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Measurement of glomerular filtration rate in cats: Methods and advantages over routine markers of renal function
Natalie Finch
Practical relevance: Routinely used markers of renal function in clinical practice include urea and creatinine. However, these are insensitive markers, particularly in the early stages of kidney disease. Measurement of glomerular filtration rate (GFR) is regarded as the most sensitive index of functioning renal mass. It may be useful for feline patients in varying clinical scenarios; for example, where a more accurate measurement of renal function may aid diagnosis, to enable response to therapeutic interventions to be more closely monitored, or to evaluate renal function prior to the use of nephrotoxic or renally cleared drugs. Clinical challenges: Traditional methods of measuring GFR, such as renal clearance or multisample plasma clearance techniques, are generally impractical for clinical use. Limited sampling and single sample plasma clearance methods using the filtration marker iothexol have been validated in cats. These have the advantages of reduced stress to cats associated with repeated sampling and reduced costs of analysis, and therefore offer greater clinical utility. Attempts to develop an estimated GFR (eGFR) formula similar to that used in human patients have been made in cats, although currently an accurate and reliable formula is not available. Audience: This review presents the basis for the theoretical understanding and practical measurement of GFR for any veterinary practitioner wishing to obtain a more accurate and sensitive assessment of renal function than routinely used markers provide.

Pharmacological appetite stimulation: Rational choices in the inappetent cat
Wendy Agnew and Rachel Korman
Practical relevance: Inappetence is a commonly encountered problem in feline medicine. Primary goals in managing the inappetent or anorectic cat are to diagnose and treat the underlying disease and reinstate adequate nutrition. Rationale: As cats are intolerant of prolonged periods of inadequate nutritional intake, especially given their propensity to develop hepatic lipidosis, their increased requirements for amino acids, and inability to slow their rate of gluconeogenesis, symptomatic therapy and nutritional support is often required during diagnostic investigations. Clinical challenges: Most cats presenting with reduced food intake will be suffering from an underlying systemic disease, and so the mechanism of action, pharmacokinetics and contraindications of appetite-stimulating medications will need to be considered in each case to ensure rational use of these agents. Pharmacological appetite stimulation should never replace monitoring and ensuring adequate caloric intake, and may not be appropriate in some cases, such as critically ill or severely malnourished patients. Evidence base: While there are no medications approved specifically for the treatment of anorexia in cats, some drugs have proven efficacious in the clinical field. Although several agents have been used historically for appetite stimulation, due to potential side effects and/or lack of efficacy or predictability only cyproheptadine and mirtazapine can currently be recommended for use.

Feline cutaneous lymphocytosis: case report and summary of the literature
Marlene S Pariser and Dunbar W Gram
Practical relevance: Feline cutaneous lymphocytosis is a rare disease characterized by proliferation of T and/or B lymphocytes in the dermis. Although some of the clinical and histopathologic findings of this condition can overlap with cutaneous lymphoma, it is important to distinguish these entities since their treatment and clinical outcomes vary greatly. Scope: This report presents a summary of the literature on feline cutaneous lymphocytosis and describes a case of this condition which showed some unique clinical features and was successfully controlled with oral glucocorticoids.

Microcirculatory effects of intravenous fluid administration in anesthetized dogs undergoing elective ovariohysterectomy.
Deborah C. Silverstein, Elizabeth M. Cozzi, Amber S. Hopkins, Thomas J. Keefe.
Objective—To assess the microcirculatory effects of IV fluid administration in healthy anesthetized dogs undergoing elective ovariohysterectomy. Animals—49 client-owned dogs. Procedures—Dogs were sedated, and anesthesia was induced with propofol and diazepam and maintained with isoflurane in oxygen. Dogs received lactated Ringer's solution (LRS) IV at rates of 0, 10, or 20 mL/kg/h. Videomicroscopy was used to assess and record effects of LRS administration on microcirculation in the buccal mucosa. Measurements of microcirculatory (total vessel density, proportion of perfused vessels, microcirculatory flow index, and perfused vessel density by vessel size [< 20 µm, ≥ 20 µm, and all diameters]) and other physiologic variables (heart rate,
Doppler-measured blood pressure, oxygen saturation as measured by pulse oximetry, capillary refill time, and body temperature) were compared among groups at baseline (immediately after anesthetic induction), 30 and 60 minutes afterward, and overall. Results—Neither the proportion of perfused vessels nor microcirculatory flow index varied among treatment groups at any time point, regardless of vessel size. For vessels < 20 µm in diameter and for all vessels combined, total and perfused vessel density were similar among groups. For vessels ≥ 20 µm in diameter, total vessel density was significantly greater in the 20 mL/kg/h group than in other groups, and perfused vessel density was significantly greater in the 20 mL/kg/h group than in the 0 mL/kg/h group, when all time points were considered. Other physiologic variables were similar among groups. Conclusions and Clinical Relevance—Total and perfused vessel density of vessels ≥ 20 µm in diameter (mostly venules) were greatest in dogs that received 20 mL of LRS/kg/h. Further research is required to evaluate clinical importance of these findings.

In vivo proton magnetic resonance spectroscopy for the evaluation of hepatic encephalopathy in dogs. Inés Carrera, Patrick R. Kircher, Dieter Meier, Henning Richter, Katrin Beckman, Matthias Dennler. Objective—To investigate clinical use of proton magnetic resonance spectroscopy (1H MRS) and to compare metabolic brain bioprofiles of dogs with and without hepatic encephalopathy. Animals—6 dogs with hepatic encephalopathy and 12 control dogs. Procedures—Conventional MRI and single-voxel 1H MRS were performed with a 3-T magnet. Images for routine MRI planes and sequences were obtained. Single-voxel 1H MRS was performed with a point-resolved sequence with a short echo time (35 milliseconds) and voxel of interest placement at the level of the basal ganglia. Metabolites of interest included the glutamine-glutamate complex (sum quantification of glutamate and glutamine), myoinositol, N-acetyl aspartate, total choline, and creatine. Data were analyzed with postprocessing fitting algorithm software, and metabolite concentration relative to water and ratios with creatine as the reference metabolite were calculated. Results—Compared with control dogs, dogs with hepatic encephalopathy had specific changes, which included significantly higher concentration relative to water of the glutamine-glutamate complex and significantly lower concentration of myoinositol. Choline and N-acetyl aspartate concentrations were also slightly lower in dogs with hepatic encephalopathy than in control dogs. No differences in creatine concentration were detected between groups. Conclusions and Clinical Relevance—1H MRS aids in the diagnosis of hepatic encephalopathy in dogs, and findings supported the assumption that ammonia is a neurotoxin that manifests via glutamine-glutamate complex derangements. Use of 1H MRS may provide clinically relevant information in patients with subclinical hepatic encephalopathy, equivocal results of bile acids tests, and equivocal ammonia concentrations or may be helpful in monitoring efficacy of medical management.

Evaluation of DNA methylation profiles of the CpG island of the ABCB1 gene in dogs with lymphoma. Hirotaka Tomiyasu, Aki Fujiwara-Igarashi, Yuko Goto-Koshino, Yasuhide Fujino, Koichi Ohno, Hajime Tsujimoto. Objective—To examine the DNA methylation status of the ABCB1 gene in tumor cells of dogs with lymphoma. Animals—27 dogs with multicentric B-cell high-grade lymphoma (19 chemotherapy-sensitive dogs and 8 chemotherapy-resistant dogs). Procedures—The DNA methylation profile of the CpG island of the ABCB1 gene was analyzed by use of bisulphite sequencing and real-time methylation-specific PCR assay in lymphoma cells. Quantitative reverse transcriptase PCR assay of the ABCB1 gene was conducted to measure the amount of mRNA. Correlation between the amount of ABCB1 mRNA and the methylation rate was examined. Results—The CpG island of the ABCB1 gene was hypomethylated in most dogs in both the chemotherapy-sensitive and -resistant groups. No significant difference was detected in the methylation rate between the 2 groups, and no significant correlation was detected between the methylation rate and the mRNA expression level. Conclusions and Clinical Relevance—Expression of the ABCB1 gene was not suppressed by hypermethylation of its CpG island in most dogs with lymphoma regardless of their chemotherapy sensitivity status.

Journal of Small Animal Practice

Measurement of the S-adenosyl methionine (SAMe) content in a range of commercial veterinary SAMe supplements. C. P. Sturgess Objectives: To measure the percentage of the stated amount of S-adenosyl methionine present in a range of commercially available S-adenosyl methionine supplements for veterinary use. METHOD: Sixty-four samples of products containing S-adenosyl methionine marketed to support liver function were obtained from five manufacturers via three commercial wholesalers. The amount of S-adenosyl methionine in each product was measured using high-pressure liquid chromatography. RESULTS; There were greater than threefold variation in the percentage of measured S-adenosyl methionine compared to the stated amount on the packaging which was significantly (P < 0.001) related to the product group being measured. CLINICAL SIGNIFICANCE;
Differences in received dose of S-adenosyl methionine between different products were marked and this could have a profound influence on studies that evaluate any variation in absorption of S-adenosyl methionine between different product formulations, the effectiveness of S-adenosyl methionine-based products in clinical cases or when translating the results of studies that have used a specific S-adenosyl methionine product to those produced by a different manufacturer.

**Lymphocytic ganglioneuritis secondary to intervertebral disc extrusion in a dog.**
A. E. Mouradian-Darby, B. D. Young, J. F. Griffin IV, J. Mansell and J. M. Levine
This study presents a case of lymphocytic ganglioneuritis in a dog secondary to intervertebral disc extrusion that mimicked a peripheral nerve sheath tumour on magnetic resonance imaging. A four-year-old spayed female dachshund with lumbar pain was imaged via magnetic resonance. A tubular, space-occupying, contrast-enhancing lesion was noted in the right intervertebral foramen at L6 to L7. This was presumed to represent focal enlargement of the right sixth lumbar spinal nerve. A right-sided haemilaminectomy was performed at L6 to L7 and material that grossly resembled extruded nucleus pulposus was removed. The right L6 dorsal root ganglion, dorsal nerve root and proximal spinal nerve were severely enlarged and a partial thickness biopsy was collected from the dorsal root ganglion. Results of histopathological examination of the submitted tissue samples were consistent with extruded disc material and lymphocytic ganglioneuritis. To the author's knowledge, this is the first published report of lymphocytic ganglioneuritis secondary to intervertebral disc disease in a dog.

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

**Analysis of the relationship of extrahepatic portosystemic shunt morphology with clinical variables in dogs: 53 cases (2009-2012).**
Kraun MB1, Nelson LL, Hauptman JG, Nelson NC.
Objective-To investigate differences in clinical variables among dogs with extrahepatic portosystemic shunts (EHPSSs) of various morphologies. Design- Retrospective case series. Animals-53 dogs with EHPSSs. Procedures-Medical records of dogs undergoing preoperative CT angiography of an EHPSS over a 3-year period were reviewed. Analysis was performed to investigate relationships of clinical variables with shunt morphology. Morphologies were analyzed individually as well as in several groups. Results-Shunt morphologies included 10 splenocaval, 9 splenohprenic, 11 splenoazygos, 10 right gastric-caval, 12 right gastric-caval with a caudal loop, and 1 right gastric-azygos with a caudal loop. Several biochemical variables associated with EHPSS were lowest in dogs with splenocaval shunts. Preoperative clinical signs were more common in dogs that had shunts with vena caval than right azygos vein insertion (36/41 [88%] vs 7/12 [58%]) and insertion caudal to the liver than diaphragmatic insertion (29/32 [91%] vs 14/21 [67%]). Neurologic signs were more common when shunts inserted into the vena cava caudal to the liver than in other locations (21/32 [66%] vs 6/21 [29%]) and were most frequent with splenocaval shunts. Urinary tract signs were more common when shunts had right gastric vein origin than gastroepiploic vein origin (14/23 [61%] vs 10/30 [33%]). Conclusions and Clinical Relevance-Splenocaval shunts caused more clinical abnormalities than did other shunt morphologies. Results suggested that dogs with shunt insertion in the caudal vena cava, especially caudal to the liver, were most likely to have clinical signs.

**Case-control study of the effects of pimobendan on survival time in cats with hypertrophic cardiomyopathy and congestive heart failure.**
Reina-Doreste Y1, Stern JÅ, Keene BW, Tou SP, Atkins CE, DeFrancesco TC, Ames MK, Hodge TE, Meurs KM.
Objective-To assess survival time and adverse events related to the administration of pimobendan to cats with congestive heart failure (CHF) to hypertrophic cardiomyopathy (HCM) or hypertrophic obstructive cardiomyopathy (HOCM). Design-Retrospective case-control study. Animals-27 cats receiving treatment with pimobendan and 27 cats receiving treatment without pimobendan. Procedures-Medical records between 2003 and 2013 were reviewed. All cats with HCM or HOCM treated with a regimen that included pimobendan (case cats) were identified. Control cats (cats with CHF treated during the same period with a regimen that did not include pimobendan) were selected by matching to case cats on the basis of age, sex, body weight, type of cardiomyopathy, and manifestation of CHF. Data collected included signalment, physical examination findings, echocardiographic data, serum biochemical values, and survival time from initial diagnosis of CHF. Kaplan-Meier survival curves were constructed and compared by means of a log rank test. Results-Cats receiving pimobendan had a significant benefit in survival time. Median survival time of case cats receiving pimobendan was 626 days, whereas median survival time for control cats not receiving pimobendan was 103 days. No significant differences were detected for any other variable. Conclusions and Clinical Relevance-The addition of pimobendan to traditional treatment for CHF may provide a substantial clinical benefit in survival time for HCM-affected cats with CHF and possibly HOCM-affected cats with CHF.
Long-term survival and quality of life in dogs with clinical signs associated with a congenital portosystemic shunt after surgical or medical treatment.

Greenhalgh SN1, Reeve JA, Johnstone T, Goodfellow MR, Dunning MD, O'Neill EJ, Hall EJ, Watson PJ, Jeffery ND.

Objective-To compare long-term survival and quality of life data in dogs with clinical signs associated with a congenital portosystemic shunt (CPSS) that underwent medical or surgical treatment. Design-Prospective cohort study. Animals-124 client-owned dogs with CPSS. Procedures-Dogs received medical or surgical treatment without regard to signalment, clinical signs, or clinicopathologic results. Survival data were analyzed with a Cox regression model. Quality of life information, obtained from owner questionnaires, included frequency of CPSS-associated clinical signs (from which a clinical score was derived), whether owners considered their dog normal, and (for surgically treated dogs) any ongoing medical treatment for CPSS. A Mann-Whitney U test was used to compare mean clinical score data between surgically and medically managed dogs during predetermined follow-up intervals. Results-97 dogs underwent surgical treatment; 27 were managed medically. Median follow-up time for all dogs was 1,936 days. Forty-five dogs (24 medically managed and 21 surgically managed) died or were euthanized during the follow-up period. Survival rate was significantly improved in dogs that underwent surgical treatment (hazard ratio, 8.11; 95% CI, 4.20 to 15.66) than in those treated medically for CPSS. Neither age at diagnosis nor shunt type affected survival rate. Frequency of clinical signs was lower in surgically versus medically managed dogs for all follow-up intervals, with a significant difference between groups at 4 to 7 years after study entry. Conclusions and Clinical Relevance-Surgical treatment of CPSS in dogs resulted in significantly improved survival rate and lower frequency of ongoing clinical signs, compared with medical management. Age at diagnosis did not affect survival rate and should not influence treatment choice.

Nutritional management of idiopathic epilepsy in dogs.

Larsen JA1, Owens TJ, Fascetti AJ.

Online — no abstract available

Journal of the American Veterinary Medical Association – Sep 15

Feeding practices of dog breeders in the United States and Canada

Kevin M. Connolly, PhD; Caitlin R. Heinze, VMD, MS; Lisa M. Freeman, DVM, PhD

Objective—To determine the proportion of dog breeders who fed diets meeting the Association of American Feed Control Officials regulations for nutritional adequacy for reproduction and growth and to investigate factors that influenced feeding practices of breeders. Design—Web-based cross-sectional survey. Sample—2,067 dog breeders from the United States and Canada. Procedures—A self-administered, anonymous, Web-based questionnaire was used to collect information on breeder demographics and feeding practices during 3 life stages of dogs: adult maintenance for nonpregnant dogs, gestation-lactation, and puppy growth. Appropriateness of commercial diets for each life stage was determined by respondent-reported nutritional adequacy statements on product labels. Data were also collected regarding breeder criteria for diet selection and sources of nutrition information. Results—A substantial number of breeders reported feeding commercial diets not intended for that life stage during gestation-lactation (126/746 [16.9%]) and puppy growth (57/652 [8.7%]). Additionally, approximately one-seventh of breeders reported feeding home-prepared diets for ≥ 1 life stage. Unsubstantiated health and marketing information influenced diet selection of many breeders. Veterinarians, although generally viewed as a trusted source of nutrition information, were consulted by only 823 of 1,669 (49.3%) breeders and were viewed less favorably by breeders feeding home-prepared diets, compared with the opinion of breeders feeding commercial diets. Conclusions and Clinical Relevance—Veterinarians should consider taking a more proactive role in directing dog breeders and other pet owners toward scientifically substantiated sources of diet information and in explaining the importance of current nutritional standards for reproduction and early development of dogs.

Clinical outcome after diagnosis of hemophilia A in dogs

Mary E. Asladian, DVM; Claire R. Sharp, BVMS, MS; Elizabeth A. Rozanski, DVM; Armelle M. de Laforcade, DVM; Mark Rishniw, BVSc, PhD; Marjory B. Brooks, DVM

Objective—To evaluate the clinical course of dogs with hemophilia A (factor VIII deficiency) and to determine whether factor VIII coagulant activity (FVIII:C) was associated with severity of clinical signs and outcome. Design—Survey study. Sample—Respondent information for 39 client-owned dogs with FVIII deficiency. Procedures—Information was obtained via a survey distributed to the American College of Veterinary Internal Medicine and American College of Veterinary Emergency and Critical Care email list serves and to the Veterinary Information Network community to identify dogs with hemophilia A (FVIII:C ≤ 20%). Severity of FVIII deficiency was classified as mild (FVIII:C, 6% to 20%), moderate (FVIII:C, 2% to 5%), or severe
Concentrations and the CCECAI or mucosal disease had increased urinary or fecal NMH concentrations, but there was no correlation between NMH (where available) in dogs with gastrointestinal disease was evaluated. Seven of 16 dogs with gastrointestinal concentration, the clinical disease activity index (CCECAI), and gastrointestinal mucosal mast cell control ranges. Correlation between fecal and urinary NMH concentrations, serum C-reactive protein (CRP) concentration, the clinical disease activity index (CCECAI), and gastrointestinal mucosal mast cell numbers (where available) in dogs with gastrointestinal disease was evaluated. Seven of 16 dogs with gastrointestinal disease had increased urinary or fecal NMH concentrations, but there was no correlation between NMH concentrations and the CCECAI or mucosal mast cell numbers. Urinary NMH concentrations were positively associated with histological grading and serum CRP concentrations. The lack of correlation between NMH

**Australian Veterinary Journal**

**Late-onset cerebellar abiotrophy in a Labrador Retriever.**

Bertalan A1, Glass E, Kent M, De LaHunta A, Bradley C.

**CASE REPORT:** A 5-year-old female spayed Labrador Retriever was examined for a hindlimb gait abnormality. Initial neurological examination was consistent with vestibular dysfunction. Over the course of 1 year, signs progressed to reflect cerebellar ataxia, vertical nystagmus and delayed postural reactions in all limbs. At the initial examination, subjective evaluation of magnetic resonance imaging scan of the brain was considered normal. Repeat imaging at 1 year after initial examination revealed a reduction in the size of the cerebellum. Retrospectively, the size of the cerebellum on the initial MRI was small when assessed using an objective measurement algorithm. Postmortem histopathological evaluation of the brain showed diffuse degeneration of Purkinje cell neurones with secondary granule cell loss in the cerebellum, in addition to pigment inclusions in brainstem neurones. **CONCLUSION:** The clinical history and clinicopathological data are consistent with late-onset cerebellar abiotrophy, which has not previously been described in this breed.

**The Veterinary Journal**

**Effect of high-impact targeted trap-neuter-return and adoption of community cats on cat intake to a shelter**


Approximately 2–3 million cats enter animal shelters annually in the United States. A large proportion of these are unowned community cats that have no one to reclaim them and may be too unsocialized for adoption. More than half of impounded cats are euthanased due to shelter crowding, shelter-acquired disease or feral behavior. Trap-neuter-return (TNR), an alternative to shelter impoundment, improves cat welfare and reduces the size of cat colonies, but has been regarded as too impractical to reduce cat populations on a larger scale or to limit shelter cat intake. The aim of this study was to assess the effect of TNR concentrated in a region of historically high cat impoundments in a Florida community. A 2-year program was implemented to capture and neuter at least 50% of the estimated community cats in a single 11.9 km2 zip code area, followed by return to the neighborhood or adoption. Trends in shelter cat intake from the target zip code were compared to the rest of the county. A total of 2366 cats, representing approximately 54% of the projected community cat population in the targeted area, were captured for the TNR program over the 2-year study period. After 2 years, per capita shelter intake was 3.5-fold higher and per capita shelter euthanasia was 17.5-fold higher in the non-target area than in the target area. Shelter cat impoundment from the target area where 60 cats/1000 residents were neutered annually decreased by 66% during the 2-year study period, compared to a decrease of 12% in the non-target area, where only 12 cats/1000 residents were neutered annually. High-impact TNR combined with the adoption of socialized cats and nuisance resolution counseling for residents is an effective tool for reducing shelter cat intake.

**Fecal and urinary N-methylhistamine concentrations in dogs with chronic gastrointestinal disease**

Nora Berghoff, Steve Hill, Nolie K. Parnell, Joanne Mansell, Jan S. Suchodolski, Jörg M. Steiner.

Due to their ability to release inflammatory mediators, such as histamine, mast cells are potentially important in gastrointestinal disease. The purpose of this study was to measure N-methylhistamine (NMH), a histamine metabolite, in fecal and urine samples from dogs with chronic gastrointestinal disease. Fecal and urinary NMH concentrations were compared between dogs with chronic gastrointestinal disease and control dogs, and/or to control ranges. Correlation between fecal and urinary NMH concentrations, serum C-reactive protein (CRP) concentration, the clinical disease activity index (CCECAI), and gastrointestinal mucosal mast cell numbers (where available) in dogs with gastrointestinal disease was evaluated. Seven of 16 dogs with gastrointestinal disease had increased urinary or fecal NMH concentrations, but there was no correlation between NMH concentrations and the CCECAI or mucosal mast cell numbers. Urinary NMH concentrations were positively associated with histological grading and serum CRP concentrations. The lack of correlation between NMH
concentrations and the CCECAI suggests that NMH may not be a good marker for clinical disease activity in dogs as determined by the CCECAI. Based on their association with severity of intestinal mucosal inflammation, urinary NMH concentrations may potentially have clinical utility as a marker of intestinal inflammation in certain groups of dogs with chronic gastrointestinal disease, but future studies in a larger number of dogs are necessary to further characterize the role of mast cell-mediated inflammation in dogs with chronic gastrointestinal disease.

**Efficacy of passively transferred antibodies in cats with acute viral upper respiratory tract infection**

Yvonne Friedl, Bianka Schulz, Anne Knebl, Chris Helps, Uwe Truyen, Katrin Hartmann

A commercial hyperimmune serum, containing antibodies against feline calicivirus (FCV), feline herpesvirus 1 (FHV-1), and feline panleukopenia virus, is available for treatment of cats with feline upper respiratory tract disease (FURTĐ), but its efficacy has not been rigorously evaluated in scientific studies. The aim of this randomised, placebo-controlled, double-blind clinical trial was to evaluate the efficacy of passive immunisation in cats with acute viral FURTĐ caused by FCV and/or FHV-1 infection. All cats received symptomatic treatment during the study period. Hyperimmune serum was administered to one group (n = 22) and an equivalent amount of saline was administered to the control group (n = 20) as placebo, for 3 consecutive days. In the treatment group, cats ≤12 weeks old received 2 mL, cats >12 weeks old received 4 mL, subcutaneously once daily and topically into eyes, nostrils, and mouth every 8 h. Clinical signs, including a ‘FURTĐ score’ and general health status, were recorded daily for 8 days and again on day 21. FCV shedding was determined by quantitative PCR on days 0 and 21. Clinical signs and health status in both groups improved significantly over time (P < 0.001). Cats receiving hyperimmune serum significantly improved in terms of ‘FURTĐ score’ (P = 0.046) and general health status (P = 0.032) by day 3, while cats in the placebo group only improved significantly by day 7. There was no significant difference in the number of cats shedding FCV between the two groups. Thus, administration of hyperimmune serum led to a more rapid improvement of clinical signs in cats with acute viral FURTĐ, but by day 7, clinical signs had improved equally in both groups.

**The canine hepatic progenitor cell niche: Molecular characterisation in health and disease**


Hepatic progenitor cells (HPCs) are an adult stem cell compartment in the liver that contributes to liver regeneration when replication of mature hepatocytes is insufficient. In this study, laser microdissection was used to isolate HPC niches from the livers of healthy dogs and dogs with lobular dissecting hepatitis (LDH), in which HPCs are massively activated. Gene expression of HPC, hepatocyte and biliary markers was determined by quantitative reverse transcriptase PCR. Expression and localisation of selected markers were further studied at the protein level by immunohistochemistry and immunofluorescent double staining in samples of normal liver and liver from dogs with LDH, acute and chronic hepatitis, and extrahepatic cholestasis. Activated HPC niches had higher gene expression of the hepatic progenitor markers OPN, FN14, CD29, CD44, CD133, LIF, LIFR and BMI1 compared to HPCs from normal liver. There was lower expression of albumin, but activated HPC niches were positive for the biliary markers SOX9, HNF1β and keratin 19 by immunohistochemistry and immunofluorescence. Laminin, activated stellate cells and macrophages are abundant extracellular matrix and cellular components of the canine HPC niche. This study demonstrates that the molecular and cellular characteristics of canine HPCs are similar to rodent and human HPCs, and that canine HPCs are distinctively activated in different types of liver disease.

**Detection of respiratory viruses and Bordetella bronchiseptica in dogs with acute respiratory tract infections**

B.S. Schulz, S. Kurz, K. Weber, H.-J. Balzer, K. Hartmann

Canine infectious respiratory disease (CIRD) is an acute, highly contagious disease complex caused by a variety of infectious agents. At present, the role of viral and bacterial components as primary or secondary pathogens in CIRD is not fully understood. The aim of this study was to investigate the prevalence of canine parainfluenza virus (CPIV), canine adenovirus type 2 (CAV-2), canine influenza virus (CIV), canine respiratory coronavirus (CRCoV), canine herpes virus-1 (CHV-1), canine distemper virus (CDV) and Bordetella bronchiseptica in dogs with CIRD and to compare the data with findings in healthy dogs. Sixty-one dogs with CIRD and 90 clinically healthy dogs from Southern Germany were prospectively enrolled in this study. Nasal and pharyngeal swabs were collected from all dogs and were analysed for CPIV, CAV-2, CIV, CRCoV, CHV-1, CDV, and B. bronchiseptica by real-time PCR. In dogs with acute respiratory signs, 37.7% tested positive for CPIV, 9.8% for CRCoV and 78.7% for B. bronchiseptica. Co-infections with more than one agent were detected in 47.9% of B. bronchiseptica-positive, 82.6% of CPIV-positive, and 100% of CRCoV-positive dogs. In clinically healthy dogs, 1.1% tested positive for CAV-2, 7.8% for CPIV and 45.6% for B. bronchiseptica. CPIV and B. bronchiseptica were detected significantly more often in dogs with CIRD than in clinically healthy dogs.
The effects of positioning, reason for screening and the referring veterinarian on prevalence estimates of canine hip dysplasia

Although the prevalence of canine hip dysplasia (HD) has been the subject of a number of published studies, estimates vary widely. This study evaluated several possible causes for these differences. Sixty Belgian, Dutch and German veterinarians were asked to submit all hip radiographs obtained for screening purposes (irrespective of HD status) over a 2-year period, resulting in a database of 583 dogs. Each set of radiographs was accompanied by information on the reason for screening (breeding soundness examination, clinical complaint, assistance dogs, or other reasons), and dog breed, date of birth and age. Dog positioning exerted an effect at multiple levels. The agreement among different observers regarding correct or incorrect positioning was limited and incorrect positioning itself reduced the inter-observer agreement for radiographic hip conformation. Dysplastic dogs were more commonly positioned incorrectly than non-dysplastic dogs. The clinical complaint population had a high prevalence of dysplastic dogs (>70%) compared with the breeding population (11%) and the assistance dogs (6%). There was a significantly lower prevalence of HD among cases referred by veterinarians who frequently submitted hip-extended radiographs for evaluation (P = 0.002) compared to those who refer less frequently. However, this was likely to be selection bias, as radiographs that were from dogs suspected to be dysplastic were not submitted by frequent senders. The prevalence of dysplastic dogs varied widely between breeds (16.7–71.4%). Dogs diagnosed with dysplasia were significantly older than dogs considered healthy (P = 0.001) and dogs classified as borderline dysplastic (P = 0.035). Inter-observer agreement for hip conformation was moderately low, resulting in >7% variation in prevalence estimates for dysplasia.

Pancreas-specific lipase concentrations and amylase and lipase activities in the peritoneal fluid of dogs with suspected pancreatitis
Marie A. Chartier, Steve L. Hill, Sarena Sunico, Jan S. Suchodolski, Jane E. Robertson, Joerg M. Steiner

Diagnosing acute pancreatitis in the dog can be challenging. The aim of this study was to determine the concentrations of pancreas-specific lipase immunoreactivity (cPLI), and the activities of amylase and lipase, in the peritoneal fluid from a population of dogs diagnosed with acute pancreatitis based on clinical signs, ultrasonographic findings and serum cPLI concentrations. In a prospective study, cPLI concentrations, and amylase and lipase activities, were measured in the peritoneal fluid of 14 dogs with pancreatitis and 19 dogs with non-pancreatic disease. The sensitivity and specificity of peritoneal fluid cPLI concentration (cut-off value 500 µg/L) were 100.0% (95% confidence interval, CI, 80.7–100.0%) and 94.7% (95% CI 76.7–99.7%), respectively. The sensitivity and specificity of peritoneal fluid amylase (cut-off value 1050 U/L) and lipase activities (cut-off value 500 U/L) were 71.4% (95% CI 44.5–90.2%) and 84.2% (95% CI 62.8–95.8%) for amylase activity, and 92.9% (95% CI 69.5–99.6%) and 94.7% (95% CI 76.7–99.7%) for lipase activity, respectively. In conclusion, peritoneal fluid cPLI concentration was highly sensitive as a complementary diagnostic tool in a group of dogs with suspected acute pancreatitis. Peritoneal fluid lipase activity was not as sensitive as cPLI concentration, but may also support a diagnosis of acute pancreatitis in dogs.

Diagnosis of canine gastric adenocarcinoma using squash preparation cytology
Fulvio Riondato, Barbara Miniscalco, Enrica Berio, Elvio Lepri, Silvia Rossi, Enrico Bottero

Adenocarcinoma is the most common gastric tumour in dogs. Clinical signs and laboratory results are often non-specific, with histopathological examination of gastric biopsies being required to reach a definitive diagnosis. Use of cytology would potentially shorten the time to diagnosis and allow early interventional measures to be implemented. However, there are relatively few studies of the cytological features of gastric samples. The present study was designed to investigate whether cytology might be useful for diagnosis of canine gastric adenocarcinomas and to evaluate the performance of squash preparation cytology for this purpose. Squash preparations of gastric biopsies from 94 dogs were reviewed to determine the presence or absence of specific cytological features associated with adenocarcinomas and to compare findings with the results of histopathological examination of gastric biopsies. The presence of signet ring cells, microvacuolation, cellular pleomorphism and single cell distribution of epithelial cells were positively associated with a diagnosis of gastric adenocarcinoma. Combined evaluation (parallel testing) for the presence of signet ring cells and microvacuolation demonstrated excellent results for recognition of adenocarcinomas. Cytological examination of squash preparations from gastric biopsies and identification of signet ring cells and cytoplasmic vacuolation can allow rapid and reliable diagnosis of canine gastric adenocarcinomas.
Short term effects of increasing dietary salt concentrations on urine composition in healthy cats

N. Paßlack, H. Burmeier, T. Brenten, K. Neumann, J. Zentek

High dietary salt (NaCl) concentrations are assumed to be beneficial in preventing the formation of calcium oxalate (CaOx) uroliths in cats, since increased water intake and urine volume have been observed subsequent to intake. In human beings, dietary NaCl restriction is recommended for the prevention of CaOx urolith formation, since high NaCl intake is associated with increased urinary Ca excretion. The aim of the present study was to clarify the role of dietary NaCl in the formation of CaOx uroliths in cats. Eight cats received four diets that differed in Na and Cl concentrations (0.38–1.43% Na and 0.56–2.52% Cl dry matter, DM). Each feeding period consisted of a 21 day adaptation period, followed by a 7 day sampling period for urine collection. Higher dietary NaCl concentrations were associated with increased urine volume and renal Na excretion. Urinary Ca concentration was constant, but renal Ca excretion increased from 0.62 to 1.05 mg/kg bodyweight (BW)/day with higher dietary NaCl concentrations (P ≤ 0.05). Urinary oxalate (Ox), citrate, P and K concentrations decreased when NaCl intake was high (P ≤ 0.05), and urinary pH was low in all groups (6.33–6.45; P > 0.05). Relative supersaturation of CaOx in the urine was unaffected by dietary NaCl concentrations. In conclusion, the present study demonstrated several beneficial effects of high dietary NaCl intake over a relatively short time period. In particular, urinary Ca concentration remained unchanged because of increased urine volume. Decreased urinary Ox concentrations might help to prevent the formation of CaOx uroliths, but this should be verified in future studies in diseased or predisposed cats.

Platelet parameters from an automated hematology analyzer in dogs with inflammatory clinical diseases

Jo R. Smith, Katherine F. Smith, Benjamin M. Brainard

The mean platelet component (MPC) is a proprietary algorithm of an automated laser-based hematology analyzer system which measures the refractive index of platelets. The MPC is related linearly to platelet density and is an indirect index of platelet activation status. Previous investigations of canine inflammatory conditions and models of endotoxemia demonstrated a significant decrease in the MPC, consistent with platelet activation. The purpose of this study was to evaluate the MPC and other platelet parameters in dogs with different diseases to determine if they could show differential platelet activation with different pathologies. The hypothesis was that the MPC would decrease in clinical conditions associated with systemic inflammation or platelet activation. Complete blood counts run on the analyzer from dogs with different inflammatory conditions (primary immune-mediated hemolytic anemia (IMHA) or thrombocytopenia (ITP), pituitary-dependent hyperadrenocorticism, intra-abdominal sepsis, pancreatitis, intravascular thrombus or thromboembolus and hemangiosarcoma) were reviewed retrospectively and compared with those of control dogs presenting for orthopedic evaluation. Dogs with ITP had a decreased plateletcrit and MPC, with an increased platelet volume and number of large platelets (P < 0.001). Dogs with IMHA had an increased plateletcrit and mass, and more numerous large platelets (P < 0.001). With the exception of the ITP group, there was no difference in MPC in the diseased groups when compared with the controls. The results of this study suggest the MPC does not change in certain canine diseases associated with systemic inflammation.

Surveillance of diarrhoea in small animal practice through the Small Animal Veterinary Surveillance Network (SAVSNET)


Using the Small Animal Veterinary Surveillance Network (SAVSNET), a national small animal disease-surveillance scheme, information on gastrointestinal disease was collected for a total of 76 days between 10 May 2010 and 8 August 2011 from 16,223 consultations (including data from 9115 individual dogs and 3462 individual cats) from 42 premises belonging to 19 UK veterinary practices. During that period, 7% of dogs and 3% of cats presented with diarrhoea. Adult dogs had a higher proportional morbidity of diarrhoea (PMD) than adult cats (P < 0.001). This difference was not observed in animals <1 year old. Younger animals in both species had higher PMDs than adult animals (P < 0.001). Neutering was associated with reduced PMD in young male dogs. In adult dogs, miniature Schnauzers had the highest PMD. Most animals with diarrhoea (51%) presented having been ill for 2–4 days, but a history of vomiting or haemorrhagic diarrhoea was associated with a shorter time to presentation. The most common treatments employed were dietary modification (66% of dogs; 63% of cats) and antibacterials (63% of dogs; 49% of cats). There was variability in PMD between different practices. The SAVNET methodology facilitates rapid collection of cross-sectional data regarding diarrhoea, a recognised sentinel for infectious disease, and characterises data that could benchmark clinical practice and support the development of evidence-based medicine.

Selection response to DNA testing for canine ceroid lipofuscinosis in Tibetan terriers

Susanne Kluth, Judith Eckardt, Ottmar Distl

A late onset form of canine ceroid lipofuscinosis (CCL) is prevalent in Tibetan terriers. The disease is inherited as a monogenic recessive trait caused by aberrant exon skipping in ATP13A2. The aim of the present study was...
to analyze the frequencies of this mutation in Tibetan terriers registered with the German club for Tibetan dog breeds (Internationaler Klub für Tibetische Hunderassen, KTR) from 1987 to 2012 and to determine responses to selection following the introduction of DNA testing in 2010. The study included DNA extracted from blood samples from 1120/1240 (90.3%) Tibetan terriers registered with the KTR, including 405/420 (96.4%) registered breeding dogs. Mutant allele frequencies before the introduction of DNA testing were 0.20–0.28 in the registered and breeding dog populations, respectively, decreasing to 0.09 and 0.14, respectively, following the introduction of DNA testing.

**Journal of Veterinary Internal Medicine**

**Evaluation of Urethral Stent Placement for Benign Urethral Obstructions in Dogs.**
T.L. Hill, A.C. Berent and C.W. Weisse. Background Benign urethral obstructions (BUO) in dogs result in substantial morbidity because of challenges with conventional therapies. Treatment of malignant urethral obstructions with intraluminal urethral stents is reported to successfully relieve obstructions. Hypothesis/Objectives To evaluate the efficacy and outcome of urethral stent placement for treatment of BUO in dogs. Animals Eleven client-owned animals with urethral stents placed for treatment of BUO. Methods Retrospective study in which medical records were reviewed in dogs diagnosed with BUO and treated with a metallic urethral stent. Data collected included signalment, cause of benign obstruction, procedure time, size and type of stent, complications, and short- and long-term outcome. Results Eleven dogs with 15 urethral stents were included. Intraluminal urethral stent(s) relieved the obstructions in all dogs. Four dogs had 2 stents placed in separate procedures because of incomplete patency after treatment (n = 1), inadvertent compression of the stent (n = 1), or tissue ingrowth through the stent (n = 2). The median continence score after stent placement was 10 of 10 (range 3–10) with 6 dogs being continent, 3 mildly incontinent, and 1 each moderately and severely incontinent. All owners considered their dog to have an excellent long-term clinical outcome with long-term urethral patency. The median follow-up time was 24 months (range 4–48). Conclusions and Clinical Importance Urethral stents appear to be an effective treatment for benign urinary obstructions. Moderate to severe incontinence developed in a minority (12.5%) of dogs. Stents relieved obstructions in all dogs with an excellent long-term outcome.

**A Retrospective Study of 1,098 Blood Samples with Anemia from Adult Cats: Frequency, Classification, and Association with Serum Creatinine Concentration.**
E. Furman, E. Leidinger, E.H. Hooijberg, N. Bauer, G. Beddies and A. Moritz. Background Frequency and classification of anemia in terms of regeneration status and erythrocyte indices are not well described in cats. Objective To determine frequency and regenerative status of anemia in samples from adult cats, to assess the sensitivity and specificity of macrocytosis and hypochromasia for detecting regenerative anemia (RA), and to evaluate the association of anemia with increased serum creatinine concentration (SC). Study Population Laboratory records from 30,503 blood samples from cats (2003–2011). Methods Clinicopathologic data reviewed retrospectively. Anemia defined as hematocrit (Ht) ≤27%, red blood cell count (RBC) ≤5.5 × 10^6/µL and hemoglobin (Hb) ≤9.0 g/dL. RA defined by manual absolute reticulocyte count >50 × 10^3/µL. Macrocytosis was defined as mean corpuscular volume (MCV) >55 fL and hypochromasia as mean corpuscular hemoglobin concentration (MCHC) <31 g/dL. Cutoff for increased serum creatinine concentration was 1.6 mg/dL. Results Overall, 1,098 of 30,503 blood samples (3.6%) from cats fulfilled criteria for anemia, 633 of 1,098 (57.7%) classified as nonregenerative (NRA) and 465 of 1,098 (42.3%) as regenerative. RBC, Ht, and Hb were significantly lower in the RA compared to NRA group (P < .05). Sensitivity and specificity of the combined high MCV and low MCHC to detect samples with RA were 19.5 and 90.7%. SC was increased in 572 of the 1,098 anemic samples (52.1%) and in 11,121 of 29,405 of nonanemic samples (37.8%). Conclusions and Clinical Importance Majority of anemic samples were classified as NRA. Anemia was more severe in cats with RA. Erythrocyte indices were not sensitive indicators of RA.

**Comparison of Manual and Suction Pump Aspiration Techniques for Performing Bronchoalveolar Lavage in 18 Dogs with Respiratory Tract Disease.**
K.S. Woods, A.M.N. Defarges, A.C.G. Abrams-Ogg, L. Viel, B.A. Brisson and D. Bienzle. Background Different aspiration techniques to retrieve bronchoalveolar lavage fluid (BALF) affect sample quality in healthy dogs. Studies evaluating these techniques in dogs with respiratory disease are lacking. Objectives To compare sample quality of BALF acquired by manual aspiration (MA) and suction pump aspiration (SPA). Animals Eighteen client-owned dogs with respiratory disease. Methods Randomized, blinded prospective clinical trial. Manual aspiration was performed with a 35-mL syringe attached directly to the bronchoscope biopsy channel and SPA was performed with a maximum of 50 mmHg negative pressure applied to the bronchoscope suction valve using the suction trap connection. Both aspiration techniques were performed in each dog on contralateral lung lobes, utilizing 2 mL/kg lavage volumes per site. Samples of BALF were
analyzed by percentage of retrieved infusate, total nucleated cell count (TNCC), differential cell count, semiquantitative assessment of slide quality, and diagnosis score. Data were compared by paired Student's t-test, Wilcoxon signed-rank test, chi-squared test, and ANOVA. Cohen's kappa coefficient was used to assess agreement. Results The percentage of retrieved BALF (P = .001) was significantly higher for SPA than MA. Substantial agreement was found between cytologic classification of BALF obtained with MA and SPA (kappa = 0.615). There was no significant difference in rate of definitive diagnosis achieved with cytologic assessment between techniques (P = .78). Conclusions and Clinical Importance Suction pump aspiration, compared to MA, improved BALF retrieval, but did not significantly affect the rate of diagnostic success of bronchoalveolar lavage (BAL) in dogs with pulmonary disease.

ISO-Based Assessment of Accuracy and Precision of Glucose Meters in Dogs.
Background Portable blood glucose meters (PBGMs) allow easy glucose measurements. As animal-specific PBGMs are not available everywhere, those for humans are widely used. Objectives To assess the accuracy and precision of 9 PBGMs in canine whole blood (WB) and plasma, based on the ISO 15197:2013. Animals Fifty-nine client-owned dogs attending the Veterinary Teaching Hospital. Methods Analytical evaluation of 100 blood samples was performed for accuracy and 23 for precision (glucose 29–579 mg/dL) following ISO recommendations. A PBGM was considered accurate if 95% of the measurements were within ±15 mg/dL from the reference when glucose was <100 mg/dL and within ±15% when it was ≥100 mg/dL, and if 99% of them were within zones A and B in error grid analysis (EG). A hexokinase-based analyzer was used as reference. Ninety samples were assessed for hematocrit interferences. Results Accuracy requirements were not fulfilled by any PBGM in WB (74% of measurements within the limits for the most accurate) and by 1 only in plasma. However, the EG analysis in WB was passed by 6 PBGM and by all in plasma. The most accurate were also the most precise, with coefficients of variation <5% in WB and <3% in plasma. Hematocrit correlated with bias against the reference method in 4 PBGM (r = −0.243 [−0.371]; P < .021). Conclusions and Clinical Importance This disparity among PBGM suggests that meters approved for humans need to be evaluated before use in other species.

Effects of Maropitant Citrate or Acepromazine on the Incidence of Adverse Events Associated with Hydromorphone Premedication in Dogs.
A.K. Claude, A. Dedeaux, L. Chiavaccini and S. Hinz
Background Vomiting is a common complication associated with the use of hydromorphone for pre-emptive analgesia in dogs. The ideal anti-emetic protocol for prevention of this complication has not been established. Hypothesis Maropitant administered concurrently or before hydromorphone would reduce the incidence of vomiting, signs of nausea, ptyalism, and increased panting compared to administration of acepromazine or a 0.9% saline control. Animals Sixty mixed-breed female dogs scheduled for ovariohysterectomy. Methods Randomized, blinded, placebo-controlled experimental study. Dogs were assigned to 4 experimental groups with 15 dogs per group. All groups received 0.2 mg/kg of hydromorphone IM. Group “Control” received 0.1 mL/kg saline SC 30–45 minutes before hydromorphone, group “Marop1” received 1 mg/kg maropitant SC 30–45 minutes before hydromorphone, group “Ace” received 0.02 mg/kg IM acepromazine 30–45 minutes before hydromorphone, and group “Marop2” received 1 mg/kg SC maropitant concurrently with hydromorphone. A trained and blinded observer documented adverse events from the time hydromorphone was administered until the time dogs were induced for surgery. Results Marop1 had significantly less vomiting (0%) compared to Control (87%; P < .01) and Ace (53%; P < .01). Marop2 had significantly less vomiting (27%) compared to Control (P < .01). Marop1 had significantly greater incidence of ptyalism (73%) compared to Ace (P < .01; 20%). Ace showed significantly less panting (33%) compared to Marop2 (93%; P < .01). Conclusions and Clinical Importance In healthy dogs, maropitant citrate administered before hydromorphone significantly decreases the incidence of vomiting in dogs but does not improve signs of nausea, ptyalism, or increased panting.

Hypomagnesemia in Brachycephalic Dogs
M.S. Mellema, and G.L. Hoareau
Background Brachycephalic dogs are at risk for arterial hypertension and obstructive sleep apnea, which are both associated with chronic magnesium (Mg) depletion. Hypothesis/Objectives To compare the period prevalence of hypomagnesemia between Boxers and Bulldogs presented to a referral teaching hospital. To screen a group of Bulldogs for evidence of hypomagnesemia, and to obtain pilot data regarding the utility of parenteral Mg tolerance testing (PMgTT) in the diagnosis of whole-body Mg deficiency. Animals Chemistry laboratory submissions were retrospectively analyzed for serum total Mg (tMg) in Boxers and Bulldogs. prospectively, 16 healthy client-owned Bulldogs were enrolled. Methods Retrospective case study. tMg concentrations were compared between Boxers and Bulldogs. Dogs with low serum albumin or high serum
creatinine concentrations were excluded. Prospectively, ionized Mg (iMg), tMg, and arterial blood pressure were measured and iMg-to-tMg ratio (iMg : tMg) was calculated. Parenteral Mg tolerance testing (PMgTT) was performed in 3/16 dogs. Results In the retrospective study, period prevalence of hypomagnesemia was 4.7% in Boxers and 15% in Bulldogs (P = .02). The risk ratio for hypomagnesemia in Bulldogs was 1.8 when compared to Boxers (CI: 1.3–2.7). In the prospective study, iMg was [median (interquartile)] 0.43 (0.42–0.46) mmol/L (reference range 0.4–0.52), tMg was 1.9 (1.8–1.9) mg/dL (reference range 1.9–2.5). iMg : tMg was [mean (+SD)] 0.59 ± 0.04. Percentage retention after PMgTT were 55%, 95%, and 67%, respectively. Conclusions and Clinical Importance Mg deficiency is common in Bulldogs and could contribute to comorbidities often observed in this breed. iMg : tMg and PMgTT might prove helpful in detecting chronic subclinical Mg deficiency.

Markers of Angiogenesis Associated with Surgical Attenuation of Congenital Portosystemic Shunts in Dogs
M.S. Tivers, A.K. House, K.C. Smith, C.P.D. Wheeler-Jones and V.J. Lipscomb
Background Dogs with congenital portosystemic shunts (CPSS) have hypoplasia of the intrahepatic portal veins. Surgical CPSS attenuation results in the development of the intrahepatic portal vasculature, the precise mechanism for which is unknown, although new vessel formation by angiogenesis is suspected. Hypothesis That the degree of portal vascular development and the increase in portal vascularization after CPSS attenuation is significantly associated with hepatic vascular endothelial growth factor (VEGF) and VEGF receptor 2 (VEGFR2) gene expression and serum VEGF concentration. Animals Client-owned dogs with CPSS undergoing surgical treatment. Forty-nine dogs were included in the gene expression data and 35 in the serum VEGF data. Materials and Methods Dogs surgically treated by partial or complete CPSS attenuation were prospectively recruited. Relative gene expression of VEGF and VEGFR2 was measured in liver biopsy samples taken at initial and follow-up surgery using quantitative polymerase chain reaction. Serum VEGF concentration was measured before and after CPSS attenuation using a canine specific ELISA. Statistical significance was set at the 5% level (P ≤ .05). Results There was a significant increase in the mRNA expression of VEGFR2 after partial attenuation (P = .006). Dogs that could tolerate complete attenuation had significantly greater VEGFR2 mRNA expression than those that only tolerated partial attenuation (P = .037). Serum VEGF concentration was significantly increased at 24 (P < .001) and 48 (P = .003) hours after attenuation. Conclusions and Clinical Importance These findings suggest that intrahepatic angiogenesis is likely to occur after the surgical attenuation of CPSS in dogs, and contributes to the development of the intrahepatic vasculature postoperatively.

Urinary Corticoid Concentrations Measured by 5 Different Immunoassays and Gas Chromatography-Mass Spectrometry in Healthy Dogs and Dogs with Hypercortisolism at Home and in the Hospital.
Background Determination of the urinary corticoid-to-creatinine ratio (UCCR) is an important screening test in the diagnosis of hypercortisolism (HC). However, urinary cortisol metabolites interfere with cortisol measurement in immunoassays, leading to decreased specificity. Gas chromatography-mass spectrometry (GC-MS) is considered the gold standard for steroid hormone analysis, because it provides a high level of selectivity and accuracy. Objectives To prospectively compare the UCCR of healthy dogs and dogs with HC determined by 5 different immunoassays and by GC-MS and to evaluate the influence of veterinary care on UCCR. Animals Twenty healthy dogs; 18 dogs with HC. Methods Urine was collected in the hospital and again after 6 days at home. Three chemiluminescence immunoassays (Access 2, Beckmann; Immulite 2000, DPC Siemens, with and without trichloromethane extraction) and 2 RIAs (Utrecht in house; Access Beckmann) were used. GC-MS analyses were performed with Agilent 6890N/5973N. Urinary corticoid concentrations were related to urinary creatinine concentrations. Results Immunoassay results were significantly higher compared to GC-MS results. Evaluation of bias plots and clinical assessment made on the basis of the assay results of each dog indicated substantial disagreement among the assays. Sensitivity varied from 37.5 to 75% and with selected assays was lower in samples from day 6 compared to day 0. GC-MS was not superior to the immunoassays in discriminating healthy from HC dogs. Conclusions and Clinical Importance Considerable variation must be anticipated comparing different urinary cortisol assays. Establishing an assay- and laboratory-specific reference range is critical when using UCCR.

Endoscopic Assessment of the Duodenum in Dogs with Inflammatory Bowel Disease
Background Endoscopy is performed for direct inspection of the mucosa and acquisition of biopsies in dogs with inflammatory bowel disease (IBD). Aim To evaluate the interobserver agreement in the endoscopic assessment of duodenal mucosa in dogs with IBD. Methods Thirty-five archived endoscopic images of grossly normal (n = 6) and inflamed (n = 29) duodenal mucosa were displayed to 3 expert and 5 trainee endoscopists.
Each image was assessed independently by endoscopists for mucosal abnormalities using established indices (of hyperemia, granularity, friability, lymphatic dilatation, and erosions) or interpreted as normal mucosa (trial 1). A repeated trial (trial 2) was performed with the same images presented in random order 1 month later, and accompanied by a visual template. Results There was slight interobserver agreement in initial mucosal assessment for expert and trainee endoscopists in trial 1 (kappa ≤ 0.02, P > .05). Interobserver agreement improved in trial 2 for both expert and trainee endoscopists (kappa = 0.2, P > .05) for experts and (P < .05) for trainees. There was a significant (P < .01) improvement in trainee endoscopy scores of lesions from trial 1 to trial 2. Regression analysis showed a significant (P < .01) difference between expert versus trainee endoscopy scores in trial 1. Repeat lesion assessment aided by use of a visual template (trial 2) improved the overall scores of trainee endoscopists to near that of expert endoscopists (P = .06). Conclusions and Clinical Importance Interobserver agreement of IBD mucosal appearance from endoscopic findings benefitted from operator experience.

N-Terminal Pro-C-Natriuretic Peptide and Cytokine Kinetics in Dogs with Endotoxemia.
Background Serum N-terminal pro-C-natriuretic peptide (NT-proCNP) concentration at hospital admission has sufficient sensitivity and specificity to differentiate naturally occurring sepsis from nonseptic systemic inflammatory response syndrome (SIRS). However, little is known about serum NT-proCNP concentrations in dogs during the course of sepsis. Objective To determine serum NT-proCNP and cytokine kinetics in dogs with endotoxemia, a model of canine sepsis. Samples Eighty canine serum samples. Methods Eight healthy adult Beagles were randomized to receive Escherichia coli lipopolysaccharide (LPS, 5 µg/kg) or placebo (0.9% NaCl) as a single IV dose in a randomized crossover study. Serum collected at 0, 1, 2, 4, and 24 hours was stored at −80°C for batch analysis. Serum NT-proCNP was measured by ELISA and 13 cytokines and chemokines by multiplex magnetic bead-based assay. Results Serum NT-proCNP concentrations did not differ significantly between LPS- and placebo-treated dogs at any time. When comparing serum cytokine concentrations, LPS-treated dogs had higher interleukin-6 (IL-6), IL-10, TNF-α and KC-like at 1, 2, and 4 hours; higher CCL2 at 1, 2, 4, and 24 hours; and higher IL-8 and CXCL10 at 4 hours compared to placebo-treated dogs. There were no differences in serum GM-CSF, IFN-γ, IL-2, IL-7, IL-15 or IL-18 between LPS- and placebo-treated dogs. Conclusions and Clinical Importance Serum NT-proCNP concentration does not change significantly in response to LPS administration in healthy dogs. Certain serum cytokine and chemokine concentrations are significantly increased within 1–4 hours after LPS administration and warrant further investigation as tools for the detection and management of sepsis in dogs.

Characterization of Kidney Injury Molecule-1 in Cats.
S.K. Bland, O. Côté, M.E. Clark, J. DeLay and D. Bienzle
Background Kidney disease (KD) is common in older cats and presumed to arise from subclinical kidney injuries throughout life. Sensitive markers for detecting kidney injury are lacking. Kidney injury molecule 1 (KIM-1) is a useful biomarker of kidney injury in humans and rodents. Hypothesis/Objectives Feline KIM-1 is conserved across species, expressed in kidney, and shed into urine of cats with acute kidney injury (AKI). The objectives were to characterize the feline KIM-1 gene and protein, assess available immunoassays for detecting KIM-1 in urine of cats, and identify KIM-1 expression in kidney sections. Animals Samples from 36 hospitalized and 7 clinically healthy cats were evaluated. Hospitalized cats were divided into 2 groups based on absence (n = 20) or presence (n = 16) of historical KD. Methods Feline KIM-1 genomic and complementary DNA sequences were amplified, sequenced and analyzed to determine the presence of isoforms, exon-intron organization and similarity with orthologous sequences. Presence in urine was evaluated by immunoassay and expression in kidney by immunohistochemistry. Results Three expressed feline KIM-1 transcript variants comprising 894, 810, and 705 bp were identified in renal tissue. KIM-1 immunoassays yielded positive results in urine of cats with conditions associated with AKI, but not chronic KD. Immunohistochemistry of kidney sections identified KIM-1 in proximal tubular cells of cats with positive urine immunoassay results. Conclusions and Clinical Importance Kidney injury molecule 1 was expressed in specific segments of the nephron and detected in urine of cats at risk of AKI. Urine KIM-1 immunoassay may be a useful indicator of tubular injury.

Serum Concentrations of Gastrin after Famotidine and Omeprazole Administration to Dogs
N.L. Parente, N. Bari Olivier, K.R. Refsal and C.A. Johnson
Background The duration of antacid-induced hypergastrinemia after cessation of administration of omeprazole and famotidine apparently has not been determined in dogs. Hypothesis That serum gastrin will return to basal concentrations by 7 days after cessation of famotidine or omeprazole administration. Animals Nine healthy, adult, male, research colony dogs. Methods Randomized, cross-over design. Serum gastrin was determined daily for 7 days to establish baseline concentrations. Famotidine (1.0 mg/kg q24h) or omeprazole (1.0 mg/kg q24h)
Cardiac Troponin I and T as Prognostic Markers in Cats with Hypertrophic Cardiomyopathy.
R. Langhorn, I. Tarnow, J.L. Willemsen, M. Kjelgaard-Hansen, I.M. Skovgaard and J. Koch
Background Myocardial injury detected by cardiac troponin I and T (cTnI and cTnT) in cardiac disease is associated with increased risk of death in humans and dogs. Hypothesis Presence of myocardial injury predicts long-term death in cats with hypertrophic cardiomyopathy (HCM), and ongoing myocardial injury reflects change in left ventricular wall thickness over time. Animals Thirty-six cats with primary HCM. Methods
Prospective cohort study. Cats with HCM were included consecutively and examined every 6 months. Echocardiography, ECG, blood pressure, and serum cTnI and cTnT were evaluated at each visit. Cox proportional hazards regression analysis was performed to evaluate prognostic potential of serum troponin concentrations at admission and subsequent examinations. Correlations were used to examine associations between troponin concentrations and cardiac hypertrophy. Results Troponin concentrations at admission were median [range] 0.14 [0.004–1.02] ng/mL for cTnI, and 13 [13–79.5] ng/L for cTnT. Both were prognostic for death (P = .032 and .026) as were the last available concentrations of each (P = .016 and .003). The final cTnT concentration was a significant predictor of death even when adjusting for the admission concentration (P = .043). In a model containing both markers, only cTnT remained significant (P = .043). Left ventricular free wall thickness at end-diastole (LVFWd) at admission was correlated with cTnI at admission (r = 0.35, P = .035), however no significant correlations (r = 0.2–0.31, P = .074–.26) were found between changes in troponin concentrations and left ventricular thickness over time. Conclusions and Clinical Importance Myocardial injury is part of the pathophysiology leading to disease progression and death. Low sensitivities and specificities prevent outcome prediction in individual cats.

**Prediction of Long-Term Outcome by Measurement of Serum Concentration of Cardiac Troponins in Critically Ill Dogs with Systemic Inflammation.**

R. Langhorn, V. Thawley, M.A. Oyama, L.G. King, M.C. Machen, D.J. Trafny, J.L. Willesen, I. Tarnow and M. Kjelgaard-Hansen

Background Myocardial injury, detected by cardiac troponin I and T (cTnI and cTnT), has been associated with long-term death in the noncardiac human intensive care unit (ICU). Hypothesis Presence of myocardial injury predicts 1-year case fatality in critically ill dogs with systemic inflammation. Animals Thirty-eight dogs with evidence of systemic inflammation and no primary cardiac disease. Methods Prospective cohort study. In dogs admitted to the ICU with evidence of systemic inflammation, blood samples were obtained at ICU admission for measurement of cTnI and cTnT, and cTnI was measured once daily during ICU hospitalization. Receiver operating characteristic (ROC) curves were used to examine prognostic capacity of admission cTnI, admission cTnT, and peak cTnI concentrations. Results One-year case fatality rate was 47% (18/38 dogs). Admission cTnI concentrations were (median [range]) 0.48 [0.004–141.50] ng/mL, and peak cTnI concentrations were 1.21 [0.021–141.50] ng/mL. Admission cTnI concentrations were 15 [<13–3744] ng/L. For each marker, non-survivors had significantly higher concentrations than survivors (P = .0082–.038). ROC analyses revealed areas under curves [95% CI] of 0.707 [0.537–0.843] for peak cTnI and 0.739 [0.571–0.867] for admission cTnT, respectively. At the optimal cut-off, concentrations were 1.17 ng/mL (peak cTnI) and 23 ng/L (admission cTnT), sensitivities were 72% and 72%, and specificities were 70% and 80%, respectively. Conclusions and Clinical Importance While peak cTnI and admission cTnI are significantly related to 1-year case fatality in critically ill dogs with systemic inflammation, low sensitivities and specificities prevent their prediction of long-term outcome in individual patients. Troponins might play a role in identification of dogs at long-term risk of death.

**Association between Aortoseptal Angle in Golden Retriever Puppies and Subaortic Stenosis in Adulthood.**

M.C. Belanger, E. Côté and G. Beauchamp

Background Predicting subaortic stenosis (SAS) in adult Golden Retriever dogs (GRs) by evaluating them as puppies is hampered by the progressive expression of the SAS phenotype in youth. In some children who develop SAS as adults, an abnormal aortoseptal angle (AoSA) precedes development of stenosis. Objectives To determine the normal AoSA in young adult GRs using echocardiography; to assess the value of AoSA in GR puppies for predicting development of the SAS phenotype. Animals Forty-eight 2- to 6-month-old GR puppies. Methods Prospective study. Puppies were recruited from clients and breeders. Puppies were evaluated with a physical examination and an echocardiogram, and this evaluation was repeated when they were 12–18-month-old adults. Puppies were classified as unaffected (WNL) or affected (SAS) retroactively, based on their results as adults. Results In WNL young adult GRs, mean ± SD AoSA was 152.3 ± 6.5°. Mean ± SD AoSA in SAS puppies (144.9 ± 8.6°) was significantly different from mean AoSA in WNL puppies (155.7 ± 8.8°, P < .01). No puppy with AoSA >160° had the SAS phenotype as a young adult; 93% (75.7–99.1%) of puppies with AoSA <145° had the SAS phenotype as young adults. Peak LVOT velocity increased significantly between evaluations (P < .0001) whereas AoSA did not (P = .45). Conclusion and Clinical Significance A steep AoSA in GR puppies is associated with the SAS phenotype in young adulthood. Some GR puppies have an abnormal AoSA that persists in young adulthood and is detectable before peak LVOT velocity reaches levels consistent with SAS.

**Transepophageal Echocardiography as the Sole Guidance for Occlusion of Patent Ductus Arteriosus using a Canine Ductal Occluder in Dogs.**
Background Transcatheter occlusion of patent ductus arteriosus (PDA) is usually performed by fluoroscopy alone or together with transesophageal echocardiography (TEE). Transthoracic echocardiography (TTE) guidance has been used for deployment of Amplatz Canine Ductal Occluder (ACDO), but sometimes is limited by suboptimal acoustic windows. Transesophageal echocardiography can overcome such issues and provides higher image resolution at the level of the great vessels. Objectives To determine if TEE without fluoroscopy could be used to successfully perform ductal occlusion for the treatment of PDA in dogs. Animals Twenty client-owned dogs with PDA. Methods A prospective consecutive case series of PDA occlusion was performed using only TEE guidance. Results Ductal occlusion was performed successfully without need for fluoroscopy and without complications in 19 dogs. One dog required a second larger ACDO because of embolization of the first device 18 hours after positioning. Conclusions and Clinical Importance We have demonstrated that TEE monitoring without concurrent fluoroscopy can guide each step of transcatheter ACDO embolization thereby providing an alternate method of visualization for this procedure. Use of TEE alone can reduce radiation exposure or is an option when fluoroscopy is not available, and, therefore, should be evaluated in a larger case series to better assess procedural failure rates.

Peripheral and Central Venous Blood Glucose Concentrations in Dogs and Cats with Acute Arterial Thromboembolism.
Background Acute limb paralysis because of arterial thromboembolism (ATE) occurs in cats and less commonly in dogs. ATE is diagnosed based on physical examination findings and, occasionally, advanced imaging. Hypothesis/Objectives Peripheral, affected limb venous glucose concentration is decreased in ATE, whereas its systemic concentration is within or above reference interval. Animals Client-owned cats and dogs were divided into 3 respective groups: acute limb paralysis because of ATE (22 cats and 9 dogs); acute limb paralysis secondary to orthopedic or neurologic conditions (nonambulatory controls; 10 cats and 11 dogs); ambulatory animals presented because of various diseases (ambulatory controls; 10 cats and 9 dogs). Methods Prospective observational, clinical study. Systemic and local (affected limb) blood glucose concentrations were measured. Their absolute and relative differences (ΔGlu and %ΔGlu, respectively) were compared among groups. Results ΔGlu and %ΔGlu were significantly higher in the ATE cats and dogs groups, compared to both of their respective controls (P < .0001 and P < .001, respectively). No significant differences were observed between the control groups. Receiver operator characteristics analysis of ΔGlu and %ΔGlu as predictors of ATE had area under the curve of 0.96 and 0.99 in cats, respectively, and 1.00 and 1.00, in dogs, respectively. ΔGlu cutoffs of 30 mg/dL and 16 mg/dL, in cats and dogs, respectively, corresponded to sensitivity and specificity of 100% and 90% in cats, respectively, and 100% in dogs. Conclusions and Clinical Importance ΔGlu and %ΔGlu are accurate, readily available, diagnostic markers of acute ATE in paralyzed cats and dogs.

Bioperterin Status in Dogs with Myxomatous Mitral Valve Disease is Associated with Disease Severity and Cardiovascular Risk Factors.
Background Endothelial dysfunction (ED) has been suggested to be associated with myxomatous mitral valve disease (MMVD) in dogs. Tetrahydrobiopterin (BH4) is an important cofactor for production of the endothelium-derived vasodilator nitric oxide (NO). Under conditions of oxidative stress, BH4 is oxidized to the biologically inactive form dihydrobiopterin (BH2). Thus, plasma concentrations of BH2 and BH4 may reflect ED and oxidative stress. Objective To determine plasma concentrations of BH2 and BH4 in dogs with different degrees of MMVD. Animals Eighty-four privately owned dogs grouped according to ACVIM guidelines (37 healthy control dogs including 13 Beagles and 24 Cavalier King Charles Spaniels [CKCS], 33 CKCSs with MMVD of differing severity including 18 CKCSs [group B1] and 15 CKCSs [group B2], and 14 dogs of different breeds with clinical signs of congestive heart failure [CHF] because of MMVD [group C]). Methods Dogs underwent clinical examination including echocardiography. Plasma concentrations of BH2 and BH4 were measured using high-performance liquid chromatography with fluorescence detection. Results Higher plasma BH4 and BH2 concentrations were found with dogs in CHF compared with all other groups (control, B1 and B2; P ≤ .001). Females had higher concentrations of BH4 and BH4/BH2 (P ≤ .0003). BH4/BH2 was found to decrease with age (P < .0001). Cardiovascular risk factors in humans such as passive smoking (P ≤ .01) and increased body weight (P ≤ .009) were associated with lower BH4 concentrations. Conclusions and Clinical Importance Age, sex, body weight, passive smoking, and cardiac status are associated with plasma bioperterin concentration in dogs. Additional studies should clarify the clinical implications of the findings.

F. Porciello, D. Caivano, M.E. Giorgi, P. Knafelz, M. Rishniw, N.S. Moise, A. Bufalari, A. Fruganti and F. Biretoni
Background Transcatheter occlusion of patent ductus arteriosus (PDA) is usually performed by fluoroscopy alone or together with transesophageal echocardiography (TEE). Transthoracic echocardiography (TTE) guidance has been used for deployment of Amplatz Canine Ductal Occluder (ACDO), but sometimes is limited by suboptimal acoustic windows. Transesophageal echocardiography can overcome such issues and provides higher image resolution at the level of the great vessels. Objectives To determine if TEE without fluoroscopy could be used to successfully perform ductal occlusion for the treatment of PDA in dogs. Animals Twenty client-owned dogs with PDA. Methods A prospective consecutive case series of PDA occlusion was performed using only TEE guidance. Dogs were positioned in right lateral recumbency and the TEE probe was positioned to visualize the descending aorta, PDA, and pulmonary artery. The guide wire, long introducer sheath, and ACDO were imaged by TEE to direct deployment. Results Ductal occlusion was performed successfully without need for fluoroscopy and without complications in 19 dogs. One dog required a second larger ACDO because of embolization of the first device 18 hours after positioning. Conclusions and Clinical Importance We have demonstrated that TEE monitoring without concurrent fluoroscopy can guide each step of transcatheter ACDO embolization thereby providing an alternate method of visualization for this procedure. Use of TEE alone can reduce radiation exposure or is an option when fluoroscopy is not available, and, therefore, should be evaluated in a larger case series to better assess procedural failure rates.

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Discrepancies in Identification of Left Atrial Enlargement Using Left Atrial Volume versus Left Atrial-to-Aortic Root Ratio in Dogs. 
S. Wesselowksi, M. Borgarelli, N.M. Bello and J. Abbott.
Background: Left atrial size is prognostically important in dogs with myxomatous mitral valve disease (MMVD). Hypothesis/Objectives: To compare the level of agreement in identification of left atrial enlargement (LAe) between the left atrial-to-aortic root ratio (LA : Ao) and left atrial volume using the biplane area-length method indexed to body weight (LA Vol/BW). Animals: Sixty dogs with MMVD and 22 normal dogs were prospectively studied with 2-dimensional echocardiography. Methods: The upper limit of normal for LA Vol/BW was defined as 1.1 mL/kg. LA : Ao was deemed normal if ≤1.5. To define overall disease severity, each dog was assigned a mitral regurgitation severity score (MRSS) based on echocardiographic parameters that did not include left atrial size. ACVIM staging also was utilized. Results: Of 60 affected dogs, 20 were ACVIM Stage B1, 25 were Stage B2, and 15 were Stage C. LA Vol/BW identified LAE in 12 cases in which LA : Ao was normal; 7 of these were Stage B1 and 5 were Stage B2. This diagnostic disagreement was significant (P = .00012). Of the 12 cases in which diagnostic disagreements were identified, 5/5 of the B2 dogs and 3/7 B1 dogs had a moderate MRSS, whereas 4/7 B1 dogs had a mild MRSS. No diagnostic discrepancies between LA : Ao and LA Vol/BW were apparent in dogs with a severe MRSS. Conclusions and Clinical Importance: This study shows evidence of diagnostic disagreement between LA : Ao and LA Vol/BW for assessment of LAE. LA Vol/BW may be superior to LA : Ao for identification of mild LAE.

Serotonin Concentrations in Platelets, Plasma, Mitral Valve Leaflet, and Left Ventricular Myocardial Tissue in Dogs with Myxomatous Mitral Valve Disease.
Hypothesis/Objectives: Altered serotonin (5-hydroxytryptamine, 5HT) signaling is postulated in development and progression of canine myxomatous mitral valve disease (MMVD). Little is known regarding platelet, plasma, valvular, or myocardial 5HT concentration ([5HT]) in affected dogs. We quantified [5HT] in platelet-rich plasma (PRP), platelet-poor plasma (PPP), mitral valve leaflets (MV), and left ventricular myocardium (LV). Animals: Forty-five dogs comprised 4 plasma groups of Cavalier King Charles Spaniels (CKCS) or non-CKCS, either healthy (CON) or MMVD affected: CKCS CON (n = 12); non-CKCS CON (n = 8); CKCS MMVD (n = 14); non-CKCS MMVD (n = 11). Twenty-four dogs comprised 3 tissue groups: MMVD (n = 8); other-HD (heart disease) (n = 7); non-HD, extracardiac disease (n = 9). Methods: High-performance liquid chromatography measured PRP, PPP, MV, and LV [5HT]. Results: Platelet-rich plasma platelet [5HT] was greater in CKCS CON (1.83 femtograms/platelet [fg/plt]; range, 0.20–4.76; P = .002), CKCS MMVD (1.58 fg/plt; range, 0.70–4.03; P = .005), and non-CKCS MMVD (1.72 fg/plt; range, 0.85–4.44; P = .003) versus non-CKCS CON (0.92 fg/plt; range, 0.63–1.30). There was no group difference in PPP [5HT]. MV [5HT] was significantly higher in MMVD (32.4 ng/mg; range, 8.4–106.7) versus non-HD (3.6 ng/mg; range, 0–28.3; P = .01) and LV [5HT] was significantly higher in MMVD (11.9 ng/mg; range, 4.0–104.8) versus other-HD (0.9 ng/mg; range, 0–10.1; P = .011) and non-HD (2.5 mg/mg; range, 0–6.9; P = .001). Conclusions and Clinical Importance: Platelet [5HT] was highest in healthy CKCS and both MMVD groups, but plasma [5HT] showed no group differences. Tissue [5HT] was highest in MV and LV of MMVD-affected dogs, suggesting altered 5HT signaling as a potential feature of MMVD. Interactions of platelet, valvular, and myocardial 5HT signaling warrant further investigation.

Basal Serum Cortisol Concentration as a Screening Test for Hypoadrenocorticism in Dogs.
C. Bovens, K. Tennant, J. Reeve and K.F. Murphy.
Background: Measurement of basal serum or plasma cortisol concentration is used as a screening test for hypoadrenocorticism in dogs, but is not well characterized. Hypothesis/Objectives: To evaluate the sensitivity and specificity of basal serum cortisol to detect hypoadrenocorticism in a population of dogs with a clinical suspicion of hypoadrenocorticism. Animals: Four hundred and fifty dogs with nonadrenal gland illness and 14 dogs with naturally occurring hypoadrenocorticism were included. Methods: Retrospective case-control study. The records of all dogs having had an ACTH stimulation test performed between January 2005 and September 2011 at the University of Bristol were reviewed. Dogs were included if the test was performed as a screening for hypoadrenocorticism. The sensitivity and specificity of basal serum cortisol concentration to detect dogs with hypoadrenocorticism were calculated using 2 cut-offs and compared to the gold standard ACTH stimulation test. Results: Using a cut-off of ≤2 µg/dL (≤55 nmol/L), the sensitivity and specificity of basal cortisol to detect hypoadrenocorticism were 100% and 63.3%, respectively, whereas for a cut-off of ≤1 µg/dL (≤28 nmol/L), the sensitivity and specificity were 85.7% and 91.8%, respectively. Conclusions and Clinical Importance: Measurement of basal serum cortisol is useful as a screening test for hypoadrenocorticism in dogs using a cut-off of ≤2 µg/dL (≤55 nmol/L), and the disease is unlikely with a basal serum cortisol >2 µg/dL (>55 nmol/L). A basal serum cortisol ≤2 µg/dL (≤55 nmol/L) cannot be used to diagnose hypoadrenocorticism, and an ACTH stimulation test should be performed in these cases.
Use of the Cortisol-to-ACTH Ratio for Diagnosis of Primary Hypoadrenocorticism in Dogs.

P. Lathan, J.C. Scott-Moncrieff and R.W. Wills

Background The ACTH stimulation test is currently required for definitive diagnosis of hypoadrenocorticism. Increased cost of synthetic ACTH (cosyntropin) has prompted a search for alternative diagnostic methods.

Objective The purpose of this study was to determine whether a cortisol-to-ACTH ratio (CAR) can be used to differentiate dogs with hypoadrenocorticism from normal dogs and those with nonadrenal illness. Animals Eight healthy dogs (H), 19 dogs with nonadrenal illness (NAI), and 15 dogs with hypoadrenocorticism (HAD).

Methods Dogs in the HAD group were retrospectively identified from PUVTH medical records. The NAI group consisted of hospitalized dogs with clinical signs, clinicopathologic findings, or both, consistent with a diagnosis of hypoadrenocorticism, but in which hypoadrenocorticism was ruled out based on ACTH stimulation test results. Healthy dogs were recruited from hospital staff and students. Endogenous ACTH concentrations and cortisol concentrations before and after ACTH stimulation were measured in all dogs. Results Baseline cortisol concentration was significantly lower, and ACTH concentration was significantly higher, in the HAD group versus the H and NAI group (P < .001). However, there was overlap among groups. Cortisol-to-ACTH ratio was significantly lower in the HAD group versus the H and NAI groups (P < .001), and there was no overlap between the HAD group and the other 2 groups. Conclusions and Clinical Importance CAR can be used for definitive diagnosis of primary hypoadrenocorticism.

Chiari-Like Malformation and Syringomyelia in American Brussels Griffon Dogs.

A.C. Freeman, S.R. Platt, M. Kent, E. Huguet, C. Rusbridge and S. Holmes

Background Although Chiari-like malformation (CM) and syringomyelia (SM) have been described in many small breed dogs, the prevalence and clinical manifestations of this complex have not been documented in a large cohort of American Brussels Griffon (ABG) dogs. Objectives To characterize the clinical and magnetic resonance imaging (MRI) features of CM and SM in the ABG breed. Animals Eighty-four American Kennel Club registered ABG dogs were recruited. Methods Prospective study. Complete histories and neurologic examinations were obtained before MRI. Images were blindly reviewed and calculations were made by using OsiriX. All analyses were performed by Student’s t-test, Spearman’s correlation, ANOVA, and chi-square test where appropriate. Results Chiari-like malformation and SM were present in 65% and 52% of dogs, respectively. Twenty-eight percent of dogs had neurologic deficits and 20% had neck pain. Mean central canal (CC) transverse height was 2.5 mm with a mean length of 3.6 cervical vertebrae. Neurologic deficits were significantly associated with a larger syrinx (P = .04, P = .08) and syrinx size increased with age (P = .027). SM was associated with a smaller craniocervical junction (CCJ) height (P = .04) and larger ventricles (P = .0001; P < .001). Conclusions and Clinical Importance Syringomyelia and CM are prevalent in American Brussels Griffon dogs. Syrinx size is associated with neurologic deficits, CM, larger ventricles, a smaller craniocervical junction height, neurologic deficits, and cerebellar herniation. Fifty-two percent of dogs with a SM were clinically normal.

Clinical Features and Treatment Outcomes of 41 Dogs with Sublingual Ectopic Thyroid Neoplasia.

M.R. Broome, M.E. Peterson and J.R. Walker

Background Thyroid neoplasia is common in dogs, but there are few reports of dogs with ectopic, sublingual thyroid tumors. Objectives To describe clinical features and outcomes of dogs with ectopic, sublingual thyroid neoplasia. Animals Five hundred and forty-four dogs with thyroid neoplasia. Methods This retrospective study reviewed the medical records of dogs referred for thyroid neoplasia between 1995 and 2013. Data extracted included signalment, extent of thyroid disease (eutopic or ectopic; metastasis), serum thyroxine (T4) concentration, treatment, and survival. Results Of 544 dogs with thyroid neoplasia, 41 (7.5%) dogs had ectopic sublingual thyroid tumors. The clinical features of these 41 dogs were similar to the cohort group of 503 dogs with eutopic or ectopic mediastinal thyroid tumors, but dogs with sublingual tumors were younger and less likely to have metastatic disease (15% versus 30%, P < .05). Of the 41 dogs, 28 received treatment: 21 with surgery (which included partial hyoidectomy in 13), 7 with radioiodine alone, and 13 with surgery followed by administration of radioiodine. Overall median survival was 562 days (range, 1-1,850 days). Conclusions and Clinical Importance When compared with eutopic thyroid carcinomas, ectopic sublingual thyroid tumors generally have a less aggressive biologic behavior. Many dogs have prolonged survival, even without treatment, although death because of local tumor invasiveness or metastasis can develop in some dogs. Surgical thyroidectomy, including partial hyoidectomy, is generally effective for control of local disease. Administration of radioiodine, alone or in combination with surgical treatment, is recommended for multifocal disease or metastasis.

Phase II Evaluation of VDC-1101 in Canine Cutaneous T-Cell Lymphoma

Background Canine cutaneous T-cell lymphoma (CTCL) is an uncommon disease for which efficacious therapies are lacking. The novel anticancer nucleotide prodrug VDC-1101 (formerly known as GS-9219) has shown efficacy in dogs with multicentric lymphoma. One of the observed adverse effects with this drug was a skin change characterized by hair loss, erythema, and pruritus, implying delivery of VDC-1101 to the skin.

Hypothesis/Objectives The primary study objective was to identify the objective response rate (ORR) to VDC-1101 in canine CTCL; secondary objectives included characterization of progression-free survival (PFS) and adverse events (AEs). Animals Twelve dogs with chemotherapy-naive or relapsed, histologically and immunohistochemically confirmed CTCL. Methods Dogs received VDC-1101 as a 30-minute IV infusion once every 21 days. Prednisone (1 mg/kg PO q48h) was administered concurrently. Results In 11 evaluable patients, responses included 1 complete response (CR), 4 partial responses (PR), 2 stable disease (SD), and 4 progressive disease for an ORR of 45% and biologic response rate (CR/PR/SD) of 64%. The median PFS was 37.5 days (26 to >399 days), which includes 1 durable and ongoing CR (>1 year). Gastrointestinal and hematologic AEs were mild; no dogs developed grade 3 or 4 AEs. Three dogs developed dermatopathies and 1 of these dogs was removed from the study as a result of this AE. Conclusions and Clinical Importance VDC-1101 has activity against canine CTCL and could provide another treatment option in a disease process with a poor prognosis.

Platelet Volume and Plateletcrit in Dogs with Presumed Primary Immune-Mediated Thrombocytopenia.


Background Mean platelet volume (MPV) and plateletcrit (PCT) are indices used in evaluating immune-mediated thrombocytopenia (IMT) in humans and in dogs with congenital macrothrombocytopenia. These indices may provide clinically valuable information in acquired thrombocytopenia. Hypothesis/Objectives Dogs with presumed primary IMT will have increased MPV, and therefore platelet mass (PCT) will increase faster than platelet count (PLT) during recovery. Animals Forty-nine dogs with automated PLT < 30,000/µL because of presumed primary IMT and hematocrit (HCT), PCT, MPV, and platelet distribution width determined from the same complete blood count (CBC), and 46 healthy controls. Methods Case-control retrospective study; PLT, PCT, MPV, and platelet distribution width (PDW) were recorded from CBCs from 49 dogs, with 45 having data collected on the day of presentation. Fifteen were confirmed to have attained a PLT ≥ 75,000/µL on at least 1 CBC within 15 days after admission. The PCT equivalent to a PLT of 75,000/µL (assuming an average MPV) was calculated for comparison with PLT in terms of time to achieve a threshold of platelet mass by the 2 measures. Results Mean platelet volume was higher in IMT dogs (17.3 fl) than the reference population (10.5 fl) (P < .0001). The PDW was not significantly different among the groups. The median time for PCT to reach threshold in confirmed responders was faster (3 days) compared with PLT (4 days). Conclusions and Clinical Importance Immune-mediated thrombocytopenia is characterized by increased MPV. Time to achieve a threshold PCT tended to be shorter than PLT, suggesting that PCT may be a useful platelet parameter for monitoring dogs with IMT.

Vertebral Osteomyelitis and Multiple Cutaneous Lesions in a Dog Caused by Nocardia pseudobrasiliensis.


Congenital Methemoglobinemia in a Dog with a Promoter Deletion and a Nonsynonymous Coding Variant in the Gene Encoding Cytochrome b5

J.A. McKenna, J. Sacco, T.T. Son, L.A. Trepanier, M.B. Callan, J.W. Harvey and J.W. Arndt

Veterinary Clinics of North America (September/October)

Metronomic Chemotherapy in Veterinary Patients with Cancer: Rethinking the Targets and Strategies of Chemotherapy

Barbara Biller

Cancer chemotherapy in dogs and cats has traditionally involved administration of chemotherapy agents at the maximum tolerated dose. Cytotoxic chemotherapy has an acceptably low risk of serious toxicity, but an obligatory rest period must be included to allow for recovery of drug-sensitive normal cell populations. This rest period can also allow significant recovery of tumor cells. Metronomic chemotherapy is characterized by more frequent administration of lower doses of oral drugs and appears to halt or slow tumor progression through multiple mechanisms. This approach may be at least as effective as conventional chemotherapy with a lower risk of toxicity.

Evidence-based Integrative Medicine in Clinical Veterinary Oncology

Donna M. Raditic, Joseph W. Bartges
Integrative medicine is the combined use of complementary and alternative medicine with conventional or traditional Western medicine systems. The demand for integrative veterinary medicine is growing, but evidence-based research on its efficacy is limited. In veterinary clinical oncology, such research could be translated to human medicine, because veterinary patients with spontaneous tumors are valuable translational models for human cancers. An overview of specific herbs, botanics, dietary supplements, and acupuncture evaluated in dogs, in vitro canine cells, and other relevant species both in vivo and in vitro is presented for their potential use as integrative therapies in veterinary clinical oncology.

Role of Surgery in Multimodal Cancer Therapy for Small Animals
Sarah Boston, Ralph A. Henderson Jr.
Surgery is a critical component in the treatment of most solid tumors in small animals. Surgery is increasingly combined with adjuvant therapies such as chemotherapy and radiation so surgeons who are treating cancer must have a good understanding of surgical oncology principles, cancer biology, and the roles and potential interactions of surgery, radiation, and chemotherapy. The sequencing plan for these modalities should be determined before treatment is initiated. The surgical oncologist must have a working knowledge of chemotherapy agents and radiation and the effect of these treatments on the ability of tissues to heal and the outcome for the patient.

Cancer Screening Tests for Small Animals
Stephanie E. Schleis
Cancer is increasingly more common. Several tests for the diagnosis and treatment of cancer in companion animals have been developed. Screening tests discussed include those for lymphoid neoplasia, hemangiosarcoma, and transitional cell carcinoma of the bladder. None of these tests should be used in isolation for diagnosis. Vincristine and doxorubicin are mainstays in the treatment of canine lymphoma. However, it is important and accepted practice to test individuals of predisposed breeds for this mutation before administering these drugs in a lymphoma protocol.

Antimicrobial Use in the Veterinary Cancer Patient
Bonnie Boudreaux
This article discusses the clinically relevant uses of antimicrobials in small animal cancer patients. The article focuses on general considerations of antimicrobial use, antimicrobials in the neutropenic patient, prophylactic antimicrobial usage, antimicrobials in radiation therapy, and antimicrobials in metronomic chemotherapy protocols.

Small Molecule Inhibitors in Veterinary Oncology Practice
Cheryl A. London
Recent advances in molecular biology have permitted the identification and characterization of specific abnormalities regarding cell signaling and function in cancer cells. Proteins that are found to be dysregulated in cancer cells can serve as relevant targets for therapeutic intervention. Although there are several approaches to block proteins that contribute to cellular dysfunction, the one most commonly used involves a class of therapeutics called small molecule inhibitors. Such inhibitors work by disrupting critical pathways/processes in cancer cells, thereby preventing their ability to grow and survive.

Advances in Veterinary Radiation Therapy: Targeting Tumors and Improving Patient Comfort
Susan M. LaRue, James T. Custis
Newer technology, such as intensity-modulated radiation therapy, can dramatically decrease acute radiation side effects, making patients more comfortable during and after treatment. Stereotactic radiation therapy for definitive treatment can be delivered in 1 to 5 fractions, with minimal radiation-associated effects. Image-guided radiation therapy can be used to direct treatment in locations previously not amenable to radiation therapy. Traditional fractionated radiation therapy remains the most commonly available type in veterinary medicine and is the standard of care for many tumors. This article discusses the role of advancements in the treatment of veterinary cancer patients and reviews more traditional radiation treatment.

Immunotherapy in Veterinary Oncology
Philip J. Bergman
Tumor immunology and immunotherapy is one of the most exciting and rapidly expanding fields. The immune system is divided into 2 primary components: the innate immune response and the highly
specific, but more slowly developing, adaptive or acquired immune response. Immune responses are separated by whether they are induced by exposure to a foreign antigen (active response) or transferred through serum or lymphocytes from an immunized individual (passive response). The ideal cancer immunotherapy agent should discriminate between cancer and normal cells (specificity), be potent enough to kill small or large numbers of tumor cells (sensitivity), and prevent recurrence of a tumor (durability).

Chemotherapy Safety in Clinical Veterinary Oncology
Shawna Klahn
Exposure to chemotherapy is a health hazard for all personnel in facilities that store, prepare, or administer antineoplastic agents. Contamination levels have been measured as much as 15 times higher in the veterinary medicine sector than in human facilities. Recent publications in human and veterinary medicine indicate that exposure extends beyond the clinic walls to affect the patient’s home and family. This article provides an update on the advances in chemotherapy safety, the current issues, and the impact on cancer management in veterinary medicine.

The Role of Neutering in Cancer Development
Annette N. Smith
Increased discussion on the influence of neutering on cancer development has been recently prompted with several studies that seem to indicate that incidence of some cancers may be increased with castration or spaying in our canine populations. Although the data are thought-provoking, we may not be able to extrapolate findings in single dog breeds to the entire species. Additionally, societal and humane issues related to pet overpopulation, as well as the incidence of other noncancerous diseases, behavior issues, and potentially decreased overall lifespan in unaltered animals must be taken into consideration before wholesale rejection of neutering in pets.

The Role of Clinical Trials in Veterinary Oncology
Jenna Burton, Chand Khanna
Clinical trials for companion animals are becoming more common and more accessible to pet owners as veterinary oncologists seek to expand their knowledge of tumor biology in companion animal species and improve the way they diagnose and treat cancer for these animals. Many owners enroll their pets because they wish to participate in clinical cancer research that may ultimately benefit pets and people. Understanding the goals, benefits, and risks of clinical trials participation provides the knowledge needed by primary care veterinarians to counsel their clients as to whether clinical trial participation is a good choice for them and their pets.

Pain Management in Veterinary Patients with Cancer
Timothy M. Fan
Pain is a widespread clinical symptom in companion animals with cancer, and its aggressive management should be a priority. Education and skills can be acquired by health care professionals and caregivers to better understand, recognize, and treat cancer-associated pain. The early and rational institution of multimodality analgesic protocols can be highly effective and maximize the chances of improving quality of life in dogs and cats with cancer. This article describes the pathophysiology of pain in companion animals diagnosed with cancer. The foundational causes of cancer-associated pain and treatment strategies for alleviating discomfort in companion animals with cancer are discussed.

New Zealand Veterinary Journal (September/October)
An exploration of attitudes towards pedigree dogs and their disorders as expressed by a sample of companion animal veterinarians in New Zealand

T Farrow, AJ Keown & MJ Farnworth

AIMS: To explore veterinary perceptions of inherited disorders in pedigree dogs within New Zealand and how these affect animal health and welfare. METHODS: An online questionnaire was distributed to the 647 members of the Companion Animal Society of the New Zealand Veterinary Association using an online survey system. The questionnaire collected details of practitioners, pedigree dog breeds and disorders most often encountered in practice, and responses to questions and statements regarding inherited disorders and pedigree dogs. RESULTS: Of the 216 respondents, 194 (89.8%) believed inherited disorders in dogs were a significant issue. The most commonly identified breeds presenting with inherited disorders were Boxer, Bulldog and German Shepherd dog. The most commonly reported inherited disorders were hip dysplasia, brachycephalic syndromes and elbow dysplasia. Of 207 respondents, 100 (48.3%) had advised clients against purchasing a pedigree dog due to common inherited disorders and 183 (85.6%) considered the health and welfare of some breeds to be too compromised to continue breeding. Of 199 respondents, 132 (66.3%) reported seeing no change in prevalence of inherited conditions, 103/204 (50.5%) reported seeing a positive change in attitudes towards inherited disorders among dog owners, and 81/207 (39.1%) thought legislative support would help decrease inherited disorders in pedigree dogs. Attitudes were not associated with time since graduation or ownership of a New Zealand Kennel Club registered breed of dog. The most common suggestions to decrease prevalence of inherited disorders were to alter breed standards, educate public or buyers and compulsory genetic testing. CONCLUSIONS: Among respondents, veterinarians considered inherited disorders as significant issues in a number of pedigree breeds. Veterinarians were concerned about inherited disorders in pedigree dogs, felt they had an obligation to treat such animals and were supportive of measures to make genetic testing for inheritable disorders a requirement for registration of pedigree breeds. CLINICAL RELEVANCE: Prevalence and perceived importance of inherited disorders influences how clinicians advise their clients. Respondents to this survey provided a number of mechanisms by which inherited disorders may be managed and these could form the basis of future discussions within the profession.

Journal of the American Animal Hospital Association

Gastrointestinal Perforation Associated With Endoscopy in Cats and Dogs

Sara Irom, Robert Sherding, Susan Johnson, Paul Stromberg

Gastrointestinal endoscopy is a minimally invasive diagnostic tool for cats and dogs with signs of gastrointestinal disease. This retrospective study examined the case records of six cats and one dog diagnosed with perforation secondary to gastrointestinal endoscopy. Gastrointestinal perforation occurred in 1.6% of cats and 0.1% of dogs that underwent endoscopy during the 17 yr study period (from 1993 to 2010). It can be difficult to predict what animals are at risk for gastrointestinal perforation but possible risk factors suggested by this study include small intestinal infiltrative disease in cats and preexisting gastrointestinal ulceration in both cats and dogs. Overall, gastrointestinal endoscopy is associated with a low rate of gastrointestinal perforation.

Radiographic and Ultrasonographic Findings of Uterine Neoplasms in Nine Dogs


The records of nine female intact dogs with histologically confirmed uterine tumors were reviewed retrospectively, and the related radiographic and ultrasonographic signs of the lesions detected were recorded. Radiography revealed a soft-tissue opacity between the urinary bladder and colon in six of seven dogs with uterine body and/or cervical tumors, and a soft-tissue opacity in the midventral abdomen in two dogs with uterine horn tumors. Ultrasonography revealed masses in all dogs with uterine body/cervical tumors and could delineate the origin of the mass in one of two dogs with uterine horn tumors. The mass was characterized ultrasonographically as solid in three dogs (all leiomyomas), solid with cystic component in four dogs (two adenocarcinomas, one leiomyoma, and one fibroleiomyoma), and cystic in two (both leiomyomas). Hyperchoic foci in the mass were observed in three dogs. Ultrasonography was a useful method for demonstrating uterine body and/or cervical tumors. However, it was not possible to ascertain sonographically that a mass originated in a uterine horn unless there was associated evidence of uterine horn to which the mass could be traced. The ultrasonographic appearance of uterine tumors was variable, and the type of neoplasm could only be determined by taking biopsies of the mass.
Jessica C. Pritchard, Adam J. Birkenheuer, Rita M. Hanel, Michael W. Wood
Copperhead envenomation is common within the US, and no studies exist describing the clinical course of copperhead envenomation in dogs. Almost all treatment decisions regarding those bites are extrapolated from retrospective studies evaluating the clinical course of rattlesnake bites. Because copperheads and rattlesnakes produce venom with different potency, assumptions that treatment of the different envenomations should be similar may be incorrect. The purpose of this retrospective study was to evaluate the clinical course of copperhead envenomation in dogs and administered treatments. Medical records of 52 dogs treated for copperhead envenomation were reviewed, and owners were contacted regarding outcome. The most common clinical signs associated with copperhead envenomation included swelling, pain, and ecchymosis. Clinicopathological abnormalities (e.g., thrombocytopenia, elevated clotting times, leukocytosis) were mild, and red blood cell morphology changes and coagulopathies were rare. Most dogs were treated with antimicrobials, analgesics, and fluid therapy. No dogs in this study required the use of antivenin and all survived to discharge. This study found that the clinical course after copperhead envenomation is generally limited to local rather than systemic illness. Copperhead envenomation in dogs is largely self-limiting and responsive to supportive care with hospitalization for monitoring.

Resolution of Polyneuropathy in a Hypothyroid Dog Following Thyroid Supplementation
Shinichi Utsugi, Miyoko Saito, and G. Diane Shelton
An 8 yr old male golden retriever was evaluated because of chronic, progressive, multiple neurologic signs. Physical examination showed marked obesity and facial swelling with a “tragic facial expression.” Neurologic evaluation revealed the dog had multiple cranial nerve deficits and lower motor neuron signs in the pelvic limbs. Serum biochemical analysis and thyroid function tests were consistent with hypothyroidism. A biopsy from the common peroneal nerve revealed a loss of myelinated fibers, inappropriately thin myelinated fibers, and resolving subperineurial edema. The diagnosis of polyneuropathy associated with hypothyroidism was made. Levothyroxine therapy was initiated. Response to levothyroxine treatment was slow, with most neurologic abnormalities persisting for >6 wk. However, the dog made a full neurologic recovery within 6 mo. Although the occurrence of polyneuropathy in dogs resulting from hypothyroidism has been controversial, the study authors demonstrated that hypothyroid polyneuropathy can occur in dogs as documented in humans. This is the first report describing long-term follow-up information together with detailed pathological features of hypothyroid polyneuropathy in a dog. In hypothyroid polyneuropathy, the response to thyroid replacement may be slow, but a recovery can be expected if treatment is initiated before peripheral nerve fiber loss becomes severe.

Abdominal Chronic Expanding Hematoma Causing Iron-Deficiency Anemia in a Dog
Lionel Sebbag, Kenneth R. Harkin, Allison Habekost, Sanjeev Gumber, and Tiffany Lee
A 2 yr old spayed female mixed-breed Irish wolfhound was referred for assessment of anemia and slowly progressing abdominal distention. At the time of admission, the dog had marked anemia and thrombocytosis, a decreased serum iron concentration, and a normal coagulation profile. An ultrasound examination showed a massive fluid-filled cavitated structure in the abdominal cavity. Paracentesis of that structure yielded a large amount of hemorrhagic fluid with an iron concentration >24 times greater than the serum iron concentration, consistent with chronic sequestration of iron, leading to iron-deficiency anemia. Blood transfusions and incomplete surgical removal of the structure allowed short-term stabilization of the patient, but the dog was euthanized 17 days postsurgery for lethargy and continued abdominal distention. Histopathological evaluation of the structure was consistent with a chronic expanding hematoma. To the authors’ knowledge, this is the first reported case of intra-abdominal chronic expanding hematoma in a dog. It is also unique given its features of iron-deficiency anemia caused by internal blood loss.

Paragonimosis in a Cat and the Temporal Progression of Pulmonary Radiographic Lesions Following Treatment
Andrew S. Peregrine, Stephanie G. Nykamp, Heather Carey, and Stephen Kruth,
A 16 mo old cat presented with a 5 mo history of dyspnea, coughing, and gagging. Radiographic findings revealed seven nodules measuring 1–3 cm distributed multifocally in the lungs. Examination of feces revealed large numbers of eggs of *Paragonimus kellicotti*. Two fenbendazole treatment regimens (28 mg/kg per os q 12 hr for 21 days) and prednisone were required to eliminate the infection. Resolution of pulmonary nodules was monitored for 8 mo following successful treatment, and four lesions were still partially visible at 8 mo.

Recurrent Urethral Fibroepithelial Polyps in a Golden Retriever
David C. Grant and Gregory C. Troy
A 2 yr old castrated male golden retriever was referred multiple times over a period of 7.5 yr for stranguria, pollakiuria, urinary incontinence and urinary outflow obstructions due to urethral polyps. Diagnostic imaging modalities used to identify polyps included abdominal ultrasound, excretory urography, double-contrast retrograde urethrocystograms, and urethrocystoscopy, which revealed multiple filling defects within the proximal and prostatic urethra. Multiple cystotomies and endourologic procedures were performed to remove the multiple fibroepithelial polyps within the proximal and prostatic urethra. Urinary incontinence resulted from treatments, but did respond to phenylpropanolamine. Medical treatment consisted of a nonsteroidal anti-inflammatory drug, which appeared to decrease the recurrence of the polyps over time. Urethral polyps are an uncommon cause of urinary outflow obstruction and do not usually recur after removal. This case illustrates an uncommon clinical presentation and the difficulties encountered in treatment over an expanded time frame.

**Mural Endocarditis Caused by Corynebacterium mustelae in a Dog With a VSD**

Randolph L. Winter, Sonya G. Gordon, Shuping Zhang, Crystal D. Hariu, and Matthew W. Miller

A 6 yr old female spayed large Munsterlander was evaluated following a 3 wk history of lethargy, inappetence, intermittent fever, and a recent change to the timing of her previously diagnosed heart murmur. Physical examination revealed marked dehydration, lethargy, and a grade 5/6 to-and-fro heart murmur that was auscultated best at the right sternal border. The dog was febrile, and echocardiography revealed a large, mobile, vegetative lesion in the right ventricular outflow tract associated with a ventricular septal defect (VSD). Mild aortic insufficiency was present. *Corynebacterium mustelae* (*C. mustelae*) was isolated from a pooled blood culture. Treatment of infective endocarditis (IE) was initiated along with supportive care, and the patient was discharged 9 days later. The dog remained without clinical signs 132 days after discharge. VSD is rarely mentioned as a predisposing factor for development of IE in veterinary literature; however, this report highlights that dogs with a VSD may be at risk for IE. To the authors’ knowledge, this is the first documented case of a canine infection with *C. mustelae*. Infection with *C. mustelae* in this case represents a novel agent for IE in the dog.

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