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May 2015 abstracts

Journal of the American Veterinary Medical Association – May 1

Clinical effects of a constant rate infusion of remifentanil, alone or in combination with ketamine, in cats anesthetized with isoflurane
Paulo V. M. Steagall, Monica Aucoin, Beatriz P. Monteiro, Maxim Moreau, Brad T. Simon, Patrick M. Burns

Objective—To evaluate the effects of a constant rate infusion of remifentanil, alone or in combination with ketamine, in healthy cats anesthetized with isoflurane. Design—Randomized, controlled, clinical trial. Animals—23 cats undergoing elective ovariohysterectomy. Procedures—Cats were premedicated with acepromazine and morphine; anesthesia was induced with propofol and maintained with isoflurane. Cats were given constant rate infusions of remifentanil (20 µg/kg/h [9 µg/lb/h], IV; n = 8), remifentanil and ketamine (0.5 mg/kg [0.23 mg/lb], then 1.8 mg/kg/h [0.82 mg/lb/h], IV; 7), or crystalloid fluids (8). The anesthesiologist was blinded to treatment group, end-tidal isoflurane concentration, and vaporizer setting. Heart rate, systolic arterial blood pressure, respiratory rate, end-tidal partial pressure of CO₂, temperature, and end-tidal isoflurane concentration were monitored; recovery scores were assigned. Results—There were no significant differences among treatment groups with respect to age, body weight, surgery time, anesthesia time, time to extubation, recovery score, or cardiorespiratory variables. End-tidal isoflurane concentration was significantly reduced in cats given remifentanil and ketamine (mean ± SD, 0.63 ± 0.4%), compared with concentration in cats given crystalloid fluids (1.22 ± 0.5%) but not compared with concentration in cats given remifentanil alone (1.03 ± 0.4%). Compared with cats given crystalloid fluids, mean isoflurane requirement was reduced by 48.3% in cats given remifentanil-ketamine and 15.6% in cats given remifentanil alone.
Conclusions and Clinical Relevance—At the dosages administered, a constant rate infusion of remifentanil-ketamine resulted in a significant decrease in the isoflurane requirement in healthy cats undergoing ovariohysterectomy. However, significant differences in cardiovascular variables were not observed among treatment groups.

Characterization, treatment, and outcome of bacterial cholecystitis and bactibilia in dogs
Yuri A. Lawrence, Craig G. Ruaux, Sarah Nemanic, Milan Milovancev

Objective—To characterize historical, clinicopathologic, ultrasonographic, microbiological, surgical, and histopathologic features of bacterial cholecystitis and bactibilia in dogs and evaluate response to treatment and outcomes in these patients. Design—Retrospective case-control study. Animals—40 client-owned dogs (10 with bacterial cholecystitis on histologic analysis or bactibilia on cytologic examination [case dogs] and 30 without bactibilia [controls]) evaluated at a veterinary teaching hospital between 2010 and 2014. Procedures—Signalment, history, clinicopathologic findings, ultrasonographic features, microbiological results, surgical findings, histopathologic changes, treatments, and outcomes of case dogs were derived from medical records and summarized. Demographic and clinicopathologic data and ultrasonographic findings were compared between case and control dogs. Relationships among prior antimicrobial treatment, sediment formation in the gallbladder, presence of immobile biliary sludge, and presence of bactibilia or bacterial cholecystitis were assessed. Results—No finding was pathognomonic for bactibilia or bacterial cholecystitis in dogs. Case dogs were significantly more likely to have immobile biliary sludge and had a greater degree of biliary sediment formation than did control dogs. All case dogs for which gallbladders were examined histologically (6/6) had bacterial cholecystitis. Five of 10 case dogs were Dachshunds. Medical or surgical treatment resulted in good outcomes. Conclusions and Clinical Relevance—Bactibilia and bacterial cholecystitis were important differential diagnoses in dogs with signs referable to biliary tract disease. Dachshunds were overrepresented, which may suggest a breed predisposition. Cytologic evaluation of bile should be considered in the routine assessment of dogs with hepatobiliary disease if immobile biliary sludge is present.

Transient unilateral vision loss in a dog following inadvertent intravitreal injection of bupivacaine during a dental procedure
Terri L. Alessio, Emily M. Krieger

Case Description—A 4-year-old castrated male Chihuahua was evaluated because of unilateral vision loss following extraoral administration of a caudal maxillary nerve block during a dental procedure. Clinical Findings—The menace response was absent in the left eye, but the pupillary light reflex was intact. Vitreal hemorrhages and opacities were present on ophthalmic examination of the left eye.
Ultrasonographic findings were supportive of the clinical findings. The posterior lens capsule and retina appeared to be undisturbed. Treatment and Outcome—Treatment consisted of administration of carprofen and prophylactic administration of amoxicillin-clavulanate. Vision was clinically normal with an intact menace response 1 week later. Clinical Relevance—Findings indicated that intravitreal injection of the local anesthetic agent should be considered as a potential complication when performing nerve blocks prior to dental procedures in dogs.

Allogeneic hematopoietic cell transplantation in a dog with acute large granular lymphocytic leukemia
Steven E. Suter, Matthew J Hamilton, Edmund W Sullivan, Gopalakrishnan M Venkataraman
Case Description—A 3-year-old 10-kg (22-lb) neutered male Cavalier King Charles Spaniel was referred because of an episode of acute vomiting and diarrhea. Clinical Findings—On physical examination, mild splenomegaly and prominent submandibular and popliteal lymph nodes were detected. Complete blood cell count revealed a high WBC count, characterized by a moderate lymphocytosis with 62% unclassified cells and severe thrombocytopenia with macroplatelets. On cytologic evaluation, the unclassified cells were described as large, neoplastic lymphoid cells containing a large nucleus with lacy chromatin and a large amount of blue vacuolated cytoplasm containing sparse, very fine azurophilic granules. A diagnosis of acute large granular lymphocytic leukemia of splenic origin was made. Treatment and Outcome—Following induction chemotherapy, the affected dog underwent allogeneic hematopoietic cell transplantation with dog leukocyte antigen–matched CD34+ cells harvested from a sibling of the same litter. Chimerism analysis revealed full donor engraftment within 2 weeks after transplantation that remained stable for at least 2 years, with the dog remaining apparently healthy at home. Clinical Relevance—Acute leukemias in dogs are rapidly fatal diseases. If an appropriate donor can be located, allogeneic hematopoietic cell transplantation may offer a feasible treatment, although peripheral blood CD34+ cell harvesting requires the availability of cell separator machines and management of graft-versus-host disease with immunosuppressive agents.

Journal of the American Veterinary Medical Association – May 15

Effect of cardiac and respiratory cycles on vertebral heart score measured on fluoroscopic images of healthy dogs
Julien Olive, Romain Javard, Swan Specchi, Marie-Claude Bélanger, Catherine Bélanger, Guy Beauchamp, Kate Alexander
Objective—to assess the variability in vertebral heart score (VHS) measurement induced by cardiac and respiratory cycles in dogs. Design—Prospective observational study. Animals—14 healthy Beagles. Procedures—Dogs underwent fluoroscopic examination by 4 observers, and VHS was measured at end-tidal inspiration and end-tidal expiration during end systole and end diastole in left and right lateral recumbency. Mean VHS was compared within and among cardiac and respiratory phases and recumbency type, and correlation between VHS and heart rate was investigated. Interobserver variability was assessed. Results—Mean VHS for each combination of respiratory and cardiac cycle was larger on images obtained in right lateral versus left lateral recumbency. The greatest differences were observed between VHS measured in the diastolic inspiratory phase (mean ± SD, 10.59 ± 0.49 vertebral units [VU] and 10.35 ± 0.50 VU for right and left lateral recumbency, respectively) and the systolic expiratory phase (10.11 ± 0.37 VU and 9.92 ± 0.50 VU for right and left lateral recumbency, respectively). The combination of respiratory and cardiac cycles induced a maximal difference in VHS of up to 0.97 VU and 1.11 VU in the inspiratory and expiratory phases, respectively. Heart rate was not correlated with the difference between VHS in systolic and diastolic phases. Conclusions and Clinical Relevance—Clinicians should be aware of the potential influence of these factors when assessing VHS in dogs; in addition to allowing optimal pulmonary assessment, consistently taking radiographs at end-inspiratory tidal volume may help to limit VHS variability attributable to the respiratory cycle. Further research is needed to assess the effects of cardiac and respiratory phases on VHS in dogs with cardiac or respiratory disease.

Associations of diet and breed with recurrence of calcium oxalate cystic calculi in dogs
Heidi S. Allen, William S. Swecker, Iveta Becvarova, Lisa P. Weeth, Stephen R. Werre
Objective—to evaluate the long-term risk of recurrence of calcium oxalate (CaOx) cystic calculi in dogs of various breeds fed 1 of 2 therapeutic diets. Design—Retrospective cohort study. Animals—135 dogs with a history of CaOx cystic calculi. Procedures—Medical records for 4 referral hospitals were searched to identify dogs that had had CaOx cystic calculi removed. Owners were contacted and
medical records evaluated to obtain information on postoperative diet, recurrence of signs of lower urinary tract disease, and recurrence of cystic calculi. Dogs were grouped on the basis of breed (high-risk breeds, low-risk breeds, and Miniature Schnauzers) and diet fed after removal of cystic calculi (diet A, diet B, and any other diet [diet C], with diets A and B being therapeutic diets formulated to prevent recurrence of CaOx calculi). Results—Breed group was a significant predictor of calculi recurrence (as determined by abdominal radiography or ultrasonography), with Miniature Schnauzers having 3 times the risk of recurrence as did dogs of other breeds. Dogs in diet group A had a lower prevalence of recurrence than did dogs in diet group C, but this difference was not significant in multivariable analysis. Conclusions and Clinical Relevance—Results indicated that Miniature Schnauzers had a higher risk of CaOx cystic calculi recurrence than did dogs of other breeds. In addition, findings suggested that diet may play a role in decreasing recurrence, but future prospective studies are needed to validate these observations.

**The Canadian Veterinary Journal**

*In vitro evaluation of the impact of silver coating on Escherichia coli adherence to urinary catheters*

Adam T. Ogilvie, Brigitte A. Brisson, Ameet Singh, J. Scott Weese

A silver-coated urinary catheter was compared to a non-silver-coated urinary catheter for the ability to reduce adherence of 6 isolates of Escherichia coli. Catheters were incubated with E. coli strains for 0, 24, 48, and 72 h. Broth was sampled at all time points to determine CFU/mL. Catheters were subjected to sonication to determine adhered bacteria at all time points, and scanning electron microscopy (SEM) to semi-quantitatively assess biofilm formation. Silver-coated catheters had significantly less adhered bacteria than non-silver-coated catheters at times 24, 48, and 72 h. Subjectively, silver-coated urinary catheters had less biofilm formation than non-silver-coated urinary catheters as assessed by SEM. Silver coating of catheters was associated with reduced adherence of E. coli in an in vitro evaluation. Testing of catheters in dogs in vivo is required to determine if there is a reduction in catheter-associated urinary tract infections.

**Enteric parasites of free-roaming, owned, and rural cats in prairie regions of Canada**

Jessica Hoopes, Janet E. Hill, Lydden Polley, Champika Fernando, Brent Wagner, Janna Schurer, Emily Jenkins

The objective of this study was to determine prevalence, intensity, and zoonotic potential of gastrointestinal parasites in free-roaming and pet cats in urban areas of Saskatchewan (SK) and a rural region in southwestern Alberta (AB). Fecal samples were analyzed using a modified double centrifugation sucrose flotation to detect helminth eggs and coccidian oocysts, and an immunofluorescence assay to detect Giardia and Cryptosporidium. Endoparasite prevalence was higher in samples from rural AB cats (41% of 27) and free-roaming SK cats (32% of 161) than client-owned SK cats (6% of 31). Parasites identified using morphological and molecular techniques included Toxocara cati, Toxascaris leonina, Baylisascaris-type eggs, Eucoleus aerophilus, Taenia taeniaeformis, Isospora spp., Cryptosporidium spp., and zoonotic genotype A of Giardia duodenalis. This study demonstrates significant differences in endoparasite prevalence in feline populations, and the value of molecular techniques in fecal-based surveys to identify and determine parasite zoonotic potential.

**Osteomyelitis associated with Nocardiopsis composta in a dog**

Elisa N. Salas, Debra Royal, Lance Kurz, J. Dustin Loy

We report the first detection of Nocardiosis composta in association with osteomyelitis in a young male miniature Australian shepherd dog. Findings included supplicative osteomyelitis containing intraslesional Fite's acid fast bacilli, aerobic culture of branching Gram-positive rods, and positive identification via phenotypic analysis and 16S rDNA sequencing.

**Successful treatment of Corynebacterium urealyticum encrusting cystitis with systemic and intravesical antimicrobial therapy**

Oriana Raab, Romain Béraud, Karen M. Tefft, C. Anne Muckle

A 6-year-old Saint Bernard dog was diagnosed with encrusting cystitis caused by Corynebacterium urealyticum. The infection persisted despite the prolonged use of antimicrobials and surgical debridement of the urinary bladder. Resolution occurred following intravenous vancomycin, urine acidification, and intravesical gentamicin. The challenges involved in the treatment of encrusting cystitis are described.
Pancreatic torsion in a dog
Tamera L. Brabson, Lynn C. Maki, Susan M. Newell, S. Christopher Ralphs
A 6-month-old male intact Cane Corso mastiff dog was presented for a recent history of vomiting, abdominal pain, and lethargy. A diagnosis of pancreatic torsion was made during abdominal exploratory surgery and was confirmed with histopathology. The dog underwent partial pancreatectomy and recovered with no complications.

The Australian Veterinary Journal

Spatial and temporal evaluation of veterinarians and veterinary employers relative to human and domesticated animal populations in Australia 2002–2012
GB Smyth, IJ East and RM Wicks
Objectives - To examine the distribution of veterinarians, humans, domestic animals and non-private practice employers in Australia and assess whether a relationship exists between them. To identify trends in the number of veterinarians, humans and domestic animals between 2002 and 2012 that may influence future demands for veterinary services. Methods - Australian data on registered veterinarians, veterinary practices, the human population and various domestic animal species were obtained for the years 2002, 2007 and 2012. The data were mapped to assess distribution and temporal trends in number and distribution were assessed. Results - Nationally, registered veterinarians were distributed similarly to the general population, with a slight bias to regional areas. The number of veterinarians nationally increased both in absolute terms and relative to the human population between 2002 and 2012. Companion animals were distributed similarly to the human population and livestock occurred in highest density in the more productive agricultural areas. The areas with highest density of domestic animals were within 100 km of an existing veterinary practice. There was moderate correlation between the number of registered veterinarians and the number of people or companion animals, but poor correlation for livestock. The number of domestic animal species decreased between 2002 and 2012, with the exceptions of cattle and poultry. Conclusions - There is not a simple relationship between the number of veterinarians, people or domestic animals. Better data are needed to describe the drivers for demand for veterinary services and enable future workforce planning.

Owned dog and cat populations in remote Indigenous communities in the Northern Territory: a retrospective study
A Burleigh, S McMahon and S Kiely
Objective - To determine the population of owned dogs and cats in Indigenous communities in the Northern Territory (NT), and compare the data with those for the average Australian household. Methods - Results of 20 Indigenous community animal health programs were analysed for species present and dog and cat numbers. The female breeding and puppy populations were also identified. Results - The average dog population density was significantly higher than the average Australian household, with an average of 24.4 dogs per 10 households, but the average cat population density was similar (3.3 cats per 10 households). Numbers of other species were not determined. The average percentage of puppies in these communities was 17.6% of the treated canine population, the average percentage of breeding canine females was 18.6% of the treated canine population, and the average percentage of breeding feline females was 19.7% of the total feline population. Conclusions - Dog populations in NT Indigenous communities were at least 6.3-fold higher per household compared with data for the rest of Australia. Cat populations per household were similar to the overall population. Factors contributing to the relatively high dog populations in remote Indigenous communities include a lack of veterinary presence, community remoteness, poor socioeconomic factors, poor house and yard designs, cultural reasons, communal beliefs, lack of community animal management and a lack of funding. We believe that animal health programs are an important way of addressing a number of these issues. Other elements that should be addressed include improving house and yard design, increasing education regarding animal health, care and welfare, and increasing the training and presence of health and animal professionals.

Journal of Veterinary Internal Medicine (May/June)

The Immunotherapy of Canine Osteosarcoma: A Historical and Systematic Review
Osteosarcoma is a malignant mesenchymal neoplasm that accounts for the majority of primary bone tumors in dogs and shares biological and clinical similarities with osteosarcoma in humans. Despite dose intensification with conventional cytotoxic therapies, survival times for dogs and humans
Quantitative Accuracy of the Simplified Strong Ion Equation to Predict Serum pH in Dogs

N.J. Cave and S.T. Koo

Background: Electrochemical approach to the assessment of acid-base states should provide a better mechanistic explanation of the metabolic component than methods that consider only pH and carbon dioxide. Hypothesis/Objectives: Simplified strong ion equation (SSIE), using published dog-specific values, would predict the measured serum pH of diseased dogs. Animals: Ten dogs, hospitalized for various reasons. Methods: Prospective study of a convenience sample of a consecutive series of dogs admitted to the Massey University Veterinary Teaching Hospital (MUVTH), from which serum biochemistry and blood gas analyses were performed at the same time. Serum pH was calculated using the SSIE, and published values for the concentration and dissociation constant for the nonvolatile weak acids (Atot and Ka), and subsequently inline image was compared with the dog's actual pH inline image. To determine the source of discordance between inline image and inline image, the calculations were repeated using a series of substituted values for Atot and Ka. Results: The inline image did not approximate the inline image for any dog (P<0.001, r2=0.169 to <0.001). Substituting the effective SID inline image produced a strong association between inline image and inline image (r2=0.977). Conclusions and Clinical Importance: Using the simplified strong ion equation and the published values for Atot and Ka does not appear to provide a quantitative explanation for the acid-base status of dogs. Efficacy of substituting the effective SID in the simplified strong ion equation suggests the error lies in calculating the SID.

Randomized Placebo-Controlled Clinical Trial of a Chewable Formulation of Amlodipine for the Treatment of Hypertension in Client-Owned Cats


Background: There is an unmet clinical need for a cat-specific formulation of amlodipine to treat hypertensive cats. Objectives: To assess the efficacy of chewable amlodipine tablets in reducing systolic blood pressure (SBP) in cats diagnosed with systemic arterial hypertension. Animals: Seventy-seven client-owned cats with systemic hypertension were included (median age 14 years). Methods: The study was randomized, double-blinded, and placebo-controlled. Forty-two cats received 0.125–0.50 mg/kg amlodipine once daily for 28 days; 35 cats received placebo. After 28 days all cats continued with amlodipine for 2–3 months in an open-label phase. Blood pressure was measured using high definition oscillometry. A responder was defined as a cat showing a decrease of SBP to <150 mmHg at 28 days or a decrease from baseline ≥15%. Results: Sixty-one cats completed the study. The responder rate was 63% in amlodipine group and 18% in placebo group. Cats receiving amlodipine were 7.9 (95% CI 2.6–24.1) times more likely to be classified as responders when compared to those receiving placebo (P<0.001). From a mean (±SD) baseline value of 181 (±12) mmHg, SBP decreased to 154 (±17) mmHg with amlodipine and to 170 (±21) mmHg with placebo (P<0.001). The voluntary acceptance rate of amlodipine formulation was 73%. Conclusions and Clinical Importance: The chewable amlodipine tablet effectively reduced SBP compared with placebo in hypertensive cats, and was well-tolerated. It can be used concomitantly with angiotensin-converting enzyme inhibitors and in cats with chronic kidney disease.

Incidence, Severity and Prognosis Associated with Hypernatremia in Dogs and Cats

Y. Ueda, K. Hopper and S.E. Epstein

Background: Hypernatremia has been associated with substantial morbidity and death in human patients. The incidence and importance of hypernatremia in dogs and cats has not been determined. Hypothesis/Objectives: To describe the incidence of and prognosis associated with hypernatremia in...
dogs and cats at a university teaching hospital. Animals A total of 16,691 dogs and 4,211 cats with measured blood or serum sodium concentration. Methods Retrospective study. Medical records of animals with a blood or serum sodium concentration measured during a 60-month period were reviewed to determine the severity of hypernatremia and its associated case fatality rate. Cases with moderate (11–15 mmol/L above the reference range) or severe hypernatremia (≥16 mmol/L above the reference range) were further reviewed. Results A total of 957 dogs (5.7%) and 338 cats (8.0%) were diagnosed with hypernatremia. Case fatality rates of dogs and cats with hypernatremia was 20.6 and 28.1%, respectively compared to 4.4 and 4.5% with a normal blood or serum sodium concentration (P < .0001). The magnitude of hypernatremia was linearly associated with a higher case fatality rate (P < .0001). Hypernatremia was associated with a higher case fatality rate than hyponatremia. Among the animals with moderate or severe hypernatremia, 50% of dogs and 38.5% of cats presented with community-acquired hypernatremia, and 50% of dogs and 61.5% of cats developed hospital-acquired hypernatremia. Conclusions and clinical importance Hypernatremia was found infrequently in this population but was associated with increased case fatality rates in dogs and cats. Presence and severity of hypernatremia might be useful as a prognostic indicator.

Incidence, Severity and Prognosis Associated with Hyponatremia in Dogs and Cats

Y. Ueda, K. Hopper and S.E. Epstein

Background Hyponatremia is a common electrolyte abnormality in human patients and is associated with substantial morbidity and death. The incidence and importance of hyponatremia in dogs and cats has not been determined. Hypothesis/Objectives To describe the incidence of and prognosis associated with hyponatremia in dogs and cats at a university teaching hospital. Animals Of 16,691 dogs and 4,211 cats with measured blood or serum sodium concentration. Methods Retrospective study. Medical records of animals with a blood or serum sodium concentration measured during a 60-month period were reviewed to determine the severity of hyponatremia and its associated fatality rate. Cases with moderate (11–15 mmol/L below the reference range) or severe hyponatremia (≥16 mmol/L below the reference range) were further reviewed. Results Of 4,254 dogs (25.5%) and 2,081 cats (49.4%) were diagnosed with hyponatremia. Case fatality rates of dogs and cats with hyponatremia were 13.7% and 11.9%, respectively, compared to 4.4% and 4.5% with a normal blood or serum sodium concentration (P < .0001). The magnitude of hyponatremia was linearly associated with a higher case fatality rate (P < 0.0001). Hyponatremia was associated with a lower case fatality rate than hypernatremia in the same population. Among the animals with moderate or severe hyponatremia, 92.1% of dogs and 90.6% of cats presented with community-acquired hyponatremia, and 7.9% of dogs and 9.4% of cats developed hospital-acquired hyponatremia. Conclusions and clinical importance Hyponatremia was found commonly in this population and was associated with increased case fatality rate. Presence and severity of hyponatremia might be useful as a prognostic indicator.

Relationship between lean body mass and serum renal biomarkers in healthy dogs

Jean A. Hall, Maha Yerramilli, Edward Obare, Murthy Yerramilli, Lynda D. Melendez and Dennis E. Jewell

Background Symmetric dimethylarginine (SDMA) is an accurate and precise biomarker for estimating glomerular filtration rate (GFR) in humans and cats. Serum creatinine (sCr) also correlates with GFR, but has limitations as a biomarker of renal function because nonrenal factors can influence its concentration. Hypothesis Differences in lean body mass (LBM) influence sCr, but not serum SDMA concentrations. Animals Forty-one healthy Beagles, mean age 9.9 years (range: 3.1–14.8 years), were studied over a 6 month period. Methods Serum biomarkers of renal function were measured prospectively at baseline, and 1, 3, and 6 months. SDMA concentrations were measured by liquid chromatography-mass spectroscopy and sCr concentrations by enzymatic colorimetry. Body composition was determined by dual energy x-ray absorptiometry. Results LBM (P < .001) and age (P = .006) were significant explanatory variables for sCr concentration (R2 = 0.38), but not SDMA concentration. Time on food was the only significant explanatory variable for SDMA concentration (R2 = 0.49). SDMA concentrations decreased across time (P < .001). LBM was affected by sex (males > females; P = .02). Mature adult dogs (<8 years) had greater LBM compared with geriatric dogs (≥8 years; P < .001). Conclusion and Clinical Importance sCr concentrations, but not SDMA concentrations, are influenced by LBM, which limits sCr utility as a biomarker for monitoring renal function in dogs with decreased LBM. Reductions in LBM can lower sCr concentration and overestimate GFR. SDMA concentrations, but not sCr concentrations were influenced by time on food. SDMA could have clinical advantages over sCr in monitoring response to nutritional interventions.
Dietary Management of Labrador Retrievers with Subclinical Hepatic Copper Accumulation


Background Genetic and environmental factors, including dietary copper intake, contribute to the pathogenesis of copper-associated hepatitis in Labrador retrievers. Clinical disease is preceded by a subclinical phase in which copper accumulates in the liver. Objective To investigate the effect of a low-copper, high-zinc diet on hepatic copper concentration in Labrador retrievers with increased hepatic copper concentrations. Animals Twenty-eight clinically healthy, client-owned Labrador retrievers with a mean hepatic copper concentration of 919 ± 477 mg/kg dry weight liver (dwl) that were related to dogs previously diagnosed with clinical copper-associated hepatitis. Methods Clinical trial in which dogs were fed a diet containing 1.3 ± 0.3 mg copper/Mcal and 64.3 ± 5.9 mg zinc/Mcal. Hepatic copper concentrations were determined in liver biopsy samples approximately every 6 months. Logistic regression was performed to investigate effects of sex, age, initial hepatic copper concentration and pedigree on the ability to normalize hepatic copper concentrations. Results In responders (15/28 dogs), hepatic copper concentrations decreased from a mean of 710 ± 216 mg/kg dwl copper to 343 ± 70 mg/kg dwl hepatic copper after a median of 7.1 months (range, 5.5–21.4 months). Dogs from a severely affected pedigree were at increased risk for inability to have their hepatic copper concentrations normalized with dietary treatment. Conclusions and Clinical Importance Feeding a low-copper, high-zinc diet resulted in a decrease in hepatic copper concentrations in a subset of clinically normal Labrador retrievers with previous hepatic copper accumulation. A positive response to diet may be influenced by genetic background. Determination of clinical benefit requires further study.

Bacterial Urinary Tract Infections Associated with Transitional Cell Carcinoma in Dogs


Background Urinary tract infections (UTI) are believed to be common in dogs with transitional cell carcinoma (TCC), but incidence and contributing factors have not been reported. Objectives To determine the frequency and bacterial agents associated with UTI in dogs with TCC and define contributing factors. Animals Eighty-five dogs with a history of urogenital TCC undergoing treatment with chemotherapy that had at least 1 urine culture performed. Methods Medical records and culture results were retrospectively reviewed and ultrasound images were reviewed when available. Clinical factors were evaluated statistically for association with positive culture. Results Fifty-five percent (47/85) of dogs had at least 1 positive culture during the course of treatment. Female dogs (80%, 40/50) were more likely than male dogs (29%, 10/35) to have at least 1 positive culture. Ultrasound examination determined that female dogs were more likely to have urethral (74%, 31/42) or trigonal tumor involvement (71%, 30/42) compared to male dogs (32%, 9/28 and 43%, 12/28, respectively). The most commonly isolated organisms were Staphylococcus spp. (23.9%, 29/121) and Escherichia coli (19.8%, 24/121). Dogs with urethral involvement of TCC were significantly more likely to have at least 1 positive culture than dogs without urethral involvement (75%, 30/40 versus 30%, 9/30).
Conclusions Urinary tract infection is common in dogs with TCC highlighting the importance of regular monitoring for bacterial cystitis in dogs with TCC. In addition, clinical factors such as tumor location and sex may be predictive of positive culture and can help clinicians assess the risk of UTI.

**Accuracy of Potassium Supplementation of Fluids Administered Intravenously**
S. N. Hoehne, K. Hopper and S. E. Epstein

Background Potassium (K+) supplementation of isotonic crystalloid fluids in daily fluid therapy is commonly performed, yet its accuracy in veterinary medicine is undetermined. Objective To investigate the accuracy of K+ supplementation in isotonic crystalloid fluids. Animals None. Methods Observational study. 210 bags of fluid supplemented with KCl being administered to hospitalized dogs and cats intravenously (IV) were sampled over a 3-month period. Measured K+ concentration ([K+]) was compared to the intended [K+] of the bag. In a second experiment, 60 stock fluid bags were supplemented to achieve a concentration of 20 mmol/L K+, mixed well and [K+] was measured. In another 12 bags of 0.9% NaCl, K+ was added without mixing the bag, and [K+] of the delivered fluid was measured at regular time points during constant rate infusion. Results The measured [K+] was significantly higher than intended [K+] (mean difference 9.0 mmol/L, range 6.5 to >280 mmol/L, P < .0001). In 28% of clinical samples measured [K+] was ≥5 mmol/L different than intended [K+]. With adequate mixing, K+ supplementation of fluids can be accurate with the mean difference between measured and intended [K+] of 0.7 (95% CI −0.32 to 1.7) mmol/L. When not mixed, K+ supplementation of 20 mmol/L can lead to very high [K+] of delivered fluid (up to 1410 mmol/L). Conclusions and Clinical Importance Inadequate mixing following K+ supplementation of fluid bags can lead to potentially life threatening IV infused [K+]. Standard protocols for K+ supplementation should be established to ensure adequate mixing.

**The Effect of Orally Administered Ranitidine and Once-Daily or Twice-Daily Orally Administered Omeprazole on Intragastric pH in Cats**
S. Sutalo, M. Ruetten, S. Hartnack, C.E. Reusch and P. H. Kook

Background Gastric acid suppressants frequently are used in cats with acid-related gastric disorders. However, it is not known if these drugs effectively increase intragastric pH in cats. Objectives To examine the effects of PO administered ranitidine and omeprazole on intragastric pH in cats and to compare the efficacy of once-daily versus twice-daily dosage regimens for omeprazole. Animals Eight domestic shorthair cats. Methods Using a randomized 4-way cross-over design, cats were given enteric-coated omeprazole granules (1.1–1.3 mg/kg q24h and q12h), ranitidine (1.5–2.3 mg/kg q12h), and placebo. Intragastric pH was monitored continuously for 96 hours using the Bravo™ system1, starting on day 4 of treatment, followed by a median washout period of 12 days. Mean percentage of time pH was ≥3 and ≥4 was compared among groups using repeated measures ANOVA. Results Mean ± SD percentage of time intragastric pH was ≥3 and ≥4 was 67.0 ± 24.0% and 54.6 ± 26.4% for twice-daily omeprazole, 24.4 ± 22.8% and 16.8 ± 19.3% for once-daily omeprazole, 16.5 ± 9.0% and 9.6 ± 5.9% for ranitidine, and 9.4 ± 8.0% and 7.0 ± 6.6% for placebo administration. Twice-daily omeprazole treatment significantly increased intragastric pH, whereas pH after once-daily omeprazole and ranitidine treatments did not differ from that of placebo-treated cats. Conclusion and Clinical Importance Only twice-daily PO administered omeprazole significantly suppressed gastric acidity in healthy cats, whereas once-daily omeprazole and standard dosages of ranitidine were not effective acid suppressants in cats.

**Prevalence of and Risk Factors for Degenerative Mitral Valve Disease in Dogs Attending Primary-care Veterinary Practices in England**

Background To date, epidemiological studies on degenerative mitral valve disease (DMVD) in dogs have largely reported referral caseloads or been limited to predisposed breeds. Analysis of primary-care data to identify factors associated with DMVD would help clinicians identify high-risk individuals and improve understanding. Objectives To estimate the prevalence of and identify risk factors for DMVD in dogs attending primary-care veterinary practices in England. Animals Cases were identified within the electronic patient records of 111,967 dogs attending 93 practices. Four hundred and 5 dogs were diagnosed with DMVD (diagnosed cases) and a further 3,557 dogs had a heart murmur (HM) consistent with DMVD (possible cases). Methods Retrospective cross-sectional study design. Prevalence was adjusted for the sampling approach. Mixed effects logistic regression models identified factors associated with DMVD. Results Prevalence estimates of diagnosed DMVD and HMs consistent with DMVD (both diagnosed and possible cases) were 0.36% (95% confidence interval [CI]: 0.29–0.45) and 3.54% (95% CI: 3.26–3.84) respectively. In the multivariable analysis, males had higher
study was to evaluate the prognostic value of perioperative plasma ACTH and cortisol concentrations

em, indicating the need for reliable prognostic indicators. Objectives The aim of this

and direct future research.

Changes in Systolic Blood Pressure over Time in Healthy Cats and Cats with Chronic Kidney Disease

E.S. Bijsmans, R.E. Jepson, Y.M. Chang, H.M. Syme and J. Elliott

Background Hypertension is a common problem in older cats, most often associated with chronic kidney disease (CKD). Cross-sectional studies have suggested that blood pressure in cats increases with age. Hypothesis/Objectives To determine whether blood pressure in cats increases with age and whether this occurs independently of the presence of CKD. To investigate risk factors for developing hypertension. Animals/Subjects Two hundred and sixty-five cats with CKD and 133 healthy cats ≥9 years were retrospectively identified. Methods Four groups were created according to status at initial evaluation (CKD or healthy) and blood pressure at the last included visit (normotensive [NT] or developed hypertension [DH]): Healthy-NT, Healthy-DH, CKD-NT and CKD-DH. Systolic blood pressure (SBP) over time slopes were compared with 0 and between groups. Risk factors for the development of hypertension were investigated, and associations of biochemical and clinical variables with SBP were examined. Results Cats that were hypertensive at CKD diagnosis (n = 105) were not included in further analyses. Twenty-seven cats with CKD and 9 healthy cats developed hypertension ≥3 months after diagnosis of CKD or their first visit. Systolic blood pressure significantly increased with age in all cats (P < .001). Healthy cats were at less risk than cats with CKD to become hypertensive (hazard ratio 0.2, P < .001), with creatinine being an independent risk factor for the development of hypertension. Conclusions and Clinical Importance The high prevalence of hypertension in azotemic cats in this study shows the importance of monitoring of SBP in elderly cats, and in particular in cats with CKD.

Evaluation of Thyroid-Stimulating Hormone, Total Thyroxine, and Free Thyroxine Concentrations in Hyperthyroid Cats Receiving Methimazole Treatment

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Background Iatrogenic hypothyroidism (IH) after treatment of hyperthyroidism can impair renal function. No study compared the efficacy of measurement of serum free thyroxine by equilibrium dialysis (fT4ed) or thyroid-stimulating hormone (TSH) concentrations for monitoring cats receiving methimazole. Objectives To (1) compare the ability of total T4 and fT4ed concentrations in conjunction with TSH to define thyroid function in hyperthyroid cats receiving methimazole, (2) determine the prevalence of IH in cats receiving methimazole, and (3) examine the relationship between thyroid axis hormones and serum creatinine concentration. Animals One hundred and twenty-five serum samples from hyperthyroid cats receiving methimazole and total T4 concentrations ≤3.9 µg/dL. Methods Total T4, fT4ed, and TSH concentrations were measured to evaluate thyroid status and serum creatinine concentration was measured to assess renal function. A low total T4 or fT4ed concentration in combination with an increased TSH concentration defined IH. Results Forty-one cats (33%) had increased TSH concentrations. Of cats with total T4 and fT4ed concentrations below the reference range, 68% and 73%, respectively, had TSH concentrations above the reference range. Only 18% of cats with a normal TSH concentration had an increased serum creatinine concentrations as compared to 39% of those with increased TSH concentrations (P < .001). Conclusions Free T4ed does not identify more cats with potential IH as compared to total T4. The IH prevalence was approximately 20%. Measurement of TSH may be more helpful in indicating that azotemia, if present, is at least in part related to IH. Investigation is needed to define TSH assay utility in identifying possible subclinical IH.

The Prognostic Value of Perioperative Profiles of ACTH and Cortisol for Recurrence after Transsphenoidal Hypophysectomy in Dogs with Corticotroph Adenomas

S.J. van Rijn, J.M. Hanson, D. Zierikzee, H.S. Kooistra, L.C. Penning, M.A. Tryfonidou and B.P. Meij

Background Transsphenoidal hypophysectomy is an effective treatment for dogs with pituitary-dependent hypercortisolism (PDH). However, long-term recurrence of hypercortisolism is a well-recognized problem, indicating the need for reliable prognostic indicators. Objectives The aim of this study was to evaluate the prognostic value of perioperative plasma ACTH and cortisol concentrations
Medullary Position at the CranioCervical Junction in Mature Cavalier King Charles Spaniels: Relationship with Neurologic Signs and Syringomyelia

S. Cerda-Gonzalez, N.J. Olby and E.H. Griffith

Background Medullary elevation (ie, medullary kinking) at the cranioCervical junction (CCJ) is reported in dogs with Chiari-like malformations (CM), but its diagnostic criteria and clinical relevance are unclear. Objective To describe the position of the medulla at the CCJ in mature cavalier King Charles spaniels (CKCS), and evaluate its relationship with clinical status and the presence of syringomyelia. Animals Thirty-six CKCS, 5–12 years of age, including 16 asymptomatic dogs. Methods Dogs were assigned a neurologic grade; magnetic resonance imaging (MRI) of the CCJ then was performed. The presence of a CM and syringomyelia was recorded and syringomyelia severity was quantified. Medullary position was quantified using the medullary kinking index, the elevation angle and obex position relative to the foramen magnum. The relationship between medullary position measures and presence and severity of neurologic signs and syringomyelia was investigated. Results Chiari-like malformation was found in 33 dogs; 26 of them had syringomyelia. Mean medullary kinking index was 46.4% (SD, 10.3), elevation angle was 132° (SD, 12) and obex position was 3.5 mm (SD, 0.8). A higher medullary kinking index was associated with the presence of neurologic signs (P = .0368). Obex position was associated with the presence (P = .0018) and severity of syringomyelia (P = .0164). Conclusions and clinical importance There is a significant association between medullary elevation and clinical signs, whereas more caudal brainstem positions appear related to the presence of syringomyelia.
Effect of Screening Abdominal Ultrasound Examination on the Decision to Pursue Advanced Diagnostic Tests and Treatment in Dogs with Neurologic Disease

Background Abdominal ultrasound examinations (AUS) are commonly performed before advanced neurodiagnostics to screen for diseases that might affect diagnostic plans and prognosis. Objectives Describe the type and frequency of abnormalities found by AUS in dogs presenting with a neurological condition, identify risk factors associated with abnormalities, and evaluate treatment decisions based on findings. Animals Seven hundred and fifty-nine hospitalized dogs. Methods Retrospective study. Medical records of dogs presented from 2007 to 2009 for neurologic disease were searched for signalment, neuroanatomic localization, and AUS findings. Whether dogs had advanced neurodiagnostics and treatment was analyzed. Results Fifty-eight percent of dogs had abnormal findings on AUS. Probability of abnormalities increased with age (P < 0.001). Nondachshund breeds had higher probability of abnormal AUS than dachshunds (odds ratio [OR] = 1.87). Eleven percent of dogs did not have advanced neurodiagnostics and in 1.3%, this was because of abnormal AUS. Dogs with ultrasonographic abnormalities were less likely than dogs without to have advanced neurodiagnostics (OR = 0.3 [95% confidence interval [CI]: 0.17, 0.52]), however, the probability of performing advanced diagnostics was high regardless of normal (OR = 0.95 [95% CI: 0.92, 0.97]) or abnormal (OR = 0.85 [95% CI: 0.81, 0.88]) AUS. Treatment was more often pursued in small dogs and less often in dogs with brain disease. Conclusions and Clinical Importance Findings from screening AUS had a small negative effect on the likelihood of pursuing advanced neurodiagnostics. Although it should be included in the extracranial diagnostic workup in dogs with significant history or physical examination abnormalities, AUS is considered a low-yield diagnostic test in young dogs and dachshunds.

Early Tumor Response to Intraarterial or Intravenous Administration of Carboplatin to Treat Naturally Occurring Lower Urinary Tract Carcinoma in Dogs

Background Survival times and tumor responses associated with malignant neoplasia of the lower urinary tract are poor despite the vast array of current treatments. Therefore, the evaluation of alternative treatments, such as intraarterial administration of chemotherapy (IAC) should be considered. Objective To describe a technique for superselective catheterization for IAC and to evaluate initial tumor response by ultrasonography after both IAC and intravenous administration of chemotherapy (IVC). Animals Client-owned dogs with lower urinary tract neoplasia treated with either IVC (n = 15) or IAC (n = 11). Methods Retrospective study. An arterial approach via the carotid or femoral artery was utilized to obtain superselective access and administer chemotherapy in the IAC cases. Medical record review was performed, data were recorded, and recorded variables were evaluated statistically. Results Intraarterial chemotherapy was successfully administered in all cases. There was a significantly greater decrease in longest unidimensional measurement in the IAC group as compared to the IVC group (P = .013). The IAC group was also significantly more likely to have a tumor response as assessed by modified RECIST guidelines (P = .049). Dogs in the IAC group were significantly less likely to develop anemia (P = .001), lethargy (P = .010) and anorexia (P = .024). Conclusion and Clinical Importance This study demonstrated the feasibility and efficacy of performing IAC for lower urinary tract neoplasia. Further investigation is necessary as the follow-up time was short and the impact on long-term outcome and survival was not determined.

Procoagulant Microparticles in Dogs with Immune-Mediated Hemolytic Anemia
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Background Studies of some human prothrombotic diseases suggest that phosphatidylserine-positive (PS+) and tissue factor-positive (TF+) microparticles (MPs) might play a role in the pathogenesis of thrombosis or serve as biomarkers of thrombotic risk. Hypothesis/Objectives To determine if circulating levels of PS+MP and procoagulant activity (PCA) associated with PS+MPs and TF+ MPs are increased in dogs with IMHA. Animals Fifteen dogs with primary or secondary IMHA and 17 clinically healthy dogs. Methods Prospective case-controlled observational study. Circulating PS+MPs were measured by flow cytometry. PCA associated with PS+MPs and TF+MPs was measured by thrombin and Factor Xa generating assays, respectively. Results Circulating numbers of PS+MPs were not significantly higher in dogs with IMHA [control median 251,000/µL (36,992–1,141,250/µL); IMHA median 361,990/µL (21,766–47,650,600/µL) P = .30]. However, PS+MP PCA [control median 2.2 (0.0–16.8) nM PS eq; IMHA median 8.596, (0.49–33 nM PS eq) P = .01] and TF+MP PCA
[control median 0.0, (0.0–0.0 pg/mL); IMHA median 0.0; (0–22.34 pg/mL), P = .04) were increased. Intravascular hemolysis, which we showed might increase PS+ and TF+MP PCA, was evident in 3 of 5 dogs with PS+MP PCA and 2 of 4 dogs with TF+MP PCA higher than controls. Underlying disease in addition to IMHA was detected in 1 of 5 dogs with PS+PCA and 3 of 4 dogs with TF+MP PCA higher than controls. Conclusions and Clinical Importance TF+ and PS+ MP PCA is increased in some dogs with IMHA. Further studies that determine if measuring TF+ and PS+ MP PCA can help identify dogs at risk for thrombosis are warranted.

Idiopathic Epilepsy in the Italian Spinone in the United Kingdom: Prevalence, Clinical Characteristics, and Predictors of Survival and Seizure Remission
L. De Risio, R. Newton, J. Freeman and A. Shea

Background
There is lack of data on idiopathic epilepsy (IE) in the Italian Spinone (IS). Objectives To estimate the prevalence of IE in the IS in the United Kingdom (UK) and to investigate predictors of survival and seizure remission. Animals The target population consisted of 3331 IS born between 2000 and 2011 and registered with the UK Kennel Club (KC). The owners of 1192 dogs returned phase I questionnaire. Sixty-three IS had IE. Methods Population survey. The owners of all UK KC-registered IS were invited to complete the phase I questionnaire. Information from the phase I questionnaire and veterinary medical records was used to identify IS with IE and obtain data on treatment and survival. Additional information was obtained from owners of epileptic IS who completed the phase II questionnaire. Results The prevalence of IE in the IS in the UK was estimated as 5.3% (95% CI, 4.03–6.57%). Survival time was significantly shorter in IS euthanized because of poorly controlled IE compared with epileptic IS that died of unrelated disorders (P = 0.001). Survival was significantly longer in IS with no cluster seizures (CS) (P = 0.040) and in IS in which antiepileptic medication was initiated after the second seizure rather than after ≥3 seizures (P = 0.044). Seizure remission occurred only in 3 IS. Conclusions and Clinical Importance The prevalence of IE in IS (5.3%) is higher than in dogs (0.6%) in the UK. Idiopathic epilepsy in IS has a severe phenotype. Antiepileptic medication initiation after the second seizure and aggressive treatment of CS may improve survival.

Syndrome of Inappropriate Antidiuretic Hormone in a Bulldog with Aspiration Pneumonia
K.D. Bowles, B.M. Brainard and K.D. Coleman

The Veterinary Journal

Biological validation of feline serum cystatin C: The effect of breed, age and sex and establishment of a reference interval

Chronic kidney disease (CKD) is common in cats, but the routine renal markers, serum creatinine (sCr) and urea, are not sensitive or specific enough to detect early CKD. Serum cystatin C (sCysC) has advantages over sCr, both in humans and dogs, and sCysC concentration is significantly higher in cats with CKD than in healthy cats. The objective of this study was to determine the effect of age, sex and breed on feline sCysC and to establish a reference interval for feline sCysC. In total, 130 healthy cats aged 1–16 years were included. sCysC was determined using a validated particle-enhanced nephelometric immunoassay. sCr, urea, urine specific gravity, urinary protein:creatinine ratio (UPC) and systolic blood pressure (SBP) were also measured. No significant differences in sCysC concentration were observed among young, middle-aged and geriatric cats, female intact, female neutered cats, male intact and male neutered cats, or among purebred and domestic short- or longhaired cats. The 95% reference interval for feline sCysC was determined to be 0.58–1.95 mg/L. sCr was significantly higher in geriatric cats than young cats. Serum urea in geriatric cats was significantly higher than in middle-aged and young cats (P = 0.004 and P < 0.001, respectively). SBP in geriatric cats was significantly higher than in both middle-aged and young cats (P = 0.004 and P = 0.040, respectively). Male neutered and female neutered cats had significantly higher serum urea concentrations than female intact cats (P = 0.003 and P = 0.006, respectively). Male intact cats had a significantly higher UPC than female intact and female neutered cats (P = 0.02 for each comparison). There were no significant differences among sex groups for USG. It is of concern that sCysC in the majority of cats with CKD in previous studies falls within the reference interval calculated in this study. Further studies are warranted to evaluate the diagnostic value of sCysC as a renal marker in cats.

The effects of altered distances between obstacles on the jump kinematics and apparent joint angulations of large agility dogs
E. Birch, J. Boyd, G. Doyle, A. Pullen
Canine agility is a rapidly growing sport in the UK. However, there is a paucity of scientific research examining jump kinematics and associated health and welfare implications of the discipline. The aim of this research was to examine differences in jump kinematics and apparent joint angulation of large (>431 mm at the withers) agility dogs (n = 54), when the distance between hurdles was altered (3.6 m, 4 m and 5 m apart) and to determine how level of skill impacted upon jump kinematics. Significant differences were observed for both the take-off (P < 0.001) and landing distances (P < 0.001) between the 3.6 m, 4 m and 5 m distances. Further differences were observed when level of skill was controlled for; take-off (F[3,55] = 5.686, P = 0.002) and landing (F[3,55] = 7.552, P < 0.001) distances differed at the 3.6 m distance, as did the take-off distance at the 4 m hurdle distance (F[3,50] = 6.168, P = 0.001). Take-off and landing speeds differed for hurdle distances (P < 0.001) and level of skill (P < 0.001). There were significant differences in apparent neck angle during take-off and landing (P < 0.001), lumbar spine angles during take-off, bascule and landing (P < 0.01), and in shoulder angles during the bascule phase (P < 0.05). The results indicate that agility dogs alter their jumping patterns to accommodate the spacing between hurdles, which ultimately may impact long term health and welfare due to altered kinematics.

Kinematic adaptations to tripedal locomotion in dogs
B. Goldner, A. Fuchs, I. Nolte, N. Schilling
Limb amputation often represents the only treatment option for canine patients with certain diseases or injuries of the appendicular system. Previous studies have investigated adaptations to tripedal locomotion in dogs but there is a lack of understanding of biomechanical compensatory mechanisms. This study evaluated the kinematic differences between quadrupedal and tripedal locomotion in nine healthy dogs running on a treadmill. The loss of the right pelvic limb was simulated using an Ehmer sling. Kinematic gait analysis included spatio-temporal comparisons of limb, joint and segment angles of the remaining pelvic and both thoracic limbs. The following key parameters were compared between quadrupedal and tripedal conditions: angles at touch-down and lift-off, minimum and maximum joint angles, plus range of motion. Significant differences in angular excursion were identified in several joints of each limb during both stance and swing phases. The most pronounced differences concerned the remaining pelvic limb, followed by the contralateral thoracic limb and, to a lesser degree, the ipsilateral thoracic limb. The thoracic limbs were, in general, more retracted, consistent with pelvic limb unloading and previous observations of bodyweight re-distribution in amputees. Proximal limb segments showed more distinct changes than distal ones. Particularly, the persistently greater anteverision of the pelvis probably affects the axial system. Overall, tripedal locomotion requires concerted kinematic adjustments of both the appendicular and axial systems, and consequently preventive, therapeutic and rehabilitative care of canine amputees should involve the whole musculoskeletal apparatus.

Secreted phospholipase A2 inhibitor modulates fatty acid composition and reduces obesity-induced inflammation in Beagle dogs
Secreted phospholipase A2 inhibitor (sPLA2i) has been reported to have an anti-inflammatory function by blocking the production of inflammatory mediators. Obesity is characterized by low-grade inflammation and oxidative stress. The aim of this study was to investigate the effects of dietary supplementation of sPLA2i on inflammation, oxidative stress and serum fatty acid profile in dogs. Seven obese and seven lean Beagle dogs were used in a 28-day double blind cross-over design. Dogs were fed a control diet without supplemental sPLA2i or an sPLA2i supplemented diet. The sPLA2i diet decreased plasma fibrinogen levels and increased the protein:fibrinogen ratio in obese dogs to levels similar to those of lean dogs fed the same diet. Obese dogs had a higher plasma concentration of the lipophilic vitamin A with potential antioxidative capacity and a lower ratio of retinol binding protein 4: vitamin A compared to lean dogs, independent of the diets. A higher proportion of myristic acid (C14:0) and a lower proportion of linoleic acid (C18:2n-6) were observed in the dogs fed with the sPLA2i diet compared to dogs fed with the control diet. Furthermore, a higher ratio of n-6 to n-3, a lower proportion of n-3 polyunsaturated fatty acids and lower omega-3 index were observed in obese compared to lean dogs. The results indicate that obese dogs are characterized by a more ‘proinflammatory’ serum fatty acid profile and that diet inclusion of sPLA2i may reduce inflammation and alter fatty acid profile.

Molecular and immunohistochemical studies do not support a role for papillomaviruses in canine oral squamous cell carcinoma development
John S. Munday, Adrienne French, Catherine J. Harvey
Oral squamous cell carcinomas (OSCCs) are common neoplasms of dogs and are of unknown cause. Whereas papillomaviruses (PVs) are an established cause of human OSCCs, few studies have investigated canine OSCCs for a PV aetiology. In humans, a PV aetiology can be determined by detecting PV DNA and PV-induced increased p16CDKN2A protein (p16) within the OSCC. In this study, PCR, using four different primer sets and p16 immunohistochemistry, was used to evaluate 28 canine OSCCs for a possible PV aetiology. None of the primers amplified PV DNA from any of the OSCCs although four neoplasms contained intense p16 immunostaining. Intense p16 immunostaining would indicate a PV aetiology in a human OSCC but the absence of PV DNA suggests that the increase in p16 was not due to PV infection. Overall the results indicated that PVs are not a significant cause of canine OSCCs.

Increased bone morphogenetic protein 7 signalling in the kidneys of dogs affected with a congenital portosystemic shunt

Astrid M. van Dongen, Susanne M. Heuving, Marianna A. Tryfonidou, Frank G. van Steenbeek, Jan Rothuizen, Louis C. Pennin

Dogs with a congenital portosystemic shunt (CPSS) often have enlarged and hyper-filtrating kidneys. Although expression of different growth factors has been well-described in the livers of dogs affected with a CPSS, their expression in the kidneys has yet to be determined. Bone morphogenetic protein 7 (BMP-7), hepatocyte growth factor (HGF) and transforming growth factor (TGF)-β have been implicated in renal development (BMP-7, HGF) or the onset of renal fibrosis (TGF-β). Moreover, BMP-7 and HGF have protective properties in renal fibrosis. In this study, the expression and activity of BMP-7 were investigated in renal biopsies obtained from 13 dogs affected with a CPSS and compared to similar samples from age-matched healthy control dogs. Both quantitative reverse-transcriptase PCR and Western blotting showed up-regulated BMP-7 signalling in kidneys of CPSS-affected dogs. These research findings may help to explain the renal pathology/dysfunction in dogs affected with a CPSS.

Journal of Feline Medicine & Surgery

Feline gastrointestinal eosinophilic sclerosing fibroplasia: 13 cases and review of an emerging clinical entity

Michael Linton, Judith S Nimmo, Jacqueline M Norris et al.

Objective: Feline gastrointestinal eosinophilic sclerosing fibroplasia (FGESF) is a recently described inflammatory disease of cats affecting stomach or intestines and draining regional lymph nodes. This study presents clinical and laboratory data on 13 newly described cases from Australia (11) and the UK (two). Observations: The disease was most often observed in middle-aged cats (median 7 years of age; interquartile range 5–9 years). Ragdolls (7/13) and males (9/13) were overrepresented. Cats generally had a long history of vomiting and/or diarrhoea. Lesions were typically large, hard, non-painful, easily palpable and most commonly situated near the pylorus or ileocaecocolic junction. Lesions were heterogeneous ultrasonographically and on sectioning at celiotomy or necropsy. Masses were hard and ‘gritty’ on fine-needle aspiration due to internal trabeculae made up of mature collagen bundles. Bacteria were commonly detected within masses (9/13 cases) using either culture or conventional light microscopy and a panel of special stains, and/or fluorescence in situ hybridisation (FISH), although detection often required a diligent search of multiple tissue sections. A consistent bacterial morphology could not be appreciated among the different cases. Outcome: Patients were treated with a variable combination of cytoreduction (debulking and biopsy, to complete surgical resection), immunosuppressive therapy and antimicrobial agents. Many cats had a poor outcome, which was attributable to late diagnosis combined with suboptimal management. It is hoped that suggestions outlined in the discussion may improve clinical outcomes and long-term survival in future cases.

Investigation of inherited diseases in cats: Genetic and genomic strategies over three decades

Barbara Gandolfi and Hasan Alhaddad

Practical relevance: The health of the cat mirrors a complex interaction between its environment (nurture) and its genetics (nature). To date, over 70 genetic mutations (variants) have been defined in the cat; many involve diseases, structural anomalies, coat color and texture, including numerous that are clinically relevant. This trend will continue as more of the feline genome is deciphered. Genetic testing, and eventually whole-genome sequencing, should become routine diagnostic tools in feline healthcare within the foreseeable future. Global importance: Cat breeds have dispersed around the world. Thus, feline medicine clinicians should be aware of breeds common to their region and common mutations found within those regional populations. Random-bred populations of domestic cats can also have defined genetic characteristics and mutations, which are equally worthy of understanding by
feline medicine clinicians. Outline: This article reviews the chronology and evolution of genetic and genomic tools pertinent to feline medicine. Possible strategies for mapping genetic traits and defects, and how these impact on feline health, are also discussed. The focus is on three historical periods: (1) research conducted before the availability of the cat genome; (2) research performed immediately after the availability of sequences of the cat genome; and (3) current research that goes beyond one cat genome and utilizes the genome sequences of many cats. Evidence base: The data presented are extracted from peer-reviewed publications pertaining to mutation identification, and relevant articles concerning heritable traits and/or diseases. The authors draw upon their personal experience and expertise in feline genetics.

**Periodic hypokalaemic polymyopathy in Burmese and closely related cats: A review including the latest genetic data**
Richard Malik, Fran J Musca, Marcus N Gunew et al.
Global importance: Hypokalaemic polymyopathy is a genetic disease of Burmese cats that has been encountered in Australasia, Europe and South Africa. Clinical features: Affected cats usually present with signs of muscle weakness and muscle pain in the first year of life. Although certain clinical features, such as ventroflexion of the head and neck, are especially characteristic, some cats do not display these signs. Usually weakness is periodic or episodic, but occasionally it is incessant. Diagnostic challenges: In the past, diagnosis was problematic in that clinical signs and a lowered serum potassium concentration were not always observed synchronously. This necessitated serial serum potassium concentration determinations, testing of serum creatine kinase activity and exclusion of other potential causes of muscle disease in cats (including muscular dystrophies, Toxoplasma myositis, immune-mediated polymyositis, organophosphorus intoxication and envenomations). Signs in affected cats often waxed and waned, possibly in response to changes in dietary factors and stress, and some cats could apparently ‘grow out of’ the condition. Recent advances and future prospects: Recent molecular genetics research has identified a single nonsense mutation in the gene (WNK4) coding for lysine-deficient 4 protein kinase, an enzyme present primarily in the distal nephron. The underlying pathomechanism in affected cats is therefore likely to be a potassium wasting nephropathy, as this enzyme is involved in complex sodium/potassium exchange mechanisms in the kidney. Additional functional characterisation of the condition is warranted to define precisely how, why and when the serum potassium concentration declines. The diagnosis of Burmese hypokalaemia is now straightforward, as an inexpensive PCR test can identify affected homozygous individuals, as well as carriers. The elimination of this condition from the Burmese breed, and also from pedigree cats infused with Burmese lines, such as the Bombay, Tonkinese and Tiffanie breeds, should therefore be possible.

**Feline hyperparathyroidism: Pathophysiology, diagnosis and treatment of primary and secondary disease**
Valerie J Parker, Chen Gilor, and Dennis J Chew
Practical relevance: Hyperparathyroidism exists in primary and secondary forms. Primary hyperparathyroidism has typically been considered a disease that uncommonly affects cats, but this condition is more prevalent than previous diagnoses would suggest. Secondary hyperparathyroidism may be caused by either nutritional influences (ie, nutritional secondary hyperparathyroidism) or chronic kidney disease (ie, renal secondary hyperparathyroidism). Tertiary hyperparathyroidism has yet to be documented in veterinary medicine, but it is possible that this condition occurs in some cats following longstanding renal secondary hyperparathyroidism. Clinical challenges: Diagnosis of this group of calcium metabolic disorders presents a number of challenges for the clinician. For example, clinical signs can be non-specific and, especially in the case of primary hyperparathyroidism, there is often a low index of suspicion for the disease; careful sample handling is required for testing of parathyroid hormone (PTH) and ionized calcium levels; and there is currently no feline-specific assay for PTH, which has implications for test sensitivity and interpretation of results. Aims: This article briefly outlines PTH and calcium physiology by way of introduction to a review of PTH measurement and interpretation. Various forms of feline hyperparathyroidism are then described, encompassing diagnosis and treatment options.

**American Journal of Veterinary Research**

**Impact of polymethylmethacrylate additives on methicillin-resistant Staphylococcus pseudintermedius biofilm formation in vitro.**
OBJECTIVE To evaluate the impact of gentamicin, silver, or both additives in polymethylmethacrylate (PMMA) beads on methicillin-resistant Staphylococcus pseudintermedius (MRSP) biofilm formation in vitro. SAMPLE 4 preparations of PMMA beads (formed with no additive [control], gentamicin, silver, and gentamicin and silver). PROCEDURES Beads from each group were exposed to 10 MRSP isolates known to be strong biofilm formers. Following incubation, the beads were rinsed to remove planktonic bacteria, then sonicated to dislodge biofilm-associated bacteria. Resulting suspensions were serially diluted, plated on blood agar, and incubated overnight; CFUs were counted. Variance of mean CFU counts following log10 transformation was analyzed among PMMA groups. RESULTS None of the PMMA additives tested completely inhibited MRSP biofilm formation. There was a significant effect of gentamicin and gentamicin plus silver on this variable, compared with controls, but not of silver alone. There was no difference between gentamicin and gentamicin plus silver. When only isolates not susceptible to gentamicin were evaluated, there were no significant differences among PMMA additive groups. Within gentamicin-susceptible isolates, there was an impact of gentamicin and gentamicin plus silver, but no impact of silver alone and no difference between gentamicin and gentamicin plus silver. CONCLUSIONS AND CLINICAL RELEVANCE Gentamicin-impregnated PMMA was effective at reducing biofilm formation of gentamicin-susceptible MRSP isolates but had no effect on isolates not susceptible to gentamicin. Silver-impregnated PMMA had no effect on MRSP biofilm formation. Results suggested that gentamicin-impregnated PMMA may not be effective in vivo against MRSP isolates not susceptible to gentamicin. Antibacterial efficacy of silver should not be assumed without proper testing of the target bacteria and specific silver compound.

Stability of hemostatic proteins in canine fresh-frozen plasma thawed with a modified commercial microwave warmer or warm water bath.
Medora B. Pashmakova, James W. Barr, Micah A. Bishop

OBJECTIVE To compare stability of hemostatic proteins in canine fresh-frozen plasma (FFP) thawed with a modified commercial microwave warmer (MCM) or warm water bath (37°C; WWB) or at room temperature (22°C). SAMPLE Fresh-frozen plasma obtained from 8 canine donors of a commercial blood bank. PROCEDURES A commercial microwave warmer was modified with a thermocouple to measure surface temperature of bags containing plasma. The MCM and a WWB were each used to concurrently thaw a 60-ml bag of plasma obtained from the same donor. Two 3-ml control aliquots of FFP from each donor were thawed to room temperature without use of a heating device. Concentrations of hemostatic proteins, albumin, and D-dimers; prothrombin time (PT); and activated partial thromboplastin time (aPTT) were determined for all samples. RESULTS Significant decreases in concentrations of factors II, IX, X, XI, fibrinogen, von Willebrand factor, antithrombin, protein C, and albumin and significant increases in PT and aPTT were detected for plasma thawed with the MCM, compared with results for samples thawed with the WWB. Concentrations of factors VII, VIII, and XII were not significantly different between plasma thawed with the MCM and WWB. Concentrations of D-dimers were above the reference range for all thawed samples regardless of thawing method. No significant differences in factor concentrations were detected between control and WWB-thawed samples. CONCLUSIONS AND CLINICAL RELEVANCE Significant differences in hemostatic protein concentrations and coagulation times were detected for plasma thawed with an MCM but not between control and WWB-thawed samples. Clinical importance of these changes should be investigated.

Pharmacologic evaluation of ammonium tetrathiomolybdate after intravenous and oral administration to healthy dogs.
Christina M. Chan, Daniel K. Langlois, John P. Buchweitz, Andreas F. Lehner, N. Bari Olivier, Thomas H. Herdt, Marc B. Bailie, William D. Schall

OBJECTIVE To evaluate pharmacokinetics of ammonium tetrathiomolybdate (TTM) after IV and oral administration to dogs and effects of TTM administration on trace mineral concentrations. ANIMALS 8 adult Beagles and Beagle crosses (4 sexually intact males and 4 sexually intact females). PROCEDURES Dogs received TTM (1 mg/kg) IV and orally in a randomized crossover study. Serum molybdenum and copper concentrations were measured via inductively coupled plasma mass spectrometry in samples obtained 0 to 72 hours after administration. Pharmacokinetics was determined via noncompartmental analysis. RESULTS For IV administration, mean ± SD terminal elimination rate constant, maximum concentration, area under the curve, and half-life were 0.03 ± 0.01 hours−1, 4.9 ± 0.6 µg/mL, 30.7 ± 5.4 µg/mL·h, and 27.7 ± 6.8 hours, respectively. For oral administration, mean ± SD terminal elimination rate constant, time to maximum concentration, maximum concentration, area under the curve, and half-life were 0.03 ± 0.01 hours−1, 3.0 ± 3.5 hours, 0.2 ± 0.4 µg/mL, 6.5 ± 8.0 µg/mL·h, and 26.8 ± 8.0 hours, respectively. Oral bioavailability was 21 ± 22%. Serum copper
concentrations increased significantly after IV and oral administration. Emesis occurred after IV (2 dogs) and oral administration (3 dogs). CONCLUSIONS AND CLINICAL RELEVANCE Pharmacokinetics for TTM after a single IV and oral administration was determined for clinically normal dogs. Absorption of TTM after oral administration was variable. Increased serum copper concentrations suggested that TTM mobilized tissue copper. Further studies will be needed to evaluate the potential therapeutic use of TTM in copper-associated chronic hepatitis of dogs.

Posaconazole pharmacokinetics after administration of an intravenous solution, oral suspension, and delayed-release tablet to dogs.
Jennifer Kendall, Mark G. Papich.
OBJECTIVE To determine pharmacokinetics of posaconazole in dogs given an IV solution, oral suspension, and delayed-release tablet. ANIMALS 6 healthy dogs. PROCEDURES Posaconazole was administered IV (3 mg/kg) and as an oral suspension (6 mg/kg) to dogs in a randomized crossover study. Blood samples were collected before (time 0) and for 48 hours after each dose. In an additional experiment, 5 of the dogs received posaconazole delayed-release tablets (mean dose, 6.9 mg/kg); blood samples were collected for 96 hours. Plasma concentrations were analyzed with high-performance liquid chromatography. RESULTS IV solution terminal half-life (t1/2) was 29 hours (coefficient of variation [CV], 23%). Clearance and volume of distribution were 78 mL/h/kg (CV, 59%) and 3.3 L/kg (CV, 38%), respectively. Oral suspension t1/2 was 24 hours (CV, 42%). Maximum plasma concentration (Cmax) of 0.42 µg/mL (CV, 56%) was obtained at 7.7 hours (CV, 92%). Mean bioavailability was 26% (range, 7.8% to 160%). Delayed-release tablet t1/2 was 42 hours (CV, 25%), with a Cmax of 1.8 µg/mL (CV, 44%) at 9.5 hours (CV, 85%). Mean bioavailability of tablets was 159% (range, 85% to 500%). Bioavailability of delayed-release tablets was 497% (range, 140% to 1,800%) relative to that of the oral suspension. CONCLUSIONS AND CLINICAL RELEVANCE Absorption of posaconazole oral suspension in dogs was variable. Absorption of the delayed-release tablets was greater than absorption of the oral suspension, with a longer t1/2 that may favor its clinical use in dogs. Administration of delayed-release tablets at a dosage of 5 mg/kg every other day can be considered for future studies.

In vitro evaluation of bursting pressure and intestinal luminal area of three jejunostomy tube placement techniques in dogs.
Marije Risselada, Gary W. Ellison, Matthew D. Winter, Robson F. Giglio, Andre Shih, Jorge A. Hernandez, Emily Griffith.
OBJECTIVE To compare pursestring, Witzel (seromuscular inversion), and seromuscular incision jejunostomy tube placement techniques in vitro. SAMPLE Jejunal specimens from 10 dogs. PROCEDURES Jejunal segments (50 cm) were harvested immediately prior to euthanasia from 10 mixed-breed dogs. Specimens were harvested with the orad and aborad ends clamped and stored in saline (0.9% NaCl) solution–soaked towels during instrumentation. Three jejunostomy tubes were placed via 3 techniques (pursestring, Witzel, and seromuscular incision), and 2 double lumen central venous catheters were placed at each intestinal end for luminal filling and leak testing. Intestinal luminal area was measured ultrasonographically with specimens suspended in a warm undyed saline solution bath with the intestinal lumen filled with dyed saline solution (intraluminal pressure, 6 mm Hg). Leak testing was performed by means of infusion of dyed saline solution (4 mL/min) until each jejunostomy site failed. Intestinal luminal area and leakage pressure were compared between the 3 tube placement techniques. RESULTS The Witzel and seromuscular incision techniques decreased the intestinal luminal area measured at the tube insertion site, albeit nonsignificantly. For the seromuscular incision technique, a significant decrease in intestinal luminal area at the intraluminal site of measurement was found. For 2/30 specimens (1/10 pursestring and 1/10 seromuscular incision), failure occurred at pressures within the range of previously reported peak peristaltic pressure for dogs. Failure occurred at supraphysiologic peristaltic pressures for the remaining 28 specimens, including all 10 specimens for the Witzel technique. CONCLUSIONS AND CLINICAL RELEVANCE In this in vitro study, all specimens for the Witzel technique withstood physiologic peristaltic pressures during leak testing. Both tunneling techniques (Witzel and seromuscular incision) created a decrease in intestinal luminal area. Further investigation, including in vivo testing, is indicated to evaluate the clinical relevance of these findings.

Journal of Small Animal Practice

Magnetic resonance imaging of the lentiform nuclei in dogs with portosystemic shunts.
Comparison between Ki-67 index and mitotic index for predicting outcome in canine mast cell tumours.

S. van Lelyveld, J. Warland, R. Miller, H. Maw, R. Foale, M. Goodfellow and J. Dobson

OBJECTIVES - To assess correlation between Ki67 index and mitotic index and determine which more accurately predicts survival in canine mast cell tumours. METHODS - Retrospective analysis of cases from three UK referral hospitals. Correlation between Ki67 index and mitotic index was assessed and survival analysis performed. RESULTS A total of 162 dogs were included: 57 dogs died with 37 due to mast cell tumour. Correlation between Ki67 index and mitotic index was moderate, while the agreement was poor. A high Ki67 index was considered sensitive (86·5%) at predicting mast cell tumour-related death, but poorly specific (57·9%). Mitotic index(>5) was poorly sensitive (32·4%), but highly specific (96%). A mitotic index of ê2 had a 75·7% sensitivity and an 80·0% specificity. Ki67 index showed a statistically significant survival difference within the mitotic index <2 (P = 0·009) group. Ki67 index did not predict survival rate in tumours with mitotic index of ê2. CLINICAL RELEVANCE Correlation between Ki67 and mitotic index is moderate. High mitotic index accurately predicted death, but many dogs with low mitotic index also died. Low Ki67 accurately predicted survival, but high Ki67 should not be considered a poor prognostic indicator. A three-tier mitotic index assessment may more accurately predict death due to mast cell tumour.

Acoustic radiation force impulse elastography of prostate and testes of healthy dogs: preliminary results.


OBJECTIVES - To describe the use of acoustic radiation force impulse elastography to evaluate the prostate and testes in healthy dogs and establish reference values for these organs. METHODS - Thirty dogs were divided into three groups according to their age: juvenile, adult and senior. Echotexture, size, contours and margins of prostate and testes were assessed via ultrasound. The presence of deformities and tissue stiffness (greyscale and homogeneous or heterogeneous) were evaluated by qualitative acoustic radiation force impulse. The shear velocity was evaluated quantitatively. RESULTS - The B mode findings were normal. The qualitative elastography demonstrated that the testes and prostate tissues were hard, homogeneous and not pliable. The shear velocity values were: left testes – juveniles: 1·28 m/s, adults: 1·23 m/s and seniors: 1·23 m/s; right testes – juveniles: 1·28 m/s, adults: 1·28 m/s and seniors: 1·28 m/s; left prostatic lobe – juveniles: 1·74 m/s, adults: 2·03 m/s and seniors: 1·82 m/s; right prostatic lobe – juvenile: 1·62 m/s, adults: 1·87 m/s and seniors: 1·90 m/s with no significant differences between groups. CLINICAL SIGNIFICANCE - Acoustic radiation force impulse elastography of the testes and prostate in dogs was easily implemented. This study provides baseline data for these organs.

Neurological signs and pre- and post-traction low-field MRI findings in Dobermanns with disc-associated cervical spondylomyelopathy (pages 331–338)

F. Stabile, M. Bernardini, G. Bevilacqua, A. B. Ekiri, A. de Stefani and L. De Risio

OBJECTIVE To investigate whether the presence of neurological signs and magnetic resonance imaging findings could predict the presence of a traction-responsive lesion in Dobermanns affected by disc-associated cervical spondylomyelopathy. METHODS Retrospective review of neurological signs
and low-field pre- and post-traction magnetic resonance imaging abnormalities of the cervical spine (abnormal vertebral body shape and vertebral tipping, intervertebral disc degeneration, protrusion and ligamentum flavum hypertrophy) in Dobermanns with disc-associated cervical spondylomyelopathy. The main outcome of interest was response to linear traction (dynamic versus static) at C6-C7 intervertebral disc space. The association between investigated variables and response to linear traction was assessed. RESULT The study included 25 dogs. No association was identified between neurological status grading and the presence of a static or traction-responsive lesion. Of the investigated magnetic resonance findings, C7-T1 intervertebral disc degeneration was significantly (P = 0.03) associated with the presence of a traction-responsive lesion at C6-C7 intervertebral disc space. CLINICAL SIGNIFICANCE The presence of C7-T1 intervertebral disc degeneration might help in predicting the presence of traction-responsive C6-C7 intervertebral disc lesions.

Comparison of endoscopy and sonography findings in dogs and cats with histologically confirmed gastric neoplasia.
OBJECTIVE - To compare sonographic and endoscopic findings in a group of dogs and cats with histologically confirmed gastric neoplasia. METHODS Retrospective analysis of cases with concurrent abdominal ultrasound and endoscopy to evaluate the presence of gastric wall abnormalities, location and tumour appearance between the two examinations. Sonographic findings of the small intestines, liver, spleen and lymph nodes were recorded. Comparison of the findings from each test and assessment of predictive characteristics for neoplasia was evaluated. RESULTS - In total 17 dogs and 5 cats were included, Sonography identified 50% and endoscopy identified 95% of all gastric neoplasms. Lymphoma was the most commonly missed tumour by sonography. There was sonographic and endoscopic tumour location agreement in 36% of cases (Cohen's kappa = 0.25). Animals with sonographically normal small intestines had a statistically greater probability of gastric neoplasia (P = 0.035). All cats had lymphoma (P < 0.001). CLINICAL SIGNIFICANCE - Sonography and endoscopy are useful for the diagnosis of gastric neoplasia. Endoscopy is more accurate in identifying gastric neoplasia; however, sonography can raise the clinical suspicion for gastric neoplasia and may provide a less invasive means of gathering information before endoscopy. Intraluminal gastric gas or fluid may limit diagnostic capabilities of sonographic evaluation.

Dystrophin-deficient muscular dystrophy in a Norfolk terrier.
A six-month-old male entire Norfolk terrier was presented with a 3-month history of poor development, reluctance to exercise and progressive and diffuse muscle atrophy. Serum creatine kinase concentration was markedly elevated. Magnetic resonance imaging of the epaxial muscles revealed asymmetrical streaky signal changes aligned within the muscle fibres (hyperintense on T2-weighted images and short-tau inversion recovery with moderate contrast enhancement on T1-weighted images). Electromyography revealed pseudomyotonic discharges and fibrillation potentials localised at the level of the supraspinatus, epaxial muscles and tibial cranialis muscles. Muscle biopsy results were consistent with dystrophin-deficient muscular dystrophy. The dog remained stable 7 months after diagnosis with coenzyme Q10 and L-carnitine; however after that time, there was a marked deterioration and the owners elected euthanasia. This case report describes the clinical presentation, magnetic resonance imaging, electrodiagnostic and histopathological findings with immunohistochemical analysis in a Norfolk terrier with confirmed dystrophin-deficient muscular dystrophy, which has not been previously described in this breed.

A case of type B botulism in a pregnant bitch.
A. Lamoureux, C. Pouzot-Nevoret and C. Escriou
A two-year-old pregnant Gordon setter presented with acute onset of flaccid tetraparesis and respiratory distress. Neurological examination revealed diffuse lower motor neuron dysfunction. Clostridium botulinum neurotoxin B was isolated from the dog's serum. The dog was hospitalised and received supportive care; respiratory function was monitored but positive-pressure ventilation was not required. Recovery was complete within 1 month and parturition occurred without complication 49 days after admission. The puppies delivered lacked any obvious congenital defects and development during the first few months of life was normal. The source of contamination was suspected to be poorly conserved dry food. To the authors’ knowledge, this is the first report of C. botulinum neurotoxin B isolation in a dog and the first report of botulism in a pregnant bitch.
Discoid lupus erythematosus (DLE) is a commonly reported canine autoimmune disease that normally presents with a phenotype consisting of erythema, depigmentation, scaling, erosions/ulcers, and scarring over the nasal planum and the proximal dorsal muzzle. Recently, two cases of a generalized canine DLE were described in dogs that responded to tetracycline and niacinamide.

Acquired tricuspid valve stenosis (TVS) is a rare complication of endocardial pacing lead implantation in humans that has only been described once previously in the veterinary literature in a dog with a 2 day history of vomiting, anorexia, and abdominal pain. Radiographs were suggestive of a foreign body obstruction, and surgery was recommended. Resection and anastomosis of the distal duodenum and proximal jejunum was performed. The dog recovered uneventfully, but approximately 36 hr postoperatively, he was found to have significant weakness and muscle tremors that were accompanied by hyperthermia. The only significant abnormality on a serum biochemical profile was a phosphorous level of 0.26mmol/L. Within 6 hr of initiating phosphorous supplementation, the patient fully recovered and had no residual signs of neuromuscular dysfunction. Signs of neurologic dysfunction secondary to hypophosphatemia are commonly recognized in human patients. Reports of patients with severe muscle weakness, some of which necessitate ventilation due to weakening of muscles of respiration, are common throughout the literature. Less commonly, tremors are noted. This is the first known report of neuromuscular signs recognized and rapidly corrected in a dog. Although it is likely to be uncommon, hypophosphatemia should be recognized as a differential diagnosis in patients with tremors and/or muscle weakness.

Review of Enterococci Isolated from Canine and Feline Urine Specimens from 2006 to 2011
Kate S. KuKanich, PhD, DVM, DACVIM (Small Animal Internal Medicine), Brian V. Lubbers, PhD, DVM, DACVCP
Canine and feline urine culture reports and medical records were reviewed at a veterinary teaching hospital from 2006 to 2011 for enterococcal growth, coinfections, antimicrobial resistance, urine sediment findings, clinical signs, and concurrent conditions. Of all of the urine specimens with significantly defined colony-forming units/mL, Enterococcus (E.) faecalis was the only enterococci isolated from cats and predominated (77.4%) in dogs followed by E. faecium (12.9%), E. durans (3.2%), and other Enterococcus spp. (6.5%). The majority of specimens with significant enterococcal growth resulted in complicated urinary tract infections in 83.9% of dogs and 81.8% of cats. Specimens with only enterococcal growth were more common than those mixed with other bacterial species. Cocci were observed in urine sediments of 8 out of 8 cats and 21 out of 25 dogs with available concurrent urinalyses. Pyuria was noted in 5 out of 8 feline and 15 out of 25 canine urine sediments, and pyuria in dogs was associated with growth of only enterococci on aerobic urine culture. Multidrug resistance was identified in 6 out of 11 cats and 7 out of 31 dogs, and E. faecalis isolates from dogs were 4.5× more likely to be multidrug resistant than E. faecalis.

Neuromuscular Signs Associated with Acute Hypophosphatemia in a Dog
Kimberly N. Claus, DVM, Thomas K. Day, MS, DVM, DACVA, DACVECC, DAAPM, CVA, Christina Wolf, DVM, DACVIM (Neurology)
The purpose of this report was to describe the successful recognition and management of neuromuscular dysfunction secondary to severe, acute hypophosphatemia in an adult dog with 2 day history of vomiting, anorexia, and abdominal pain. Radiographs were suggestive of a foreign body obstruction, and surgery was recommended. Resection and anastomosis of the distal duodenum and proximal jejunum was performed. The dog recovered uneventfully, but approximately 36 hr postoperatively, he was found to have significant weakness and muscle tremors that were accompanied by hyperthermia. The only significant abnormality on a serum biochemical profile was a phosphorous level of 0.26mmol/L. Within 6 hr of initiating phosphorous supplementation, the patient fully recovered and had no residual signs of neuromuscular dysfunction. Signs of neurologic dysfunction secondary to hypophosphatemia are commonly recognized in human patients. Reports of patients with severe muscle weakness, some of which necessitate ventilation due to weakening of muscles of respiration, are common throughout the literature. Less commonly, tremors are noted. This is the first known report of neuromuscular signs recognized and rapidly corrected in a dog. Although it is likely to be uncommon, hypophosphatemia should be recognized as a differential diagnosis in patients with tremors and/or muscle weakness.

Acquired Tricuspid Valve Stenosis Associated with Two Ventricular Endocardial Pacing Leads in a Dog
Emily Tompkins, DVM*, Michelle I. Dulake, DVM†, Shadie Ghaffari, DVM‡, Reid K. Nakamura, DVM, DACVECC, DACVIM (Cardiology)§
Acquired tricuspid valve stenosis (TVS) is a rare complication of endocardial pacing lead implantation in humans that has only been described once previously in the veterinary literature in a dog with excessive lead redundancy. A 12 yr old terrier presented with right-sided congestive heart failure 6 mo after implantation of a second ventricular endocardial pacing lead. The second lead was placed due to malfunction of the first lead, which demonstrated abnormally low impedance. Transthoracic echocardiography identified hyperechoic tissue associated with the pacing leads as they crossed the tricuspid valve annulus as well as a stenotic tricuspid inflow pattern via spectral Doppler interrogation. Medical management was ultimately unsuccessful and the dog was euthanized 6 wk after TVS was diagnosed. The authors report the first canine case of acquired TVS associated with two ventricular endocardial pacing leads.

Generalized Canine Discoid Lupus Erythematosus Responsive to Tetracycline and Niacinamide Therapy
Michael A. Rossi, DVM, MNS*,†, Linda M. Messenger, DVM, DACVD, Keith E. Linder, PhD, DVM, DACVP, Thierry Olivry, PhD, DrVet, DECVD, DACVD
Discoid lupus erythematosus (DLE) is a commonly reported canine autoimmune disease that normally presents with a phenotype consisting of erythema, depigmentation, scaling, erosions/ulcers, and scarring over the nasal planum and the proximal dorsal muzzle. Recently, two cases of a generalized...
variant of this disease have been reported, whose lesions responded to either systemic glucocorticoids or a combination of topical corticosteroids, topical tacrolimus, and the oral antimalarial hydroxychloroquine. The purpose of this report is to describe an 11 yr old shih tzu that presented with skin lesions consisting of multiple annular, erythematous papules and plaques, hyperpigmentation, adherent scaling, and atrophic scars over the caudal dorsum, flanks, craniodorsal thorax, and lateroproximal extremities. A diagnosis of generalized DLE was made based on the clinical presentation, histopathology, laboratory values, and direct immunofluorescence findings. Treatment consisted of oral tetracycline and oral niacinamide, which resulted in complete remission of clinical signs. This is the first documented report of generalized canine DLE responding to the described immunomodulating regimen. Such a combination might therefore be considered as a glucocorticoid and/or antimalarial alternative for the management of generalized DLE.

**Fatal Venous Air Embolism During Anesthesia in an Apparently Healthy Adult Chihuahua**

Pamela J. Mouser, MS, DVM, Jeffrey D. Wilson, DVM

*The online version of this article (available at www.jaaha.org) contains supplementary data in the form of one video. An apparently healthy adult female Chihuahua was presented for elective ovariohysterectomy. After induction of general anesthesia, but prior to the start of the surgery, air was inadvertently administered to the patient via the IV fluid line. The patient convulsed, became apneic, arrested, and died despite attempted cardiopulmonary resuscitation. At necropsy, the pericardial sac was incised and filled with water to entirely submerge the intact heart. The right ventricular free wall was punctured, releasing several air bubbles from the right ventricle. Death was attributed to venous air embolism based on the clinical history, gross findings, and paucity of underlying gross and microscopic pathology that might have predisposed the dog to an anesthetic-related death. The discussion of this case includes a review of previously reported veterinary cases of fatal venous air embolism, including the varied mechanisms of embolus formation, the potential impact of pre-existing cardiopulmonary disease, and the methods used to detect emboli. This report outlines the events of fatal iatrogenic venous air embolization and emphasizes the importance of considering this entity in the case of sudden death of a patient with an indwelling catheter in order to pursue either appropriate diagnostic tests or necropsy techniques to aid in the diagnosis.

**Pancreatic Abscess in a Cat with Diabetes Mellitus**

Minji Lee, MS, DVM, Ji-Houn Kang, PhD, DVM, Dongwoo Chang, PhD, DVM, Ki-Jeong Na, PhD, DVM, Mhan-Pyo Yang, PhD, DVM

An 11 yr old spayed female Maine coon cat was referred with uncontrolled diabetes mellitus. The cat had a 2 mo history of weight loss and intermittent vomiting. An abdominal ultrasound identified the presence of a large cavity measuring a maximum of 4.6 cm in the pancreas that was filled with a homogeneous echogenic fluid. Cytological analysis and culture of the fluid obtained from the pancreatic mass indicated the presence of a bacterial abscess. The application of nonsurgical drainage and the administration of glargine insulin and antibiotics resolved the clinical signs. The size of the pancreatic abscess was reduced after 5 mo, and the cat achieved diabetic remission and remained healthy at the time this report was prepared. This case report describes the successful treatment of a pancreatic bacterial abscess concurrent with diabetes mellitus in a Maine coon cat.

**Chronic Splenic Torsion in Two Dogs**

Jennifer M. Reinhart, DVM**, J. Matthew Sherwood, DVM†**, Katherine S. KuKanich, PhD, DVM, DACVIM (SAIM), Emily Klocke, DVM, DACVS, David S. Biller, DVM, DACVR

A 5 yr old spayed female poodle (case 1) was presented with a 2 wk history of mild abdominal pain, dyschezia, and intermittent anorexia. Both dogs were diagnosed with chronic splenic torsion based on changes in splenic position, echogenicity, and/or echotexture identified on B-mode abdominal ultrasonography, as well as either decreased or absent splenic blood flow on color-flow Doppler ultrasonography. Both dogs underwent splenectomy and had full resolution of clinical signs. Presentation of chronic splenic torsion is variable, and clinical signs can be nonspecific. Abdominal ultrasound with Doppler evaluation is an important diagnostic step that can lead to appropriate surgical intervention and good long-term prognosis.

**Primary Lumbar Extradural Hemangiosarcoma in a Dog**

Matthew Paek, MS, VMD*, Eric Glass, MS, DVM, DACVIM (Neurology), Marc Kent, DVM, DACVIM (Internal Medicine and Neurology), Craig A. Clifford, DVM, MS, DACVIM (Oncology)‡, Alexander De Lahunta, PhD, DVM
A 9 yr old castrated male golden retriever weighing 36 kg was presented for evaluation of progressive left pelvic limb paresis and fecal and urinary incontinence. MRI demonstrated an extradural, ovoid mass compressing the lumbar spinal cord. Surgical excision of the mass was performed. Histologically, the mass was consistent with hemangiosarcoma with no involvement of the adjacent vertebrae. The dog underwent a doxorubicin-based chemotherapy protocol with the addition of oral cyclophosphamid. After completion of chemotherapy, the dog was evaluated q 4 mo for restaging. Clinicopathological evidence of primary tumor recurrence or metastatic disease was not detected for 15 mo after initial diagnosis and treatment. To the authors’ knowledge, this is the first report of a primary extradural hemangiosarcoma in the lumbar vertebral column in a dog. The clinical presentation, diagnosis, treatment, and outcome are also discussed.

The Renal Effects of NSAIDs in Dogs
Amy L. Lomas, DVM, MS, DACVIM*, Gregory F. Grauer, DVM, MS, DACVIM
The quality of life for dogs with osteoarthritis can often be improved with nonsteroidal anti-inflammatory drugs (NSAIDs); however, the number of adverse drug events associated with NSAID use reported to the Federal Drug Administration Center for Veterinary Medicine is higher than that for any other companion animal drug. Of those events, adverse renal reactions are the second most reported. NSAIDs produce pharmacologic effects via inhibition of cyclooxygenase (COX), which decreases production of prostanoids. Prostaglandins are synthesized by both the COX-1 and COX-2 enzymes in the healthy kidney and influence renal blood flow, glomerular filtration rate, renin release, and Na excretion. There are important species differences in the renal expression of COX-1 and COX-2. For example, dogs have higher basal levels of COX-2 expression in the kidney compared with humans. In addition, in dogs with chronic kidney disease, an increase in COX-2 expression occurs and synthesis of prostaglandins shifts to the COX-2 pathway. For those reasons, NSAIDs that target COX-2 may be expected to adversely affect renal function in dogs, especially dogs with chronic kidney disease. The purpose of this review was to evaluate the literature to report the renal effects of NSAIDs in dogs.

Veterinary Clinics of North America (May/Jun)

Current Concepts in Oncologic Surgery in Small Animals
Brad M. Matz
Surgical oncology is experiencing rapid transition in veterinary medicine. Mast cell tumors and soft tissue sarcomas are two of the most common neoplasms in small animal patients. Clinicians should be familiar with the need for staging and the procedures involved in treating patients with these tumors. Clinicians should be comfortable with available adjuvant therapies and when to use them in certain patients.

Facilitation of Soft Tissue Surgery: Surgical Staplers and Vessel Sealing Devices
Laura E. Peycke
Recent advances and acceptance of various medical devices have clearly helped in the efficiency, simplicity, and effectiveness of veterinary surgery. The goals of surgery include efficient methods and minimal surgical times, delicate tissue handling techniques, confidence with tissue reconstruction, and minimizing contamination, leakage and complications. Mechanical means of suturing, cutting, and hemostasis assist with accomplishing these goals. Most recently, stapling instrumentation and vascular sealing devices have become common instruments on all levels of surgery because of their ease of use and increase in surgical efficiency.

Current Concepts in Hepatobiliary Surgery
Harry W. Boothe Jr.
The most common hepatic procedures performed in companion animals are liver biopsies and partial hepatectomies. Surgery of the biliary tract most often involves the gallbladder, although surgical intervention of the bile duct may also be performed. Hepatobiliary surgery is often challenging, being performed in patients with significant systemic illness and associated with potentially life-threatening complications. An in-depth understanding of the regional anatomy, use of a team concept for patient management, particularly for patients undergoing partial hepatectomy surgery, and provision of intensive perioperative monitoring and support helps minimize complications and maximize outcome.

Current Concepts in Congenital Portosystemic Shunts
Kelley M. Thieman Mankin
Congenital portosystemic shunts (CPSS) are vascular abnormalities that allow portal blood to bypass the liver and join systemic circulation. Laboratory and imaging studies are performed preoperatively to diagnose CPSS and hopefully identify an anatomic location of the shunt. CPSS can be found in different locations in both small and large breed dogs. Most CPSS are best managed surgically. The goal of surgical management of CPSS is to slowly redirect blood from the shunting vessel through the portal vasculature while avoiding portal hypertension. Many surgical management methods are available, including open and less invasive procedures, such as laparoscopy and embolization.

**Thoracic Surgery: Important Considerations and Practical Steps**
D. Michael Tillson

Thoracic surgery is a challenge for any veterinary surgeon. A review of several important articles on topics relative to thoracotomy procedures is presented. Discussion also includes an evaluation of availability of appropriate surgical facilities, necessary equipment before undertaking thoracic surgical procedures, and the essentials and pitfalls to making an approach and effectively closing the thoracic cavity of a dog or cat. This article reviews the 3 primary types of thoracotomy: lateral (intercostal) thoracotomy, median sternotomy, and transdiaphragmatic thoracotomy. Essential anatomy, surgical approach, and various techniques to ensure effective and durable thoracotomy closure are presented.

**Current Concepts in Minimally Invasive Surgery of the Abdomen**
Milan Milovancev, Katy L. Townsend

Minimally invasive surgery of the abdomen constitutes an increasingly common and developed set of surgical options in small animal veterinary patients. In addition to established procedures, such as laparoscopic gonadectomy and biopsies, more advanced procedures, such as adrenalectomy, cholecystectomy, cisterna chyli ablation, and lymph node extirpation, are described. Some laparoscopic procedures have been reported using different techniques or approaches, reflecting the field’s progression beyond its infancy. Advances in equipment and experience among an ever-growing group of veterinary surgeons are expected to result in progressively more widespread adoption of minimally invasive procedures.

**Current Concepts in Minimally Invasive Surgery of the Thorax**
MaryAnn Radlinsky

Thoracoscopy is a technique that has been shown to decrease patient morbidity and is rapidly becoming more diversely applied for diagnostic and therapeutic interventions in veterinary medicine. This article describes the basic equipment and application of thoracoscopy in small animal surgery. The diagnostic and therapeutic applications are introduced and briefly described.

**Current Concepts in Wound Management and Wound Healing Products**
Jacqueline R. Davidson

Current concepts in wound management are summarized. The emphasis is on selection of the contact layer of the bandage to promote a moist wound environment. Selection of an appropriate contact layer is based on the stage of wound healing and the amount of wound exudate. The contact layer can be used to promote autolytic debridement and enhance wound healing.

**Current Concepts in Negative Pressure Wound Therapy**
Lisa M. Howe

Negative pressure wound therapy (NPWT) is becoming recognized in veterinary medicine as a viable option for the management of complex wounds. NPWT has many advantages over traditional wound care and results in quicker and improved wound healing in many instances. This article discusses the art and science of NPWT, as well as the many current indications, complications, advantages and disadvantages, and future directions of NPWT in small animal veterinary medicine. This therapy will likely have a growing role in veterinary medical practice for complicated wound management and other usages in coming years.

**Antimicrobial Considerations in the Perioperative Patient**
Dawn Merton Boothe, Harry W. Boothe Jr.

Surgical site infections are among the complications that can be reduced with the timely implementation of appropriate antimicrobial therapy. A 3-D approach to judicious antimicrobial use focuses on the de-escalation of systemic antimicrobial therapy, design of dosing regimens, and decontamination of the surgeon, patient, and environment. De-escalation can be accomplished in part through proper antimicrobial prophylaxis. Dosing regimens should be designed to maximize efficacy.
and minimize resistance. Decontamination includes disinfection of inanimate surfaces and timely application of appropriate antiseptics at concentrations that maximize efficacy.

New Zealand Veterinary Journal

Pharmacokinetics of intravenous ketorolac in cats undergoing gonadectomy

R Villa, G Ravasio, C Ferraresi, A Zonca, S Carli, L Borghi & P Cagnardi

AIM: To determine the pharmacokinetics of ketorolac tromethamine (0.5 mg/kg) when administered I/V to cats undergoing gonadectomy.

METHODS: Ketorolac was administered to nine female and three male shorthair domestic cats as an I/V bolus of 0.5 mg/kg after intubation, and 20 minutes prior to ovariecctomy or orchiectomy. Intra-operative cardiorespiratory variables were monitored and blood samples were collected over 24 hours. Concentrations of ketorolac in serum were determined by high-performance liquid chromatography to establish pharmacokinetic parameters.

RESULTS: During surgery, mean end tidal isoflurane concentration was 1.63 (SD 0.24)% and normocapnia and spontaneous ventilation were maintained in all animals. The kinetics of ketorolac was described by a two-compartment model. The distribution and elimination half-lives were 0.09 (SD 0.06) and 4.14 (SD 1.18) hours, respectively. The body clearance was 56.8 (SD 33.1) mL/h/kg. The volume of distribution at steady-state and the mean residence time were 323.9 (SD 115.7) mL/kg and 6.47 (SD 2.86) hours, respectively.

CONCLUSION AND CLINICAL RELEVANCE: On the basis of the results, concentrations of ketorolac in serum in cats were above the human effective concentrations for 5–6 hours postoperatively. However, other studies including a control group are advocated to further investigate the ketorolac kinetics and the analgesic efficacy in this species.