Inside the Brachycephalic Nose: Conchal Regrowth and Mucosal Contact Points After Laser-Assisted Turbinectomy

Riccarda Schuenemann, and Gerhard Oechtering

This prospective observational study analyzed conchal regrowth after laser-assisted turbinectomy (LATE) in brachycephalic dogs and the mucosal contact of regrown conchae. Eighty brachycephalic dogs (41 pugs, 39 French bulldogs [FBs]) that underwent LATE because of obstructing conchae were evaluated by endoscopy 7 days and 6 mo after surgery. At 6 mo, 96% of FBs' and 65% of pugs' nasal cavities showed regrowth of turbinates. FBs showed higher growth grades than pugs. Revision surgery because of reobstructing regrowth was required in the nasal cavities of 17% of FBs and 3% of pugs. The mean number of contact points reduced from 3.0 in FB and 1.7 in pugs before surgery to 1.2 in FB and 0.2 in pugs after conchal regrowth. Recollapse of nares after surgery significantly influenced the frequency of reoccurrence of contact points. LATE was proven to be an effective treatment of intranasal obstruction caused by mucosal contact between conchae. Conchal regrowth commonly occurs after surgical removal, but the new conchae cause less obstruction due to a significant reduction in number of contact points. Revision surgery because of reobstruction is rarely necessary. The important physiologic functions of conchae make nonobstructing regrowth desirable.

Owner Experiences in Treating Dogs and Cats Diagnosed With Diabetes Mellitus in the United States

Karina P. Aptekmann, Jane Armstrong, Marcia Coradini, and Jacquie Rand

The objective of this study was to report owner experiences and satisfaction in treating a pet with diabetes mellitus using a descriptive report from an Internet-based survey. Descriptive analysis of results was performed, χ² tests were used to detect differences in responses between dog and cat owners, and correlations were assessed using the nonparametric Spearman rank correlation. A total of 834 owners participated in the survey. More diabetic dogs (97%) than cats (82%) were treated with insulin injections. Insulin was administered twice daily in 87% of dogs and 73% of cats. Porcine lente and neutral protamine Hagedorn were the most commonly administered insulins in dogs. In cats, glargine and protamine zinc insulin were the most commonly used insulins. Most pets were not fed a prescribed diabetes diet. More cat (66%) than dog (50%) owners were satisfied with the diabetic control achieved. Cat owners were more likely to use home blood glucose monitoring. Treatment was considered expensive by the majority of owners. Few published reports follow diabetic pets after diagnosis or report owner satisfaction. The results of this study provide useful information that may help veterinarians better educate owners and set expectations regarding diabetes treatment and quality of life for diabetic pets.

Evaluation of Data From 35 Dogs Pertaining to Dehiscence Following Intestinal Resection and Anastomosis

Emily E. Mouat, Garrett J. Davis, Kenneth J. Drobatz, and Koranda A. Wallace

The objectives of this study were to evaluate blood and abdominal fluid lactate and glucose, fluid cytology, culture, and volume 24 and 48 hr following intestinal resection and anastomosis in dogs with and without closed-suction drains and to correlate findings with survival. Thirty-five client-owned dogs that underwent intestinal resection and anastomosis were prospectively enrolled in the study. Abdominal fluid was submitted for culture at surgery and again 24 hr postoperatively. Twenty-four and 48 hr postoperatively, blood and abdominal fluid glucose and lactate were measured and fluid was submitted for cytology. Abdominal fluid was collected either from a closed-suction drain or by abdominocentesis. Patients were followed either for 14 days or until death. Comparisons were made based on development of dehiscence and presence or absence of a drain. Patients with dehiscence were more likely to have positive cultures at 24 hr and to have had more bowel resected. Surviving patients without drains had significantly smaller differences in blood and fluid glucose and lactate both 24 and 48 hr postoperatively than surviving patients with drains. The significant differences identified between patients with and without drains suggests a need for further research into the effect of drains on abdominal fluid values.

Outcome of 45 Dogs With Laryngeal Paralysis Treated by Unilateral Arytenoid Lateralization or Bilateral Ventriculocordectomy

Katherine L. Bahr, Lisa Howe, Carl Jessen, and Zachary Goodrich

The purpose of this retrospective study was to assess risk factors and complications affecting postoperative outcome of dogs with laryngeal paralysis treated by either unilateral arytenoid lateralization (UAL) or bilateral ventriculocordectomy (VCC). Medical records of all dogs having either UAL or VCC between 2000 and 2011 were analyzed. Twenty-five dogs had VCC and 20 dogs had UAL. The overall postoperative complications rates
for VCC and UAL were similar (52% and 60%, respectively; \( P = .0887 \)). Dogs that had UAL were more likely to have acute postoperative respiratory distress and aspiration pneumonia (\( P = .0526 \)). Dogs with VCC were more likely to have chronic postoperative respiratory distress and aspiration pneumonia (\( P = .0079 \)). Revision surgery was required in 6 dogs (24%) following VCC and 2 dogs (10%) following UAL. Sex, breed, presenting complaint, type of service provided, and concurrent diseases were not significantly associated with higher risk of either death or decreased survival time postoperatively with either procedure. Overall postoperative complication rates, required revision surgeries, and episodes of aspiration pneumonia were similar in dogs undergoing UAL and VCC surgeries. Dogs that had VCC appeared to have an increased risk of lifelong complications postoperatively compared with UAL; therefore, VCC may not be the optimal choice for treatment of laryngeal paralysis.

**Tracheal Foreign Body and Pneumonia in a Cat: A Near Missed Diagnosis**

Sara Johns, Rance Sellon, Erick Spencer, and Melissa Tucker

A 12 yr old mixed-breed Maine coon was referred with a 1 wk history of intermittent respiratory distress. Physical examination and thoracic radiograph abnormalities were consistent with bronchopneumonia and chronic feline asthma. Repeat thoracic radiographs and lung aspirate cytology supported those diagnoses. Response to treatment was incomplete. One wk later, due to a change in respiratory pattern, cervical radiographs were obtained. A soft-tissue density was apparent in the cat’s cervical trachea. Bronchoscopy was performed and a segment of a pine cone was removed from the cat’s trachea. Following removal of the foreign body, the cat’s respiratory signs resolved. Premature diagnostic closure may prevent a clinician from recognizing an underlying missed diagnosis when response to treatment does not occur as expected.

**A Case of Cutaneous Sterile Pyogranuloma/Granuloma Syndrome in a Maltese**

Shinpei Kawarai, Shinobu Matsuura, Saburo Yamamoto, Akio Kiuchi, Nobuyuki Kanemaki, Hiroo Madarame, and Kinji Shirota

Cutaneous sterile pyogranuloma/granuloma syndrome (SPGS) is a locally restricted multinodular dermatitis. Affected dogs are typically healthy, but a few show systemic signs. Herein, a case of a dog presenting with generalized ulcerative dermatitis with systemic signs of mild anemia and an increased C-reactive protein level is described. Cutaneous SPGS was diagnosed by histopathology, negative staining causative organisms, and polymerase chain reaction for *Mycobacterium* spp. Successful treatment was achieved by immunosuppressive drugs, including prednisolone and azathioprine, administered for at least 20 mo. Recurrences of skin lesions were observed when prednisolone and/or azathioprine were discontinued. Long-term management with immunosuppressive agents may be required if the affected dog exhibits severe symptoms of cutaneous SPGS.

**Computed Tomographic Features of Pneumothorax Secondary to a Bronchopleural Fistula in Two Dogs**

Jantra N. Suran, Annie J. Lo and Jennifer A. Reetz

A bronchopleural fistula (BPF) can lead to continuous pneumothorax and is rarely reported clinically in dogs. This report describes computed tomographic (CT) findings in two dogs with BPFs and subsequent continuous pneumothoraces that necessitated thoracotomy. Both dogs had a peripheral BPF in the right caudal lung lobe. The fistula in one dog was secondary to a previous foreign body migration, and the fistula in the other was thought to be secondary to dirofilariasis. On both CT examinations, a dilated subsegmental bronchus was seen communicating with the pleural space at the center of a focal, concave region of parenchymal consolidation. Multiplanar reformatting aided in identification and characterization of the BPF. The pneumothoraces resolved after right caudal lobectomy in both dogs. CT has the potential to identify BPFs, such as secondary to foreign body migration or dirofilariasis.

**Presumptive Subdural Empyema in a Dog**

Taemi Horikawa, Edward MacKillop, and Anne Bahr

A 13 mo old mixed-breed dog was referred for acute lateralized forebrain signs. MRI of the brain demonstrated abnormalities consistent with severe meningitis and subdural empyema secondary to a retrobulbar abscess. The dog’s clinical signs improved with antibiotic therapy, and repeat imaging showed resolution of subdural fluid accumulation presumed to be empyema with mild residual meningeal enhancement. Subdurals empyema is an infrequent cause of encephalopathy in small animals and usually develops through direct extension of a pericranial infection. This report presents a case of presumptive subdural empyema in a dog that was successfully treated without surgical intervention. MRI is the preferred imaging modality for diagnosis of subdural empyema, and the characteristic imaging features are described.

**Atypical Presentation of Ovarian Remnant Syndrome in a Dog**

Kristen Parker, and Elisabeth Snead
A 2 yr old spayed female dog presented for evaluation of abdominal pain, decreased appetite, dysuria, and frantic licking of her vulva. A midventral, soft, fluctuant mass was detected on abdominal palpation. Diagnostic testing and exploratory celiotomy revealed remnant ovarian tissue and a cystic uterine remnant. The ovary and cystic uterine remnant were removed and submitted for histopathological evaluation. Ovarian remnant syndrome (ORS) is an infrequently encountered condition of dogs. This dog had none of the classic signs of estrus associated with ORS but instead presented for sharp, intermittent, abdominal pain that is similar to women with ORS.

**Association Between Macroscopic Appearance of Liver Lesions and Liver Histology in Dogs With Splenic Hemangiosarcoma: 79 Cases (2004–2009)**


Medical records for 79 dogs with confirmed splenic hemangiosarcoma (HSA) following splenectomy were reviewed for information regarding either the presence or absence of macroscopic liver lesions and the histopathological characteristics of the liver. Only 29 of 58 dogs (50%) with grossly abnormal livers had HSA metastasis. No dogs with grossly normal livers had metastasis detected on liver pathology. Gross lesions in the liver such as multiple nodules, dark-colored nodules, and active bleeding nodules were highly associated with malignancy. For the dogs in this study, performing biopsy in a grossly normal liver was a low-yield procedure in dogs with splenic HSA.

**The New Zealand Veterinary Journal (July/August)**

The pharmacokinetics of methimazole in a novel lipophilic formulation administered transdermally to healthy cats

KE Hill, MA Gieseg, J Bridges and JP Chambers

AIM: To determine the pharmacokinetics of a novel lipophilic formulation of transdermal methimazole compared to oral carbimazole. METHODS: Healthy cats received 5 mg carbimazole orally every 12 hours for 13 treatments (n=6), then received transdermal methimazole (n=5) at a dose of 5 mg, then 10 mg, once daily on the pinna for 7 days, with 21 days between treatments. Concentrations of methimazole in serum over 24 hours and at 148 hours were determined by high performance liquid chromatography. RESULTS: Concentrations of methimazole in serum for the first 24 hours were not reliably detected in all cats treated with 5 mg methimazole transdermally, while for those receiving 5 mg carbimazole orally and 10 mg methimazole transdermally all cats had detectable concentrations of methimazole in serum. The maximum concentration and area under the curve were lower in cats receiving 10 mg methimazole transdermally (108 (SD 25) ng/mL and 2544 (SD 216) mg-hour/mL, respectively) than those receiving 5 mg oral carbimazole (355 (SD 113) ng/mL and 31,866 (SD 439) ng-hour/mL, respectively) (p<0.05). The time at maximal concentration and elimination half-life were longer for 10 mg transdermal methimazole (5.2 (SD 1.1) hours and 13 (SD 3) hours, respectively) compared to 5 mg oral carbimazole (2.1 (SD 1.6) hours and 5.1 (SD 1.2) hours, respectively). At 148 hours, mean concentrations of methimazole in serum were higher in cats receiving 10 mg methimazole transdermally (506 (SD 165) ng/mL) than for 5mg oral carbimazole (255 (SD 28) ng/mL) or 5 mg transdermally (204 (SD 76) ng/mL). The mean relative bioavailability of 10 mg transdermal methimazole compared to oral carbimazole was 48 (min 43, max 55%). CONCLUSION: Transdermal methimazole at a dose of 10 mg administered to the pinnae of healthy cats once daily in a novel lipophilic formulation has half the relative bioavailability compared to 5 mg oral carbimazole. CLINICAL RELEVANCE: Transdermal methimazole can be absorbed from the skin of healthy cats.

**Veterinary Clinics of North America (July/August)**

Nutritional Concepts for the Veterinary Practitioner

Marjorie L. Chandler, Gregg Takashima

Although veterinary practitioners know that nutrition can make a difference in the health and recovery from disease or illness in dogs and cats, they may feel poorly equipped to provide unbiased information on nutrition. This article provides information about evaluating and recommending diets and interpreting a pet food label to allow for comparisons among pet foods and discussion about how to do a nutritional assessment. It provides an example of how nutritional assessment and recommendation were successfully introduced into a busy private practice. Finally, some of the myths and misperceptions about nutrition are discussed with information provided from evidence-based research.

Handling Alternative Dietary Requests from Pet Owners

Jacqueline M. Parr, Rebecca L. Remillard
The goal of this article was to provide veterinary practitioners with an overview of the types of alternative dietary options available to pet owners and a practical method by which to evaluate the nutritional adequacy of these various options. Our approach to categorizing the alternative dietary options is based on the nutritional adequacy of these dietary options, because patients will be at risk for nutrition-related diseases if fed a nutritionally incomplete or improperly balanced diet long term.

Myths and Misperceptions About Ingredients Used in Commercial Pet Foods
Dottie Laflamme, Oscar Izquierdo, Laura Eirmann, Stephen Binder
Information and misinformation about pet nutrition and pet foods, including ingredients used in pet foods, is widely available through various sources. Often, this "information" raises questions or concerns among pet owners. Many pet owners will turn to their veterinarian for answers to these questions. One of the challenges that veterinarians have is keeping up with the volume of misinformation about pet foods and sorting out fact from fiction. The goal of this article is to provide facts regarding some common myths about ingredients used in commercial pet foods so as to better prepare veterinarians to address their client's questions.

Macronutrients in Feline Health
Cecilia Villaverde, Andrea J. Fascetti
Dietary macronutrients include protein, fat, and carbohydrates. Current nutritional recommendations establish minimums but not maximums for protein and fat but not for carbohydrates; thus, commercial feline maintenance diets have a wide range of macronutrient distribution depending on manufacturer, ingredients, and processing. There is growing interest and discussion, however, in defining the ideal macronutrient composition of feline diets to maximize longevity and health. Current recommendations should be tailored to each patient based on age, body condition, presence of muscle mass atrophy, and the presence of disease.

Nutrition for Working and Service Dogs
Joseph Wakshlag, Justin Shmalberg
Conformation, genetics, and behavioral drive are the major determinants of success in canine athletes, although controllable variables, such as training and nutrition, play an important role. The scope and breadth of canine athletic events has expanded dramatically in the past 30 years, but with limited research on performance nutrition. There are considerable data examining nutritional physiology in endurance dogs and in sprinting dogs; however, nutritional studies for agility, field trial, and detection are rare. This article highlights basic nutritional physiology and interventions for exercise, and reviews newer investigations regarding aging working and service dogs, and canine detection activities.

Nutrition of Aging Dogs
Jennifer A. Larsen, Amy Farcas
Aging is a normal process characterized by a variety of physiologic changes. Geriatric dogs are also more likely to be afflicted with certain disease conditions. Both normal and abnormal physiologic changes associated with aging in the dog may be amenable to nutritional intervention. Specific alterations in nutrients or in dietary characteristics can be beneficial; however, these are best done in the context of an individualized nutritional assessment and monitoring paradigm.

Nutrition of Aging Cats
Dottie Laflamme, Danièle Gunn-Moore
At least one-third of cats seen by veterinarians are mature, defined as 7 years of age or older, and approximately 13% of cats are geriatric, defined as 12 years of age or older. The article reviews physiologic differences between these life stages and relates the changes to nutritional needs. Geriatric cats have increased requirements for dietary energy and protein. Feeding management addresses what, when, how, and where food is provided. This article provides an update on diet-sensitive conditions, including cognitive dysfunction, diabetes mellitus, chronic kidney disease, osteoarthritis, and hyperthyroidism. Although guidelines are provided, patients must be evaluated and fed according to their individual needs.

Dietary Management of Feline Endocrine Disease
Mark E. Peterson, Laura Eirmann
When treating cats with endocrine disease, most veterinarians concentrate on medical or surgical treatments that can be used to manage or cure the disease. Dietary issues are frequently ignored or not properly addressed. However, nutritional support can play an integral role in the successful management of feline endocrine diseases. Furthermore, because most cats with endocrine disease are senior or geriatric, they may also have concurrent health conditions that warrant dietary intervention. This article discusses recommendations for
nutritional support of the 2 most common endocrine problems of cats seen in clinical practice: hyperthyroidism and diabetes mellitus.

**Pet Obesity Management: Beyond Nutrition**  
Deborah Linder, Megan Mueller  
Excess weight has been associated with many clinical and subclinical conditions that put a pet’s health at risk. Successful weight management programs extend beyond standard nutritional management and incorporate an understanding of human-animal interaction. Understanding the processes and dynamics of human-animal relationships can be a useful tool for practitioners in developing successful treatment plans for their clients. Obesity is a nutritional disorder requiring lifelong management; however, when veterinarians go beyond standard treatment to include an understanding of human-animal interaction, it is also one of the few conditions in veterinary medicine that is completely preventable and curable.

**American Journal of Veterinary Research**

**Effect of dexmedetomidine, morphine-lidocaine-ketamine, and dexmedetomidine-morphine-lidocaine-ketamine constant rate infusions on the minimum alveolar concentration of isoflurane and bispectral index in dogs.**  
Lisa Sams Ebner, Phillip Lerche, Richard M. Bednarski, John A. E. Hubbell,  
Objective—To determine the effect of dexmedetomidine, morphine-lidocaine-ketamine (MLK), and dexmedetomidine-morphine-lidocaine-ketamine (DMLK) constant rate infusions on the minimum alveolar concentration (MAC) of isoflurane and bispectral index (BIS) in dogs. Animals—6 healthy adult dogs.

Procedures—Each dog was anesthetized 4 times with a 7-day washout period between anesthetic episodes. During the first anesthetic episode, the MAC of isoflurane (baseline) was established. During the 3 subsequent anesthetic episodes, the MAC of isoflurane was determined following constant rate infusion of dexmedetomidine (0.5 µg/kg/h), MLK (morphine, 0.2 mg/kg/h; lidocaine, 3 mg/kg/h; and ketamine, 0.6 mg/kg/h), or DMLK (dexmedetomidine, 0.5 µg/kg/h; morphine, 0.2 mg/kg/h; lidocaine, 3 mg/kg/h; and ketamine 0.6 mg/kg/h). Among treatments, MAC of isoflurane was compared by means of a Friedman test with Conover posttest comparisons, and heart rate, direct arterial pressures, cardiac output, body temperature, inspired and expired gas concentrations, arterial blood gas values, and BIS were compared with repeated-measures ANOVA and a Dunn test for multiple comparisons. Results—Infusion of dexmedetomidine, MLK, and DMLK decreased the MAC of isoflurane from baseline by 30%, 55%, and 90%, respectively. Mean heart rates during dexmedetomidine and DMLK treatments was lower than that during MLK treatment. Compared with baseline values, mean heart rate decreased for all treatments, arterial pressure increased for the DMLK treatment, cardiac output decreased for the dexmedetomidine treatment, and BIS increased for the MLK and DMLK treatments. Time to extubation and sternal recumbency did not differ among treatments.

Conclusions and Clinical Relevance—Infusion of dexmedetomidine, MLK, or DMLK reduced the MAC of isoflurane in dogs.

**Modulation of inflammation and oxidative stress in canine chondrocytes**  
David L. Dycus, Angela Y. Au, Mark W. Grzanna, Jennifer L. Wardlaw, Carmelita G. Frondoza.  
Objective—To determine whether oxidative stress could be induced in canine chondrocytes in vitro. Sample—Chondrocytes obtained from healthy adult mixed-breed dogs. Procedures—Harvested chondrocytes were maintained at 37°C with 5% CO2 for 24 hours. To assess induction of oxidative stress, 2 stimuli were used: hydrogen peroxide and a combination of interleukin-1β (IL-1β) and tumor necrosis factor-α (TNF-α). To determine the effect of hydrogen peroxide, a set of chondrocyte-seeded plates was incubated with control medium alone or hydrogen peroxide (100, 200, or 300µM) for 24 hours. For inhibition of oxidative stress, cells were incubated for 24 hours with N-acetylcysteine (NAC; 10mM) before exposure to hydrogen peroxide.

Another set of chondrocyte-seeded plates was incubated with control medium alone or with IL-1β (10 ng/mL) and TNF-α (1 ng/mL) for 24 hours. Supernatants were obtained for measurement of prostaglandin E2 production, and cell lysates were used for measurement of superoxide dismutase (SOD) activity and reduced-glutathione (GSH) concentration. Results—Chondrocytes responded to the oxidative stressor hydrogen peroxide with a decrease in SOD activity and GSH concentration. Exposure to the antioxidant NAC caused an increase in SOD activity in hydrogen peroxide–stressed chondrocytes to a degree comparable with that in chondrocytes not exposed to hydrogen peroxide. Similarly, NAC exposure induced significant increases in GSH concentration. Activation with IL-1β and TNF-α also led to a decrease in SOD activity and increase in prostaglandin E2 production. Conclusions and Clinical Relevance—Canine chondrocytes responded to the oxidative stress caused...
by exposure to hydrogen peroxide and cytokines. Exposure to oxidative stress inducers could result in perturbation of chondrocyte and cartilage homeostasis and could contribute to the pathophysiology of osteoarthritis. Use of antioxidants, on the other hand, may be helpful in the treatment of arthritic dogs.

**Comparative assessment of left ventricular function variables determined via cardiac computed tomography and cardiac magnetic resonance imaging in dogs.**

Anne K. Sieslack; Peter Dziallas; Ingo Nolte, Patrick Wefstaedt,

Objective—To evaluate the accuracy and reproducibility of left ventricular (LV) volumetric and function variables determined via contrast-enhanced cardiac CT and cardiac MRI in healthy dogs. Animals—10 healthy Beagles. Procedures—Cardiac MRI and cardiac CT were performed in anesthetized Beagles; both examinations were conducted within a 2-hour period. Cardiac MRI was performed with a 3.0-T magnet, and contrast-enhanced cardiac CT was performed with a 64-row detector CT machine. Data sets were acquired during apnea with simultaneous ECG gating. Short-axis images were created to determine functional variables via the Simpson method. Results—Cardiac CT values for mean end-diastolic and end-systolic LV volumes had excellent correlation (r = 0.95) with cardiac MRI measurements, whereas LV stroke volume (r = 0.67) and LV ejection fraction (r = 0.75) had good correlations. The only variable that differed significantly between imaging modalities was end-diastolic LV volume. For each pair of values, Bland-Altman analysis revealed good limits of agreement. Conclusions and Clinical Relevance—The 3-D modalities cardiac CT and cardiac MRI were excellent techniques for use in assessing LV functional variables. Similar results were obtained for LV volume and function variables via both techniques. The major disadvantage of these modalities was the need to anesthetize the dogs for the examinations.

**Endoscopic ultrasonographic evaluation of the esophagus in healthy dogs.**

Penelope A. Baloi, Patrick R. Kircher, Peter H. Kook.

Objective—To characterize the ultrasonographic appearance of the canine esophagus. Animals—14 healthy Beagles. Procedures—Endoscopic ultrasonography (EUS) examinations were performed with a radial ultrasonographic gastroscope in anesthetized dogs. Images were obtained at 3-cm intervals along the esophageal length to allow evaluation of the esophageal wall. Images were obtained with the probe in direct contact with the esophageal wall and with a water-filled balloon as a standoff. Results—Images were obtained with (12 dogs) and without (10) the water-filled balloon. Median thickness of the esophageal wall was 2.19 mm (range, 1.03 to 5.62 mm) in the proximal third of the esophagus, 2.15 mm (range, 1.10 to 4.45 mm) in the middle third, and 2.84 mm (range, 1.35 to 5.92 mm) in the distal third. Wall thickness differed significantly between proximal and distal thirds. Results were similar when the water-filled balloon was used. Esophageal wall layers appeared as 5 alternating hyperechoic and hypoechoic bands that could not be consistently identified in all dogs. All layers could be identified in 26 of 198 (13%) images, 3 layers could be identified in 67 of 198 (34%) images, and 105 of 198 (53%) images had no layers. Visual identification of layers in images obtained with and without the balloon did not differ significantly. Conclusions and Clinical Relevance—EUS appeared to be a useful technique for assessing esophageal wall integrity in dogs; however, complete evaluation of all layers could not be accomplished in all instances. Further studies with this technique in dogs are needed.

**Effects of chemical restraint on electroretinograms recorded sequentially in awake, sedated, and anesthetized dogs.**

Kate S. Freeman, Kathryn L. Good, Philip H. Kass, Shin Ae Park, Natalia Nestorowicz, Ron Ofri.

Objective—To quantitatively and qualitatively compare electroretinography (ERG) recordings in awake, sedated, and anesthetized dogs. Animals—Six 6-month-old Beagles. Procedures—A brief ERG protocol for dogs was used. Following 1-minute and subsequent 5-minute dark adaptation, mixed rod-cone responses were recorded bilaterally with a handheld multispecies ERG device with dogs in each of 3 states of consciousness: awake, sedated (dexmedetomidine and butorphanol), and anesthetized (atropine and hydromorphone, followed by propofol and midazolam and anesthetic maintenance with isoflurane). Low- and high-frequency noise levels were quantified via Fourier analysis, and the effect of consciousness state on signal amplitude, implicit time, and noise was analyzed via repeated-measures ANOVA. In addition, 13 veterinary ophthalmologists who were unaware of the dogs’ consciousness states subjectively graded the ERG recording quality, and scores for each tracing were compared. Results—ERG amplitudes were highest in awake dogs and lowest in anesthetized dogs. Implicit times were shortest in awake dogs and longest in anesthetized dogs. Differences in b-wave amplitudes and a-wave implicit times were significant. Neither low- nor high-frequency noise levels differed significantly among consciousness states. Furthermore, no significant differences were identified among observers’ scores.
assigned to ERG tracings. Conclusions and Clinical Relevance—Anesthesia and sedation resulted in significant attenuation and delay of ERG responses in dogs. Chemical restraint of dogs had no consistently significant effect on low- or high-frequency noise levels or on observer perception of signal quality.

**Journal of Small Animal Practice**

**Arterial blood gas parameters in pet rabbits anaesthetized using a combination of fentanyl-fluanisone-midazolam-isoflurane.**

L. Benato, M. Chesnel, K. Eatwell and A. Meredith

Objectives; Blood gas analysis is a well-recognized method to monitor pulmonary function, blood oxygenation, ventilation and acid–base status during general anaesthesia. The aim of this study was to report blood gas analysis results in pet rabbits (*Oryctolagus cuniculus*) obtained during general anaesthesia using a portable clinical analyser. Methods; Thirty-two rabbits were premedicated with 0·2 mL/kg fentanyl and fluanisone. Anaesthesia was induced with 0·2 mg/kg midazolam and maintained with 2% isoflurane in oxygen via endotracheal tube. Arterial blood samples were taken from the central ear artery 10 minutes after induction of anaesthesia. Results; Respiratory acidemia was observed during anaesthesia. Mean ±sd (range) arterial blood pH was 7·33 ±0·08 (7·15 to 7·48). PaCO\(_2\) and PaO\(_2\) were, respectively, 55·02 ±10·5 (37·7 to 92·1) mmHg and 370·9 ±120·5 (67 to 561) mmHg. Base excess was 2·8 ±3·6 (–3 to 11) mmol/L, HCO\(_3\) was 28·73 ±3·07 (23·7 to 35·4) mmol/L and TCO\(_2\) was 55·4 ±3·2 (25 to 37) mmol/L. None of the rabbits developed haematoma during arterial blood collection or ischaemia of the pinna during the hospitalization period. Clinical Significance; Arterial blood gas analysis is a safe and easy to perform diagnostic technique that can contribute to improved safety of rabbit anaesthesia, by providing information on the respiratory and metabolic status of the patient.

**Late presentation of canine nasal tumours in a UK referral hospital and treatment outcomes.**

S. L. Mason, T. W. Maddox, S. M. Lillis and L. Blackwood

Objectives; To determine the computed tomographic stage of dogs with nasal tumours in a UK referral population, and whether stage, time to referral and treatment correlates with outcome. Methods; Retrospective review of clinical records and computed tomography scans of dogs with nasal tumours. Results; Dogs (n=78) presented to a referral practice in the UK with suspected nasal tumours are presented with more late stage tumours than dogs in the USA and Japan. Length of time from initial presentation to referral did not correlate with tumour stage at diagnosis. Median survival times for radiotherapy-treated dogs in this population are equivalent to those previously reported for late stage nasal tumours. Clinical Significance; Dogs with nasal tumours are presented late in the course of disease in the North West of England. Dogs with clinical signs consistent with a nasal tumour should have timely imaging and biopsy, in order to make prompt treatment decisions. Although survival times are comparable with previous reports and radiotherapy is a valid treatment option for dogs with late stage disease, better outcomes are likely to be achievable with earlier treatment.

**Haematological and biochemical values in North American Scottish deerhounds.**


Objective; Sighthounds, including deerhounds, have unique physiological traits that result in laboratory test results that may lie outside reference intervals for the general dog population. Although reference intervals for most analytes are thought to be similar among sighthounds, breed-specific reference intervals are available mainly for greyhounds. The aim of this study was to establish reference intervals for haematology and serum biochemical profiles in deerhounds. Methods; Venous blood samples were collected from healthy deerhounds. Haematological and biochemical analytes were examined and reference intervals were established using the 5th and 95th percentiles. Results; The reference intervals obtained from 96 dogs for platelets, reticulocytes, total thyroxine, chloride, gamma glutamyl transferase, bilirubin and glucose were lower than the general dog population. Reference intervals for eosinophils and globulin were wider than that of the general population. Clinical Significance; These results confirm that differences in haematological and biochemical values exist in the deerhound. Some appear to be shared by all sighthounds but others may be unique to this breed.

**Stem-cell therapy for dilated cardiomyopathy: a pilot study evaluating retrograde coronary venous delivery.**

Objective; To evaluate retrograde coronary venous stem-cell delivery for Dobermanns with dilated cardiomyopathy. Methods; Retrograde coronary venous delivery of adipose-derived mesenchymal stem cells transduced with tyrosine mutant adeno-associated virus 2 to express stromal-derived factor-1 was performed in Dobermanns with dilated cardiomyopathy. Cases were followed for 2 years and electrocardiograms (ECG), echocardiograms and Holter monitoring were performed. Results; Delivery of cells was feasible in 15 of 15 dogs. One dog died following the development of ventricular fibrillation 24 hours after cell delivery. The remaining 14 dogs were discharged the following day without complications. Echocardiographic measurements of left ventricular size and function showed continued progression of disease. On the basis of Kaplan–Meier product limit estimates, median survival for dogs following stem-cell delivery was 620 days (range of 1–799 days). When including only the occult-dilated cardiomyopathy population and excluding those dogs already in congestive heart failure, median survival was 652 days (range of 46–799 days). Clinical Significance; Retrograde venous delivery of tyrosine mutant adeno-associated virus 2-stromal-derived factor-1 adipose-derived mesenchymal stem cells appears safe. Stem-cell therapy in dogs with occult-dilated cardiomyopathy does not appear to offer advantage compared to recently published survival data in similarly affected Dobermanns.

Investigation of the pathophysiological mechanism for altered calcium homeostasis in hyperthyroid cats.
T. L. Williams, J. Elliott, J. Berry and H. M. Syme

Objective; To investigate possible pathophysiological mechanisms (reduced plasma calcitriol concentrations and/or presence of concurrent or masked chronic kidney disease) for hypocalkaemia in hyperthyroid cats.

Methods; Prospective cohort study. Routine plasma biochemical parameters, plasma parathyroid hormone and calcitriol concentrations, ionized calcium concentrations, and venous pH, were measured at diagnosis and following treatment of hyperthyroidism. Linear regression analysis was used to determine predictors of ionized calcium concentration. Results; Hyperthyroid cats (n=45) had lower ionized calcium concentrations than healthy geriatric cats (n=52), however, ionized calcium concentrations were higher in hyperthyroid cats with concurrent or masked chronic kidney disease than non-azotaemic hyperthyroid cats. Plasma calcitriol concentrations were higher in hyperthyroid cats than control cats. Plasma total thyroxine concentration and venous pH were independent predictors of ionized calcium concentration. Plasma total thyroxine concentration was also a predictor of ionized calcium concentration after adjustment for plasma parathyroid hormone and calcitriol concentrations. Clinical Significance; Hypocalcaemia in hyperthyroid cats is not associated with the presence of concurrent or masked chronic kidney disease or reduced plasma calcitriol concentrations. Increased thyroid hormone concentrations might influence ionized calcium concentrations through a mechanism, yet to be determined, that is independent of control by parathyroid hormone and calcitriol.

Avascular necrosis of the canine radial carpal bone: a condition analogous to Preiser's disease?
M. J. Aiken, J. E. Stewart and A. A. Anderson

An eight-year-old male neutered Staffordshire bull terrier was presented for investigation of right forelimb lameness of 14 months’ duration. Radiography showed mottled osteolysis of the right radial carpal bone. Histopathology of the bone demonstrated replacement of healthy bone with granulation tissue suggestive of ischaemic necrosis. Lameness resolved following pancarpal arthrodesis. In humans, Preiser's disease is a condition in which idiopathic ischaemic necrosis of the scaphoid bone, the equivalent of the canine radial carpal bone, occurs. This disease may be analogous to the presentation seen in this case. To the authors’ knowledge, this is the first report of such a condition in a dog.

Heterogeneity of internal tandem duplications in the c-kit of dogs with multiple mast cell tumours

Mast cell tumours are one of the most common neoplasms in dogs. Mutations in the proto-oncogene c-kit, especially internal tandem duplications of exon 11, are considered to play a crucial role in mast cell tumourigenesis. In this report, two cases that suffered from multiple mast cell tumours containing an internal tandem duplication in the primary lesion but not in the secondary lesions are described. This finding indicates the existence of heterogenous c-kit gene mutations in each site of multiple mast cell tumours. Additionally, these results raise the possibility that the contribution of internal tandem duplications in the malignant transformation of mast cells is quite limited. It is proposed that, for clinicians, genetic analysis of several regions of multiple mast cell tumours is necessary for predicting prognosis and tumour response to KIT inhibitors.
Successful wound healing over exposed metal implants using vacuum-assisted wound closure in a dog  
J. Bertran, M. Farrell and N. Fitzpatrick  
An eight-month-old Labrador retriever was presented with a grade IIIb open shearing injury of the left tarsus. Acute severe surgical site infection developed 2 days after pan-tarsal arthrodesis, resulting in wound dehiscence. Vacuum-assisted wound therapy was carried out for 12 days to treat an extensive full-thickness soft tissue defect with exposure of metal implants. New granulation tissue formation covering most of the defect was achieved by day 10 of this therapy. Epithelialization was achieved by second intention healing with open wound management. To the authors’ knowledge, this is the first veterinary clinical case report documenting complete healing over exposed metal implants without any requirement for surgical revision.

Duplicated ectopic ureter in a nine-year-old Labrador  
R. Novellas, J. Stone, K. Pratschke and G. Hammond  
A nine-year-old male neutered Labrador retriever presented with a history of chronic urinary tract infections and occasional dribbling of urine. Abdominal ultrasound showed changes suggestive of a left ectopic ureter. A pneumocystogram revealed an air-filled distended tubular and tortuous structure extending from the region of the prostatic urethra to the left kidney, consistent with an ectopic ureter. Intravenous urography depicted the presence of an additional left ureter with only slightly larger diameter than the right and with normal insertion in the bladder neck. A duplicated ectopic left ureter was suspected and confirmed during surgery. To the authors’ knowledge, this is the first description of a duplicated ectopic ureter in the canine species. The combination of ultrasound and contrast radiography was important to reach the diagnosis.

Cyclophosphamide intoxication because of pharmacy error in two dogs.  
Wells JE1, Sabatino BR, Whittomore JC.  
CASE DESCRIPTION: An 8-year-old spayed female Yorkshire Terrier and 5-year-old castrated male West Highland White Terrier were evaluated because of cyclophosphamide intoxication subsequent to pharmacy error. Both dogs received cumulative doses of approximately 1,080 mg of cyclophosphamide/m(2) after cyclophosphamide was erroneously dispensed instead of cyclosporine by different pharmacies. CLINICAL FINDINGS: Both dogs became lethargic, and 1 dog also had anorexia, vomiting, and diarrhea within 2 days after initiation of cyclophosphamide administration. The other dog developed anorexia on the seventh day after initiation of cyclophosphamide administration. The dogs were evaluated by their primary-care veterinarians 9 and 11 days after administration of the first dose of cyclophosphamide, and both had severe leukopenia and thrombocytopenia. TREATMENT AND OUTCOME: One dog was treated on an outpatient basis with broad-spectrum antimicrobials, granulocyte colony-stimulating factor, and an appetite stimulant. The other dog was more severely affected and was hospitalized for 7 days, during which it was treated with broad-spectrum antimicrobials, gastroproctectants, granulocyte colony-stimulating factor, and cryopreserved platelet and packed RBC transfusions. Both dogs fully recovered after treatment. CLINICAL RELEVANCE: This was the first report of survival for dogs with inadvertent prolonged cyclophosphamide intoxication subsequent to pharmacy error. Although the 2 dogs had similar clinical signs and clinicopathologic findings, the severity of disease and treatment required differed for each dog. Dogs can recover from prolonged cyclophosphamide intoxication provided appropriate supportive care is administered.

Use of ethylene-vinyl alcohol copolymer as a liquid embolic agent to treat a peripheral arteriovenous malformation in a dog.  
Culp WT1, Glaiberman CB, Pollard RE, Wisner ER.  
CASE DESCRIPTION: An 11-year-old castrated male Tibetan Mastiff was evaluated because of a visibly enlarged blood vessel and progressively worsening swelling of the right hind limb. CLINICAL FINDINGS: On physical examination, the right hind limb was markedly larger than the left hind limb and the dog was minimally weight bearing on the affected limb. A bruit was auscultated over the affected region. Ultrasonography of the tarsal region of the right hind limb revealed an artery with turbulent flow that communicated with venous drainage. A CT scan confirmed the presence of an arteriovenous malformation (AVM). TREATMENT AND OUTCOME: Embolization of the AVM with a liquid embolic agent (ethylene-vinyl alcohol copolymer dissolved in dimethyl sulfoxide) was elected. An arteriogram was performed prior to treatment and delineated the vessels that were targeted for embolization. The embolic agent was infused into the AVM, and a postinjection arteriogram confirmed complete occlusion of the AVM nidus and normal arterial flow to the paw.
with subsequent normal venous drainage. The circumference of the abnormal paw was 51 cm before the procedure and 22.9 cm at 4 weeks after the procedure. Additionally, the gait of the dog dramatically improved. No complications associated with the procedure developed. CLINICAL RELEVANCE: Peripheral AVMs in dogs are uncommon, and described treatment options are limited and generally associated with serious morbidity. A liquid embolic agent, ethylene-vinyl alcohol copolymer dissolved in dimethyl sulfoxide, was successfully administered in this case, and no morbidity was observed secondary to the procedure. Clinical success was characterized by substantial improvement in limb swelling and marked improvement in the gait of the dog.

**Appendicular osteosarcoma in small-breed dogs: 51 cases (1986-2011).**
Amsellem PM1, Selmic LE, Wypij JM, Bacon NJ, Culp WT, Ehrhart NP, Powers BE, Stryhn H, Fare JP.
OBJECTIVE: To describe outcomes for small-breed dogs with appendicular osteosarcoma. DESIGN: Multi-institutional retrospective case series. ANIMALS: 51 small-breed dogs. PROCEDURES: Records from participating Veterinary Society of Surgical Oncology members were searched for dogs that weighed ≤ 15 kg (33 lb) with a histologic diagnosis of appendicular osteosarcoma. The Kaplan-Meier method was used to determine median survival times (MSTs), and Cox regression was performed to identify variables associated with survival time. RESULTS: Tumors were most commonly located on the humerus (n = 15) and femur (14). Of the 51 study dogs, 9 were treated nonsurgically, 16 underwent amputation of the affected limb only, and 26 underwent curative-intent treatment, with MSTs of 112, 257, and 415 days, respectively. The MST did not differ significantly between dogs in the amputation-only and curative-intent groups. For dogs in the nonsurgical group, MST decreased significantly as the tumor histologic grade increased. For dogs in the amputation-only group, MST decreased as body weight increased. CONCLUSIONS AND CLINICAL RELEVANCE: For the small-breed dogs with appendicular osteosarcoma of the present study, tumor histologic grade and mitotic index were subjectively lower and MST following amputation of the affected limb without adjuvant chemotherapy was longer, compared with those for similarly affected larger dogs. Results indicated no significant advantage in MST for dogs that underwent curative-intent treatment versus dogs that underwent amputation only, and further investigation of the importance of adjuvant chemotherapy is warranted.

**Evaluation of the perioperative analgesic efficacy of buprenorphine, compared with butorphanol, in cats.**
Warne LN1, Beths T, Holm M, Carter JE, Bauquier SH.
OBJECTIVE: To compare the analgesic effects of buprenorphine and butorphanol in domestic cats. DESIGN: 2-phase positive-controlled randomized masked clinical trial. ANIMALS: 39 healthy female cats (10 in phase 1 and 29 in phase 2). PROCEDURES: Cats admitted for ovariohysterectomy received buprenorphine (4 in phase 1; 14 in phase 2) or butorphanol (6 in phase 1; 15 in phase 2). In phase 1, cats were premedicated with buprenorphine (0.02 mg/kg [0.009 mg/lb], IM) or butorphanol (0.4 mg/kg [0.18 mg/lb], IM), in combination with medetomidine. Anesthesia was induced with propofol (IV) and maintained with isoflurane in oxygen. After extubation, medetomidine was antagonized with atipamezole. A validated multidimensional composite scale was used to assess signs of pain after surgery starting 20 minutes after extubation and continuing for up to 360 minutes, and pain score comparisons were made between the 2 groups. Phase 2 proceeded similar to phase 1 with the following addition: during wound closure, cats from the butorphanol and buprenorphine groups received butorphanol (0.4 mg/kg, IM) or buprenorphine (0.02 mg/kg, IM), respectively. RESULTS: Phase 1 of the study was stopped after 10 cats were ovariohysterectomized because 9 of 10 cats required rescue analgesia at the first evaluation. In phase 2, at the first pain evaluation, pain scores from the buprenorphine group were lower, and all cats from the butorphanol group required rescue analgesia. None of the cats from the buprenorphine group required rescue analgesia at any time. CONCLUSIONS AND CLINICAL RELEVANCE: Buprenorphine (0.02 mg/kg, IM) given before surgery and during wound closure provided adequate analgesia for 6 hours following ovariohysterectomy in cats, whereas butorphanol did not.

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

**Ischemic stroke in Greyhounds: 21 cases (2007-2013).**
Kent M1, Glass EN, Haley AC, March P, Rozanski EA, Galban EM, Bertalan A, Platt SR.
Objective-To determine the prevalence of ischemic stroke in Greyhounds and determine whether affected dogs had coagulation abnormalities and hypertension. Design-Multi-institutional, retrospective study. Animals-21 dogs. Procedures-Medical records (including diagnostic testing results) and MRI images of the brain were reviewed for Greyhounds with ischemic stroke that had been evaluated at 4 institutions. The proportion of
Greyhounds with ischemic stroke was compared with the proportion of non-Greyhound dogs with ischemic stroke. Demographic information for dogs evaluated at each institution was obtained to determine the proportion of Greyhounds in the hospital populations. Results-21 Greyhounds with ischemic stroke were identified. Abnormalities in coagulation were not identified in the 14 Greyhounds that underwent such testing. Systemic hypertension was identified in 6 of 14 Greyhounds that underwent such testing. No other abnormalities were identified by means of other routine diagnostic tests for Greyhounds. For all institutions combined, the prevalence of ischemic stroke in Greyhounds was 0.66% (21/3,161 Greyhounds). Greyhounds were significantly more likely to be evaluated because of ischemic stroke, compared with all other dog breeds combined (OR, 6.6; 95% confidence interval, 4.2 to 10.2). Conclusions and Clinical Relevance-Results of this study suggested that Greyhounds were predisposed to ischemic stroke, compared with all other breeds combined. Coagulation abnormalities did not seem to contribute to ischemic stroke. Hypertension may have contributed to the development of ischemic stroke. Greyhounds with ischemic stroke should undergo measurement of systolic arterial blood pressure. Antihypertensive treatments may be warranted for such dogs.

**Prevalence and clinical outcome of subclinical bacteriuria in female dogs.**

Wan SY1, Hartmann FA, Jooss MK, Viviano KR.

Objective-To determine the prevalence of subclinical bacteriuria and its natural clinical course over a 3-month period in healthy female dogs. Design-Observational, prospective, cross-sectional study. Animals-101 healthy client-owned female dogs. Procedures-In all dogs, screening clinicopathologic tests and bacteriologic culture of urine were performed. In culture-positive dogs, subclinical bacteriuria was confirmed by 2 positive culture results within 2 weeks and dogs were reevaluated at 3 months. Results-The prevalence of subclinical bacteriuria in healthy female dogs was 9 of 101 (8.9%). Three-month follow-up data were available for 8 of 9 dogs with subclinical bacteriuria. Four dogs had persistent bacteriuria, and 4 had transient bacteriuria. No dogs with subclinical bacteriuria developed clinical signs during the 3-month observation period. Subclinical bacteriuria was diagnosed in 6 of 51 (12%) young and middle-aged dogs and 3 of 50 (6.0%) senior and geriatric dogs. No significant difference was found in the prevalence of subclinical bacteriuria with age. Conclusions and Clinical Relevance-Results suggested that subclinical bacteriuria is a nonprogressive condition in healthy female dogs and can be persistent or transient. No significant difference in the prevalence of subclinical bacteriuria in young and middle-aged dogs versus senior and geriatric dogs was detected. No dogs with subclinical bacteriuria developed clinical signs requiring antimicrobial treatment during the 3-month observation period. Healthy female dogs with subclinical bacteriuria may be a population of dogs in which antimicrobial treatment is unnecessary.

**Total dietary fiber composition of diets used for management of obesity and diabetes mellitus in cats.**

Owens TJ1, Larsen JA, Farcas AK, Nelson RW, Kass PH, Fascetti AJ.

Objective-To determine total dietary fiber (TDF) composition of feline diets used for management of obesity and diabetes mellitus. Design-Cross-sectional survey. Sample-Dry veterinary (n = 10), canned veterinary (12), and canned over-the-counter (3) feline diets. Procedures-Percentage of TDF as insoluble dietary fiber (IDF), high-molecular-weight soluble dietary fiber (HMWSDF), and low-molecular-weight soluble dietary fiber (LMWSDF) was determined. Results-Median measured TDF concentration was greater than reported maximum crude fiber content in dry and canned diets. Median TDF (dry-matter) concentration in dry and canned diets was 12.2% (range, 8.11% to 27.16%) and 13.8% (range, 4.7% to 27.9%), respectively. Dry and canned diets, and diets with and without a source of oligosaccharides in the ingredient list, were not different in energy density or concentrations of TDF, IDF, HMWSDF, or LMWSDF. Similarly, loaf-type (n = 11) and gravy-type (4) canned diets differed only in LMWSDF concentration. Disparities in TDF concentrations among products existed despite a lack of differences among groups. Limited differences in TDF concentration and dietary fiber composition were detected when diets were compared on the basis of carbohydrate concentration. Diets labeled for management of obesity were higher in TDF concentration and lower in energy density than diets for management of diabetes mellitus. Conclusions and Clinical Relevance-Diets provided a range of TDF concentrations with variable concentrations of IDF, HMWSDF, and LMWSDF. Crude fiber concentration was not a reliable indicator of TDF concentration or dietary fiber composition. Because carbohydrate content is calculated as a difference, results suggested that use of crude fiber content would cause overestimation of both carbohydrate and energy content of diets.
Performance of a commercially available in-clinic ELISA for detection of antibodies against Anaplasma phagocytophilum, Anaplasma platys, Borrelia burgdorferi, Ehrlichia canis, and Ehrlichia ewingii and Dirofilaria immitis antigen in dogs.


Objective: To evaluate the performance of an in-clinic ELISA designed for detection of heartworm antigen and antibodies against 5 tick-borne pathogens. Design: Validation study. Sample-1,601 serum or matched serum, plasma, and blood samples from dogs. Procedures-Samples were tested for Dirofilaria immitis (heartworm) antigen and antibodies against Anaplasma phagocytophilum, Anaplasma platys, Borrelia burgdorferi, Ehrlichia canis, and Ehrlichia ewingii by means of an in-clinic ELISA. Evaluation of assay sensitivity and specificity, agreement of results among sample types, and cross-reactivity of E canis antigens in the assay with anti-Ehrlichia chaffeensis antibodies in stored samples from experimentally infected dogs were performed at a reference laboratory. Field tests of the in-clinic ELISA were performed at 6 veterinary facilities. Results were compared with confirmatory test results. Results: Sensitivity and specificity of the in-clinic ELISA were > 89% for detection of antibodies against A phagocytophilum (93.2% and 99.2%, respectively), A platys (89.2% and 99.2%, respectively), B burgdorferi (96.7% and 98.8%, respectively), E canis (97.8% and 92.3%, respectively), and E ewingii (96.5% and 93.9%, respectively). Sensitivity of the assay for detection of D immitis was 98.9%, with 99.3% specificity. The in-clinic ELISA identified exposure to > 1 vector-borne pathogen in 354 of 1,195 samples. Cross-reactivity of E canis antigens with anti-E chaffeensis antibodies was confirmed. Results of field evaluations confirmed that the in-clinic ELISA could be reliably used under typical clinical conditions to identify dogs exposed to the pathogens of interest. Conclusions and Clinical Relevance: The in-clinic ELISA provided a comprehensive in-house serologic screening test for all vector-borne pathogens evaluated.

Journal of Feline Medicine and Surgery

Inflammatory joint disease in cats: Diagnostic approach and treatment

Julie Lemetayer and Susan Taylor

Practical relevance: Osteoarthritis, a degenerative non-inflammatory joint disease, is common in cats, usually causing gradual changes in behavior and lifestyle rather than severe lameness. Inflammatory arthritis occurs much less frequently and is nearly always associated with debilitating lameness. It may have an infectious or immune-mediated cause – but, unlike the canine disease, is much more likely to be infectious in origin. Clinical challenges: Cats with inflammatory joint disease are presented for evaluation of lethargy, anorexia, reluctance to walk or fever. Synovial fluid collection and analysis is required to confirm joint inflammation, but this is a procedure many veterinarians are not comfortable performing in cats. Once inflammatory arthritis is confirmed, extensive testing is required to diagnose infectious causes and determine appropriate treatment. Immune-mediated polyarthritis can be treated with immunosuppressive drugs only after all infectious possibilities are eliminated. Radiographs are used to characterize the arthritis as erosive or nonerosive, but radiographic changes in cats are often subtle compared with those described in canine rheumatoid-like arthritis. Audience: This review, aimed at all veterinarians who treat cats, describes the general clinical approach to feline joint disease, the collection and analysis of synovial fluid, and the diagnosis and management of inflammatory joint diseases affecting cats. The diagnostic approach to an unusual case of erosive polyarthritis is discussed in the Case Notes. Evidence base: To date, the veterinary literature on inflammatory joint disease in cats has been limited to older reviews of immune-mediated disorders and multiple single case reports or small case series describing infectious disorders. This article offers a current comprehensive review of these disorders.

Feline respiratory disease: What is the role of Mycoplasma species?

Tekla Lee-Fowler

Practical relevance: Non-hemotropic Mycoplasma species are frequently implicated in cases of respiratory disease, and also conjunctivitis, in cats. Clinical challenges: Mycoplasma species are considered commensal bacteria of the conjunctiva and the upper respiratory tract of cats, and hence their role as a primary pathogen is difficult to determine. These organisms certainly appear to play a significant role as a secondary pathogen in the upper airways, and there is increasing evidence that in some animals they may represent a primary infection. However, mycoplasmas have not been found in the lower airways of clinically healthy cats – suggesting that, when present, they likely represent a pathologic process. Diagnostic challenges exist as well; Mycoplasma species are not typically identified via cytology due to their small size, and culture of these organisms requires special media and handling. Although PCR has improved identification and allowed for
speciation, conflicting culture and PCR results can create a dilemma regarding the clinical relevance of infection. Evidence base: This article draws on original research and case reports to provide information about the role of *Mycoplasma* species in the feline upper and lower respiratory tract, diagnostic methods and associated challenges, and treatment options. Audience: The goal is to provide small animal practitioners with a current and organized review of the often-conflicting literature regarding the role of *Mycoplasma* species in feline respiratory infections.

**Tramadol toxicity in a cat: case report and literature review of serotonin syndrome**

Yenny Indrawirawan and Trudi McAlees

Overview: Tramadol toxicity has not previously been reported in a cat. Case summary: This report describes the clinical signs, diagnosis and treatment of tramadol toxicity, manifesting as serotonin syndrome, in a cat in Australia. Practical relevance: For any cat with suspicion of serotonin syndrome, in particular secondary to tramadol overdose, it is recommended that decontamination, monitoring and supportive care are instituted as soon as clinical signs develop. Prolonged hospitalisation may be required in the event of a severe overdose. Literature review: The literature relating to the pharmacology of tramadol and tramadol overdose, clinical manifestations of tramadol overdose, and serotonin syndrome in cats, humans and dogs is reviewed. Recommended treatment for tramadol overdose and serotonin syndrome is also discussed.

**AAFP and ISFM Guidelines for Diagnosing and Solving House-Soiling Behavior in Cats**

Hazel C Carney, Tammy P Sadek, Terry M Curtis et. al

Rationale: These Guidelines have been developed by the American Association of Feline Practitioners (AAFP) and the International Society of Feline Medicine (ISFM) as a resource for veterinary practitioners who want to better understand and manage the important clinical condition of house-soiling in their feline patients. The Guidelines offer straightforward, practical solutions that, in most cases, will help veterinarians and cat owners prevent, manage or entirely remediate feline house-soiling behavior. Evidence base: The Guidelines include scientifically documented information when it is available. However, because research is often lacking, some recommendations reflect the accumulated clinical experience of the authors.

**Journal of Veterinary Internal Medicine**

**Multiple Organ Dysfunction Syndrome in Humans and Animals.**

K. Osterbur, F.A. Mann, K. Kuroki and A. DeClue.

Multiple organ dysfunction syndrome (MODS), defined as the presence of altered organ function in an acutely ill patient such that homeostasis cannot be maintained without intervention, is a cause of high morbidity and mortality in humans and animals. Many advances have been made in understanding the pathophysiology and treatment of this syndrome in human medicine, but much still is unknown. This comparative review will provide information regarding the history and pathophysiology of MODS in humans and discuss how MODS affects each major organ system in animals.

**Cystatin C: A New Renal Marker and Its Potential Use in Small Animal Medicine.**


The occurrence of chronic kidney disease is underestimated in both human and veterinary medicine. Glomerular filtration rate (GFR) is considered the gold standard for evaluating kidney function. However, GFR assessment is time-consuming and labor-intensive and therefore not routinely used in practice. The commonly used indirect GFR markers, serum creatinine (sCr) and urea, are not sufficiently sensitive or specific to detect early renal dysfunction. Serum cystatin C (sCysC), a proteinase inhibitor, has most of the properties required for an endogenous GFR marker. In human medicine, numerous studies have evaluated its potential use as a GFR marker in several populations. In veterinary medicine, this marker is gaining interest. The measurement is easy, which makes it an interesting parameter for clinical use. This review summarizes current knowledge about cystatin C (CysC) in humans, dogs, and cats, including its history, assays, relationship with GFR, and biological and clinical variations in both human and veterinary medicine.

**Advances in Diagnostic and Treatment Modalities for Intracranial Tumors.**

P.J. Dickinson.

Intracranial neoplasia is a common clinical condition in domestic companion animals, particularly in dogs. Application of advances in standard diagnostic and therapeutic modalities together with a broad interest in the
development of novel translational therapeutic strategies in dogs has resulted in clinically relevant improvements in outcome for many canine patients. This review highlights the status of current diagnostic and therapeutic approaches to intracranial neoplasia and areas of novel treatment currently in development.

**DNA Testing in Neurologic Diseases.**
D.P. O’Brien and T. Leeb.
DNA testing is available for a growing number of hereditary diseases in neurology and other specialties. In addition to guiding breeding decisions, DNA tests are important tools in the diagnosis of diseases, particularly in conditions for which clinical signs are relatively nonspecific. DNA testing also can provide valuable insight into the risk of hereditary disease when decisions about treating comorbidities are being made. Advances in technology and bioinformatics will make broad screening for potential disease-causing mutations available soon. As DNA tests come into more common use, it is critical that clinicians understand the proper application and interpretation of these test results.

**The Impact of Demographic, Social, and Environmental Factors on the Development of Steroid-Responsive Meningitis-Arteritis (SRMA) in the United Kingdom.**
Background Steroid-responsive meningitis-arteritis (SRMA) is an inflammatory disease of dogs that is suspected to be immune-mediated. The development of other immune-mediated diseases has been linked to vaccinations, time of the year, geographic location, sex, neuter status, and breed. Hypothesis/Objectives To identify if the development of SRMA is associated with time of year, vaccination, geographic location, sex, neuter status, and breed. Animals Sixty SRMA cases and 180 controls, all ≤24 months of age and matched for year of presentation, from a referral hospital population in the United Kingdom. Methods Retrospective case-control study with unconditional logistic regression analysis. Results Beagles (P = .001), Border Collies (P = .001), Boxers (P = .032), Jack Russell Terriers (P = .001), Weimaraners (P = .048), and Whippets (P < .001) had significantly greater odds of developing SRMA in this population of dogs. Vaccination, time of year, geographic category, sex, and neuter status did not increase the odds of developing SRMA. Conclusions and Clinical Importance Only breed increased the odds of developing SRMA. It would be prudent to investigate the genetics of the identified breeds to help elucidate the etiopathogenesis of SRMA.

**Hepatic Hepcidin Gene Expression in Dogs with a Congenital Portosystemic Shunt.**
Background Microcytic anemia is common in dogs with a congenital portosystemic shunt (cPSS) and typically resolves after surgical attenuation of the anomalous vessel. However, the pathophysiology of the microcytic anemia remains poorly understood. Hepcidin has been a key role in controlling iron transport in both humans and animals and in mediating anemia of inflammatory disease in humans. The role of hepcidin in the development of microcytic anemia in dogs with a cPSS has not been examined. Hypothesis To determine whether hepatic hepcidin mRNA expression decreases, while red blood cell count (RBC) and mean corpuscular volume (MCV) increase in dogs after surgical attenuation of a cPSS. Animals Eighteen client-owned dogs with confirmed cPSS undergoing surgical attenuation. Method Prospective study. Red blood cell count (RBC) and mean corpuscular volume (MCV), together with hepatic gene expression of hepcidin, were measured in dogs before and after partial attenuation of a cPSS. Results There was a significant increase in both RBC (median pre 6.17 × 10¹²/L, median post 7.08 × 10¹²/L, P < .001) and MCV (median pre 61.5fl, median post 65.5fl, P = .006) after partial surgical attenuation of the cPSS. Despite the increase in both measured red blood cell parameters, hepatic gene expression of hepcidin remained unchanged. Conclusions and Clinical Importance This study found no evidence that dysregulated production of hepcidin was associated with anemia in dogs with a cPSS.

**Assessment of Mitral Regurgitation Severity by Doppler Color Flow Mapping of the Vena Contracta in Dogs.**
Background Quantitative and semiquantitative methods have been proposed for the assessment of MR severity, and though all are associated with limitations. Measurement of vena contracta width (VCW) has been used in clinical practice. Objective To measure the VCW in dogs with different levels of MR severity. Animals Two hundred and seventy-nine dogs were classified according to 5 levels of MR severity. Methods This was a
its Clinical Efficacy in Hypothyroid Dogs.

Pharmacokinetics of Total Thyroxine after Repeated Oral Administration of Levothyroxine Solution and its Clinical Efficacy in Hypothyroid Dogs.

Methods A randomized, positive-controlled, prospective study was performed. Cats received Chinese rhubarb, benazepril, or both in addition to standard treatment for CKD. Repeated measures ANOVA was used to assess changes in serum creatinine concentration, body weight, hematocrit, urine protein: urine creatinine ratio (UPC), and systemic arterial blood pressure over time between and within treatment groups over an average of 22 months. Results No significant differences were detected in serum creatinine concentration, body weight, hematocrit, UPC, and systemic arterial pressure over time between or within treatment groups. Conclusions and Clinical Importance This study failed to detect a significant difference in the progression of CKD in cats treated with Chinese rhubarb, benazepril, or both. Further study in specific subsets of cats with CKD is warranted.

ARVC median age of survival was 11 years, and for controls was 10 years. Conclusions/Clinical Importance Arrhythmogenic right ventricular cardiomyopathy is a disease of middle age and frequently is associated with the striatoin deletion. Syncope occurs in approximately 1/3 of affected dogs; systolic dysfunction is uncommon. The prognosis in many affected dogs is good.

Background Boxer arrhythmogenic right ventricular cardiomyopathy (ARVC) is a disease that may result in sudden death or heart failure. Hypothesis/objectives To prospectively study the natural history of Boxer ARVC.

Animals 72 dogs (49 ARVC, 23 controls). Methods Boxers >1 year of age were recruited for annual reevaluation. Controls were defined as being ≥6 years of age and having <50 ventricular premature complex (VPCs)/24 h. ARVC was defined as ≥300 VPCs/24 h in the absence of other disease. Dogs were genotyped for the striatin deletion when possible. Descriptive statistics were determined for age; VPC number; annual change in VPC number; and left ventricular (LV) echocardiographic dimensions. Survival time was calculated. Results Controls: median age of 7 years (range, 6–10); number of VPCs 12 (range, 4–32). Median time in study of 6 years (range, 2–9). Seventeen of 23 were genotyped (5 positive, 12 negative). ARVC: median age of diagnosis of 6 (range, 1–11). Median time in study 5 years (range, 3–8). A total of 33% were syncopal and 43/49 were genotyped (36 positive, 7 negative). Yearly change in VPCs was 46 (range, −7,699 to 33,524). Annual percentage change in LV dimensions was 0, and change in fractional shortening (FS%) was 2%. Two dogs had FS% <20%. Although ARVC dogs died suddenly, there was no difference in survival time between groups. ARVC median age of survival was 11 years, and for controls was 10 years. Conclusions/Clinical Importance Arrhythmogenic right ventricular cardiomyopathy is a disease of middle age and frequently is associated with the striatoin deletion. Syncope occurs in approximately 1/3 of affected dogs; systolic dysfunction is uncommon. The prognosis in many affected dogs is good.

The Effect of Chinese Rhubarb, Rheum officinale, with and without Benazepril on the Progression of Naturally Occurring Chronic Kidney Disease in Cats.

The Natural History of Arrhythmogenic Right Ventricular Cardiomyopathy in the Boxer Dog: A Prospective Study.

Natural History of Arrhythmogenic Right Ventricular Cardiomyopathy in the Boxer Dog: A Prospective Study.

Background Renal fibrosis is common in progressive kidney disease. Transforming growth factors β (TGF-β) are important mediators of all types of fibrosis, including renal fibrosis. Chinese rhubarb has been shown to have antifibrotic properties in part because of inhibition of TGF-β and has slowed the progression of kidney disease in rodent models. Hypothesis That administration of a Chinese rhubarb supplement will slow the progression of chronic kidney disease (CKD) in cats and the concurrent administration of Chinese rhubarb and benazepril will be more effective than either alone. Animals Twenty-nine client-owned cats with naturally occurring IRIS Stage 2 or early Stage 3 CKD and without comorbidity such as cancer, urinary tract obstruction, urinary tract infection, poorly controlled hyperthyroidism, or systemic hypertension were enrolled in the study. Methods A randomized, positive-controlled, prospective study was performed. Cats received Chinese rhubarb, benazepril, or both in addition to standard treatment for CKD. Repeated measures ANOVA was used to assess changes in serum creatinine concentration, body weight, hematocrit, urine protein: urine creatinine ratio (UPC), and systemic arterial blood pressure over time between and within treatment groups over an average of 22 months. Results No significant differences were detected in serum creatinine concentration, body weight, hematocrit, UPC, and systemic arterial pressure over time between or within treatment groups. Conclusions and Clinical Importance This study failed to detect a significant difference in the progression of CKD in cats treated with Chinese rhubarb, benazepril, or both. Further study in specific subsets of cats with CKD is warranted.
I.C. van Dijl, G. Le Traon, B.D.A.M. van de Meulengraaf, S. Burgaud, L.J.I. Horspool and H.S. Kooistra. Background Oral levothyroxine (L-T4) supplementation is commonly used to treat hypothyroid dogs. Objectives Investigate the plasma profile and pharmacokinetics of total thyroxine (T4) after PO administration of a L-T4 solution and its clinical efficacy in hypothyroid dogs. Animals Ten dogs with naturally occurring hypothyroidism. Methods After hypothyroidism diagnosis and supplementation with L-T4 solution PO q24h at 20 mg/kg BW for minimum 4 weeks, the plasma profile and pharmacokinetics of T4 were determined over 34 hours and the clinical condition of the dogs was evaluated. Results Before dosing for pharmacokinetic evaluation, mean T4 concentration was 23 ± 9 nmol/L. L-T4 was absorbed rapidly (tmax, 5 hours), reaching a mean maximal T4 concentration of 56 ± 11 nmol/L. The apparent terminal half-life was 11.8 hours. Clinical signs of hypothyroidism improved or resolved in all dogs after 4 weeks of treatment. The dosage of 20 mg/kg PO q24h was judged appropriate in 5 dogs, and 4 dogs required slight increases (9–16%). Twice daily treatment, with a 30% increase in dosage, was necessary for 1 dog. Conclusions and Clinical Importance The pharmacokinetics of L-T4 in hypothyroid dogs was similar to that reported in healthy euthyroid dogs. Clinical and hormonal responses to L-T4 solution were rapid in all dogs. The starting dosage of 20 mg/kg PO q24h was suitable for maintenance supplementation in 50% of the dogs, minor dosage modification was required in 4 other dogs, and treatment q12h was required in 1 dog.

Echocardiographic Findings in 11 Cats with Acromegaly. J.A. Myers, K.F. Lunn and J.M. Bright Background Information regarding cardiac changes in domestic cats with acromegaly is limited. Hypothesis/Objectives The objective of this study was to describe the echocardiographic findings in cats with acromegaly. Animals Eighteen cats diagnosed with acromegaly at Colorado State University between 2008 and 2012. Of these 18 cats, 11 had echocardiography performed. Methods A retrospectively review of medical records was made to identify cats with acromegaly that also had echocardiography performed. Results Of the 11 cats identified, 7 had left ventricular concentric hypertrophy, 6 had left atrial enlargement, and 7 had evidence of abnormal diastolic function. All 11 cats had evidence of structural or functional cardiac disease. Conclusions and Clinical Importance Cardiovascular abnormalities frequently are present in cats with acromegaly, and a complete cardiac evaluation should be considered in these patients.

Comparison of Adrenocorticotropic Hormone Stimulation Test Results Started 2 versus 4 Hours after Trilostane Administration in Dogs with Naturally Occurring Hyperadrenocorticism. C.M. Bonadio, E.C. Feldman, T.A. Cohen and P.H. Kass Background Trilostane medical treatment of naturally occurring hyperadrenocorticism (NOH) in dogs is common, as is use of the adrenocorticotropic hormone (ACTH) stimulation test (ACTHst) in monitoring response to treatment. There is uncertainty regarding when the ACTHst should be started relative to time of trilostane administration. Objective To compare ACTHst results in dogs being treated for NOH with trilostane when the test is begun 2 versus 4 hours after trilostane administration. Animals Twenty-one privately owned dogs with NOH, each treated with trilostane for at least 30 days. Methods Each dog had 2 ACTHst completed, 1 started 2 hours and the other 4 hours after trilostane administration. The second test was started no sooner than 46 hours and no later than 74 hours after the first. Results For all 21 dogs, the mean post-ACTH serum cortisol concentration from tests started 2 hours after trilostane administration (5.4 ± 3.7 µg/dL) was significantly lower (P = .03) as compared with results from the tests started 4 hours after administration (6.5 ± 4.5 µg/dL). Conclusions Results of ACTHst started at different times yield significantly different results. Dogs with NOH, treated with trilostane, and monitored with ACTHst results should have all of their subsequent ACTHst tests begun at or about the same time after trilostane administration.

Canine Pancreatic-Specific Lipase Concentrations in Clinically Healthy Dogs and Dogs with Naturally Occurring Hyperadrenocorticism. D.I. Mawby, J.C. Whittemore and K.A. Fecteau Background Specificity of canine pancreatic lipase immunoreactivity (cPLI) assays in dogs with hyperadrenocorticism (HAC) is unknown. Hypothesis Results of cPLI assays differ for clinically healthy dogs and dogs with HAC. Animals Seventeen healthy dogs and 20 dogs with HAC diagnosed by ACTH stimulation test results without evidence of clinical pancreatitis. Methods Dogs were enrolled between December 2009 and November 2010. Serum cPLI concentrations were determined by quantitative (Spec cPL test, SPEC) and semiquantitative (SNAP cPL test, SNAP) assays. Results were categorized as normal, equivocal, or abnormal (SPEC) or negative or positive (SNAP). Associations between group and cPLI were assessed using Fisher's
exact test or the Mann–Whitney U-test. Spearman rank correlation coefficients (ρ) were determined for SNAP and SPEC results. Significance was set at P < .05. Results Spec cPL test concentrations were significantly (P < .001) higher in dogs with HAC (491.1 µg/L) than in healthy dogs (75.2 µg/L), with more abnormal SPEC results in HAC dogs (P < .001). There were more (P = .002) positive SNAP results in dogs with HAC (55%) than in healthy dogs (6%). SNAP and SPEC results were highly correlated (ρ = 0.85; P < .001). Conclusions and Clinical Importance Dogs with HAC had higher SPEC concentrations and more positive SNAP results than clinically healthy dogs with normal ACTH stimulation test results. Specificity of SPEC and SNAP assays in HAC dogs without clinical pancreatitis were 65 and 45%, respectively. Pending further study, SNAP and SPEC results should be interpreted cautiously in dogs with HAC to avoid false diagnosis of concurrent pancreatitis.

Effect on Renal Function of Restoration of Euthyroidism in Hyperthyroid Cats with Iatrogenic Hypothyroidism.

T.L. Williams, J. Elliott and H.M. Syme

Background Iatrogenic hypothyroidism is associated with an increased incidence of azotemia after treatment of hyperthyroidism, and decreased survival time in azotemic hyperthyroid cats. Hypothyroidism Restoration of euthyroidism will decrease plasma creatinine concentrations. Animals Nineteen client-owned, methimazole- or carbimazole-treated, hyperthyroid cats with documented iatrogenic hypothyroidism (based on subnormal plasma total thyroxine concentrations [TT4] and increased plasma thyroid-stimulating hormone concentrations).

Methods Prospective interventional study. Doses of antithyroid medication were reduced until euthyroidism was restored (TT4 10–40 nmol/L). Plasma creatinine concentration and selected other clinicopathologic variables were evaluated before and after restoration of euthyroidism and compared by nonparametric statistics. Data are presented as median [25th, 75th percentile]. Results Restoration of euthyroidism was associated with a significant decrease in plasma creatinine concentrations (2.61 [1.90, 3.26] mg/dL versus 2.07 [1.42, 2.82] mg/dL; P < .001) and body weight (4.03 [3.59, 4.53] kg versus 3.89 [3.34, 4.18] kg; P = .019), and a significant increase in packed cell volume (30 [28, 39]% versus 34 [29, 39]%; P = .038), heart rate (174 [163, 201] bpm versus 190 [164, 202] bpm; P = .009), and plasma alkaline phosphatase activity (26.6 [17.0, 33.0] IU/L versus 38.0 [23.5, 46.5] IU/L; P < .001). Conclusions and Clinical Importance Restoration of euthyroidism in medically treated hyperthyroid cats with iatrogenic hypothyroidism causes a reduction in plasma creatinine concentrations, and thus might improve renal function; however, this could be influenced by concurrent changes in body weight.


Background The prognostic value of early magnetic resonance imaging (MRI) in dogs after traumatic brain injury (TBI) remains unclear. Objectives Determine whether MRI findings are associated with prognosis after TBI in dogs. Animals Fifty client-owned dogs. Methods Retrospective study of dogs with TBI that underwent 1.5T MRI within 14 days after trauma. MRI evaluators were blinded to the clinical presentation, and all images were scored based on an MRI grading system (Grade I [normal brain parenchyma] to Grade VI [bilateral lesions affecting the brainstem with or without any lesions of lesser grade]). Skull fractures, percentage of intraparenchymal lesions, degree of midline shift, and type of brain herniation were evaluated. MGCS was assessed at presentation. The presence of seizures was recorded. Outcome was assessed at 48 h (alive or dead) and at 3, 6, 12, and 24 months after TBI. Results Sixty-six percent of the dogs had abnormal MRI findings. MRI grade was negatively correlated (P < .001) with MGCS. A significant negative correlation of MRI grade, degree of midline shift, and percentage of intraparenchymal lesions with follow-up scores was identified. The MGCS was lower in dogs with brain herniation (P = .0191). Follow-up scores were significantly lower in dogs that had brain herniation or skull fractures. The possibility of having seizures was associated with higher percentage of intraparenchymal lesions (P = 0.0054) and 10% developed PTE. Conclusions and Clinical Importance Significant associations exist between MRI findings and prognosis in dogs with TBI. MRI can help to predict prognosis in dogs with TBI.

Use of Contrast-Enhanced Fluid-Attenuated Inversion Recovery Sequence to Detect Brain Lesions in Dogs and Cats.

K. Merhof, J. Lang, S. Dürr, C. Stahl and D. Gorgas

Background The diagnostic value of a contrast-enhanced T2-weighted FLAIR sequence (ceFLAIR) in brain imaging is unclear. Hypothesis/Objectives That the number of brain lesions detected with ceFLAIR would be no greater than the sum of lesions detected with nFLAIR and ceT1W sequence. Animals One hundred and twenty-
nine animals (108 dogs and 21 cats) undergoing magnetic resonance imaging (MRI) of the head between July 2010 and October 2011 were included in the study. Methods A transverse ceFLAIR was added to a standard brain MRI protocol. Presence and number of lesions were determined based on all available MRI sequences by 3 examiners in consensus and lesion visibility was evaluated for nFLAIR, ceFLAIR, and ceT1W sequences. Results Eighty-three lesions (58 intra-axial and 25 extra-axial) were identified in 51 patients. Five lesions were detected with nFLAIR alone, 2 with ceT1W alone, and 1 with ceFLAIR alone. Significantly higher numbers of lesions were detected using ceFLAIR than nFLAIR (76 versus 67 lesions; \( P = 0.04 \)), in particular for lesions also detected with ceT1W images (53 versus 40; \( P = .01 \)). There was no significant difference between the number of lesions detected with combined nFLAIR and ceT1W sequences compared to those detected with ceFLAIR (82 versus 76; \( P = .25 \)). Conclusion and Clinical Importance Use of ceFLAIR as a complementary sequence to nFLAIR and ceT1W sequences did not improve the detection of brain lesions and cannot be recommended as part of a routine brain MRI protocol in dogs and cats with suspected brain lesions.

**Cytokine Concentrations in the Cerebrospinal Fluid of Great Danes with Cervical Spondylomyelopathy.**


Background Chronic inflammation is involved in the pathogenesis of human cervical spondylotic myelopathy and could also play a role in cervical spondylomyelopathy (CSM) in dogs. Hypothesis/Objectives That cerebrospinal fluid (CSF) cytokine concentrations would differ between clinically normal (control) and CSM-affected Great Danes (GDs), with affected GDs showing higher levels of inflammatory cytokines, such as interleukin (IL)-6 and monocyte chemotactant protein-1/chemokine ligand 2 (MCP-1/CCL2). Animals Client-owned GDs: 15 control, 15 CSM-affected. Methods Prospective study. Dogs underwent cervical vertebral column magnetic resonance imaging and collection of CSF from the cerebellomedullary cistern. Cytokine concentrations were measured using a commercially available canine multiplex immunoassay. Cytokine concentrations were compared between groups. Associations with the administration of anti-inflammatory medications, disease duration and severity, severity of spinal cord (SC) compression, and SC signal changes were investigated in affected GDs. Results Affected GDs had significantly lower MCP-1/CCL2 (mean 138.03 pg/mL, 95% confidence interval [CI] = 114.85–161.20) than control GDs (212.89 pg/mL, 95% CI = 165.68–260.11, \( P = .028 \)). In affected GDs, MCP-1/CCL2 concentrations correlated inversely with the severity of SC compression. There were no associations with administration of anti-inflammatory medications, disease duration, or disease severity. IL-6 concentrations were significantly higher (2.20 pg/mL, 95% CI = 1.92–2.47, \( P < .001 \)) in GDs with SC signal changes. Conclusions and Clinical Importance Lower MCP-1/CCL2 in CSM-affected GDs might compromise clearance of axonal and myelin debris, delay axon regeneration, and affect recovery. Higher IL-6 in CSM-affected GDs with SC signal changes suggests more severe inflammation in this group.

**Corpus Callosal Abnormalities in Dogs.**


Background Corpus callosal abnormalities (CCA) in dogs have been only sporadically reported and are poorly characterized. Hypothesis/Objectives To describe the clinical presentation and magnetic resonance imaging (MRI) characteristics of dogs with CCA. Animals Fifteen client-owned dogs. Methods Retrospective study. Records of the contributing institutions were reviewed to identify dogs diagnosed with malformations affecting the corpus callosum (CC); cases in which the CCA was thought to be secondary were excluded. Results The most represented breeds were Staffordshire Bull Terriers (5/15) and Miniature Schnauzers (3/15; n = 3, 20%) and the mean age at time of presentation of 19 months (range 3–81 months). The clinical signs most commonly reported were adipsia/hypodipsia with associated hypernatremia (12/15), tremors (6/15), and seizures (6/15). Review of the MR images revealed that 10 dogs had absence of the rostral CC and hypoplasia of the caudal portion, 4 dogs had a diffusely hypoplastic and dysplastic CC, and 1 dog had a diffusely hypoplastic CC. In 14 cases, there was abnormal cortical development with fusion of the ventral frontal lobes and part of the diencephalon, indicating lobar holoprosencephaly. Conclusions and Clinical Importance Previous literature has mainly associated CCA with adipsia and only 12 of 15 dogs in the current series demonstrated this abnormality. There are different degrees of the malformation but in 10 dogs the rostral portion of the CC is most severely affected. Fourteen dogs have simultaneous fusion of the midline structures rostral to the CC; this region has several structures involved in thirst regulation and might explain this derangement.

Hyperinsulinemic Hypoglycemia Syndrome in 2 Dogs with Bartonellosis E.B. Breitschwerdt, C. Goldkamp, W.L. Castleman, J.M. Cullen, P.E. Mascarelli, L. Thalhem and M. Schauer

Caudal Fossa Respiratory Epithelial Cyst in a Dog: Clinical, Magnetic Resonance Imaging, and Histopathologic Findings J. Molín, K. Rentmeister and K. Matiasek

The Veterinary Journal

What progress has been made in the understanding and treatment of degenerative lumbosacral stenosis in dogs during the past 30 years?
Nick D. Jeffery, Andrew Barker, Tom Harcourt-Brown
An association between degenerative changes in the lumbosacral region of the vertebral column and clinical signs of pain and pelvic limb dysfunction has long been recognized in dogs and has become known as degenerative lumbosacral stenosis syndrome. Over the past two decades, methods of imaging this condition have advanced greatly, but definitive criteria for a reliable diagnosis using physical examination, imaging and electrodiagnostics remain elusive. Available treatment options have changed little over more than 30 years but, more importantly, there is a lack of comparative studies and little progress has been made in providing evidence-based recommendations for the treatment of affected dogs. This review provides an overview of the changes in diagnosis, understanding and treatment of lumbosacral disease in dogs over the past 30 years. Approaches to address the unanswered questions regarding treatment choice are also proposed.

The influence of sex hormones on seizures in dogs and humans.
Sofie A.E. Van Meervenne, Holger A. Volk, Kaspar Matiasek, Luc M.L. Van Ham
Epilepsy is the most common chronic neurological disorder in both humans and dogs. The effect of sex hormones on seizures is well documented in human medicine. Catamenial epilepsy is defined as an increase in frequency and severity of seizures during certain periods of the menstrual cycle. Oestradiol increases seizure activity and progesterone is believed to exhibit a protective effect. The role of androgens is controversial and there is a lack of research focusing on androgens and epilepsy. Indeed, little is known about the influence of sex hormones on epilepsy in dogs. Sterilisation is believed to improve seizure control, but no systematic research has been conducted in this field. This review provides an overview of the current literature on the influence of sex hormones on seizures in humans. The literature on idiopathic epilepsy in dogs was assessed to identify potential risk factors related to sex and sterilisation status. In general, there appears to be an over-representation of male dogs with idiopathic epilepsy but no explanation for this difference in prevalence between sexes has been reported. In addition, no reliable conclusions can be drawn on the effect of sterilisation due to the lack of focused research and robust scientific evidence.

Evaluation of prognostic indicators using validated canine insulinoma tissue microarrays
Floryne O. Buishand, Judith Visser, Marja Kik, Andrea Gröne, Rebekah I. Keesler, Inge H. Briaire-de Bruijn, Jolle Kirpensteijn.
Tissue microarray (TMA) technology allows analysis of multiple tumour samples simultaneously on a single slide. The aim of the present study was to develop and assess a TMA containing 32 primary canine insulinomas and 13 insulinoma metastases. The results of histopathological and immunohistochemical analyses of triplicate core biopsies were compared with those of individual tissue sections using weighted \( \kappa \) statistics. Inter-observer agreement of TMA immunohistochemistry scores were assessed for chromogranin A (CgA), insulin, growth hormone (GH), growth hormone receptor (GHR) and Ki67 index, as well as the prognostic utility of clinicopathological, histopathological and immunohistochemical criteria. There was substantial agreement of scores for histopathological parameters (\( \kappa = 0.64–0.70 \)) and a substantial to near-perfect agreement for homogenous immunohistochemical parameters (\( \kappa = 0.69–1.00 \)). Except for GH, which demonstrated heterogeneous staining, there was good to excellent inter-observer agreement for all other immunohistochemical staining scores (intra-class correlation coefficients: 0.70–1.00). On univariate analysis, the presence of nuclear atypia was significantly predictive of disease-free intervals (DFIs) for canine insulinoma, while tumour size, TNM stage, necrosis and Ki67 index were significant in terms of prognosis, with respect to both DFI and survival time. On multivariate analysis, tumour size and Ki67 index retained predictive power for survival time,
as did tumour size for DFI. This study confirms the applicability of TMA technology for evaluation of canine insulinoma.

Cervical spondylomyelopathy in Great Danes: A magnetic resonance imaging morphometric study

P. Martin-Vaquero, R.C. da Costa, C.G.D. Lima

Morphometric investigations comparing normal and affected animals increase our understanding of spinal diseases in dogs. The aim of this study was to generate morphometric data for osseous-associated cervical spondylomyelopathy (CSM) in Great Danes (GDs). Magnetic resonance imaging (MRI) morphometric features of the cervical vertebral column of GDs with and without clinical signs of CSM were characterized and compared. Thirty client-owned GDs were prospectively enrolled, including 15 clinically normal and 15 CSM-affected GDs. All dogs underwent MRI of the cervical to thoracic vertebral column (C2-C3 through T1-T2). Areas of the cranial and caudal articular processes, and the height, width and areas of the vertebral canal and spinal cord were determined. Middle foraminal heights were measured. Intervertebral disc width was measured before and after traction. Intraobserver and interobserver agreement were calculated. CSM-affected GDs had larger areas of the caudal articular processes from C2-C3 through T1-T2. In CSM-affected GDs, the vertebral canal and spinal cord areas were significantly smaller at C5-C6 and C6-C7, the vertebral canal width was significantly narrower at C5-C7 and C7-T1, and the spinal cord width was significantly narrower at C5-C6 and C6-C7. Middle foraminal height was smaller in CSM-affected GDs from C3-C4 through C7-T1. Neutral intervertebral disc widths were smaller in CSM-affected GDs. It was concluded that the cervical vertebral canal dimensions are significantly different between normal and CSM-affected GDs. Absolute vertebral canal stenosis and severe foraminal stenosis involving the cervical vertebrae distinguish CSM-affected from clinically normal GDs. These findings are relevant to the pathogenesis of osseous-associated CSM and should be taken into consideration when performing imaging studies and planning surgery.

Antitumour effect and modulation of expression of the ABCB1 gene by perifosine in canine lymphoid tumour cell lines

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

Acquisition of multidrug resistance (MDR) is a common cause of treatment failure during chemotherapy for dogs with lymphoma (lymphosarcoma). Overexpression of P-glycoprotein (P-gp), encoded by the ABCB1 gene, is associated with MDR. Perifosine, an Akt inhibitor, downregulates the expression of P-gp. In this study, the antitumour effect of perifosine and its ability to modulate ABCB1 expression were examined in four canine lymphoid tumour cell lines (GL-1, CLBL-1, UL-1 and Ema). GL-1 and CLBL-1 were inherently negative for P-gp, while UL-1 and Ema were inherently positive for P-gp. GL-1 and UL-1 were sensitive to perifosine, whereas CLBL-1 and Ema were resistant. The amount of ABCB1 mRNA significantly decreased after treatment with perifosine in UL-1, associated with activation of the c-Jun NH2-terminal kinase (JNK) pathway, but such an effect was not observed in Ema. In UL-1, perifosine decreased the efflux of rhodamine 123 dye and reduced the 50% inhibitory concentration of vincristine, but such effects were not observed in Ema. Perifosine had an antitumour effect in 2/4 canine lymphoid tumour cell lines. In 1/4 cell lines, perifosine downregulated ABCB1 gene expression through activation of the JNK pathway and increased sensitivity to vincristine.

Magnetic resonance imaging signs of presumed elevated intracranial pressure in dogs

S. Bittermann, J. Lang, D. Henke, J. Howard, D. Gorgas

The aim of this study was to describe magnetic resonance imaging (MRI) findings associated with presumed elevated intracranial pressure (ICP) in dogs and to evaluate whether MRI could be used to discriminate between dogs with and without elevated ICP. Of 91 dogs that underwent cranial MRI examination, 18 (19.8%) were diagnosed with elevated ICP based on neurology examination, fundoscopy and transcranial Doppler ultrasonography. The MRI findings that showed the strongest association with elevated ICP were mass effect (odds ratio [OR], 78.5), caudal transtentorial herniation (OR, 72.0), subfalcial herniation (OR, 45.6), perilesional oedema (OR, 34.0), displacement of the lamina quadrigemina (OR, 27.7) and effacement of the cerebral sulci (OR, 27.1). The presence of any two or more of the following MRI findings identified elevated ICP with a sensitivity of 72% and a specificity of 96%: compression of the suprapineal recess, compression of the third ventricle, compression of the fourth ventricle, effacement of the cerebral sulci and caudal transposition of the lamina quadrigemina. In conclusion, there is an association between MRI findings and elevated ICP in dogs; therefore, MRI might be useful to discriminate between dogs with and without elevated ICP.

Canine stage 1 periodontal disease: A latent pathology.
To evaluate the potential health issues associated with periodontal disease (PD) in dogs, 1004 teeth from 25 dogs were examined. The dogs were randomly selected, aged 2–14 years, and had at least 95% of their teeth at the first PD stage. Significant positive correlations between plaque grade (PG) and gum inflammation, gingival regression, periodontal pocket, age and serum alanine aminotransferase (ALT) activity were identified. In contrast, PG was negatively correlated to total platelet count. Altogether, these findings suggest that prevention and therapy at the first PD stages can have an important impact on the general health condition of dogs.