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March 2015 abstracts

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

2015 AAHA/AAFP Pain Management Guidelines for Dogs and Cats*
Mark Epstein, Ilona Rodan, Gregg Griffenhagen, Jamie Kadrlik, Michael Petty, Sheilah Robertson, Wendy Simpson
The robust advances in pain management for companion animals underlie the decision of AAHA and AAFP to expand on the information provided in the 2007 AAHA/AAFP Pain Management Guidelines for Dogs and Cats. The 2015 guidelines summarize and offer a discriminating review of much of this new knowledge. Pain management is central to veterinary practice, alleviating pain, improving patient outcomes, and enhancing both quality of life and the veterinarian-client-patient relationship. The management of pain requires a continuum of care that includes anticipation, early intervention, and evaluation of response on an individual-patient basis. The guidelines include both pharmacologic and nonpharmacologic modalities to manage pain; they are evidence-based insofar as possible and otherwise represent a consensus of expert opinion. Behavioral changes are currently the principal indicator of pain and its course of improvement or progression, and the basis for recently validated pain scores. A team-oriented approach, including the owner, is essential for maximizing the recognition, prevention, and treatment of pain in animals. Postsurgical pain is eminently predictable but a strong body of evidence exists supporting strategies to mitigate adaptive as well as maladaptive forms. Degenerative joint disease is one of the most significant and under-diagnosed diseases of cats and dogs. Degenerative joint disease is ubiquitous, found in pets of all ages, and inevitably progresses over time; evidence-based strategies for management are established in dogs, and emerging in cats. These guidelines support veterinarians in incorporating pain management into practice, improving patient care.

Transobturator Vaginal Tape for Treatment of Urinary Incontinence in Spayed Bitches
Jack-Yves Deschamps, Françoise A. Roux
This study investigated the long-term effectiveness and safety of a variant of the transobturator vaginal tape inside-out technique for acquired urinary incontinence. Twelve spayed female dogs were operated over a 2 yr period. No intraoperative complications were encountered. Transient dysuria was the most common postoperative complication (7 out of 12 dogs). On the 12th day postoperatively, incontinence was completely cured in 11 out of 12 dogs (92%). At the time of the second evaluation (median follow-up time was 21 mo), patients classified as “cured,” “greatly improved,” or “improved” were 25, 50, and 25% of the total, respectively. At the time of either the fourth evaluation or at the time of death (median follow-up time was 52 mo), 50% of the bitches (6 out of 12) had the same results as previously but the other 50% had leakage that reappeared sporadically. A fistula appeared on the path of the tape in two bitches at 28 and 32 mo postsurgically. The technique presented is effective and more cost effective than the standard technique and could constitute an attractive alternative; however, it could be associated with an immediate postoperative dysuria, delayed fistula formation, and a partial recurrence of clinical signs.

Laparoscopic Treatment of Testicular Torsion in a Puppy
Jennifer G. Carr, Hock Gan Heng, Jeffrey Ruth, Lynetta Freeman
A 6 mo old male puppy was presented as an emergency for an acute onset of lethargy, ptialism, and vomiting. On physical examination, the dog was painful on abdominal palpation. A torsed intra-abdominal testis was diagnosed via abdominal ultrasonography and radiography. Laparoscopy was used to identify and remove the torsed testis. The dog recovered uneventfully and was described as doing well by the owners at the 6 mo follow-up telephone contact. This is the first report of an abdominal testicular torsion treated with laparoscopy.

Porcupine Quill Migration in the Thoracic Cavity of a German Shorthaired Pointer
Jose L. Guevara Elaine S. Holmes, Jennifer Reetz, David E. Holt
A 7 yr old German shorthaired pointer presented with progressive respiratory distress and lethargy. Two weeks prior to presentation, the dog had porcupine quills removed from the left forepaw, muzzle, and sternal area. At the time of presentation, the dog had bounding pulses and friction rubs in the right dorsal lung field. Harsh lung sounds and decreased lung sounds were ausculted in multiple lung fields. Radiographs revealed a pneumothorax and rounding of the cardiac silhouette suggestive of pericardial effusion. Computed tomographic imaging was performed and revealed multiple porcupine quills in the thoracic cavity. Surgery was performed and quills were found in multiple lung lobes and the heart. Following surgery the dog remained hypotensive. A post-operative echocardiogram revealed multiple curvilinear soft-tissue opacities in the heart. Given the grave prognosis the dog was subsequently euthanized and a postmortem examination was performed. A single porcupine quill was discovered in the left atrium above the mitral valve annulus. The quill extended across the aortic root, impinging
on the coronary artery below the level of the aortic valve. To the authors' knowledge, this is the first known report of porcupine quill migration through the heart.

**Abdominal Cryptococcosis in Two Dogs: Diagnosis and Medical Management**
Lindsay Tangeman, Danielle Davignon, Reema Patel, Meryl Littman
Canine cryptococcosis cases are typically reported as neurologic, disseminated, or both. There have been few reports of other parenchymal organ involvement. Dogs infected with *Cryptococcus* spp. are likely to develop central nervous system involvement, and those that are severely affected are treated aggressively with surgery and/or amphotericin B. This report describes two cases of canine abdominal cryptococcosis: one boxer with primary alimentary cryptococcosis alone and one miniature schnauzer with pancreatic and disseminated cryptococcosis. The boxer is unique in that the dog suffered from primary alimentary cryptococcosis without dissemination, secondary anemia due to gastrointestinal losses, and is the second case to have *Cryptococcus* spp. identified on fecal examination as part of the diagnostic workup. Unlike previous reports, surgery was not performed in either case, and both dogs were treated with fluconazole alone. Currently, both dogs are free from clinical signs, and *Cryptococcus* spp. antigen titers are negative at 17 and 15 mo after initial presentation. These cases suggest fluconazole may be effective therapy alone for canine abdominal cryptococcosis, negating the need for high-risk therapy options such as surgery and/or amphotericin B in some cases.

**Iatrogenic Traumatic Brain Injury During Tooth Extraction**
Mark Troxel
An 8 yr old spayed female Yorkshire terrier was referred for evaluation of progressive neurological signs after a routine dental prophylaxis with tooth extractions. The patient was circling to the left and blind in the right eye with right hemiparesis. Neurolocalization was to the left forebrain. MRI revealed a linear tract extending from the caudal oropharynx, through the left retrobulbar space and frontal lobe, into the left parietal lobe. A small skull fracture was identified in the frontal bone through which the linear tract passed. Those findings were consistent with iatrogenic trauma from slippage of a dental elevator during extraction of tooth 210. The dog was treated empirically with clindamycin. The patient regained most of its normal neurological function within the first 4 mo after the initial injury. Although still not normal, the dog has a good quality of life. Traumatic brain injury is a rarely reported complication of extraction. Care must be taken while performing dental cleaning and tooth extraction, especially of the maxillary premolar and molar teeth to avoid iatrogenic damage to surrounding structures.

**Septicemia and Infection due to ESBL-producing *K. pneumoniae* Following Feline Renal Allograft Transplantation**
Heidi Phillips, Lindsay L. Occhipinti, Lillian R. Aronson
A 12 yr old castrated male domestic longhair underwent renal transplantation for treatment of chronic interstitial nephritis. Full-thickness intestinal biopsies obtained prior to transplantation revealed mild enteritis. Twelve months following transplantation, the patient underwent surgery for resection of a mesenteric mass causing septic peritonitis. The mesenteric mass was resected and an intestinal resection and anastomosis was performed. Extended–spectrum-β-lactamase producing *Klebsiella pneumoniae* was cultured from the resected tissue and urinar tract. Bacterial rods were noted to be circulating in the bloodstream, causing septicemia. Despite aggressive treatment of the septic peritonitis and septicemia using surgical debridement, drain placement, aggressive antibiotic therapy with IV meropenem, and vasopressor support, the patient succumbed to persistent hypotension and suffered cardiopulmonary arrest. Extended–spectrum-β-lactamase-producing bacteria are of growing concern in human and veterinary medicine, maintaining susceptibility often only to carbapenem and aminoglycoside antibiotics. Resistance to even those antibiotics is emerging. Veterinary patients with a history of antibiotic therapy, central venous or urinary catheterization, immunosuppression, enteric surgery, and an extended stay in the intensive care unit may be predisposed.

**Angioleiomyosarcoma in the Nasal Vestibule of a Dog: Surgical Excision via a Modified Lateral Approach**
Jayne A. McGhie, Louise FitzGerald, Giselle Hosgood
This case report describes an 11 yr old spayed female German shepherd dog weighing 42 kg that presented with intermittent epistaxis from the left nostril. A nonulcerated pale irregular polypoid mass was visualized within the left nare. Computed tomography revealed a pedunculated mass arising from the ventrolateral nasal mucosal of the left nasal cavity with no evidence of involvement or invasion of adjacent soft tissues or bony structures. Histological and immunohistochemical examination of rhinoscopic biopsies returned a diagnosis of an angioleiomyosarcoma. The mass was excised using a modified lateral approach to the nasal cavity. Fulguration of the wound bed was performed. Clean surgical margins were identified on histopathology. The dog remained clinically free of recurrence 28 mo postsurgically. Angioleiomyosarcomas are rare tumors originating from the
Canine Alopecia Secondary to Human Topical Hormone Replacement Therapy in Six Dogs
Darren J. Berger, Thomas P. Lewis, Anthea E. Schick, Rose I. Miller, Diana G. Loeffler

Alopecia is a common presenting complaint in veterinary medicine and is known to occur secondary to numerous primary conditions. In this report, six unrelated dogs from three households were subsequently determined to have developed alopecia as a result of accidental transdermal exposure to their owners' topical hormone replacement therapy (THRT). All cases presented with alopecia ranging in duration from 2 mo to 2.5 yr. All dogs demonstrated alopecia affecting the ventral neck, thoracic and abdominal surfaces, proximal lateral extremities, and lateral trunk. At the time of initial presentation, five of six dogs were also noted to have physical exam findings suggestive of feminization. In all cases, serum total thyroxine was within normal reference range. Affected skin was biopsied in five dogs, and all samples demonstrated four similar histological characteristics: basal melanosis, epidermal and infundibular follicular hyperkeratosis, kenogen hair follicles, and small sebaceous glands. All dogs had elevated baseline estradiol levels, and four dogs had concurrent elevations of baseline progesterone. Average time to onset of clinical signs in those dogs was 5.5 mo after the owners started THRT. Following discontinuation of THRT by the owners, all dogs had complete resolution of their clinical signs by 5.5 mo.

New Zealand Veterinary Journal (Mar/Apr)

Evaluation of complications and feasibility of indwelling epidural catheter use for post-operative pain control in dogs in the home environment
LR Phillips°, KP McAbee°, N Stephenson°, NJ Stanke°, ML Booms° & DD Degner°

AIMS: The objective of this study was to describe the use of indwelling epidural catheters post-operatively in dogs in a home environment, and to report associated complications. METHODS: Dogs undergoing surgical procedures of the hind limb (n=83) were included in the study and were administered 0.05 or 0.10 mg/kg epidural morphine via an indwelling epidural catheter every 6 hours. Data compiled relating to catheter placement included time of placement, ease of placement and problems encountered, number of attempts of placement, and individual placing the catheter. A client questionnaire was provided to evaluate side effects, complications, pain, and ease of use of the epidural catheter system after discharge from the hospital and catheter removal at home. Side effects were compared between the dogs receiving 0.05 or 0.1 mg/kg epidural morphine. RESULTS: The most common patient complication was abnormal urination patterns (32/82, 39%); specifically dribbling urine where laying, emptying the entire bladder where laying, not urinating for extended periods of time, and taking a longer time to pass urine were reported. There were no significant differences in the number or types of side effects reported in either dosing group. The most common technical issues reported by owners were difficulty getting the needle into the injection port (10/81, 12%) and removing the adhesive covering keeping the epidural catheter system in place (19/78, 24%). There were no reports of inflammation or discharge at the catheter site in any of the dogs. Of the respondents surveyed, 76/79 (97%) found the epidural catheter system easy to use at home in the post-operative period. CONCLUSIONS: Indwelling epidural catheters are a feasible method of administration of post-operative analgesia in the immediate post-operative period in the home environment and were associated with only a few minor complications in this population.

Post-vaccinal distemper encephalitis in two Border Collie cross littermates
RA Fairley°, O Knesl°, PA Pesavento° & BC Elias°

CASE HISTORY: One 4.5-month-old male Border Collie cross presented with aggression and seizures in October 2006. A 16-month-old, female, spayed Border Collie cross presented with hypersalivation and a dropped jaw and rapidly became stuporous in September 2007. The dogs were littermates and developed acute neurological signs 5 and 27 days, respectively, after vaccination with different modified live vaccines containing canine distemper virus. HISTOPATHOLOGICAL FINDINGS: Sections of brain in both dogs showed evidence of encephalitis mainly centred on the grey matter of brainstem nuclei, where there was extensive and intense parenchymal and perivascular infiltration of histiocytes and lymphocytes. Intra-nuclear and intra-cytoplasmic inclusions typical of distemper virus were plentiful and there was abundant labelling for canine distemper virus using immunohistochemistry. DIAGNOSIS: Post-vaccinal canine distemper. CLINICAL RELEVANCE: Post-vaccinal canine distemper has mainly been attributed to virulent vaccine virus, but it may also occur in dogs whose immunologic nature makes them susceptible to disease induced by a modified-live vaccine virus that is safe and protective for most dogs.

Diagnosis and treatment of a suspected pseudoaneurysm of the femoral artery in a working police dog
A Tikekar & HR Milner
Acute chylous peritonitis associated with acute pancreatitis in a Staffordshire Bull Terrier
K Lott, C Mansfield & LA Abraham

Veterinary Clinics of North America (Mar/Apr)

Hospital-Associated Infections in Small Animal Practice
Jason W. Stull, J. Scott Weese
Hospital-associated infections (HAIs) occur in veterinary hospitals of all types and sizes, and their frequency is likely to increase. Urinary tract infections, pneumonia, bloodstream infections, surgical site infections, and infectious diarrhea are the HAIs most frequently identified in veterinary medicine. A hospital infection control program, consisting of an infectious disease control officer, written protocols, and staff training, is critical to reducing HAIs and promoting patient, staff, and client health. Infection control protocols (plans) should include discussion of hand hygiene and use of personal protective equipment, cleaning and disinfection, patient management, with-in hospital surveillance, and antimicrobial stewardship.

Veterinary Hospital Surveillance Systems
Brandy A. Burgess, Paul S. Morley
We cannot manage what we do not measure. In order to provide optimal patient care appropriate effort must be given to the prevention of infectious disease transmission through the development and maintenance of an infection control program that is founded on results obtained through organized surveillance efforts. Every facility is unique – thus efforts should be tailored to distinctive physical attributes and organizational limitations of individual practices. There is not only an ethical responsibility to do so, but there is a legal responsibility to meet the minimum standard of practice with respect to veterinary infection prevention and control.

Fighting Surgical Site Infections in Small Animals: Are We Getting Anywhere?
Denis Verwilghen, Ameet Singh
A diverse array of pathogen-related, patient-related, and caretaker-related issues influence risk and prevention of surgical site infections (SSIs). The entire surgical team involved in health care settings in which surgical procedures are performed play a pivotal role in the prevention of SSIs. In this article, current knowledge of SSI risk factors and prevention methods is reviewed. Although new avenues that can be explored in the prevention of SSIs in veterinary medicine are described, the main conclusion drawn is that the best method for prevention of SSI is to adhere to what we already know.

Patient Management
Lynn Guptill
Hospital-associated infections, including those caused by zoonotic agents, represent an increasing concern in veterinary practice. Veterinarians and hospital staff are obligated and expected to provide education about and protection from transmission of pathogens among animal patients and between animal patients and human beings (eg, veterinary staff, volunteers, owners) who come into contact with infected animals. Patient management involves assessing risks of pathogen transmission, identification of animals either suspected of or proved to be infected with a transmissible infectious disease agent, and the implementation of measures that minimize the likelihood of transmission of the infectious agent.

Environmental Cleaning and Disinfection
Michelle Traverse, Helen Aceto
The guidelines in this article provide veterinarians, veterinary technicians, and veterinary health care workers with an overview of evidence-based recommendations for the best practices associated with environmental cleaning and disinfection of a veterinary clinic that deals with small animals. Hospital-associated infections and the control and prevention programs necessary to alleviate them are addressed from an environmental perspective. Measures of hospital cleaning and disinfection include understanding mechanisms and types of contamination in veterinary settings, recognizing areas of potential concern, addressing appropriate decontamination techniques and selection of disinfectants, the management of potentially contaminated equipment, laundry, and waste management, and environmental surveillance strategies.

Cleaning and Disinfection of Patient Care Items, in Relation to Small Animals
J. Scott Weese
Patient care involves several medical and surgical items, including those that come into contact with sterile or other high-risk body sites and items that have been used on other patients. These situations create a risk for infection if items are contaminated, and the implications can range from single infections to large outbreaks. To minimize the risk, proper equipment cleaning, disinfection/sterilization, storage, and monitoring practices are
required. Risks posed by different items; the required level of cleaning, disinfection, or sterilization; the methods that are available and appropriate; and how to ensure efficacy, must be considered when designing and implementing an infection control program.

**Contact Precautions and Hand Hygiene in Veterinary Clinics**
Maureen E.C. Anderson
Hand hygiene, contact precautions, and other basic infection control measures are crucial in veterinary clinics, because these facilities can be community mixing pots of animals and people with a wide range of health and disease-carrier states. Veterinary staff must be knowledgeable and well trained regarding when and how to apply situation-appropriate contact precautions and to properly perform hand hygiene. The limited information on the use of contact precautions and hand hygiene practices among veterinary staff suggests that compliance is low. Improving the infection control culture in clinics and in veterinary medicine is critical to achieving better compliance with these practices.

**Antimicrobial Stewardship in Small Animal Veterinary Practice: From Theory to Practice**
Luca Guardabassi, John F. Prescott
Despite the increasing recognition of the critical role for antimicrobial stewardship in preventing the spread of multidrug-resistant bacteria, examples of effective antimicrobial stewardship programs are rare in small animal veterinary practice. This article highlights the basic requirements for establishing stewardship programs at the clinic level. The authors provide suggestions and approaches to overcome constraints and to move from theoretic concepts toward implementation of effective antimicrobial stewardship programs in small animal clinics.

**Zoonotic Disease Risks for Immunocompromised and Other High-risk Clients and Staff: Promoting Safe Pet Ownership and Contact**
Jason W. Stull, Kurt B. Stevenson
Pets can be a source of disease (zoonoses) for humans. The disease risks associated with pet contact are highest among young children, the elderly, pregnant women, and immunocompromised hosts. These individuals and household members display limited knowledge of pet-associated disease, rarely recall receipt of pet-associated disease information, and report pet ownership practices that are often at odds with established disease prevention recommendations. Veterinary staff are in a key position to promote safe pet ownership and contact practices. Encouraging and safeguarding client disclosure of immunocompromising health conditions and promoting veterinarian-physician communications are critical for effectively providing this service.

**Legal Implications of Zoonotic Disease Transmission for Veterinary Practices**
Antoinette E. Marsh, Sarah Babcock
Increased recognition of veterinarians' capabilities and their role in public health raises concerns as to their legal duty to both clients and the public. With the numerous potential situations and variety of clients, the veterinarians' role in public health issues associated with zoonotic agents seems vague. However, analysis of the legal duty provides a more precise road map to the responsibilities and actions needed in companion animal medicine. The authors discuss mitigation measures to apply to potential situations regarding the ethical and legal requirements of zoonotic diseases and the legal repercussions of failing to act.

**Workplace Safety and Health for the Veterinary Health Care Team**
John D. Gibbins, Kathleen MacMahon
Veterinary clinic employers have a legal and ethical responsibility to provide a safe and healthy workplace. Clinic members are responsible for consistently using safe practices and procedures set up by their employer. Development and implementation of a customized comprehensive workplace safety and health program is emphasized, including an infection control plan. Occupational safety and health regulations are reviewed. The hazards of sharps, animal bites and scratches, and drugs are discussed. Strategies to prevent or minimize adverse health effects and resources for training and education are provided.

**Journal of Small Animal Practice**

**European consensus statement on leptospirosis in dogs and cats.**
S. Schuller, T. Francey, K. Hartmann, M. Hugonnard, B. Kohn, J. E. Nally and J. Sykes
Leptospirosis is a zoonotic disease with a worldwide distribution affecting most mammalian species. Clinical leptospirosis is common in dogs but appears to be rare in cats. Both dogs and cats, however, can shed leptospires in the urine. This is problematic as it can lead to exposure of humans. The control of leptospirosis, therefore, is important not only from an animal but also from a public health perspective. The aim of this
consensus statement is to raise awareness of leptospirosis and to outline the current knowledge on the epidemiology, clinical features, diagnostic tools, prevention and treatment measures relevant to canine and feline leptospirosis in Europe.

Acoustic radiation force impulse (ARFI) elastography of the spleen in healthy adult cats – a preliminary study.
OBJECTIVES - To evaluate the splenic stiffness of healthy adult cats using acoustic radiation force impulse elastography to determine the quality (greyscale images and tissue deformity) and quantity (shear velocity) standards. METHODS - Fifteen healthy, adult shorthair cats were selected. The echotexture, echogenicity, size and edges of the spleen were assessed via mode-B ultrasound. Using qualitative elastography, specific portions of the spleen were evaluated according to homogeneity, presence of deformities and white and dark regions. The shear velocities in different portions of the spleen were quantitatively evaluated. RESULTS - The echotexture, echogenicity, size and edges of the spleen were normal on B-mode ultrasound in all cats. On qualitative elastography, the evaluated splenic portions were not deformable, and the images presented as homogeneous dark areas. On quantitative elastography, the mean shear velocity values were 1 · 98 m/s for the head portion, 1 · 77 m/s for the body portion and 2 · 03 m/s for the tail portion. These were not significantly different.
CLINICAL SIGNIFICANCE - Quantitative and qualitative acoustic radiation force impulse elastography of the spleen in healthy adult cats was easily implemented and this study may provide baseline data for this organ to allow the future use of this technique in evaluating cats with splenic disease.

Magnetic resonance imaging of suspected idiopathic bilateral C2 hypertrophic ganglioneuritis in dogs.
OBJECTIVES - To report the magnetic resonance imaging and clinical features of suspected idiopathic bilaterally symmetric hypertrophic ganglioneuritis affecting the C2 nerve roots. METHODS - Retrospective analysis of case records of dogs with imaging findings suggestive of idiopathic bilateral C2 neuritis. Data analysed included signalment, history, clinical signs, clinical pathology results and magnetic resonance imaging findings. Nerve root enlargement and spinal cord changes were classified as clinically significant or incidental, and further graded as mild, moderate or severe based on the degree of spinal cord distortion/compression. Imaging features were also correlated with severity of neurological deficits. RESULTS - Twelve dogs, including nine Staffordshire bull terriers showed magnetic resonance imaging features suggestive of idiopathic hypertrophic neuritis of C2 nerve roots. Findings were considered incidental (4/12) or clinically significant (8/12) based on prior neurological examination. Changes were best visualised on transverse images at the level of the C1-2 intervertebral foramina. The degree of associated spinal cord compression subjectively correlated with the severity of the neurological deficits. All cases with clinically significant lesions that were treated with corticosteroids responded favourably. CLINICAL SIGNIFICANCE - Bilaterally symmetric C2 neuritis likely represents idiopathic hypertrophic ganglioneuritis. Staffordshire bull terriers appear over represented. Immunosuppressive doses of corticosteroids should be considered for clinically significant lesions.

Faecal shedding of antimicrobial-resistant Clostridium difficile strains by dogs.
OBJECTIVES - To longitudinally assess the shedding of antimicrobial resistant Clostridium difficile strains by clinically healthy dogs raised at breeding facilities. METHODS - 18 puppies from three different litters (#1, 2 and 3) were sampled weekly from parturition to day 20–55 postpartum. Faecal samples from the mothers of litters #2 and 3 were also available for analysis. Bacterial isolates were ribotyped, tested for in vitro antimicrobial susceptibility and further characterised. RESULTS - C. Difficile was recovered from all sampled animals of litters #1 and 2, and a third of puppies from litter #3, but marked differences in C. Difficile recovery were detected in different age groups (0–100%). Recovered PCR ribotypes included 056 (22 isolates), 010 (6 isolates), 078 and 213 (2 isolates each), and 009 and 020 (1 isolate each). Different ribotypes were shed by four individual animals. Regardless of their origin and ribotype, all isolates demonstrated full resistance to levofloxacin. Additionally, all but one isolate (belonging to ribotype 078) were resistant to ertapenem, and all ribotype 010 isolates displayed high-level resistance to clindamycin, clarithromycin and erythromycin. A single ribotype 078 isolate showed metronidazole heteroresistance. CLINICAL SIGNIFICANCE - Healthy dogs can shed antimicrobial-resistant C. Difficile strains.
Retrospective evaluation of moderate-to-severe pulmonary hypertension in dogs naturally infected with Angiostrongylus vasorum.


OBJECTIVES - The outcome in dogs with pulmonary hypertension associated with natural Angiostrongylus vasorum infection is unclear. This study aimed to report long-term outcome of dogs with A. vasorum and pulmonary hypertension, and to evaluate factors associated with pulmonary hypertension development. It was hypothesised that dogs with pulmonary hypertension had a shorter survival time than dogs without pulmonary hypertension. METHODS - Retrospective review of clinical records of dogs diagnosed with A. vasorum. Dogs were classified as having or not having pulmonary hypertension based on clinical signs and imaging findings. Signalment, signs and outcome were recorded. DNA obtained from banked samples was genotyped for the PDE5a:E90K polymorphism, a possible factor in development of pulmonary hypertension. RESULTS - The proportion of dogs with moderate-to-severe pulmonary hypertension and A. vasorum infection in the study population was 14 - 6%. No difference in the population characteristics or PDE5a genotype was detected between dogs with and without pulmonary hypertension. Dogs with pulmonary hypertension had a significantly shorter survival time (P = 0 · 006) and a greater risk of death within 6 months of diagnosis (odds ratio 12 · 5, 95% confidence interval 2 - 1 to 74 - 9; P = 0 · 0053). CLINICAL SIGNIFICANCE - A. vasorum-associated pulmonary hypertension is an important problem in naturally infected dogs and has a negative effect upon survival.

Characteristics of the bacterial flora in the conjunctival sac of cats from Poland.

Z. Kielbowicz, K. Płoneczka-Janezcko, J. Bania, K. Bierowiec and M. Kielbowicz

OBJECTIVES - To assess the bacterial flora of the conjunctival sac in clinically healthy cats and cats with signs of conjunctivitis. METHODS - A total of 324 conjunctival swabs were examined between 2011 and 2012 taken from 60 animals, 30 of which were clinically healthy and 30 with signs of chronic conjunctivitis. The samples were taken three times at 4-week intervals from the clinically healthy cats. The samples from the cats with conjunctivitis were taken before and 4 weeks after cessation of successful therapy. Swabs from both the right and left eye of each cat were subjected to microbiological examination and polymerase chain reaction for the presence of DNA of Chlamydophila felis and Mycoplasma felis. RESULTS - There was no qualitative difference in the eye microflora between the clinically healthy animals and those with signs of conjunctivitis. Staphylococcus epidermidis (21 · 9%) was the most common microorganism isolated and it was more commonly detected in swabs from cats with conjunctivitis (P < 0 · 0001) as was Staphylococcus aureus (P = 0 · 07). The presence of C. felis was significantly correlated with (P < 0 · 0001) signs of conjunctivitis and was detected in 25% of swabs collected from both conjunctival sacs. No DNA of M. felis was detected in any swab. None of the animals had sterile conjunctival sacs in all consecutive bacteriological tests. CLINICAL SIGNIFICANCE - The conjunctival sac in cats was sterile in over 50% of the clinically healthy cats and 25% of the cats with conjunctivitis. The sterility did not persist for longer than 4 weeks. Positive bacterial cultures occur in cats with and without clinical signs of conjunctivitis.

A skeletal disorder in a dog resembling the Klippel–Feil Syndrome with Sprengel's Deformity in humans.

G. Bertolini, M. Trotta and M. Caldin

A five-year-old intact male golden retriever dog was evaluated for cervical pain and right hemiparesis. Clinical and computed tomography features suggested a caudal cervical instability and myelopathy due to a cervicospinal malformation resembling the human Klippel–Feil Syndrome with Sprengel Deformity, a rare complex congenital disorder. Polymerase chain reaction (PCR) and direct sequencing of MEOX1, PAX1 and FGFR3 genes were performed in this dog to investigate a possible underlying genetic predisposition, but no mutations were detected in the coding regions of the three target genes evaluated. Other genes can be involved in this condition in dogs and require further investigation. This report describes a cervical vertebral fusion and complex scapular anomaly in a dog. The presence of an omovertebral bone should be considered in the setting of signs characteristic of myelopathy in dogs with or without obvious skeletal deformity.

Squamous cell carcinoma of the anal sacs in three dogs.

S. Mellett, S. Verganti, S. Murphy and K. Bowlt.

Anal sac squamous cell carcinoma is rare in dogs. Five cases have been previously reported, treatment of which involved surgery alone. This report describes three further cases of canine anal sac squamous cell carcinoma which underwent medical (meloxicam) management alone, resulting in survival of up to seven months. No
metastases were identified. Squamous cell carcinoma, although extremely uncommon, should be considered as a possible differential diagnosis when a dog is presented for investigation of an anal sac mass.

American Journal of Veterinary Research

Effect of gantacurium on evoked laryngospasm and duration of apnea in anesthetized healthy cats.
OBJECTIVE To evaluate whether the ultrashort-acting neuromuscular blocking agent gantacurium can be used to blunt evoked laryngospasm in anesthetized cats and to determine the duration of apnea without hemoglobin desaturation. ANIMALS 8 healthy adult domestic short hair cats. PROCEDURES Each cat was anesthetized with dexmedetomidine and propofol, instrumented with a laryngeal mask, and allowed to breathe spontaneously (fraction of inspired oxygen, 1.0). The larynx was stimulated by spraying sterile water (0.3 mL) at the rima glottidis; a fiberscope placed in the laryngeal mask airway was used to detect evoked laryngospasm. Laryngeal stimulation was performed at baseline; after IV administration of gantacurium at doses of 0.1, 0.3, and 0.5 mg/kg; and after the effects of the last dose of gantacurium had terminated. Duration of apnea and hemoglobin oxygen saturation (measured by means of pulse oximetry) after each laryngeal stimulation were recorded. Neurumuscular block was monitored throughout the experiment by means of acceleromyography on a pelvic limb. RESULTS Laryngospasm was elicited in all cats at baseline, after administration of 0.1mg of gantacurium/kg, and after the effects of the last dose of gantacurium had terminated. The 0.3 and 0.5 mg/kg doses of gantacurium abolished laryngospasm in 3 and 8 cats, respectively, and induced complete neuromuscular block measured at the pelvic limb; the mean ± SE duration of apnea was 2 ± 1 minutes and 3 ± 1.5 minutes, respectively. Hemoglobin oxygen saturation did not decrease significantly after administration of any dose of gantacurium. CONCLUSIONS AND CLINICAL RELEVANCE Gantacurium may reduce tracheal intubation-associated morbidity in cats breathing oxygen.

Evaluation of hepatic contrast enhancement with a hepatocyte-specific magnetic resonance imaging contrast agent (gadoxetic acid) in healthy dogs.
OBJECTIVE To determine, by means of MRI, the time to maximal contrast enhancement in T1-weighted images following IV administration of gadoxetic acid in healthy dogs and assess the impact of gadoxetic acid on the signal intensity of T2-weighted images. ANIMALS 7 healthy dogs. PROCEDURES No hepatic abnormalities were detected during ultrasonographic examination. Each dog was anesthetized and positioned in dorsal recumbency for MRI. Transverse T1- and T2-weighted images of the liver were acquired prior to and following (at 5-minute intervals) IV injection of 0.1 mL of gadoxetic acid/kg. Signal intensity of the liver parenchyma was measured in 3 regions of interest in the T1- and T2-weighted images before and at various times point after contrast agent administration. Time versus signal-to-noise ratio curves were plotted to determine time to maximal contrast enhancement and contrast agent–related changes in signal intensity in T2-weighted images. RESULTS Analysis of T1-weighted images revealed that mean ± SD time to maximal enhancement after gadoxetic acid injection was 10.5 ± 3.99 minutes. Signal intensity of T2-weighted images was not significantly affected by gadoxetic acid administration. No injection-related adverse effects were observed in any dog. CONCLUSIONS AND CLINICAL RELEVANCE Results indicated that gadoxetic acid can be used for hepatic MRI in healthy dogs and the resultant hepatic enhancement patterns are similar to those described for humans. Maximal contrast enhancement occurred between 10 and 15 minutes after contrast agent injection; thus, T2-weighted images may be obtained in the interval between injection and maximal enhancement for a more time-efficient clinical protocol.

Systemic absorption and adverse ocular and systemic effects after topical opthalmic administration of 0.1% diclofenac to healthy cats.
Kimberly K. Hsu, Chantale L. Pinard, Ron J. Johnson, Dana G. Allen, Butch K. KuKanich, Stephanie G. Nykamp.
OBJECTIVE To quantify plasma concentrations and determine adverse ocular, renal, or hepatic effects associated with repeated topical opthalmic application of 0.1% diclofenac to healthy cats. ANIMALS 8 healthy sexually intact male cats. PROCEDURES A randomized, placebo-controlled crossover study was conducted. A topical formulation of 0.1% diclofenac was administered 4 times/d for 7 days to 4 cats, and artificial tear (control) solution was administered to the other 4 cats. After a 12-day washout period, cats received the other treatment. Ophthalmic examinations were performed daily. Plasma samples were obtained on days 1 and 7 for
pharmacokinetic analysis. A CBC, serum biochemical analysis, urinalysis, determination of urine protein-to-creatinine ratio, and determination of glomerular filtration rate were performed before the start of the study and after each 7-day treatment period. RESULTS Mild conjunctival hyperemia was the only adverse ocular effect detected. Maximal drug concentration and area under the curve were significantly higher on day 7 than on day 1. Diclofenac-treated cats had a significantly lower glomerular filtration rate than did control-treated cats after the second but not after the first treatment period, presumably associated with iatrogenic hypovolemia.

CONCLUSIONS AND CLINICAL RELEVANCE Topical ophthalmic administration of 0.1% diclofenac was well tolerated in healthy cats, with only mild signs of ocular irritation. Detectable systemic concentrations of diclofenac were achieved with accumulation over 7 days. Systemic absorption of diclofenac may be associated with reduced glomerular filtration rate, particularly in volume-contracted animals. Topical ophthalmic 0.1% diclofenac should be used with caution in volume-contracted or systemically ill cats.

Comparison of directly measured arterial blood pressure at various anatomic locations in anesthetized dogs.
Mark J. Acierno, Michelle E. Domingues, Sara J. Ramos; Amanda M. Shelby, Anderson F. da Cunha.
OBJECTIVE To determine whether directly measured arterial blood pressure differs among anatomic locations and whether arterial blood pressure is influenced by body position. ANIMALS 33 client-owned dogs undergoing anesthesia. PROCEDURES Dogs undergoing anesthetic procedures had 20-gauge catheters placed in both the superficial palmar arch and the contralateral dorsal pedal artery (group 1 [n = 20]) or the superficial palmar arch and median sacral artery (group 2 [13]). Dogs were positioned in dorsal recumbency, and mean arterial blood pressure (MAP), systolic arterial blood pressure (SAP), and diastolic arterial blood pressure (DAP) were recorded for both arteries 4 times (2-minute interval between successive measurements). Dogs were positioned in right lateral recumbency, and blood pressure measurements were repeated. RESULTS Differences were detected between pressures measured at the 2 arterial sites in both groups. This was especially true for SAP measurements in group 1, in which hind limb measurements were a mean of 16.12 mm Hg higher than carpus measurements when dogs were in dorsal recumbency and 14.70 mm Hg higher than carpus measurements when dogs were in lateral recumbency. Also, there was significant dispersion about the mean for all SAP, DAP, and MAP measurements. CONCLUSIONS AND CLINICAL RELEVANCE Results suggested that arterial blood pressures may be dependent on anatomic location and body position. Because this may affect outcomes of studies conducted to validate indirect blood pressure measurement systems, care must be used when developing future studies or interpreting previous results.

Journal of Feline Medicine and Surgery

DNA mutations of the cat: The good, the bad and the ugly
Leslie A Lyons
Practical relevance: The health of the cat is a complex interaction between its environment (nurture) and its genetics (nature). Over 70 genetic mutations (variants) have been defined in the cat, many involving diseases, structural abnormalities and clinically relevant health concerns. As more of the cat’s genome is deciphered, less commonly will the term ‘idiopathic’ be used regarding the diagnosis of diseases and unique health conditions. State-of-the-art health care will include DNA profiling of the individual cat, and perhaps its tumor, to establish the best treatment approaches. Genetic testing and eventually whole genome sequencing should become routine diagnostics for feline health care. Global importance: Cat breeds have disseminated around the world. Thus, practitioners should be aware of the breeds common to their region and the mutations found in those regional populations. Specific random-bred populations can also have defined genetic characteristics and mutations. Audience: This review of ‘the good, the bad and the ugly’ DNA variants provides the current state of knowledge for genetic testing and genetic health management for cats. It is aimed at feline and general practitioners wanting to update and review the basics of genetics, what tests are available for cats and sources for genetic testing. The tables are intended to be used as references in the clinic. Practitioners with a high proportion of cat breeder clientele will especially benefit from the review. Evidence base: The data presented is extracted from peer-reviewed publications pertaining to mutation identification, and relevant articles concerning the heritable trait and/or disease. The author also draws upon personal experience and expertise in feline genetics.

Update in feline therapeutics: Clinical use of 10 emerging therapies
William Whitehouse and Katrina Viviano
Practical relevance: The field of veterinary medicine is constantly evolving. New medications are being introduced into clinical practice, and novel uses for established medications are frequently being discovered as new information comes to light. Clinical challenges: Therapeutic options for our feline patients can be restricted based on inadequate clinical evidence, adverse effects and patient compliance concerns. Additionally, with the reduced availability of commonly used medications in some regions, clinicians are forced to utilize alternatives with which they may have limited experience. Audience: This review article is directed towards primary care veterinarians working with feline patients. The selection of medications discussed is based on many of the clinical challenges commonly encountered in practice. Evidence base: The evidence for use of some of these medications is limited due to their novelty. Known mechanisms of action, pharmacokinetic and pharmacodynamics data, adverse effects and clinical uses are reviewed where possible, with clinical recommendations made based on the evidence of data available.

ISFM Consensus Guidelines on the Practical Management of Diabetes Mellitus in Cats
Andrew H Sparkes, Martha Cannon, David Church, et al

Practical relevance: Diabetes mellitus (DM) is a common endocrinopathy in cats that appears to be increasing in prevalence. The prognosis for affected cats can be good when the disease is well managed, but clinical management presents challenges, both for the veterinary team and for the owner. These ISFM Guidelines have been developed by an independent, international expert panel of clinicians and academics to provide practical advice on the management of routine (uncomplicated) diabetic cats. Clinical challenges: Although the diagnosis of diabetes is usually straightforward, optimal management can be challenging. Clinical goals should be to limit or eliminate clinical signs of the disease using a treatment regimen suitable for the owner, and to avoid insulin-induced hypoglycaemia or other complications. Optimising bodyweight, feeding an appropriate diet and using a longer acting insulin preparation (eg, protamine zinc insulin, insulin glargine or insulin detemir) are all factors that are likely to result in improved glycaemic control in the majority of cats. There is also some evidence that improved glycaemic control and reversal of glucose toxicity may promote the chances of diabetic remission. Owner considerations and owner involvement are an important aspect of management. Provided adequate support is given, and owners are able to take an active role in monitoring blood glucose concentrations in the home environment, glycaemic control may be improved. Monitoring of other parameters is also vitally important in assessing the response to insulin. Insulin adjustments should always be made cautiously and not too frequently – unless hypoglycaemia is encountered. Evidence base: The Panel has produced these Guidelines after careful review of the existing literature and of the quality of the published studies. They represent a consensus view on practical management of cats with DM based on available clinical data and experience. However, in many areas, substantial data are lacking and there is a need for better studies in the future to help inform and refine recommendations for the clinical management of this common disease.

2015 AAHA/AAFP Pain Management Guidelines for Dogs and Cats
Mark E Epstein, Ilona Rodan, Gregg Griffenhagen, et al

Rationale: The robust advances in pain management for companion animals underlie the decision of the American Animal Hospital Association (AAHA) and American Association of Feline Practitioners (AAFP) to expand on the information provided in the 2007 AAHA/AAFP Pain Management Guidelines. The 2015 Guidelines summarize and offer a discriminating review of much of this new knowledge. Relevance: Pain management is central to veterinary practice, alleviating pain, improving patient outcomes, and enhancing both quality of life and the veterinarian–client–patient relationship. These Guidelines support veterinarians in incorporating pain management into practice, improving patient care. Approaches: The management of pain requires a continuum of care that includes anticipation, early intervention, and evaluation of response on an individual patient basis. A team-oriented approach, including the owner, is essential for maximizing the recognition, prevention and treatment of pain in animals. Evidence base: The Guidelines include both pharmacologic and non-pharmacologic modalities to manage pain; they are evidence-based insofar as possible and otherwise represent a consensus of expert opinion. Behavioral changes are currently the principal indicator of pain and its course of improvement or progression, and the basis for recently validated pain scores. Postsurgical pain is eminently predictable but a strong body of evidence exists supporting strategies to mitigate adaptive as well as maladaptive forms. Chronic pain is dominated by degenerative joint disease (DJD), which is one of the most significant and under-diagnosed diseases of cats and dogs. DJD is ubiquitous, found in pets of all ages, and inevitably progresses over time; evidence-based strategies for management are established in dogs, and emerging in cats.
Biomechanical evaluation of finger trap suture variants for securing catheters
Zachary H., Ricker, Mark C., Rochat, Mark E., Payton

Objective—To biomechanically evaluate various finger trap patterns and suture materials for securing 5F polyvinylchloride and polypropylene catheters. Design—In vitro prospective study. Sample—132 finger trap constructs. Procedures—Each group of constructs comprised 6 to 10 replicates each of 3 finger trap patterns tied with 2–0 glycolide-lactide copolymer (GLC), braided nylon, and monofilament polypropylene suture on 5F polypropylene and polyvinylchloride catheters. The 3 finger trap variants were of similar lengths but differed in the number of surgeon's throws included in the pattern. Constructs were tested with a universal materials testing machine to the point of failure or a maximum of 100 mm of distraction. Force and distraction data were evaluated for significance with a competing risks model. Results—There was no difference in performance (as measured by the proportion of test failures, median distraction distance, or median force at failure or end of testing) attributable to the finger trap pattern variants. Sixteen of 66 constructs with polyvinylchloride catheter material failed at ≤ 100 mm distraction, whereas all polypropylene constructs failed during testing. For polypropylene catheters, braided nylon or GLC suture withstood greater distraction distance and force, respectively. For polyvinylchloride catheters, differences among suture types were nonsignificant.

Conclusions and Clinical Relevance—Data suggested that, for the material combinations evaluated, a finger trap suture pattern with fewer knots may provide catheter security similar to that for patterns tied with a more traditional pattern. These results should not be extrapolated to catheters of different diameters or materials, patterns tied with different suture sizes, or clinical performance in vivo without further testing.

Clinical and histopathologic features of dorsally located furunculosis in dogs following water immersion or exposure to grooming products: 22 cases (2005–2013)
Christine L., Cain, Elizabeth A., Mauldin

Objective—To describe clinical and histopathologic features of furunculosis in dogs following water immersion or exposure to grooming products. Design—Retrospective case series. Animals—22 dogs with skin lesions consistent with furunculosis and a history of water immersion or grooming prior to onset. Procedures—Information collected from the medical records of affected dogs included signalment, clinical signs, bathing or grooming procedure, diagnostic tests, treatment, and outcome. Results—German Shepherd Dogs (4/22 [18%]) and Labrador Retrievers (4/22 [18%]) were most commonly affected. Skin lesions, particularly hemorrhagic pustules and crusts, were dorsally located in all dogs and occurred a median of 2 days (range, 1 to 7 days) following water immersion or exposure to grooming products. Twenty (91%) dogs were bathed at home or at a commercial grooming facility prior to lesion onset; 1 dog developed skin lesions following hydrotherapy on an underwater treadmill, and 1 dog developed peri-incisional skin lesions after surgery. Lethargy, signs of neck or back pain, and fever were common clinical signs. Pseudomonas aeruginosa was the most common bacterial isolate from dogs with bacteriologic culture performed on skin samples (10/14). The main histologic feature was acute follicular rupture in the superficial dermis with suppurative inflammation and dermal hemorrhage. Systemic antimicrobial treatment, particularly oral administration of fluoroquinolones, resulted in excellent clinical response in 16 of 22 (73%) dogs. Conclusions and Clinical Relevance—Acute-onset furunculosis with characteristic clinical and histopathologic features in dogs following water immersion or exposure to grooming products was described. Knowledge of the historical and clinical features of this syndrome is essential for accurate diagnosis and appropriate treatment of affected dogs.

Risk factors for urolithiasis in dogs with congenital extrahepatic portosystemic shunts: 95 cases (1999–2013)
Evelyn H. G. Caporali, Heidi Phillips, Lucy Underwood, Laura E. Selmic

Objective—To identify risk factors for urolithiasis in dogs with congenital extrahepatic portosystemic shunts (EHPSSs) and to determine whether portoazygous shunts were associated with increased risk of urolithiasis at the initial evaluation for EHPSS. Design—Retrospective case series. Animals—Dogs (n = 95) with EHPSSs confirmed via CT angiography or surgery. Procedures—Medical records from 1999 to 2013 were reviewed. Variables of interest included signalment, previous medical management, and results of urinalysis, urolith analyses, and diagnostic imaging. Univariable and multivariable logistic regression analyses for assessment of risk factors for urolithiasis at the time of initial EHPSS evaluation were performed. Results—The dogs’ median age was 0.9 years (range, 0.2 to 12.6 years). Among the 95 dogs, 27 (28.4%) and 68 (71.6%) had portoazygous and portocaval shunts, respectively. Urinalysis was performed for 79 (83.2%) dogs, 29 (36.7%) of which had
crystalluria (mainly ammonium urate and struvite crystals). Uroliths were present in 34 of 95 (35.8%) dogs; 16 of 17 uroliths analyzed were composed of ammonium urate. Portoozygos shunts were not associated with significantly increased odds of urolithiasis at the time of the initial evaluation for EHPSS. However, the odds of urolithiasis was significantly increased for male dogs, older dogs, and dogs that received previous medical treatment. Conclusions and Clinical Relevance—In dogs with EHPSS, shunt morphology was not associated with increased odds of urolithiasis at the initial evaluation. Male dogs, older dogs, and dogs having received medical management for EHPSS prior to initial evaluation should be considered at increased risk for development of urolithiasis.

Multiple magnetic gastrointestinal foreign bodies in a dog
Mark S. Garneau, Robert J. McCarthy
Case Description—A 3-year-old castrated male Yorkshire Terrier was referred because of a 3-day history of vomiting, hyporexia, and lethargy after suspected ingestion of magnetic desk toys. Multiple metallic gastric foreign bodies were visible on radiographic views obtained 24 hours previously by the referring veterinarian. Clinical Findings—On physical examination of the dog, findings included moderate dyspnea, signs of pain in the cranial portion of the abdomen, hypothermia, and tachycardia. Repeated radiography revealed moderate pleural effusion and the presence of several round metallic foreign bodies in a linear ring formation in the distal aspect of the esophagus and gastric cardia. Treatment and Outcome—Endoscopy was performed, at which time the dog became increasingly dyspneic, tachycardic, and hypotensive. Thoracocentesis was performed, and a large volume of septic exudate was removed from the left hemithorax. Exploratory surgery of the thoracic and abdominal cavities was performed, during which the magnetic foreign bodies were removed and esophageal and gastric perforations were debrided and closed. The dog died following acute cardiac arrest 48 hours after surgery. Clinical Relevance—Ingestion of multiple magnetic foreign bodies carries a high risk of gastrointestinal tract perforation, volvulus, and obstruction. Immediate surgical intervention is recommended in such cases and would have likely improved the outcome for the dog of this report.

Journal of the American Veterinary Medical Association – Mar 15

Application of fast-track surgery principles to evaluate effects of atipamezole on recovery and analgesia following ovariohysterectomy in cats anesthetized with dexmedetomidine-ketamine-hydromorphone
Michelle M. M. Hasiuk, Dean Brown, Claire Cooney, Marta Gunn, Daniel S. J. Pang
Objective—To evaluate the effects of atipamezole hydrochloride on recovery and analgesia following ovariohysterectomy in cats anesthetized with a dexmedetomidine hydrochloride, ketamine hydrochloride, and hydromorphone hydrochloride combination, in accordance with fast-track surgery principles. Design—Prospective, randomized, clinical trial. Animals—44 cats. Procedures—Cats were anesthetized with a combination of dexmedetomidine (15 µg/kg [6.8 µg/lb]), ketamine (5 mg/kg [2.3 mg/lb]), and hydromorphone (0.05 mg/kg [0.023 mg/lb]), IM, supplemented with isoflurane in oxygen. Immediately after ovariohysterectomy, cats received meloxicam (0.2 mg/kg [0.09 mg/lb]) SC and either atipamezole (75 µg/kg [34.1 µg/lb]) or an equivalent volume of saline (0.9% NaCl) solution IM. Pain and sedation were scored at baseline (prior to surgery) and at predetermined intervals after surgery. Time to sternal recumbency was recorded. Results—The atipamezole group recovered to sternal recumbency faster (median, 15 minutes; range, 5 to 60 minutes) than the saline solution group (median, 60 minutes; range, 15 to 90 minutes). Pain scores did not differ between groups or at any time, compared with baseline, and were below the intervention threshold for most cats. Sedation scores were significantly greater in the saline solution group (median, 0; range, 0 to 2) at 2 hours after surgery, compared with the atipamezole group (median, 0; range, 0 to 0). Conclusions and Clinical Relevance—Results indicated that administration of atipamezole, compared with saline solution, allowed for a faster recovery from anesthesia with dexmedetomidine-ketamine-hydromorphone in cats following ovariohysterectomy without compromising analgesia. These findings have implications for the provision of appropriate postoperative analgesia following ovariohysterectomy in cats.

Effect of tooth extraction on stomatitis in cats: 95 cases (2000–2013)
Michael W. Jennings, John R. Lewis, Maria M. Soltero-Rivera, Dorothy C. Brown, Alexander M. Reiter
Objective—To evaluate long-term response of cats with stomatitis to tooth extraction. Design—Retrospective case series. Animals—95 cats with stomatitis. Procedures—Medical records of cats with stomatitis that was treated with tooth extraction during a 14-year period were reviewed. Demographic information and diagnostic results were recorded as well as surgical procedure, including full-mouth extraction (FME) versus partial-mouth
extraction (PME), and specifics of medical management. Patients were categorized according to response to treatment. Results—Median postoperative follow-up time was 231 days (range, 33 to 2,655 days). Of 95 cats, 6 (6.3%) had no improvement and 25 (26.3%) had little improvement in stomatitis following tooth extraction and extended medical management (EMM). Following tooth extraction, 37 (39.0%) cats had substantial clinical improvement and 27 (28.4%) cats had complete resolution of stomatitis; of these 64 cats, 44 (68.8%) required EMM for a finite period to achieve positive outcomes. Extent of tooth extraction (PME vs FME) was not associated with overall response to treatment. At initial recheck examination, a better long-term response to tooth extraction was observed in patients with resolution of abnormal behavior (OR, 7.2), decrease in oral inflammation (OR, 3.5), and lack of need for follow-up medical management with antimicrobials (OR, 3.7).

Conclusions and Clinical Relevance—Extraction of teeth in areas of oral inflammation provided substantial improvement or complete resolution of stomatitis in more than two-thirds of affected cats. Full-mouth extraction did not appear to provide additional benefit over PME. Most cats with stomatitis may require EMM to achieve substantial clinical improvement or complete resolution.

The Canadian Veterinary Journal

Suspected primary hematomyelia in 3 dogs
Andrew Barker, Jackie M. Williams, Annie Chen, Rod Bagley, Nick D. Jeffery
Primary hematomyelia refers to hemorrhage occurring within the spinal cord without an identifiable etiology. Clinical signs, magnetic resonance imaging characteristics, and histopathological findings are described. Diagnosis was made through histological analysis and rule-outs for underlying factors. Following removal of the hematoma, neurologic deficits improved, although some residual deficits persisted.

Foramen magnum decompression surgery in 23 Chiari-like malformation patients 2007–2010: Outcomes and owner survey results
Nora Ortinau, Samantha Vitale, Erin Y. Akin, Michaela Beasley, Andy Shores
Chiari-like malformation (CLM) with syringomyelia (SM) in dogs is particularly prominent in the Cavalier King Charles spaniel breed, but has also been reported in several other small breed dogs. Over a period of 3 years, 23 canine patients were treated surgically for CLM-SM. Surgery consisted of foramen magnum decompression, durotomy, duraplasty, and free autogenous adipose tissue grafting (fat graft). All patients were re-evaluated clinically at least 1 month after surgery and some up to 3 years after surgery. Improvement was noted on all clinical evaluations. A questionnaire was mailed to all 23 owners after a period of at least 1 year after surgery. Seventeen surveys were returned. No patient has required additional surgery to date, 94% (16/17) had some improvement in quality of life after surgery, and none were judged to deteriorate to less than the pre-surgical status. The authors conclude that this surgical procedure, combined with medical therapy, resulted in favorable long-term outcomes.

Mandibulectomy for treatment of fractures associated with severe periodontal disease
Carina Marchiori Carvalho, Sheila Canavez C. Rahal, Luciane dos Reis Mesquita, Maira Sales Castilho, Washington Takashi Kano, Maria Jaqueline Mamprim
Six cases of mandibular fractures associated with severe periodontal disease that had been treated by mandibulectomy, due to intense bone loss, were evaluated retrospectively. The dogs were mainly older, small breed dogs that had suffered a traumatic event. Four dogs had a bilateral mandibulectomy and 2 a unilateral mandibulectomy

Perianal neuroendocrine tumor with suspected lymph node metastasis causing colonic compression and subsequent megacolon
Scott D. Joudrey, Duane A. Robinson, Robert Blair, Leslie D. McLaughlin, Lorrie Gaschen
An 8-year-old spayed female domestic shorthair cat was presented with a 4- to 5-month history of a progressively growing mass above her anus and an inability to defecate for 3 to 4 wk. External perianal and internal regional masses were subsequently identified and diagnosed as tumors of neuroendocrine origin through surgical excision and histopathologic evaluation. The cat was treated with 2 courses of chemotherapy and radiation therapy.

Urticaria pigmentosa-like disease in a dog
Urticaria pigmentosa is a rare dermatologic syndrome in humans, cats, and dogs. This report documents a case of canine urticaria pigmentosa-like disease with unusual features and no C-Kit mutation.

**Pulmonary Echinococcus multilocularis metastasis in a dog**
Karine Gendron, Christine Goepfert, Elisa Linon, Horst Posthaus, Caroline F. Frey
A young adult Labrador retriever dog was presented for surgical debulking of hepatic alveolar echinococcosis. Computed tomography detected hepatomegaly with multiple large cavitary masses with extension of tissue from a lesion wall into the caudal vena cava and numerous nodules in all lung lobes. Following euthanasia, histology confirmed parasitic vesicles with granulomatous reaction in all lesions, and polymerase chain reaction (PCR) established the causative agent to be Echinococcus multilocularis. This report is the first to present imaging features of pulmonary E. multilocularis granuloma in a dog.

**Mucopolysaccharidosis type VI in a juvenile miniature schnauzer dog with concurrent hypertriglyceridemia, necrotizing pancreatitis, and diabetic ketoacidosis**
Mayrim L. Pérez, Heather A. Kridel, Alex Gallagher, Barbara J. Sheppard, Shona Reese, Hirotaka Kondo, Rick Alleman, Urs Giger
A 7-month-old, neutered male miniature schnauzer dog with a history of cryptorchidism and umbilical hernia was referred for diabetic ketoacidosis. Clinical evaluation revealed stunted growth, skeletal abnormalities, hypertriglyceridemia, diabetic ketoacidosis, and acute necrotizing pancreatitis. Further testing was diagnostic for mucopolysaccharidosis type VI causing the stunted growth and skeletal deformities, but no connection between mucopolysaccharidosis type VI, hypertriglyceridemia, and pancreatic diseases was found.

**The Australian Veterinary Journal**

**Canine tick-borne pathogens and associated risk factors in dogs presenting with and without clinical signs consistent with tick-borne diseases in northern Australia (pages 58–66)**
SF Hii, RJ Traub, MF Thompson, J Henning, CA O’Leary, A Burleigh, S McMahon, RL Rees and SR Kopp
Objectives - To estimate the proportion of canine tick-borne disease (CTBD) pathogens in dogs from northern states of Australia presenting with and without clinical signs/laboratory abnormalities suggestive of CTBD and to evaluate associated risk factors. Design - Client-owned dogs presented to a general practice clinic in the Northern Territory (NT; n = 138) and five referral hospitals in south-east Queensland (SEQ; n = 100) were grouped into CTBD-suspect and -control groups based on clinical and laboratory criteria. Blood and sera were screened for haemotropic Mycoplasma spp., Babesia spp., Anaplasma spp., Ehrlichia spp. and Hepatozoon spp. using microscopic examination, in-clinic ELISA testing and PCR assays. Dog-specific risk factors associated with the presence of CTBD pathogens were evaluated. Results - Overall, 24.4% of the suspect group and 12.2% of the control group dogs were infected. The proportions of *M. haemocanis*, *B. vogeli*, *A. platys*, *Candidatus Mycoplasma haematoparvum*, and *C. Mycoplasma haemobos* were 7.1%, 5.0%, 3.8%, 1.7% and 0.4%, respectively. Dogs originating from the NT were 3.6-fold (95% confidence interval (CI) 1.51–8.62; P = 0.004) more likely to be infected with CTBD pathogens than those from SEQ. Male dogs were 2.3-fold (95% CI 1.17–4.80, P = 0.024) more likely to be PCR-positive to CTBD pathogens than female dogs. Dogs presenting with clinical signs consistent with CTBD and thrombocytopenia were more likely to be infected by CTBD pathogens (odds ratio 2.85; 95% CI 1.16, 7.02; P = 0.019). Conclusions - Haemotropic mycoplasmas were the most common tick-borne pathogen infecting client-owned dogs. Subclinical cases were common in dogs from the NT. Veterinary practitioners should be aware of the proportion of CTBD pathogens and the presenting features of clinical and subclinical disease in their area.

**Right-sided congestive heart failure in a dog because of a primary intracavitary myocardial lymphoma (pages 67–71)**
LJ Tong, SL Bennett, DJ Thompson, SL Adsett and RE Shiel
Case report - A 9-year-old female intact Cocker Spaniel was presented with a history of acute-onset dyspnoea and abdominal distension of 3 days' duration. Ultrasonography revealed pleural, peritoneal and pericardial effusions. Abdominal fluid analysis was consistent with a modified transudate. Echocardiography revealed a large, hypoechoic space-occupying mass within the right atrium. The dog was euthanased and the postmortem examination showed a solid, $40 \times 35 \times 20$ mm broad-based mass arising from the right atrial wall and occluding approximately 90% of the right atrial lumen. Histopathology revealed myocardial lymphoma. There were histologically similar, focal nodules in the lung parenchyma without involvement of other extracardiac sites. There was gross and histological evidence of hepatic congestion and marked distension of the caudal vena cava, consistent with secondary right-sided congestive heart failure. Conclusion - This case highlights the need to consider lymphoma as a differential diagnosis for an intra-atrial mass and as a cause of congestive heart failure in the dog.

Journal of Veterinary Internal Medicine (Mar/Apr)

ACVIM Consensus Statement on Therapeutic Antimicrobial Use in Animals and Antimicrobial Resistance
The epidemic of antimicrobial resistant infections continues to challenge, compromising animal care, complicating food animal production and posing zoonotic disease risks. While the overall role of therapeutic antimicrobial use in animals in the development AMR in animal and human pathogens is poorly defined, veterinarians must consider the impacts of antimicrobial use in animal and take steps to optimize antimicrobial use, so as to maximize the health benefits to animals while minimizing the likelihood of antimicrobial resistance and other adverse effects. This consensus statement aims to provide guidance on the therapeutic use of antimicrobials in animals, balancing the need for effective therapy with minimizing development of antimicrobial resistance in bacteria from animals and humans.

Hypercoagulability in Dogs with Blastomycosis
M.A. McMichael, M. O’Brien and S.A. Smith.
Background Blastomycosis is a potentially fatal fungal disease that most commonly affects humans and dogs. The organism causes systemic inflammation and has a predilection for the lungs. The inflammation might lead to a hypercoagulable state with microemboli in the pulmonary circulation which could contribute to inadequate oxygen exchange in infected dogs. Hypothesis/Objectives Dogs with blastomycosis will be hypercoagulable compared with healthy case-matched controls. Animals Client-owned dogs with a diagnosis of blastomycosis (n = 23) and healthy case-matched controls (n = 23). Methods Prospective case-controlled study of client-owned dogs presented to a veterinary teaching hospital with clinical signs compatible with blastomycosis. Complete blood counts, fibrinogen, PT, aPTT, thromboelastometry (TE), thrombin antithrombin complexes (TAT), and thrombin generation were evaluated. Results Cases had a leukocytosis compared with controls [mean (SD) 16.6 (7.6) $\times 10^3$/µL versus 8.2 (1.8) $\times 10^3$/µL, P < .001], hyperfibrinogenemia [median 784 mg/dL, range 329–1,443 versus median 178 mg/dL, range 82–257, P < .001], and increased TAT concentrations [mean (SD) 9.0 (5.7) µg/L versus 2.0 (2.8) µg/L, P < .001]. As compared to controls, cases were also hypercoagulable as evaluated by thromboelastometry and had increased in vitro thrombin generation on calibrated automated thrombography. Conclusions and Clinical Importance Hypercoagulability occurs in dogs with systemic blastomycosis. Additional studies are needed to explore a possible contribution of thrombogenicity to the clinical manifestations of systemic blastomycosis.

Changes in Serum and Urine SAA Concentrations and Qualitative and Quantitative Proteinuria in Abyssinian Cats with Familial Amyloidosis: A Five-year Longitudinal Study (2009–2014)
S. Paltrinieri, G. Sironi, L. Giori, S. Faverzani and M. Longeri
Background Diagnosis of familial amyloidosis (FA) in Abyssinian cats usually is made on postmortem examination. Hypothesis/Objectives Sequential analysis of serum SAA (sSAA), urinary SAA (uSAA), urinary protein:creatinine (UPC) ratio, or sodium-dodecyl sulfate agarose gel electrophoresis (SDS-AGE) may facilitate early identification of cats with FA. Animals Twenty-three Abyssinian cats belonging to cattery A or B (low and high prevalence of FA, respectively). Methods Prospective longitudinal study using 109 blood and 100 urine samples collected over 4-year period every 4 months, if possible, or more frequently in case of illness. Cats that died during study were necropsied. Health status of live cats was checked 5 years after enrollment. Serum amyloid A (sSAA) and urinary SAA (uSAA) were measured using ELISA kit. The UPC ratio and SDS-AGE
Incidence, Timing, and Risk Factors of Azathioprine Hepatotoxicosis in Dogs
K. Wallisch and L.A. Trepanier
Background The use of azathioprine (AZA) in dogs is limited by the development of hepatotoxicosis and cytopenias. Hypothesis and Objectives To characterize the observed incidence, timing, and risk factors for AZA hepatotoxicosis in dogs treated clinically, and to determine the relationship between the development of hepatotoxicosis and cytopenias. Animals Fifty-two dogs treated with AZA with clinical and biochemical follow-up, with a subset of 34 dogs available for determination of changes in liver enzyme activities in serum. Methods Retrospective medical record review, from January 2009 through December 2013. Results Hepatotoxicosis (as defined by a >2-fold increase in serum ALT) was observed in 5 of 34 dogs (15%) within a median onset of 14 days (range, 13–22 days). Dogs had a median 9-fold increase in ALT and 8-fold increase in ALP, which stabilized or resolved with drug discontinuation or dose reduction. German shepherds were significantly over-represented (3 of 5 dogs with hepatotoxicosis; P = .0017). Thrombocytopenia or neutropenia were seen in 4 of 48 dogs with CBC follow-up (8% of dogs), but occurred significantly later in treatment (median onset, 53 days; range 45–196 days) compared to hepatotoxicosis (P = .016). Conclusions and Clinical Importance These results support the routine monitoring of liver enzymes during the first 1–4 weeks of AZA treatment in dogs, with continued monitoring of the CBC. Additional studies are warranted to characterize the apparently higher risk of AZA hepatotoxicosis in German shepherds.

Plasma Vitamin D Metabolites and C-Reactive Protein in Stage-Stop Racing Endurance Sled Dogs
J.W. Spoo, R.L. Downey, C. Griffitts, R.J. Horst, C.B. Levine, R.M. Childs and J.J. Wakshlag
Background Dogs are a unique model for examining the effects of exercise on vitamin D status because of their lack of vitamin D synthesis by UV exposure. In addition, the inflammatory response may be associated with hypovitaminosis D. Objectives To investigate the effects of several days of endurance exercise on plasma vitamin D (25-(OH)D3, 24,25-(OH)D3 and 1,25(OH)D3) and serum C-reactive protein (CRP) concentrations in stage-stop racing sled dogs. Animals 12 racing sled dogs and 8 control dogs. Methods Blood was collected before the race and immediately after racing on days 2 and 8. Plasma vitamin D metabolites and serum CRP concentrations were measured. Results Racing dogs showed a significant increase in 25(OH)D3 on day 2 (P = .027) and day 8 of the race (P < .001), whereas no increases were observed in control dogs. The plasma concentration of 24,25(OH)D3 showed a significant increase by day 8 (P < .001). There were no significant changes in 1,25(OH) D3 concentrations across all time points and groups. Racing dogs had significantly increased CRP concentrations by day 2 (39.3 ± 30.1 µg/mL; P < .001). Conclusions and Clinical Importance Increases in vitamin D metabolites as well as increases in CRP concentrations were observed in racing sled dogs. This finding was contrary to the hypothesis that decreases in vitamin D status in athletes may be related to the acute phase inflammatory response during exercise. In addition, the increased 24,25(OH)D3 concentrations compared to what is observed in other species suggests metabolic variations in dogs that lead to enhanced disposal of vitamin D.

Tracheobronchial Brush Cytology and Bronchoalveolar Lavage in Dogs and Cats with Chronic Cough: 45 Cases (2012–2014)
B.Y. Zhu, L.R. Johnson and W. Vernau
Background Animals with chronic cough can have normal bronchoalveolar lavage fluid cytology when small airway disease is absent. Cytology of a tracheobronchial brushing can detect inflammation in larger airways; however, evaluation of this technique has been limited in veterinary medicine. Objective To compare airway brush cytology to bronchoalveolar lavage fluid analysis in dogs and cats with chronic cough. Animals Forty dogs and five cats undergoing bronchoscopic investigation of chronic cough. Methods Prospective study. Bronchoscopy and bronchoalveolar lavage were performed followed by tracheobronchial brushing of central airways. Results of cytologic assessment of BAL fluid and brush cytology were compared for the presence or
absence of inflammation and concordance of inflammatory cell type. Results Brush cytology detected central airway inflammation in 34 of 40 (85%) dogs with inflammatory BAL fluid. However, the type of inflammation reported differed in 23 of 34 dogs. In five cats with inflammation in BAL fluid, brush cytology detected inflammation in four; the type of inflammation was discordant in all cats. Conclusions and clinical relevance Brush cytology has good agreement with BAL regarding the presence of inflammation, although the type of inflammation detected with the different sampling techniques commonly varies. Brush cytology can provide supplementary information to BAL, and additional studies will provide further information on the role of tracheobronchial brush cytology in the diagnosis and management of respiratory conditions.

A Prospective, Randomized, Blinded, Placebo-Controlled Pilot Study on the Effect of Enterococcus faecium on Clinical Activity and Intestinal Gene Expression in Canine Food-Responsive Chronic Enteropathy
S. Schmitz, B. Glanemann, O.A. Garden, H. Brooks, Y.M. Chang, D. Werling and K. Allenspach
Background Canine chronic enteropathies (CE) are believed to be caused by an aberrant immune response towards the intestinal microbiome. Administration of probiotics can alleviate colitis in people. In vitro effects of the probiotic Enterococcus faecium NCIMB 10415 E1707 (EF) previously have been evaluated using canine cells (e.g., whole blood, intestinal biopsies), but data on in vivo efficacy are lacking. Hypothesis/Objectives Administration of EF to dogs with food-responsive CE will improve clinical outcome and decrease the intestinal inflammatory profile. Animals Dogs diagnosed with CE were prospectively recruited to receive a hydrolyzed elimination diet plus either a synbiotic product containing EF or placebo for 6 weeks. Both veterinary staff and owners were blinded to the treatment. Methods Clinical severity index (CCECAI), clinicopathological data and gene expression using intestinal biopsies (TLR2/4/5/9, IL-17A, IL-22, IL-23p19, RORC, IL-2, IL-12p35, TNFa, IL-4, IFNy, IL-10, TGFβ, IL-1β, IL-18, NLRP3, casp-1, TFF1, TFF3 and PPARy) before and after 6 weeks of treatment were analyzed using linear mixed modeling. Results Of the 45 cases recruited, 12 finished the clinical trial. Seven received the synbiotic and 5 the placebo product. There was no difference between groups or treatments regarding clinical efficacy, histology scores or expression of any of the investigated genes. Conclusions and clinical importance Standard dietary treatment induced rapid clinical response in all cases. Because the study was underpowered, it was not possible to determine whether or not EF had an additional effect within the time period of 6 weeks.

Co-infections with Respiratory Viruses in Dogs with Bacterial Pneumonia
S.J. Viitanen, A. Lappalainen and M.M. Rajamäki
Background Bacterial pneumonia (BP) is an inflammation of the lower airways and lung parenchyma secondary to bacterial infection. The pathogenesis of BP in dogs is complex and the role of canine respiratory viruses has not been fully evaluated. Objectives The aim of this study was to investigate the occurrence of viral co-infections in dogs with BP and to assess demographic or clinical variables as well as disease severity associated with viral co-infections. Animals Twenty household dogs with BP caused by opportunistic bacteria and 13 dogs with chronic (>30 days) tracheobronchitis caused by Bordetella bronchiseptica (BBTB). Methods Prospective cross-sectional observational study. Diagnosis was confirmed by clinical and laboratory findings, diagnostic imaging, and cytologic and microbiologic analysis of bronchoalveolar lavage or transtracheal wash fluid. Canine parainfluenza virus (CPIV), canine adenovirus, canine herpes virus, canine influenza virus, canine distemper virus, canine respiratory coronavirus (CRCoV) and canine pneumovirus, as well as B. bronchiseptica and Mycoplasma spp. were analyzed in respiratory samples using PCR assays. Results CPIV was detected in 7/20 and CRCoV in 1/20 dogs with BP. Respiratory viruses were not detected in dogs with BBTB. There were no significant differences in clinical variables between BP dogs with and without a viral co-infection. Conclusion and Clinical Importance Respiratory viruses were found frequently in dogs with BP and may therefore play an important role in the etiology and pathogenesis of BP. Clinical variables and disease severity did not differ between BP dogs with and without viral co-infection.

Persistent Ehrlichia ewingii Infection in Dogs after Natural Tick Infestation
L.A. Starkey, A.W. Barrett, M.J. Beall, R. Chandrashekar, B. Thatcher, P. Tyrrell and S.E. Little
Background Ehrlichia ewingii, which causes disease in dogs and people, is the most common Ehrlichia spp. infecting dogs in the United States, but little is known about how long E. ewingii infection persists in dogs. Hypothesis/Objectives To evaluate the persistence of natural infection with E. ewingii in dogs. Animals Four Class A Beagles; no previous exposure to ticks or tick-borne infectious agents. Methods Dogs were exposed to ticks by weekly walks through tick habitat in north central Oklahoma; dogs positive for infection with Ehrlichia
spp. by sequence-confirmed PCR and peptide-specific serology were evaluated for 733 days (D). Whole blood was collected once weekly for PCR, and serum was collected once monthly for detection of antibodies to Ehrlichia canis (peptide p16), Ehrlichia chaffeensis (indirect fluorescence antibody [IFA] and variable-length PCR target [VLPT]), and E. ewingii (peptide p28). Results All dogs (4/4) became infected with Ehrlichia spp. as evidenced by seroconversion on IFA to E. chaffeensis (4/4); PCR detection of E. ewingii (4/4) and E. chaffeensis (2/4) DNA using both nested and real-time assays; and presence of specific antibodies to E. ewingii (4/4) and E. chaffeensis (2/4). Infection with E. chaffeensis was not detected after D55. Intermittent E. ewingii rickettsemia persisted in 3 of 4 dogs for as long as 733 days. Conclusions and Clinical Importance Our data demonstrate that dogs infected with E. ewingii from tick feeding are capable of maintaining infection with this pathogen long-term, and may serve as a reservoir host for the maintenance of E. ewingii in nature.

Efficacy of Intravenous Administration of Combined Acid Suppressants in Healthy Dogs
M.K. Tolbert, A. Odunayo, R.S. Howell, E.E. Peters and A. Reed
Background Short-term intravenous co-administration of famotidine and pantoprazole is used by some veterinarians to treat gastrointestinal bleeding in critically ill dogs. However, clinical studies have not evaluated the efficacy of combination acid suppressant treatment in dogs. Hypothesis/Objectives To compare the effect of intravenous co-administration of famotidine and pantoprazole to monotherapy with pantoprazole on intragastric pH in dogs. We hypothesized that single agent pantoprazole would be more effective than combination with famotidine. Animals Twelve healthy adult colony dogs. Methods Randomized, 2-way crossover design. All dogs received placebo (0.9% saline) for 24 hours followed by 1.0 mg/kg IV q12h pantoprazole or combination treatment with famotidine and pantoprazole for 3 consecutive days. Intragastric pH monitoring was used to continuously record intragastric pH for 96 hours beginning on day 0 of treatment. Mean percentage time (MPT) that intragastric pH was ≥3 and ≥4 were compared between groups using ANOVA with a posthoc Tukey-Kramer test (α = 0.017). Results The MPT ± standard deviation intragastric pH was greater than ≥3 and 4 were 79 ± 17% and 68 ± 17% for pantoprazole and 74 ± 19% and 64 ± 23% for combination treatment, respectively. There were no significant differences in MPT intragastric pH was ≥3 and 4 between groups. Pantoprazole administered alone achieved pH goals established for humans with acid-related disorders. Conclusions and Clinical Importance These results suggest that short-term combination treatment with famotidine and pantoprazole is not superior to pantoprazole alone for increasing intragastric pH in dogs.

Sudden Death Associated with QT Interval Prolongation and KCNQ1 Gene Mutation in a Family of English Springer Spaniels
W.A. Ware, Y. Reina-Doreste, J.A. Stern and K.M. Meurs
Background A 5-year-old, healthy English Springer Spaniel died suddenly 4 months after delivering a litter of 7 puppies. Within 4 months of the dam’s death, 3 offspring also died suddenly. Hypothesis Abnormal cardiac repolarization, caused by an inherited long QT syndrome, is thought to be responsible for arrhythmias leading to sudden death in this family. Animals Four remaining dogs from the affected litter and 11 related dogs. Methods Physical examination and resting ECG were done on the littermates and 9 related dogs. Additional tests on some or all littermates included echocardiogram with Doppler, Holter monitoring, and routine serum biochemistry. Blood for DNA sequencing was obtained from all 15 dogs. Results Three of 4 littermates examined, but no other dogs, had prolonged QT intervals with unique T-wave morphology. DNA sequencing of the KCNQ1 gene identified a heterozygous single base pair mutation, unique to these 3 dogs, which changes a conserved amino acid from threonine to lysine and is predicted to change protein structure. Conclusions and Clinical Importance This family represents the first documentation in dogs of spontaneous familial QT prolongation, which was associated with a KCNQ1 gene mutation and sudden death. Although the final rhythm could not be documented in these dogs, their phenotypic manifestations of QT interval prolongation and abnormal ECG restitution suggested increased risk for sudden arrhythmic death. The KCNQ1 gene mutation identified is speculated to impair the cardiac repolarizing current IKs, similar to KCNQ1 mutations causing long QT syndrome 1 in humans.

Prevalence and Prognostic Importance of Pulmonary Hypertension in Dogs with Myxomatous Mitral Valve Disease
Background Pulmonary hypertension (PH) is common in dogs with myxomatous mitral valve disease (MMVD) but its effect on clinical outcome has not been investigated. Hypothesis/objectives The presence of PH worsens
the outcome in dogs with MMVD. To compare survival times of dogs with MMVD and PH to those without PH. Animals Two hundred and twelve client-owned dogs. Methods Case review study. Medical records of dogs diagnosed with ACVIM stage B2 and C MMVD between January 2010 and December 2011 were retrospectively reviewed. Long-term outcome was determined by telephone interview or from the medical record. End of the observation period was March 2013. PH was identified if tricuspid regurgitation peak velocity was >3 m/s. Results Two hundred and twelve were identified. Eighty-three dogs (39%) had PH. PH was more commonly identified in stage C compared to B2 (P < .0001). One hundred and five (49.5%) dogs died during the observation period. Median survival time for the entire study population was 567 days (95% CI 512–743). Stage C (P = .003), the presence of PH (P = .009), left atrial to aortic root ratio (LA/Ao) >1.7 (P = .0002), normalized left-ventricular end-diastolic diameter (LVEDn) >1.73 (P = .048), and tricuspid regurgitation pressure gradient (TRPG) >55 mmHg (P = .009) were associated with worse outcomes in the univariate analyses. The presence of TRPG >55 mmHg (HR 1.8 95% CI 1–2.9; P = .05) and LA/Ao > 1.7 (HR 2.95% CI 1.2–3.4; P = .01) remained significant predictors of worse outcome in the multivariate analysis. Conclusions and Clinical Importance In dogs with MMVD, moderate to severe PH worsens outcome.

Clinical Severity Score System in Dogs with Degenerative Mitral Valve Disease
J. López-Alvarez, J. Elliott, D. Pfeiffer, Y.-M. Chang, M. Mattin, W. Moonarmart, M.J. Hezzell and A. Boswood
Background Several risk factors already have been determined for dogs with degenerative mitral valve disease (DMVD). Risk factors often have been considered in isolation and have not always taken into account additional information provided by the history and physical examination (PE). Hypothesis/Objectives Data obtained from history and PE of dogs with DMVD provide prognostic information and can be used for risk stratification. Animals Client-owned dogs (n = 244) with DMVD recruited from first opinion practice. Methods Prospective longitudinal follow-up of dogs with DMVD. History and PE data were obtained at 6-month intervals and analyzed with time-dependent Cox models to derive relative risk of cardiac death. Independent hazard ratios were used to derive a clinical severity score (CSS), the prognostic value of which was evaluated by analyzing the median survival times for different risk groups and ROC analysis. Analysis of the progression of CSS over time also was undertaken. Results History of cough, exercise intolerance, decreased appetite, breathlessness (difficulty breathing) and syncope with PE findings of heart murmur intensity louder than III/VI and absence of respiratory sinus arrhythmia were independently associated with outcome and allowed development of the CSS. Clinical severity score distinguished groups of dogs with significantly different outcomes. Conclusions and Clinical Importance Routinely obtained clinical findings allow risk stratification of dogs with DMVD. Results of ancillary diagnostic tests may be complementary to history and PE findings and always should be interpreted in conjunction with these findings.

Association of Tricuspid Annular Plane Systolic Excursion with Survival Time in Boxer Dogs with Ventricular Arrhythmias
B.M. Kaye, K. Borgeat, P.F. Mõtsküla, V. Luis Fuentes and D.J. Connolly
Background Tricuspid annular plane systolic excursion (TAPSE) is a useful estimate of right ventricular function in humans. Reference intervals for dogs have been generated, but the value of measuring TAPSE in other diseases, or investigating the association between TAPSE and outcome, is unknown. Hypothesis TAPSE is lower in Boxer dogs with ≥50 VPCs/24 h on Holter than in dogs with fewer ventricular ectopies, and lower TAPSE is associated with a shorter survival time. Animals Fifty Boxer dogs that presented for investigation of syncope or suspected arrhythmogenic right ventricular cardiomyopathy (ARVC) at a veterinary teaching hospital (2004–2011). Methods Retrospective study. Clinical records, Holter, and echocardiographic data were reviewed. TAPSE was measured in a blinded manner on stored echocardiographic cine-loops using anatomic M-mode. Outcome information was obtained and death was classified as cardiac or noncardiac. Survival analysis was performed using Kaplan-Meier curves and Cox proportional hazards models. Results TAPSE was lower in Boxers with ≥50 VPCs/24 h (13.9 ± 4.04 mm) than Boxers with <50 VPCs/24 h (16.8 ± 3.21 mm; P < .001). TAPSE <15.1 mm was associated with shorter cardiac survival time in all dogs (P = .004) and also in dogs with left ventricular dysfunction (P = .035). When controlling for other variables, including ventricular tachycardia on Holter and left ventricular systolic dysfunction, multivariable analysis showed that TAPSE remained an independent predictor of time to cardiac death (HR >4.09, 95%CI 1.15–16.9, P < .029). Conclusions and Clinical Importance TAPSE offers prognostic value for Boxer dogs, including those with apparently normal systolic function and ≥50 VPCs/24 h on Holter analysis.
Longitudinal Evaluation of Serum Pancreatic Enzymes and Ultrasonographic Findings in Diabetic Cats Without Clinically Relevant Pancreatitis at Diagnosis


Background Cats with diabetes mellitus can have subclinical pancreatitis but prospective studies to confirm this are lacking. Metabolic control of diabetic cats with pancreatitis is difficult. Hypothesis Subclinical pancreatitis occurs in diabetic cats at the time diabetes is diagnosed or might develop during the follow-up period, hampering diabetic remission. Animals Thirty cats with newly diagnosed diabetes without clinical signs of pancreatitis on admission. Methods Prospective study. On admission and 2 and 6 months later, serum Spec fPL and DGGR-lipase were measured and the pancreas underwent ultrasonographic examination. Pancreatitis was suspected if serum markers were increased or ≥2 ultrasonographic abnormalities were detected. Cats were treated with insulin glargine and diabetic remission was defined as euglycemia ≥4 weeks after discontinuation of insulin. Nonparametric statistical tests were used for analysis. Results Subclinical pancreatitis at the time of diagnosis was suspected in 33, 50, and 31% of cats based on Spec fPL, DGGR-lipase and ultrasonography, respectively; and in 60% when diagnostic criteria were combined. During the follow-up period, suspected pancreatitis developed in additional 17–30% cats. Only 1 cat had transient clinical signs compatible with pancreatitis. Seventeen of the 30 cats (57%) achieved remission. Frequency of abnormal Spec fPL and DGGR-lipase and abnormal ultrasonographic findings did not differ in cats achieving remission and those who did not. Cats achieving remission had significantly lower Spec fPL at 2 months (P < .001). Conclusions and Clinical Importance Based on laboratory and ultrasonographic measurements, many cats with diabetes might have pancreatitis, although without clinical signs. Cats with high Spec fPL might have a reduced chance of diabetic remission; however, this topic needs further studies in large cohorts of diabetic cats.

Urinary and Plasma Catecholamines and Metanephrines in Dogs with Pheochromocytoma, Hypercortisolism, Nonadrenal Disease and in Healthy Dogs


Background Diagnosis of pheochromocytoma (PC) is based on a combination of clinical suspicion, finding an adrenal mass, increased plasma, and urine concentrations of catecholamine metabolites and is finally confirmed with histopathology. In human medicine, it is controversial whether biochemically testing plasma is superior to testing urine. Objectives To measure urinary and plasma catecholamines and metanephrines in healthy dogs, dogs with PC, hypercortisolism (HC), and nonadrenal diseases (NAD) and to determine the test with the best diagnostic performance for dogs with PC. Animals Seven PC dogs, 10 dogs with HC, 14 dogs with NAD, 10 healthy dogs. Methods Prospective diagnostic clinical study. Urine and heparin plasma samples were collected and stored at −80°C before analysis using high-pressure liquid chromatography (HPLC) coupled to electrochemical detection or tandem mass spectrometry were performed. Urinary variables were expressed as ratios to urinary creatinine concentration. Results Dogs with PC had significantly higher urinary normetanephrine and metanephrine : creatinine ratios and significantly higher plasma-total and free normetanephrine and plasma-free metanephrine concentrations compared to the 3 other groups. There were no overlapping results of urinary normetanephrine concentrations between PC and all other groups, and only one PC dog with a plasma normetanephrine concentration in the range of the dogs with HC and NAD disease. Performances of total and free plasma variables were similar. Overlap of epinephrine and norepinephrine results between the groups was large with both urine and plasma. Conclusion and clinical importance Measurement of normetanephrine is the preferred biochemical test for PC and urine was superior to plasma.

Pharmacokinetics of Single-Dose Rectal Zonisamide Administration in Normal Dogs


Background Few medications are available for parental administration to animals with seizures. Rectal administration of medications is often used if the animal cannot be administered oral medications. Hypothesis/Objectives To determine the pharmacokinetic differences in zonisamide when administered rectally in either of 2 vehicles and PO to dogs. Animals Eight healthy research dogs. Methods Randomized cross-over design. Zonisamide, 10 mg/kg, was administered rectally in polyethylene glycol (PEG-R), rectally in water (H2O-R), and as an oral capsule. Plasma zonisamide concentrations were measured until 72 hours after administration. Zonisamide was quantitated by HPLC and plasma concentration versus time curve data was analyzed by using noncompartmental modeling. Results Mean maximum plasma zonisamide concentrations (µg/mL) were significantly higher after oral administration (11.56 ± 4.04) compared to H2O-R (5.00 ± 1.83) (P = .004). Disappearance half-life (hours) and mean time to maximum concentration (hours) were not significantly different between methods of administration. Mean relative bioavailability of PEG-R (85 ± 69%) was significantly higher than that of H2O-R (53 ± 37%) (P = .039). Dogs tolerated all dosing forms with no evidence of adverse effects. Conclusions and Clinical Importance The vehicle in which zonisamide is dissolved influences rectal bioavailability, with PEG preferred to H2O-R. Because of the prolonged time to maximum
concentration, rectal administration of zonisamide should not be used to treat status epilepticus in dogs. A dose higher than what was used in this study might be necessary, if currently recommended minimum therapeutic concentrations (10 µg/mL) are to be achieved with a single-dose administration.

**Histiocytic Sarcoma with Central Nervous System Involvement in Dogs: 19 Cases (2006–2012)**


Background Reports of histiocytic sarcoma (HS) involving the central nervous system (CNS) are sparse and consist mainly of case reports describing 1–3 animals. Objective The objective of this study was to report the signalments, clinical signs, clinicopathologic and diagnostic imaging findings, treatment, and outcome of a series of dogs with HS and CNS involvement. Animals Nineteen dogs with HS were examined at veterinary referral hospitals. Methods Retrospective case series. Medical records were reviewed and cases with a histopathological diagnosis of CNS HS were included in the study. Diagnostic imaging studies of the CNS were evaluated and histopathologic samples were reviewed to confirm the diagnosis. Results Retrievers and Pembroke Welsh Corgis were overrepresented in this cohort of dogs. Tumors involved the brain in 14 dogs and the spinal cord in 5. In 4 dogs, HS was part of a disseminated, multiorgan process whereas it appeared confined to the CNS in 15 dogs. Diagnostic imaging had variable appearances although extraaxial masses predominated in the brain. There was meningeal enhancement in all dogs that was often profound and remote from the primary mass lesion. Pleocytosis was present in all dogs with CSF evaluation. Median survival was 3 days. Conclusions and Clinical Importance Breed predispositions appear to vary from reports of HS in other organ systems. Some unique imaging and clinicopathologic characteristics, particularly brain herniation, profound meningeal enhancement, and pleocytosis in combination with 1 or more mass lesions, might help to differentiate this neoplasm from others involving the CNS, although this requires further study.

**Effect of Chronic Administration of Phenobarbital, or Bromide, on Pharmacokinetics of Levetiracetam in Dogs with Epilepsy**

K.R. Muñana, J.A. Nettifee-Osborne and M.G. Papich

Background Levetiracetam (LEV) is a common add-on antiepileptic drug (AED) in dogs with refractory seizures. Concurrent phenobarbital administration alters the disposition of LEV in healthy dogs. Hypothesis/Objectives To evaluate the pharmacokinetics of LEV in dogs with epilepsy when administered concurrently with conventional AEDs. Animals Eighteen client-owned dogs on maintenance treatment with LEV and phenobarbital (PB group, n = 6), LEV and bromide (BR group, n = 6) or LEV, phenobarbital and bromide (PB–BR group, n = 6). Methods Prospective pharmacokinetic study. Blood samples were collected at 0, 1, 2, 4, and 6 hours after LEV administration. Plasma LEV concentrations were determined by high-pressure liquid chromatography. To account for dose differences among dogs, LEV concentrations were normalized to the mean study dose (26.4 mg/kg). Pharmacokinetic analysis was performed on adjusted concentrations, using a noncompartmental method, and area-under-the-curve (AUC) calculated to the last measured time point. Results Compared to the PB and PB–BR groups, the BR group had significantly higher peak concentration (Cmax) (73.4 ± 24.0 versus 37.5 ± 13.7 and 26.5 ± 8.96 µg/mL, respectively, P < .001) and AUC (329 ± 114 versus 140 ± 64.7 and 98.7 ± 42.2 h*µg/mL, respectively, P < .001), and significantly lower clearance (CL/F) (71.8 ± 22.1 versus 187 ± 81.9 and 269 ± 127 mL/h/kg, respectively, P < .001). Conclusions and Clinical Importance Concurrent administration of PB alone or in combination with bromide increases LEV clearance in epileptic dogs compared to concurrent administration of bromide alone. Dosage increases might be indicated when utilizing LEV as add-on treatment with phenobarbital in dogs.

**An Open-label Phase 1 Dose-escalation Clinical Trial of a Single Intravenous Administration of Gemcitabine in Dogs with Advanced Solid Tumors**


Background A broad range of gemcitabine dosages have been used in dogs. Hypothesis/Objectives To determine maximally tolerated dose (MTD), dose-limiting toxicity (DLT), and preliminary antitumor activity of intravenous administration of gemcitabine in dogs with advanced solid tumors. Animals Twenty-two client-owned dogs. Methods Dogs with advanced cancer were prospectively enrolled in an open-label Phase 1 study of gemcitabine. Gemcitabine was administered as a 30-minute intravenous bolus starting at 800 mg/m², using escalation of 50 mg/m² increments with 3 dogs per dose level. MTD was established based on the number of dogs experiencing DLT assessed after 1 cycle. Treatment continued until disease progression or unacceptable toxicosis. Additional dogs were enrolled at MTD to better characterize tolerability, and to assess the extent and duration of gemcitabine excretion. Results Twenty-two dogs were treated at 4 dose levels, ranging from 800 to 950 mg/m². Neutropenia was identified as DLT. MTD was 900 mg/m². DLT consisting of grade 4 febrile neutropenia was observed at 950 mg/m² in 2 dogs. There were no nonhematologic DLTs. Twenty dogs received
multiple doses, and none had evidence of severe toxicosis from any of their subsequent treatments. At 900 mg/m2, 2 complete and 5 partial responses were observed in dogs with measurable tumors. The amount of gemcitabine excreted in urine decreased over time, and was undetectable after the first 24 hours. Conclusions and Clinical Importance The recommended dose of gemcitabine for future Phase 2 studies is weekly 900 mg/m2. In chemotherapy-naïve dogs with advanced solid tumor this dose level merits further evaluation.

Treatment of a Urethral Duplication in a Dog Using Cyanoacrylate and Coil
Embolization C.A. Palm, C.B. Glaiberman and W.T.N. Culp