, immunophenotypic properties, and multilineage differentiation potential. DFAT cells and ASCs could be generated from approximately 1 g of adipose tissue and were grown and subcultured on laminin-coated dishes. The frequency of CFU-Fs in DFAT cells (35.8%) was significantly higher than that in ASCs (20.8%) at passage 1 (P1). DFAT cells and ASCs displayed similar immunophenotypes (CD44+, CD90+, CD105+, CD14−, CD34− and CD45−). Alpha-smooth muscle actin-positive cells were readily detected in ASCs (15.2 ± 7.2%) but were rare in DFAT cells (2.2 ± 3.2%) at P1. Both cell types exhibited adipogenic, osteogenic, chondrogenic, and smooth muscle cell differentiation potential in vitro. In conclusion, feline DFAT cells exhibited similar properties to ASCs but displayed higher CFU-F frequency and greater homogeneity. DFAT cells, like ASCs, may be an attractive source for cell-based therapies in cats.
Epigenetic regulation of the ABCB1 gene in drug-sensitive and drug-resistant lymphoid tumour cell lines obtained from canine patients.

Hirotaka Tomiyasu, Yuko Goto-Koshino, Yasuhiro Fujino, Koichi Ohno, Hajime Tsujimoto

Multidrug resistance (MDR) is a major obstacle in the treatment of cancer. Overexpression of P-glycoprotein (P-gp), encoded by the ABCB1 (MDR1) gene, is an important factor in determining the MDR phenotype of a tumour. Although recent studies have revealed the epigenetic transcriptional regulation of the human ABCB1 gene, such regulation of this gene has not been examined in dogs. The aim of the current study was to evaluate differences in epigenetic regulation of the ABCB1 gene, between drug-sensitive and drug-resistant canine lymphoid tumour cell lines. In two drug-sensitive cell lines, GL-1 and CLBL-1, ABCB1 mRNA expression was significantly lower than in two drug-resistant cell lines, UL-1 and Ema, using real-time quantitative polymerase chain reaction (QPCR). Bisulphite sequencing and real-time methylation-specific PCR revealed that the CpG island present in the upstream region of exon 2 was hypermethylated in GL-1 and CLBL-1, but hypomethylated in UL-1 and Ema. Chromatin immunoprecipitation and QPCR revealed that histone H3 acetylation in the same CpG island was significantly increased in UL-1 and Ema compared to GL-1 and CLBL-1. Treatment with 5-aza-2′-deoxycytidine or trichostatin A increased ABCB1 mRNA expression in GL-1 and CLBL-1. DNA methylation and histone H3 acetylation were shown to be involved in ABCB1 gene expression and associated with an MDR phenotype in these canine lymphoid tumour cell lines.

Effect of hypoxia on generation of neurospheres from adipose tissue-derived canine mesenchymal stromal cells.

D.J. Chung, A. Wong, K. Hayashi, C.E. Yellowley.

Adipose tissue-derived mesenchymal stromal cells (AT-MSCs) are good candidates for cell therapy due to the accessibility of fat tissue and the abundance of AT-MSCs therein. Neurospheres are free-floating spherical condensations of cells with neural stem/progenitor cell (NSPC) characteristics that can be derived from AT-MSCs. The aims of this study were to examine the influence of oxygen (O2) tension on generation of neurospheres from canine AT-MSCs (AT-cMSCs) and to develop a hypoxic cell culture system to enhance the survival and therapeutic benefit of generated neurospheres. AT-cMSCs were cultured under varying oxygen tensions (1%, 5% and 21%) in a neurosphere culture system. Neurosphere number and area were evaluated and NSPC markers were quantified using real-time quantitative PCR (qPCR). Effects of oxygen on neurosphere expression of hypoxia inducible factor 1, α subunit (HIF1A) and its target genes, erythropoietin receptor (EPOR), chemokine (C-X-C motif) receptor 4 (CXCR4) and vascular endothelial growth factor (VEGF), were quantified by qPCR. Neural differentiation potential was evaluated in 21% O2 by cell morphology and qPCR. Neurospheres were successfully generated from AT-cMSCs at all O2 tensions. Expression of nestin mRNA (NES) was significantly increased after neurosphere culture and was significantly higher in 1% O2 compared to 5% and 21% O2. Neurospheres cultured in 1% O2 had significantly increased levels of VEGF and EPOR. There was a significant increase in CXCR4 expression in neurospheres generated at all O2 tensions. Neurosphere culture under hypoxia had no negative effect on subsequent neural differentiation. This study suggests that generation of neurospheres under hypoxia could be beneficial when considering these cells for neurological cell therapies.

Paraoxonase activity as a tool for clinical monitoring of dogs treated for canine leishmaniasis.

G. Rossi, F. Ibba, S. Meazzi, A. Giordano, S. Paltrinieri.

This study was designed to determine if the activity of paraoxonase (PON1), an antioxidant enzyme that works as a negative acute phase reactant, is a better predictor for the clinical recovery of leishmaniotic dogs receiving standard treatments compared with inflammatory markers such as C reactive protein (CRP) and electrophoretic fractions. For this purpose we tested 20 healthy dogs (controls) and 39 leishmaniotic dogs classified as sick (group A, n = 23) or severely sick (group B, n = 16) and tested at admission and after 3, 7, 14, 21, 28, 35 and 42
At admission, CRP and electrophoresis were altered in both groups, while PON1 activity was abnormal only in group B. There were no differences related to the outcome (mortality, complications or time of recovery). PON1 activity normalized in about 2 weeks in dogs that had abnormal values at admission and a final positive outcome; CRP normalized in 4–6 weeks and electrophoretic fractions were still altered after 6 weeks. The results show that, at admission, inflammatory markers did not predict the outcome of leishmaniasis. PON1 activity decreased only in some dogs with systemic inflammation but not in those with mild leishmaniasis: when decreased, PON1 normalized earlier than other markers in dogs that responded to treatment. This finding most likely depends on the rapid decrease in oxidative phenomena. PON1 activity should therefore be tested on admission: if low values are recorded, severe inflammation may be suspected and PON1 measurement may be repeated during treatment to early identify responsive dogs.

Elastin content is high in the canine cruciate ligament and is associated with degeneration


Cruciate ligaments (CLs) are primary stabilisers of the knee joint and canine cranial cruciate ligament disease (CCLD) and rupture is a common injury. Elastin fibres, composed of an elastin core and fibrillin containing microfibrils, are traditionally considered minor components of the ligament extracellular matrix (ECM). However, their content and distribution in CLs is unknown. The purposes of this study were to determine the elastin content of canine CLs and to ascertain its relationship to other biochemical components and histological architecture. Macroscopically normal CLs were harvested from Greyhounds (n = 11), a breed with a low risk of CCLD. Elastin, collagen and sulfated glycosaminoglycan content were measured and histological scoring systems were developed to quantify ECM changes using a modified Vasseur score (mVS) and oxytalan fibre (bundles of microfibrils) staining. Elastin contents were 9.86 ± 3.97% dry weight in the cranial CL and 10.79 ± 4.37% in the caudal CL, respectively, and did not alter with advancing histological degeneration. All CLs demonstrated mild degenerative changes, with an average mVS score of 11.9 ± 3.3 (maximum 24). Increasing degeneration of the ligament ECM showed a positive correlation (r = 0.690, P < 0.001) with increased oxytalan fibre staining within the ECM.

Follow-up of 100 dogs with acute diarrhoea in a primary care practice.

C.M. Berset-Istratescu, O.J. Glardon, I. Magouras, C.F. Frey, S. Gobeli, I.A. Burgener.

This study aimed to examine the aetiology of acute diarrhoea and the relapse rate in 100 client-owned dogs presented to a first-opinion clinic. History, physical examination, faecal testing and owner questionnaire data were collected at initial presentation (T0) and at either the time of relapse or at a recheck performed within 3 months. All dogs received treatment according to their clinical signs. Of 96 dogs that completed the study, 37 (38.5%) relapsed during the study period, 21 (21.9%) relapsed within 3 months, and 16 others (16.6%) at 3 months to 1 year after initial examination. Dogs that had undergone a change in housing location within 1 month prior to presentation and dogs <1 year old were significantly more likely to have positive parasitological analyses (P = 0.02 and P = 0.001, respectively). Pica was a risk factor for relapse (P = 0.0002).

Australian Veterinary Journal

Prevalence of bacteriuria in dogs without clinical signs of urinary tract infection presenting for elective surgical procedures.

McGhie J1, Stayt J, Hosgood G.

OBJECTIVES: To determine the frequency of bacteriuria in dogs presenting for elective surgery, to compare the frequency of bacteriuria in dogs presenting for orthopaedic (non-neurological) procedures to that of dogs presenting for soft tissue procedures and to measure the agreement of microscopic visualisation of bacteria in urine sediment with the occurrence of bacterial growth on culture.
METHODS: Prospective cohort study of 140 client-owned dogs. Urine was collected via prepubic cystocentesis prior to or immediately after induction of anaesthesia. Urine was submitted for quantitative bacteriological culture and urinalysis. The dogs' age, sex, weight and breed were recorded, as well as the surgical procedure performed.

RESULTS: In total, 80 orthopaedic and 60 soft tissue surgical cases were included in the study; 3 dogs (2.1%) returned bacterial growth on culture (positive urine culture) and 19 (13.6%) recorded urine sediment with pyuria and/or bacteriuria on urinalysis (positive urinalysis). All dogs with positive urine culture were female and two of them underwent orthopaedic procedures. Each bitch had growth of Escherichia coli >10^5 CFU/mL. The agreement between positive urinalysis and positive urine culture was poor (κ = 0.15).

CONCLUSIONS: The prevalence of bacteriuria in dogs without clinical signs of urinary tract infection in this population was low (2.1%). An at-risk population could not be identified because of the small number of positive outcomes. A positive urinalysis showed poor agreement with urine culture results and therefore the decision to treat without performing a urine culture is not advised.

Taking action to preserve the miracle of antibiotics.
Cruickshank M1, Duguid M, Gotterson F, Carter D.
Article online. No abstract available.

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Taking on cancer: treatment increases, improves for companion animals.
Burns K.
No abstract available

Concentrated tea tree oil toxicosis in dogs and cats: 443 cases (2002-2012).
Khan SA1, McLean MK, Slater MR.
OBJECTIVE: To determine the frequency, types, and severity of clinical signs; geographic distribution; and treatment information associated with toxicosis caused by 100% tea tree oil (TTO) in dogs and cats in the United States and Canada.
DESIGN: Retrospective case series.
ANIMALS: 337 dogs and 106 cats with evidence of exposure to 100% TTO.
PROCEDURES: 10-year incident data were retrieved from the ASPCA Animal Poison Control Center database from January 2002 to December 2012. Only evidenced or witnessed incidents assessed as toxicosis or suspected toxicosis were included. Signalment, amount of TTO used, intention of use, and outcome information were evaluated. Severity of illness and correlations with breed, sex, age, and weight were determined.
RESULTS: TTO was intentionally used in 395 of 443 (89%) animals. The amount used ranged from 0.1 to 85 mL. Incidents were reported from 41 states, the District of Columbia, and 4 Canadian provinces. Exposure route was cutaneous in 221 (50%) animals, cutaneous and oral in 133 (30%), and oral in 67 (15%). Clinical signs developed within 2 to 12 hours and lasted up to 72 hours. The most common signs were increased salivation or drooling, signs of CNS depression or lethargy, paresis, ataxia, and tremors. A significant association with severity of illness was found for age and weight, with higher prevalence of major illness in younger and smaller cats.
CONCLUSIONS AND CLINICAL RELEVANCE: Intentional or accidental use of 100% TTO in dogs or cats caused serious signs of CNS depression, paresis, ataxia, or tremors within hours after exposure and lasting up to 3 days. Younger cats and those with lighter body weight were at greater risk of developing major illness.

Endovascular evaluation and treatment of intrahepatic portosystemic shunts in dogs: 100 cases (2001-2011).
Weisse C1, Berent AC, Todd K, Solomon JA, Cope C.
OBJECTIVE: To evaluate short- and long-term outcome following endovascular treatment of intrahepatic portosystemic shunts in dogs.
DESIGN: Retrospective case series.
ANIMALS: 100 dogs.
PROCEDURES: All patients had angiographic evaluation with or without endovascular shunt attenuation. The medical records were reviewed for pertinent data, complications, outcome, and survival time.
RESULTS: 95 dogs with congenital intrahepatic portosystemic shunts received 111 procedures (83% [79/95] had 1 treatment, and 17% [16/95] had > 1 treatment; 5 dogs had no treatment because of excessive portal venous pressure-central venous pressure gradients). Angiography identified 38 right, 33 left, and 19 central divisional single shunts (n = 90) and 10 complex or multiple shunts. Partial shunt attenuation was performed in 92 dogs by means of caval stent placement and insertion of thrombogenic coils within the shunt, and 3 had complete acute shunt occlusion. Major intraoperative complications (3/111 [3%]) included temporary severe portal hypertension in 2 dogs and gastrointestinal hemorrhage in 1 dog. Major postoperative (< 1 week after surgery) complications (14/111 [13%]) included seizures or hepatoencephalopathy (7/111 [6%]), cardiac arrest (2/111 [2%]), jugular site bleeding (2/111 [2%]), pneumonia (1/111 [1%]), suspected portal hypertension (1/111 [1%]), and acute death (1/111 [1%]). Median follow-up time was 958 days (range, 0 to 3,411 days). Median survival time for treated dogs was 2,204 days (range, 0 to 3,411 days). Outcome was considered excellent (57/86 [66%]) or fair (13/86 [15%]) in 70 of 86 (81%) treated dogs.

CONCLUSIONS AND CLINICAL RELEVANCE: Results suggested that endovascular treatment of intrahepatic shunts in dogs may result in lower morbidity and mortality rates, with similar success rates, compared with previously reported outcomes for open surgical procedures. Gastrointestinal ulceration was a common finding among this population of dogs, and lifelong gastroprotectant medications are now recommended.

Presumed primary and secondary hepatic copper accumulation in cats.
Hurwitz BM1, Center SA, Randolph JF, McDonough SP, Warner KL, Hazelwood KS, Chiapella AM, Mazzei MJ, Leavey K, Acquaviva AE, Lindsay MM, Sanders L, Pintar J.
OBJECTIVE: To determine signalments, clinical features, clinicopathologic variables, imaging findings, treatments, and survival time of cats with presumed primary copper-associated hepatopathy (PCH) and to determine quantitative measures and histologic characteristics of the accumulation and distribution of copper in liver samples of cats with presumed PCH, extrahepatic bile duct obstruction, chronic nonsuppurative cholangitis-cholangiohepatitis, and miscellaneous other hepatobiliary disorders and liver samples of cats without hepatobiliary disease.

DESIGN: Retrospective cross-sectional study.
ANIMALS: 100 cats with hepatobiliary disease (PCH [n = 11], extrahepatic bile duct obstruction [14], cholangitis-cholangiohepatitis [37], and miscellaneous hepatobiliary disorders [38]) and 14 cats without hepatobiliary disease.

PROCEDURES: From 1980 to 2013, cats with and without hepatobiliary disease confirmed by liver biopsy and measurement of hepatic copper concentrations were identified. Clinical, clinicopathologic, and imaging data were compared between cats with and without PCH.

RESULTS: Cats with PCH were typically young (median age, 2.0 years); clinicopathologic and imaging characteristics were similar to those of cats with other liver disorders. Copper-specific staining patterns and quantification of copper in liver samples confirmed PCH (on the basis of detection of > 700 µg/g of liver sample dry weight). Six cats with PCH underwent successful treatment with chelation (penicillamine; n = 5), antioxidants (5), low doses of elemental zinc (2), and feeding of hepatic support or high-protein, low-carbohydrate diets, and other hepatic support treatments. One cat that received penicillamine developed hemolytic anemia, which resolved after discontinuation of administration. Three cats with high hepatic copper concentrations developed hepato cellular neoplasia.

CONCLUSIONS AND CLINICAL RELEVANCE: Results suggested that copper accumulates in livers of cats as primary and secondary processes. Long-term management of cats with PCH was possible.

Refractometric total protein concentrations in icteric serum from dogs.
Gupta A1, Stockham SL.
OBJECTIVE: To determine whether high serum bilirubin concentrations interfere with the measurement of serum total protein concentration by refractometry and to assess potential biases among refractometer measurements.

DESIGN: Evaluation study.
SAMPLE: Sera from 2 healthy Greyhounds.

PROCEDURES: Bilirubin was dissolved in 0.1M NaOH, and the resulting solution was mixed with sera from 2 dogs from which food had been withheld to achieve various bilirubin concentrations up to 40 mg/dL.

Refractometric total protein concentrations were estimated with 3 clinical refractometers. A biochemical
analyzer was used to measure biuret assay-based total protein and bilirubin concentrations with spectrophotometric assays.

RESULTS: No interference with refractometric measurement of total protein concentrations was detected with bilirubin concentrations up to 41.5 mg/dL. Biases in refractometric total protein concentrations were detected and were related to the conversion of refractive index values to total protein concentrations.

CONCLUSIONS AND CLINICAL RELEVANCE: Hyperbilirubinemia did not interfere with the refractometric estimation of serum total protein concentration. The agreement among total protein concentrations estimated by 3 refractometers was dependent on the method of conversion of refractive index to total protein concentration and was independent of hyperbilirubinemia.

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Finnerty KE1, Barnes Heller HL, Mercier MN, Giovanella CJ, Lau VW, Rylander H.
OBJECTIVE: To determine the percentage of cats with a phenobarbital (PB) concentration between 15 and 45 µg/mL that had a ≥ 50% reduction in the number of seizures and to investigate applicability of the 2011 International League Against Epilepsy (ILAE) classification system in cats.

DESIGN: Retrospective case series.

ANIMALS: 30 cats with suspected or confirmed epilepsy.

PROCEDURES: Medical records for 2004 to 2013 at 3 veterinary hospitals were searched. Information collected included signalment, duration of observation before treatment, frequency of seizures before PB administration, seizure phenotype, dose of PB, serum PB concentration, number of seizures after PB administration, duration of follow-up monitoring, and survival time. A modified 2011 ILAE classification system was applied to all cats.

RESULTS: Seizure control was achieved in 28 of 30 (93%) cats with a serum PB concentration of 15 to 45 µg/mL. This comprised 10 of 11 cats with structural epilepsy, 14 of 15 cats with unknown epilepsy, and 4 of 4 cats with presumptive unknown epilepsy. Thirteen cats had no additional seizures after initiation of PB treatment.

CONCLUSIONS AND CLINICAL RELEVANCE: Seizure control was achieved in most cats with a serum PB concentration between 15 and 45 µg/mL, regardless of the cause of the seizures. A modified 2011 ILAE classification was applied to cats with seizures and enabled classification of cats without specific genetic testing and without identified structural or inflammatory disease. This classification system should be incorporated into veterinary neurology nomenclature to standardize communication between veterinarians and improve comparisons among species.

Histopathologic findings in uterine biopsy samples from subfertile bitches: 399 cases (1990-2005).
Gifford AT1, Scarlett JM, Schlafer DH.
OBJECTIVE: To determine the prevalence of various lesion types detected by histologic evaluation of uterine biopsy samples collected from subfertile bitches.

DESIGN: Retrospective case series.

ANIMALS: 399 sexually intact bitches.

PROCEDURES: Results of histologic evaluation of canine uterine biopsy samples submitted by a single veterinary practice and clinical histories of dogs from which samples were obtained were reviewed. Clinical data including age, reason for biopsy, and histopathologic findings were recorded. The prevalence of specific lesions was determined, categorized by severity and age, and statistically analyzed.

RESULTS: Endometritis (170/399 [42.6%] cases) and cystic endometrial changes, including cystic endometrial hyperplasia (133/399 [33.3%]) were the most prevalent lesions in the study population. Eighty-nine of 170 (52.4%) cases of endometritis were characterized as chronic with predominantly lymphocytic or lymphoplasmacytic inflammatory infiltrates, 51 (30.0%) included mixed inflammatory reactions, and 30 (17.6%) were characterized as having acute inflammation with neutrophils, eosinophils, or both. Fibrosis was common (101/399 [25.3%] cases). Eosinophilic endometritis was significantly associated with a history of fetal loss during the same breeding cycle. No significant difference was found in prevalence of lesions among age groups.

CONCLUSIONS AND CLINICAL RELEVANCE: The high prevalence of endometritis in this population of dogs suggested that acute and chronic endometritis may be related to subfertility in bitches. The association of
eosinophilic endometrial infiltrates with a history of fetal loss may be an important diagnostic finding in dogs with endometritis.

**Analysis of thiamine concentrations in commercial canned foods formulated for cats.**
Markovich JE1, Freeman LM, Heinze CR.

**OBJECTIVE:** To measure thiamine concentrations in commercial canned foods formulated for cats as an initial assessment of the variation among canned foods and to determine the effects of flavor (fish vs nonfish) of the food, texture (paté vs nonpaté) of the food, country of manufacture, and size of the company on thiamine concentration.

**DESIGN:** Prospective cross-sectional study.

**SAMPLE:** 90 canned, nontherapeutic diets formulated for cats (1 fish and 1 nonfish flavor for each of 45 brands).

**PROCEDURES:** Each canned food was homogenized, and thiamine concentration was analyzed with a fluorometric method.

**RESULTS:** Thiamine concentration was below the minimums of the Association of American Feed Control Officials in 12 of 90 (13.3%) foods and below the recommended allowance of the National Research Council in 14 of 90 (15.6%) foods. Paté foods had significantly lower thiamine concentrations than did nonpaté foods, and foods from smaller companies had significantly lower thiamine concentrations, compared with concentrations in foods from larger companies. Flavor of food and country of manufacture were not significantly associated with thiamine concentration.

**CONCLUSIONS AND CLINICAL RELEVANCE:** A wide range of thiamine concentrations was found in the foods evaluated. Thiamine concentration in a substantial percentage of commercially available canned foods was below the amount recommended for adult cats. Additional research on interlot and intralot variation in thiamine concentrations of foods formulated for cats is warranted. Companies should implement strict quality control and analysis practices regarding food products. Clinicians should consider thiamine deficiency as a differential diagnosis in a cat with acute neurologic dysfunction.

**Incidence of acute lung injury in dogs receiving transfusions.**
Thomovsky EJ1, Bach J.

**OBJECTIVE:** To document the existence and incidence of acute lung injury (ie, veterinary acute lung injury [VetALI] per the 2007 consensus definition) in a population of client-owned dogs receiving transfusions for various clinical reasons.

**DESIGN:** Prospective observational study.

**ANIMALS:** 54 client-owned dogs.

**PROCEDURES:** Arterial blood gas analysis was performed for dogs receiving a transfusion (blood and plasma products) at 0 to 12 hours before and 24 to 48 hours after transfusion; dogs also underwent thoracic radiography 0 to 24 hours before and 24 to 48 hours after transfusion. The ratio of PaO2 to fraction of inspired oxygen (FIO2) was calculated. Dogs with posttransfusion radiographic signs of pulmonary infiltrates, a PaO2:FIO2 ratio < 300, or clinical signs of respiratory compromise were suspected of having VetALI and underwent echocardiography to exclude left-sided heart failure. The incidence of VetALI was calculated, and χ2 tests were used to compare the incidence in study dogs with the historical reported incidence of acute respiratory distress syndrome (ARDS) in ill dogs (not receiving transfusions) and transfusion-related acute lung injury (TRALI) in humans.

**RESULTS:** The incidence of VetALI (2/54 [3.7%]; 95% confidence interval, 0% to 8.73%) in study dogs was significantly less than the reported incidence of TRALI in humans (25%) and not significantly different from the reported incidence of ARDS in ill dogs (10%).

**CONCLUSIONS AND CLINICAL RELEVANCE:** VetALI occurred in dogs that received transfusions at a frequency similar to that previously reported for ARDS in ill dogs that did not receive transfusions.

**Journal of Feline Medicine and Surgery**

**Diagnostic laparoscopy in the cat: 1. Rationale and equipment**

Elise Robertson, David Twedt, and Craig Webb
Practical relevance: The integration of minimally invasive techniques into feline practice seems to be an intuitive step forward, especially for those cases where the owner may be reluctant to subject their cat to major surgery ‘just for a biopsy’. Although ultrasound is frequently employed as a diagnostic tool in similar cases, this modality can only provide information on gross abnormalities in organ size and shape, echogenicity and internal architecture; even with ultrasound-guided fine-needle aspiration a definitive diagnosis is rarely achieved. So the clinician and owner are left with unanswered questions that are central to the diagnosis, the most appropriate treatment to pursue and the prognosis for the cat. Laparoscopy does require anesthesia and is more expensive than ultrasound; however, when performed correctly, it is only marginally more invasive and vastly more informative, with a proven track record of minimal morbidity.

Audience: This article is aimed at all feline practitioners, from first opinion through to the referral setting. It is intended to encourage practitioners untrained in minimally invasive procedures to seek formalized training, especially those who want to expand their diagnostic capabilities. For those already performing minimally invasive surgery, it describes how laparoscopic techniques can be applied to many feline gastrointestinal cases.

Evidence base: Information provided in this article is based on published literature, comprising original studies, case review series and textbook chapters, and the authors’ own clinical experience.

Diagnostic laparoscopy in the cat: 2. Common procedures
Elise Robertson, Craig Webb, and David Twedt

Practical relevance: Minimally invasive techniques are becoming increasingly available in both first opinion and referral veterinary surgeries. Clients may be reluctant to pursue open surgery for the collection of biopsy samples in a sick cat but may be more open to a laparoscopic approach. Furthermore, a laparoscopic approach provides excellent visualization of the abdominal organs and enables high quality biopsies to be taken that are invariably more diagnostic than percutaneous needle biopsies. Although the feline patient is small in size, its distensible abdomen allows more room for surgical manipulation than afforded by a similar sized canine patient.

Clinical challenges: Clinical challenges for the most part relate to mastering laparoscopic technique. Familiarity with the use of long instrumentation viewed on a two-dimensional screen is essential. Hemostasis is an important consideration and suitable instrumentation for achieving hemostasis should be available at all times. Insufflation of the abdomen carries its own challenges with regard to anesthesia and this is covered in an accompanying article in this Special Issue series.

Aim: This article introduces the feline practitioner to basic techniques required to effectively utilize diagnostic laparoscopy within feline medical investigations. It focuses on the common procedures of liver biopsy, cholecystocentesis, pancreatic biopsy, kidney biopsy and laparoscopic-assisted intestinal biopsy.

Evidence base: Information provided in this article is drawn from the published literature and the authors’ own clinical experience.

Thoracoscopy in the cat: An up-and-coming diagnostic and therapeutic procedure
MaryAnn Radlinsky

Practical relevance: Thoracoscopy provides a minimally invasive means of diagnosis and offers many important benefits when compared with open thoracotomy. Clinical challenges: The expense of the equipment, the steep learning curve required to gain proficiency in thorascopic surgery, and the limitations imposed by the feline thoracic cavity, in terms of working and viewing space, are some of the challenges that have limited its uptake to date. However, it is envisaged that it will increase as a technique in feline medicine, in much the same way as laparoscopy has. Audience: This article is directed at veterinarians currently performing open thoracic surgery and the associated aftercare who concurrently are adept at endoscopic surgery.

Evidence base: The article draws on the small body of literature that is available on thoracoscopy in cats, which includes reports of its use for evaluation and management of undiagnosed pleural effusion, lung lobe torsion, persistent right aortic arch and chylothorax.

Cystourethroscopy in the cat: What do you need? When do you need it? How do you do it?
Allyson Berent

Practical relevance: Diagnostic and therapeutic cystourethroscopy has become very popular in the diagnosis and treatment of canine lower and upper urinary tract disease in the past 5–7 years. As expertise is expanding, the use of similar techniques in feline patients is growing. Outline: This is a brief overview of the indications, equipment needed and procedure for performing cystourethroscopy in feline patients. The principal focus is normal feline lower urinary tract anatomy. Some examples of abnormalities that might be seen are also provided, and therapeutic cystourethroscopy is touched upon.

The future: Taking veterinary laparoscopy to the next level
Boel Fransson
Practical relevance: Laparoscopic surgery minimizes tissue trauma and speeds recovery, but its uptake into veterinary clinical practice has been slow. Clinical challenges: Laparoscopy is distinctly different from traditional open surgery and a reduced working area and loss of depth perception are among the challenges that the surgeon must get to grips with. Indeed, it is often lack of the necessary skills, rather than the cost of equipment, that presents the greatest obstacle. Audience: This article is aimed at practitioners keen to embrace minimally invasive surgery and advises on how to develop excellence in laparoscopic skills. It makes the case for simulation training and outlines methods that can be instituted in practice at low cost and with comparatively little time expenditure. It also describes technological advances that have already increased the success of veterinary ‘keyhole’ surgery, as well as those that look promising for the future. Evidence base: Simulation training has been an intense area of research and publication within the past 15 years. This article draws on that evidence base and the experience gained by the author and her research team, which is at the forefront of efforts to develop laparoscopic training for veterinarians.

New techniques on the horizon: Interventional radiology and interventional endoscopy of the urinary tract (‘endourology’)
Allyson Berent

Practical relevance: Interventional radiology and interventional endoscopy (IR/IE) uses contemporary imaging modalities, such as fluoroscopy and endoscopy, to perform diagnostic and therapeutic procedures in various body parts. The majority of IR/IE procedures currently undertaken in veterinary medicine pertain to the urinary tract, and this subspecialty has been termed ‘endourology’. This technology treats diseases of the renal pelvis, ureter(s), bladder and urethra. In human medicine, endourology has overtaken traditional open urologic surgery in the past 20–30 years, and in veterinary medicine similar progress is occurring. Aim: This article presents a brief overview of some of the more common IR/IE procedures currently being performed for the treatment of urinary tract disease in veterinary patients. These techniques include percutaneous nephrolithotomy for lithotripsy of problematic nephrolithiasis, mesenchymal stem cell therapy for chronic kidney disease, sclerotherapy for the treatment of idiopathic renal hematuria, various diversion techniques for ureteral obstructions, laser lithotripsy for lower urinary tract stone disease, percutaneous cystolithotomy for removal of bladder stones, hydraulic occluder placement for refractory urinary incontinence, percutaneous cystostomy tube placement for bladder diversion, urethral stenting for benign and malignant urethral obstructions, and antegrade urethral catheterization for treatment of urethral tears. Evidence base: The majority of the data presented in this article is solely the experience of the author, and some of this has only been published and/or presented in abstract form or small case series. For information on traditional surgical approaches to these ailments readers are encouraged to evaluate other sources.

AVP
No publication this month

Compendium
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