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Due to the generosity of Dave Collins, Anna Dengate, Karina Graham, Chris Greenwell, Amy Lam and the ISFM, the CVE is able to offer this resource.
Variation of Proteinuria in Dogs with Leishmaniasis Treated with Meglumine Antimoniate and Allopurinol: A Retrospective Study
Marco Pierantozzi, Xavier Roura, Saverio Paltrinieri, Marco Poggi, Andrea Zatelli,
A retrospective study was performed using 53 client owned dogs with leishmaniasis to determine whether the degree of proteinuria, evaluated by the urine protein/creatinine ratio (UP/C), changes following treatment with meglumine antimoniate and allopurinol. Medical records of dogs with leishmaniasis in clinical stage C (according to the Canine Leishmaniasis Working Group staging system) and either proteinuric or borderline proteinuric (according to the International Renal Interest Society [IRIS] staging system) were reviewed. All dogs were treated with meglumine antimoniate and allopurinol for 4–8 wk. After treatment, UP/C, total protein, and total globulin significantly decreased and albumin and the albumin/globulin ratio (A/G) increased. After treatment, 7 of the 53 dogs (13.4%) became nonproteinuric following either a proteinuric or borderline proteinuric stage. Moreover, 12 of the 53 proteinuric dogs (22.6%) changed their stage to borderline proteinuric. The antileishmaniasis treatment with meglumine antimoniate in combination with allopurinol in dogs significantly reduced the degree of proteinuria in a short period of time. The results of the current study may be useful to the veterinary practitioner in the clinical management of canine leishmaniasis (CanL) in dogs with proteinuric chronic kidney disease.

Postoperative Complications Associated with Caudectomy in Brachycephalic Dogs with Ingrown Tails
Shanna M. Knight, MaryAnn G. Radlinsky, Karen K. Cornell, Chad W. Schmiedt,
Surgical correction of an ingrown tail is indicated to relieve clinical signs of interroginous dermatitis. The objective of this retrospective study was to identify the type and frequency of complications following caudectomy in dogs with ingrown tails. Medical records of dogs with ingrown tails treated with caudectomy from 2000 to 2010 at the University of Georgia Veterinary Teaching Hospital were reviewed. Data collected included signalment, preoperative infection status, surgical procedures performed, prophylactic antibiotic use, complications noted both during hospitalization and at suture removal, treatments instituted, and owner satisfaction. Seventeen dogs were identified for inclusion. At presentation, 4 of the 17 dogs (23.5%) were receiving antibiotics. Infection was present in 7 of the 17 dogs (41%), and 6 of the 7 cases resolved immediately postoperatively. All dogs received perioperative antimicrobial therapy, and 13 of the 17 dogs (76%) received antibiotics after surgery for an average of 13.5 days ± 5.2 days. Complications occurred in 2 of the 17 cases (12%) immediately after surgery, including decreased rectal sensation with adequate anal tone, failure to posture to defecate, and postoperative draining tracts. Complications were reported in 2 of 15 dogs (13%) at suture removal, including delayed wound healing and wound inflammation, persistent tail chasing behavior, and temporary changes in defecation habits. Caudectomy provided resolution of clinical signs with no long-term complications.

Diagnostic Utility of Abdominal Ultrasonography for Routine Staging at Diagnosis of Skeletal OSA in Dogs
Mandy Wallace, Laura Selmic, Stephen J. Withrow,
The rate of soft tissue metastases and the importance of abdominal ultrasonography in initial staging of canine skeletal osteosarcoma (OSA) are not known. The purpose of this study was to determine whether abdominal ultrasonography should be performed routinely at initial diagnosis of skeletal OSA or if certain abnormal physical examination or diagnostic findings would provide greater indication to perform ultrasonography. Eighty dogs with OSA that had an abdominal ultrasonogram performed at diagnosis were included. Abnormal findings were present in 36 of 80 dogs. Twenty-three abnormalities were evaluated with either fine-needle aspirate or biopsy and 19 were benign. None of the ultrasonograms revealed abdominal OSA metastases; however, 4 of the 80 ultrasonograms (5%) revealed another primary neoplasia. Further, 2 of the 9 cases that received an ultrasonogram due to a palpable abdominal mass were diagnosed with another primary neoplasia compared with only 1 of the 49 cases that received an ultrasonogram for routine staging. Abdominal ultrasonography as a part of staging is unlikely to reveal metastases from OSA and may not be a useful routine staging tool; however, in certain populations of dogs, such as those with palpable abdominal masses, abdominal ultrasonography may reveal abnormalities that may influence treatment decisions.

Efficacy of Serosal Patching in Dogs with Septic Peritonitis
Janet Grimes, Chad Schmiedt, Milan Milovancev, MaryAnn Radlinsky, Karen Cornell
The objective of this study was to evaluate the correlation of serosal patching in dogs with existing septic peritonitis with continued postoperative septic peritonitis and death. Records were collected from dogs that
underwent intestinal surgery from 1998 to 2007 at four veterinary teaching hospitals and one private referral clinic. Dogs were included if they were diagnosed with septic peritonitis and had subsequent surgery of either the small intestine or cecum. Eighty-two surgeries were evaluated. Eighteen dogs (22%) received a serosal patch during surgery. Of those, three dogs (16.7%) had septic peritonitis postoperatively. Sixty-four dogs (78%) did not receive a serosal patch, and 19 of those dogs (29.7%) had postoperative septic peritonitis (P < 0.027). Of the 18 cases with serosal patching, 6 (33.3%) died prior to discharge. Of the 63 cases that did not receive a patch and had information regarding survival, 14 (22.2%) died prior to discharge (P > 0.34). Use of a serosal patch did not protect dogs from either postoperative septic peritonitis or failure to survive.

Parotid Duct Foreign Body in a Dog Diagnosed with CT
Silas J. Goldsworthy, Carolyn Burton, Sergio Guilherme
A 12mo old castrated male German shorthaired pointer was referred with a 3 mo history of a recurrent left-sided facial swelling. Contrast-enhanced computed tomography (CT) combined with a positive contrast sialogram revealed the presence of a thickwalled dilated region of the left parotid duct and a normal appearance of the parotid gland. The affected parotid duct, complete with grass seed foreign body, was surgically removed under general anesthesia, and the parotid duct was ligated leaving the parotid gland in situ. Twelve mo later, the dog was doing well with no reported complications.

MRI Findings in a Rottweiler with Leukoencephalomyelopathy
Joseph S. Eagleson, Marc Kent, Simon R. Platt, Raquel R. Rech, Elizabeth W. Howerth
A 22mo old male rottweiler presented with a 1 mo progressive history of general proprioceptive ataxia and upper motor neuron tetraparesis. Neurologic examination was consistent with a lesion affecting the first through fifth cervical spinal cord segments. MRI disclosed bilaterally symmetric hyperintensities on T2-weighted (T2W) images in the crus cerebri and pyramidal tracts of the brain and the dorsal portion of the lateral funiculi of the cervical spinal cord. Fifty days after initial presentation, the dog was euthanized due to disease progression. Pathologic examination of the central nervous system (CNS) revealed a bilaterally symmetric chronic leukoencephalomyelopathy (LEM) consistent with previous reports of LEM in rottweilers. To the authors’ knowledge, this is the first report to describe the MRI characteristics of LEM in the rottweiler. The topography of the changes observed with MRI paralleled the pathologic changes, which were widespread loss of myelin, decreased axon numbers, and astroglial proliferation. Consequently, MRI of the CNS of affected rottweilers may aid in establishing a presumptive antemortem diagnosis of LEM.

Iatrogenic Tumor Seeding After Ureteral Stenting in a Dog with Urothelial Carcinoma
Kenji Hosoya, Satoshi Takagi, Masahiro Okumura
A 5 yr old castrated male miniature dachshund presented with clinical signs attributable to carcinoma involving the bladder neck and prostate. On day 84 following diagnosis, the dog developed bilateral ureteral obstruction and ureteral stenting was attempted. The stents were inserted in a normograde fashion via percutaneous puncture of the dilated renal pelvices. Two wk later, the dog developed nodules at both sites of renocentesis. En block resection of the masses was performed, and histologic examination confirmed that the masses were urothelial carcinoma, likely caused by iatrogenic tumor seeding. Ureteral stenting is a useful technique to relieve malignant ureteral obstruction; however, risk of iatrogenic tumor seeding must be considered.

Successful Treatment of Intracardiac and Intraocular Blastomycosis in a Dog with Combination Azole Therapy
Daniel K. Langlois, Augusta Pelosi, John M. Kruger
A 4 yr old spayed female Labrador retriever with clinical signs of blindness, cutaneous lesions, coughing, inappetence, and lethargy was diagnosed with disseminated blastomycosis based on cytologic (skin and lymph node aspirates) and histopathologic (skin biopsy) examinations of tissue samples. The dog deteriorated clinically during hospitalization and developed sustained ventricular tachycardia. Echocardiography revealed pericardial effusion, a nodule associated with the left ventricular papillary muscle, and a right atrial mural lesion. Therapy for myocardial performance and glaucoma was initiated. A combination of itraconazole and fluconazole successfully treated the dog. The dog regained vision in the left eye (oculus sinister [OS]) and had no residual cardiac disease detectable by either electrocardiography or echocardiography. This report is unique in documenting survival from intracardiac blastomycosis and in the use of combination azole therapy for treating disseminated disease with intraocular involvement.

Multiple Congenital PSS in a Dog: Case Report and Literature Review
Jessica J. Leeman, Stanley E. Kim, David J. Reese, Marije Risselada, Gary W. Ellison
A 4 yr old spayed female mixed-breed dog presented with a 2 yr history of recurring increases in liver enzymes. Two congenital portosystemic shunts (PSSs) were identified using computed tomography (CT) angiography,
which included a portoazygous and portorenal extrahepatic shunt. Double right renal veins were also identified. The shunts were successfully identified and attenuated with cellophane banding. Multiple congenital PSS is a rare phenomenon, but should be considered during exploratory laparotomy for PSS and in dogs with poor response to surgical attenuation of a single PSS. CT proved to be a crucial part of accurate diagnosis and surgical planning for this dog with multiple congenital PSS.

**MRI Findings in a Dog with Kernicterus**

Katie M. Belz, Andrew J. Specht, Victoria S. Johnson, Julia A. Conway

A severe increase in total bilirubin coincided with a decline in neurologic status to comatose in a 9 yr old spayed female mixedbreed dog being treated for immune-mediated hemolytic anemia. MRI of the brain was performed to investigate potential causes for the neurologic signs. MRI revealed bilaterally symmetrical hyperintensities within the caudate nuclei, globus pallidus, thalamus, deep cerebellar nuclei, and cortical gray matter on T2-weighted and fluid-attenuated inversion recovery (FLAIR) sequences, which coincided with areas of bilirubin deposition and neuronal necrosis (kernicterus) identified on necropsy examination. This is the second case report of an adult dog exhibiting kernicterus, and the first report to document MRI findings associated with that condition. Kernicterus is an uncommonly reported complication of hyperbilirubinemia in dogs, but is potentially underreported due to difficulties in recognizing subtle lesions and distinguishing kernicterus from other potential causes of neurologic abnormalities with readily available antemortem tests. MRI may be helpful in supporting the diagnosis of kernicterus.

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

**Haemoplasmas: Lessons learnt from cats**

Barker and S Tasker

The haemotropic mycoplasmas (haemoplasmas) are a group of bacteria that can induce anaemia in a wide variety of mammals, including domestic cats and wild felids. Different feline haemoplasma species of varying pathogenicity exist, with the more pathogenic Mycoplasma haemofelis (Mhf) capable of inducing severe haemolytic anaemia, whilst ‘Candidatus Mycoplasma haemominutum’ (CMhm) and ‘Candidatus Mycoplasma turicensis’ (CMt) are infrequently associated with clinical disease. Chronic haemoplasma infections are common and cats are frequently infected by two or more haemoplasmas, complicating the clinical picture. The natural route of transmission of haemoplasma infection between cats has not yet been determined; however, experimental transmission has been demonstrated via both oral and parenteral administration of infected blood. To date the haemoplasmas have been unable to be cultured in vitro, and accurate diagnosis is currently reliant on detection of bacterial DNA using PCR assays. Treatment of clinical haemoplasmosis is focussed on supportive care in combination with empirical treatment with antimicrobials (tetracyclines or fluoroquinolones). A significant number of asymptomatic cats are positive for haemoplasma infection. These cats may play a role in the maintenance of haemoplasma infection within a population, and need to be considered when choosing potential blood donors. Use of PCR assays has provided an accurate method of diagnosing haemoplasma infection and quantifying response to therapy, including in non-feline host animals, as presumed zoonotic haemoplasma infections are now being documented. Recent advances in genome sequencing techniques have allowed the whole genome sequences of the feline haemoplasmas Mhf and CMhm to be derived, as well as a number of non-feline haemoplasma species. These data have aided the identification of antigens for use in the development of serological tests, allowed the proteomic study of haemoplasmas and provided clues as to how the haemoplasmas can persist within the host. Future areas of study include investigation of their zoonotic potential, mechanisms of immune system evasion and transmission of these emerging pathogens.

**Canine herpesvirus-1 ocular diseases of mature dogs**

EC Ledbetterx

Canine herpesvirus-1 (CHV-1) is an alphaherpesvirus with a host range restricted to canids. Latent CHV-1 infection is endemic in domestic dog populations worldwide. The role of CHV-1 in severe systemic neonatal infections and as an aetiology of infectious infertility and abortion has been appreciated for decades; however, ocular diseases of mature dogs conclusively associated with CHV-1 infection were only recently described. Clinically, CHV-1 infection may produce a diverse range of adnexal and ocular surface lesions in mature dogs, including blepharitis, conjunctivitis, ulcerative keratitis, and nonulcerative keratitis. These conditions can develop during primary or recurrent ocular CHV-1 infection. Recurrent CHV-1 infections associated with reactivation of latent virus may be observed during a variety of situations and in association with numerous different viral reactivation stimuli, including the administration of immunosuppressive pharmaceuticals. The understanding of CHV-1 pathophysiology and ocular infections in mature dogs has expanded rapidly during
the past few years, but much remains to be elucidated. As the number of dogs living with chronic immunomodulatory systemic diseases and receiving immunosuppressive therapeutics continues to grow, the clinical importance of CHV-1 ocular infections is also likely to increase.

Craniocervical junction abnormalities in dogs
CW Dewey*†§, DJ Marino† and CA Loughin†
Craniocervical junction abnormality (CJA) is a term that encompasses a number of developmental anatomical aberrations at the region of the caudal occiput and first two cervical vertebrae. Chiari-like malformation appears to be the most common CJA encountered in dogs, and there has been a tremendous amount of clinical investigation into this disorder in recent years. Other abnormalities in this region include atlanto-occipital overlap, dorsal constriction at C1/C2 and atlantoaxial instability. This review article presents an overview of the current understanding of CJA in dogs, as well as medical and surgical treatment options available.

Nephroliths and ureteroliths: a new stone age
LG Adams
Nephroliths may obstruct the renal pelvis or ureter, predispose to pyelonephritis, or result in compressive injury of the renal parenchyma leading to progressive chronic kidney disease. Indications for removal of nephroliths in dogs include obstruction, recurrent infection, progressive nephrolith enlargement, presence of clinical signs (renal pain), and patients with nephroliths in a solitary functional kidney. The most common indication for removal of upper tract uroliths in cats is ureteral obstruction caused by ureteroliths. Nonobstructive nephroliths in cats are not usually treated unless they move into the ureter resulting in ureteral obstruction. The treatment approach to nephroliths and ureteroliths is different for dogs versus cats. Surgical removal of nephroliths or ureteroliths by nephrotomy and ureterotomy respectively is associated with potential for complications in more than 30% of cats treated by ureterotomy; therefore, minimally invasive options should also be considered. Extracorporeal shock wave lithotripsy (ESWL) treatment of nephroliths results in small “passable” stone fragments in most dogs, whereas ESWL does not work effectively in cats. Ureteral stents are effective for relief of ureteral obstruction by ureteroliths in both dogs and cats. Ureteral stents may be left in place long-term to relieve ureteral obstruction by ureteroliths. Post-operative morbidity and mortality are substantially lower for ureteral stent placement compared to open surgical ureterotomy in cats.

Biomarkers in canine parvovirus enteritis
JP Schoeman, A Goddard and AL Leisewitz
Canine parvovirus (CPV) enteritis has, since its emergence in 1978, remained a common and important cause of morbidity and mortality in young dogs. The continued incidence of parvoviral enteritis is partly due to the virus’ capability to evolve into more virulent and resistant variants with significant local gastrointestinal and systemic inflammatory sequelae. This paper reviews current knowledge on historical-, signalment-, and clinical factors as well as several haematological-, biochemical- and endocrine parameters that can be used as diagnostic and prognostic biomarkers in CPV enteritis. These factors include season of presentation, purebred nature, bodyweight, vomiting, leukopaenia, lymphopaenia, thrombocytopaenia, hypercoagulability, hypercortisolaemia, hypothyroxinaemia, hypoalbuminaemia, elevated C-reactive protein and tumour necrosis factor, hypocholesterolaemia and hypocitrullinaemia. Factors contributing to the manifestations of CPV infection are multiple with elements of host, pathogen, secondary infections, underlying stressors and environment affecting severity and outcome. The availability of several prognosticators has made identification of patients at high risk of death and their subsequent targeted management more rewarding.

Veterinary attitudes towards pre-pubertal gonadectomy of cats: a comparison of samples from New Zealand, Australia and the United Kingdom
MJ Farnworth, NJ Adams, K Seksel, NK Waran, NJ Beausoleil and KJ Stafford
AIM: To compare the attitudes and practices of a sample of veterinarians in New Zealand, Australia and the United Kingdom (UK) towards pre-pubertal gonadectomy of cats.
METHODS: Respondents’ demographics were gathered using an electronic questionnaire distributed via professional veterinary associations in the target countries, as were minimum age at gonadectomy and typical age of puberty. Desirability of prepubertal gonadectomy was gauged using three response categories (‘yes’, ‘no’ or ‘sometimes’), respondents were then able to justify the response given. Two-way Analyses of Variance (ANOVA) followed by post hoc Tukey HSD tests were used to test whether there were differences in minimum ages for gonadectomy within and between countries and between providers and non-providers of services to pounds (or animal welfare centres). Views on the desirability of prepubertal gonadectomy relative to demographics were explored using a Likelihood Ratio Test.
RESULTS: The survey received 717 responses. Most respondents believed pre-pubertal gonadectomy was either entirely or ‘sometimes’ desirable (556/621), few thought it was undesirable (65/621). Minimum age at
gonadectomy was significantly affected by country surveyed and provision or non-provision of services for pounds. Post hoc Tukey HSD analysis indicated the mean age of both spaying and castration (4.3 months) in the UK was significantly different from both Australia (spaying: 3.4 months, castration: 3.2 months) and New Zealand (spaying: 3.4 months, castration: 3.2 months) (all p<0.001). Mean ages at spaying and castration were also significantly different (p<0.008; p<0.019, respectively) for non-providers (spaying: 3.9 months, castration: 3.8 months) of services to pounds when compared to providers (spaying and castration: both 3.6 months). Likelihood Ratio Tests indicated significant effects amongst countries and between genders relative to the desirability of prepubertal gonadectomy. Respondents from the UK were more likely to answer 'no' (p<0.004) or 'sometimes' (p<0.050) as compared to those from New Zealand or Australia. Females were more likely to respond with 'sometimes' as opposed to 'yes' than males. Reasons for considering pre-pubertal gonadectomy desirable or sometimes desirable focussed on reducing unwanted pregnancies and improving population control, as well as improving rates of adoption, owner compliance and cat behaviour and health.

CONCLUSIONS AND CLINICAL RELEVANCE: In general, pre-pubertal gonadectomy is considered a desirable procedure by those practitioners that responded to the survey. However age at which any such procedure occurs differs depending upon a number of factors. Differences among countries may relate to the specific veterinary association’s guidelines or possibly differences in social discourse which affect perception of cats. There is substantial overlap between the reported minimum age of gonadectomy and the age at which cats can enter early puberty, allowing a window for unintentional pregnancy when pre-pubertal gonadectomy does not occur.

Papillomaviral DNA sequences are not amplifiable from canine subungual squamous cell carcinomas
JS Munday, S Waropastrakul, I Gibson, AF French
AIM: To determine if papillomaviral DNA is more frequently present within canine subungual squamous cell carcinomas (SCCs) than in non-SCC digit lesions.
METHODS: Total DNA was extracted from 23 canine subungual SCCs and 23 non-SCC digit lesions. The presence of amplifiable DNA within each sample was confirmed by amplifying a section of the glyceraldehyde-3-phosphate dehydrogenase (GADPH) gene. Two different consensus PCR primer sets were used to amplify papillomaviral DNA from the samples.
RESULTS: The consensus primers only amplified papillomaviral DNA from the positive control samples. None of the 46 canine digit samples contained DNA that was amplifiable by the consensus PCR primers.
CONCLUSION: Papillomaviruses are unlikely to be a significant cause of canine subungual SCCs.
CLINICAL RELEVANCE: While circumstantial evidence suggests that canine subungual SCCs could develop due to papillomaviral infection, this study did not reveal any evidence to support papillomaviral aetiology of these neoplasms.

Choanal atresia in a cat
S Azarpeykan, A Stickney, KE Hill, AC Hartman, BR Jones and E Acke
CASE HISTORY: A 5-month-old domestic shorthair kitten with a history of chronic left unilateral nasal discharge was examined.
CLINICAL FINDINGS: Endoscopy and computed tomography (CT) demonstrated a complete membranous obstruction of the left nasal choana, confirming congenital unilateral choanal atresia. In addition, congenital hydrocephalus was detected on CT. Nasopharyngoscopy was performed for confirmation and treatment of choanal atresia.
DIAGNOSIS: Unilateral membranous choanal atresia associated with congenital hydrocephalus.
CLINICAL RELEVANCE: This report describes a rare congenital condition and for the first time, CT imaging provided an accurate diagnosis and allowed planning for the successful treatment of unilateral membranous choanal atresia. In addition, concurrent congenital hydrocephalus was diagnosed.

Persistent pseudocowpox virus infection of the skin of a foot in a cat

Monitoring of the Emergent Small Animal Patient
Garret Pachtinger
KEY POINTS
- Careful monitoring of the emergent patient is crucial in assessment and treatment of potentially life-threatening conditions.
- Monitoring equipment does not replace the clinical evaluation of the patient. Hands-on serial patient assessment can recognize patient changes before clinical deterioration.
Major body systems assessed include the respiratory system (eg, airway, breathing), cardiovascular system (eg, circulation), and neurologic system (eg, dysfunction).

Assessment of the cardiovascular system begins with hands-on patient assessment, followed by timely serial assessments, and is supplemented with diagnostics including electrocardiography and monitoring of blood pressure.

Assessment of the respiratory system begins with observation of the patient from afar, followed by hands-on assessment. It can then be supplemented with diagnostics including radiographs, pulse oximetry, and arterial blood gases.

**Fluid Therapy for the Emergent Small Animal Patient Crystalloids, Colloids, and Albumin Products**

Elisa Mazzaferro, Lisa L. Powell

**KEY POINTS**

- Fluid therapy is essential in the treatment of emergent veterinary patients and includes crystalloid solutions, blood component therapy, concentrated albumin solutions, and synthetic colloids.
- Bolus intravenous (IV) fluid therapy can restore perfusion and stabilize critically ill and injured patients for further diagnostics and treatment.
- Synthetic colloids help maintain colloid osmotic pressure (COP) and improve blood pressure but should be used with caution in coagulopathic patients or those with cardiac disease.
- Concentrated albumin solutions may have a role in the treatment of critically ill veterinary patients with severe hypoalbuminemia (eg, septic peritonitis); further prospective, comparative studies are needed to fully elucidate the role of albumin solutions in dogs and cats.
- The pros and cons of the use of human serum albumin (HSA) and canine serum albumin (CSA) will be reviewed.

**Transfusion Medicine in Small Animals**

Beth Davidow

**KEY POINTS**

- Transfusion medicine can be life saving and can be performed in veterinary clinics.
- Blood donors should be appropriately screened to minimize disease transmission.
- Blood typing is strongly recommended before transfusion in both dogs and cats.
- Crossmatching can be performed using gel technology.
- Red blood cell transfusions are the treatment of choice for anemia. Use of plasma is indicated for the treatment of active bleeding caused by coagulopathy. Other uses of plasma are controversial.
- Platelet transfusions can be used in small animal patients with active bleeding secondary to thrombocytopenia or thrombocytopathia.
- The use of human serum albumin is associated with a high risk of reactions.
- Reactions, both non–immune mediated and immune mediated, are a risk of transfusions.

**Emergency Management and Treatment of the Poisoned Small Animal Patient**

Justine A. Lee

**KEY POINTS**

- Clinicians should be aware of the importance of history, triage, decontamination, and emergency management of the poisoned patient.
- Knowledge of the underlying mechanism of action, the pharmacokinetics, and the toxic dose of the toxicant are imperative in determining appropriate decontamination and therapy for the patient.
- Particular attention to the cardiorespiratory system, central nervous system, and gastrointestinal tract are important in the poisoned patient.

**The Use of Ultrasound for Dogs and Cats in the Emergency Room AFAST and TFAST**

Søren R. Boysen, Gregory R. Lisciandro

**KEY POINTS**

- AFAST with the abdominal fluid score (AFS) should be repeated at 4 hours in stable patients and sooner in unstable patients.
- An increase in the AFS over time suggests ongoing intra-abdominal hemorrhage.
- A decreasing AFS may be used to monitor resolution (because most cases resolve within 48 hours after bleeding ceases).
- TFAST has high sensitivity and specificity for the rapid diagnosis of pneumothorax (PTX); and the search for the lung point for assessing the degree of PTX as partial versus massive helping determine its clinical significance.
The detection of pneumothorax (PTX) using TFAST is helpful in blunt and penetrating trauma, and has better sensitivity in patients that are breathing slow and deep.

To aid in diagnosis of pleural and pericardial effusions, the sonographer should adhere to the axiom that “one view is no view” and clinically use at least two views (eg, using pericardial site [PCS] and DH views) while imaging.

Management of Respiratory Emergencies in Small Animals

KEY POINTS
- Respiratory distress is a common presenting complaint for animals brought to the emergency room, and it is important for clinicians to feel comfortable diagnosing and treating these animals.
- Prompt recognition of the localization of the source of respiratory distress, based on history, pattern recognition, and physical examination findings, will help to determine the underlying cause and is key to determining an appropriate therapeutic course.
- Careful handling, minimizing stress, and rapid and focused treatment are crucial in the management of all patients in respiratory distress.

Management of Cardiac Emergencies in Small Animals

Teresa C. DeFrancesco,

KEY POINTS
- Cardiac emergencies include a variety of different diseases, including congestive heart failure, cardiac tamponade, arrhythmogenic disease, and thromboembolic disease.
- Cardiac emergencies are life-threatening conditions that must be diagnosed quickly to avoid delays in therapy.
- A timely and accurate diagnosis leads to early relief of symptoms and improved survival.
- The increased use of thoracic ultrasound and focused echocardiography in the rapid diagnosis of HF and cardiac tamponade as well as the use of pimobendan for the treatment of HF in both dogs and cats are the most important recent advances in the management of cardiac emergencies.

Management of Urinary Tract Emergencies in Small Animals

Anusha Balakrishnan, Kenneth J. Drobatz,

KEY POINTS
- Rapid recognition and aggressive therapeutic intervention is necessary with urogenital emergencies because of the potential to become life threatening if not addressed rapidly.
- Emergencies can be divided anatomically into conditions that affect (1) the upper urinary tract, namely kidneys, renal pelvis, and ureters; and (2) the lower urinary tract, namely urinary bladder and urethra.
- Overall, the prognosis with urogenital emergencies is fair to good with appropriate medical or surgical management.

Endocrine Emergencies in Dogs and Cats

Amie Koenig

KEY POINTS
- Diabetic ketoacidosis, hyperglycemic hyperosmolar syndrome, hypoglycemia, insulinoma, hypoadrenocorticism, pheochromocytoma, thyrotoxicosis, and myxedema coma are all examples of life-threatening complications of endocrine disease.
- Success in treatment of endocrine emergencies is contingent on early recognition and treatment.
- Many endocrine diseases presenting emergently have nonspecific signs and symptoms.
- Endocrine crises are often precipitated by concurrent disease, further making early identification difficult.

Surgical Considerations in the Emergent Small Animal Patient

Jennifer J. Devey,

KEY POINTS
- To ensure a successful outcome when performing emergency surgery, the clinician must have the knowledge to be able to assess the patient to determine that surgical intervention is necessary, and to determine the urgency of the procedure.
- The emergency clinician should be prepared to perform potentially life-saving surgical procedures, including surgical cutdowns for airway and vascular access, procedures for control of severe hemorrhage, and emergency thoracotomy to control hemorrhage or perform open chest cardiac massage.
- Constant evaluation and assessment of patients and attention to detail are essential to ensuring a positive outcome.
- Records of patients that experience morbidity or those that die or are euthanized should be regularly reviewed to assess team performance and to make improvements where necessary.
Updates in the Management of the Small Animal Patient with Neurologic Trauma
Jillian DiFazio, Daniel J. Fletcher

KEY POINTS
- Neurotrauma, including traumatic brain injury (TBI) and acute spinal cord injury (SCI), is a cause of significant morbidity and mortality in veterinary patients.
- Damage to neuronal cells can be divided into primary and secondary injury.
- Pharmacologic and nonpharmacologic therapies are directed at addressing primary injury in SCI as well as minimizing the effects of secondary injury in both TBI and SCI.
- Prognosis for neurotrauma patients depends on the severity of injury, the site of the lesion, and the timing and efficacy of the treatment of primary and secondary injury.

Analgesia, Anesthesia, and Chemical Restraint in the Emergent Small Animal Patient
Jane Quandt

KEY POINTS
- Appropriate stabilization of the critically ill animal before sedation or anesthesia is imperative to minimize anesthetic complications.
- Problems should be anticipated and an appropriate and efficient therapeutic plan should be formulated before anesthetic induction.
- Consider the use of a balanced anesthesia technique to minimize potential deleterious effects of single-use drug therapy. Using a combination of different classes of analgesics may be more effective in the treatment of established pain than the use of a single agent.
- The critically ill animal should have drugs titrated to effect to minimize the amount of drug needed and to lessen potential side effects.

Basics of Mechanical Ventilation for Dogs and Cats
Kate Hopper, Lisa L. Powell

KEY POINTS
- There are 3 main indications for mechanical ventilation:
  - Severe hypoxemia (defined as a PaO2 <60 mmHg at sea level) that fails to respond to supplemental oxygen.
  - Severe hypoventilation (defined as PaCO2 >60 mm Hg).
  - Excessive work of breathing.

Updates in Small Animal Cardiopulmonary Resuscitation
Daniel J. Fletcher, DVMa, Manuel Boller

KEY POINTS
- For dogs and cats that experience cardiopulmonary arrest (CPA), rates of survival to discharge are 6% to 7%, as compared with 20% for people who experience CPA.
- To improve outcomes after CPA, a comprehensive strategy that includes preventive and preparedness measures, basic life support, advanced life support, and postcardiac arrest critical care titrated to the patient’s needs is necessary.
- Optimization of each of these elements may help improve overall survival and offers an opportunity to work toward that goal.
- The Reassessment Campaign on Veterinary Resuscitation initiative recently completed an exhaustive literature review and generated a set of evidence-based, consensus cardiopulmonary resuscitation guidelines in 5 domains: preparedness and prevention, basic life support, advanced life support, monitoring, and postcardiac arrest care.

Australian Veterinary Journal

Effect of body position on electrocardiographic recordings in dogs
JA Stern1, KW Hinchcliff1, PD Constable2,*

Objective: To determine whether body position (standing vs right lateral recumbency) altered the quality of the electrocardiogram (ECG) and value of ECG variables in dogs when the ECG was recorded using American Heart Association guidelines for frequency response.

Design: Crossover study using a convenience sample.
Methods: ECGs were recorded twice in 65 sled dogs in random order with each dog standing or placed in right lateral recumbency. Lead II and three semi-orthogonal leads (I, aVF, and V10) were recorded and muscle tremor artefact was assessed.

Results: Lead II ECGs obtained from dogs in right lateral recumbency had less muscle tremor artefact and consequently a shorter QRS duration than ECGs obtained with the dogs standing. The P, Q, R and S wave amplitudes differed in selected leads and the mean electrical axis was shifted 20° to the right when dogs were in right lateral recumbency.

Conclusions: Right lateral recumbency improves the quality of ECG recording in dogs by decreasing muscle tremor artefact, alters the amplitude of P, R and S waves in specific leads and results in a rightward shift in the mean electrical axis, relative to standing.

Vaginal discharge in a spayed dog with multiple distinct malignancies
NI Christensen1,*PH Brain1, V Langova1, AB Flory2
Background: An 11-year-old female spayed Labrador Retriever was presented with clinical signs of oestrus and vaginal bleeding. Historically, the dog had not cycled and had been spayed at less than 6 months of age.

Results: Extensive investigation culminated in the diagnosis of an ovarian granulosa cell tumour. The patient had a history of localised grade III mast cell tumour 5 years prior and hepatic haemangiosarcoma 8 months prior to diagnosis.

Conclusions: Both conditions were successfully treated with a combination of surgery and chemotherapy and there was no evidence of metastasis or recurrence at the time of evaluation for signs of oestrus.

Aplysia gigantea toxicosis in 72 dogs in Western Australia
RE Peacock*, G Hosgood, KL Swindells, L Smart
Objectives This study aimed to: (1) confirm a temporal association between exposure to the sea hare Aplysia gigantea and the development of a neurotoxicosis in dogs and (2) further characterise the clinical signs, treatment and outcomes in dogs with this suspected toxicosis.

Methods The medical records from four veterinary practices within the Geraldton region of Western Australia were searched for dogs that had been exposed to A. gigantea and subsequently presented to a veterinarian during the period of January 2001 to March 2011. Signalment, exposure history, clinical signs, treatment and outcome were recorded.

Results In total, 72 dogs met the inclusion criteria. Clinical signs included ptalism, emesis, ataxia, hyperaesthesia, tremors, muscle fasciculations, seizures, nystagmus and respiratory distress; 30 dogs did not have abnormal clinical signs at presentation; 69 dogs were presented during January to April. Treatment included gastrointestinal and dermal decontamination, and supportive management of seizures, tremors and muscle fasciculations. Of the 72 dogs, 65 survived to discharge, 4 died and 3 were euthanased. Information from subsequent examinations was available for 57 dogs and no long-term complications were reported.

Conclusions Exposure to A. gigantea was temporally associated with the development of neuroexcitatory clinical signs in dogs. Gastrointestinal and respiratory signs also occurred in some dogs. Dogs with suspected toxicosis were presented mostly in the months of January to April. The proportion of dogs that died or were euthanased because of worsening clinical signs was approximately 10%.

Primary cardiac spindle cell tumor in a dog
Midori G. Asakawa, Marisa K. Ames, Yongbaek Kim (page 672)
An adult Labrador retriever dog was presented with respiratory signs and heart murmur. Echocardiography and thoracic radiographs revealed a heart base mass infiltrating the left atrial wall. Microscopically, neoplastic tissues consisted of spindle cells and abundant extracellular matrix. Based on histochemical stain and immunohistochemistry, a diagnosis of primary cardiac sarcoma was made.
Anuria due to inadvertent prostatectomy during cryptorchidectomy
Kyle Vititoe, LeeAnn Pack (page 675)
This report describes an 8-month-old male Labrador retriever dog that was evaluated for a 2-day history of anuria and vomiting following a suspected inadvertent prostatectomy during a cryptorchidectomy. A positive contrast urethrogram was performed to definitively diagnose the absence of a patent prostatic urethra and necropsy confirmed inadvertent prostatectomy.

Dural tear and myelomalacia caused by an airgun pellet in a cat
Cristian de la Fuente, Sergio Ródenas, Martí Pumarola, Sònia Añor (page 679)
An 8-year-old cat was presented with severe neurological deficits secondary to a traumatic cervical spinal cord injury caused by an airgun pellet. This report describes, for the first time, the myelographic findings of a dural rupture in a cat and also describes a bilateral Horner’s syndrome in a cat.

Renal nephroblastoma in a 3-month-old golden retriever
Vincenzo Montinaro, Sarah E. Boston, Brian Stevens (page 683)
Nephrectomy was performed in a 3-month-old intact female golden retriever dog for a renal nephroblastoma. The dog has remained disease-free for 19 months with nephrectomy alone. The adoption of human Wilms’ tumor grading criteria may be useful in determining clinical stage, adjuvant treatment options, and prognosis in this rare disease.

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Objective—To determine overall survival time and identify prognostic factors associated with survival time in cats with newly diagnosed diabetes mellitus.
Design—Retrospective case series.
Animals—114 cats with newly diagnosed diabetes mellitus.
Procedures—Data for analysis included history, signalment, physical examination findings, hematologic and serum biochemical data, presence of ketoacidosis, and diagnosis of concurrent diseases at initial evaluation. The effects of possible predictors on survival time were determined by calculating hazard ratios (HRs) and 95% confidence intervals (CIs).
Results—Median survival time of diabetic cats was 516 days (range, 1 to 3,468 days); 70%, 64%, and 46% lived longer than 3, 6, and 24 months, respectively. Survival time was significantly shorter for cats with higher creatinine concentrations, with a hazard of dying approximately 5% greater for each increase of 10 μg/dL in serum creatinine concentration (adjusted HR, 1.005; 95% CI, 1.003 to 1.007). Ketoacidosis was not significantly associated with survival time (HR, 1.02; 95% CI, 0.590 to 1.78).
Conclusions and Clinical Relevance—Cats with newly diagnosed diabetes mellitus had a fair to good prognosis. High serum creatinine concentration at diagnosis was associated with a poor outcome, likely because of the adverse effects of renal dysfunction. Ketoacidosis apparently was not associated with decreased survival time, suggesting that this complication should not necessarily be regarded as unfavorable.

Ulnar osteosarcoma in dogs: 30 cases (1992–2008)
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Objective—To examine the biological behavior of ulnar osteosarcoma and evaluate predictors of survival time in dogs.

Design—Retrospective case series.

Animals—30 dogs with primary ulnar osteosarcoma.

Procedures—Medical records were reviewed. Variables recorded and examined to identify predictors of survival time were signalment, tumor location in the ulna, tumor length, serum alkaline phosphatase activity, surgery type, completeness of excision, tumor stage, tumor grade, histologic subtype, development of metastases, and use of chemotherapy.

Results—30 cases were identified from 9 institutions. Eleven dogs were treated with partial ulnar ostectomy and 14 with amputation; in 5 dogs, a resection was not performed. Twenty-two dogs received chemotherapy. Median disease-free interval and survival time were 437 and 463 days, respectively. Negative prognostic factors for survival time determined via univariate analyses were histologic subtype and development of lung metastases. Telangiectatic or telangiectatic-mixed subtype (n = 5) was the only negative prognostic factor identified via multivariate analysis (median survival time, 208 days). Dogs with telangiectatic subtype were 6.99 times as likely to die of the disease.

Conclusions and Clinical Relevance—The prognosis for ulnar osteosarcoma in this population was no worse and may have been better than the prognosis for dogs with osteosarcoma involving other appendicular sites. Partial ulnar ostectomy was associated with a low complication rate and good to excellent function and did not compromise survival time. Telangiectatic or telangiectatic-mixed histologic subtype was a negative prognostic factor for survival time. The efficacy of chemotherapy requires further evaluation.

Migration of extraluminal tracheal ring prostheses after tracheoplasty for treatment of tracheal collapse in a dog

John E. Moser, DVM Jeffrey J. Geels, DVM, MS, DACVS

Case Description—An 8-year-old castrated male Yorkshire Terrier was evaluated because of a 1-month history of inspiratory dyspnea that began 2.5 years after placement of extraluminal tracheal ring prostheses for tracheal collapse.

Clinical Findings—Physical examination revealed severe inspiratory dyspnea. Cervicothoracic radiography revealed a soft tissue opacity within the lumen of the cervical portion of the trachea at approximately the level of the fifth cervical vertebra. Tracheobronchoscopy revealed 2 prosthetic rings protruding into the tracheal lumen. Treatment and Outcome—The dog was anesthetized, and the 2 protruding tracheal ring prostheses were removed via separate tracheotomies. Tracheoscopy was performed after surgery, and a third prosthetic ring that was found freely floating within the tracheal lumen was removed with an endoscopic grasping forceps. The dog recovered without complications. Dyspnea resolved within the first 2 weeks after surgery. Follow-up examination performed 6 months after surgery revealed that the dog was breathing normally, with no dyspnea or coughing reported by the owner.

Clinical Relevance—Migration of extraluminal tracheal ring prostheses should be included in the differential diagnoses for any dog with dyspnea or persistent coughing after surgical correction of cervical tracheal collapse. Surgical removal of the protruding prosthetic rings, without provision of additional tracheal support, was a viable treatment option in this case.

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Thoracic radiographic findings for dogs with cardiac tamponade attributable to pericardial effusion

Etienne Côté, DVM, DACVIM; Leslie A. Schwarz, DVM, DACVR; Fortune Sithole, BVSc, PhD, DACVPM

Objective—To determine the prevalence of various radiographic findings for dogs with cardiac tamponade (CT) attributable to pericardial effusion (PE) and to determine the sensitivity and specificity of such findings for identification of affected dogs.

Design—Retrospective, randomized, blinded, controlled study.

Animals—50 dogs with CT attributable to PE and 23 control dogs (10 healthy dogs and 13 dogs with cardiac diseases other than CT).
Procedures—Thoracic radiographic images of dogs were evaluated by an observer who was unaware of the dogs’ medical histories. For each dog, a vertebral heart score, globoid appearance of the cardiac silhouette, and convexity of the dorsocaudal aspect of the cardiac silhouette were determined.

Results—The sensitivity and specificity of enlargement of the cardiac silhouette (vertebral heart score, ≥ 10.7) for identification of dogs with CT attributable to PE were 77.6% and 47.8%, respectively. The sensitivity and specificity of a globoid appearance of the cardiac silhouette for identification dogs with CT were 41.9% and 40.0%, respectively. The sensitivity and specificity of a convex appearance of the dorsocaudal aspect of the cardiac silhouette for identification of dogs with CT were 57.1% and 35.0%, respectively.

Conclusions and Clinical Relevance—Results of this study indicated none of the evaluated radiographic variables was highly (> 90%) sensitive or specific for identification of dogs with CT attributable to PE. Thoracic radiographic findings should not be considered reliable for identification of dogs with CT attributable to PE.

Effect of age at gonadectomy on the probability of dogs becoming overweight

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Objective—To determine whether gonadectomy or age at gonadectomy was associated with the risk that dogs would subsequently become overweight.

Design—Retrospective cohort study.

Animals—1,930 dogs gonadectomized between 1998 and 2001 at ≤ 6 months of age (n = 782), > 6 months to ≤ 1 year of age (287) and 1,669 sexually intact dogs.

Procedures—Dogs were followed-up through medical records for ≥ 10 years or until a diagnosis of overweight (defined as overweight, obese, or having a body condition score ≥ 4/5) was recorded. Information extracted included age at study entry, sex, breed, breed-size category, hospital visit frequency, and diagnosis (yes or no) of overweight or diseases that might affect body condition. Relative risk of a diagnosis of overweight was assessed among age groups of gonadectomized dogs and between gonadectomized and sexually intact dogs.

Results—No difference was detected among dogs grouped according to age at gonadectomy with respect to the risk of being overweight. This risk was significantly greater in gonadectomized dogs than in sexually intact dogs, but only during the first 2 years after gonadectomy. Sexually intact male dogs were approximately 40% less likely to have this diagnosis (hazard ratio, 0.61; 95% confidence interval, 0.52 to 0.72) than were sexually intact female dogs; no difference in risk between the sexes was evident for gonadectomized dogs.

Conclusions and Clinical Relevance—Gonadectomized dogs had a greater risk of being overweight than did sexually intact dogs, but this risk was not influenced by age at gonadectomy. Opportunities exist for veterinarians to provide counseling during the first years after gonadectomy to help dogs maintain a healthy weight.


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Objective—To determine the sensitivity, positive predictive value, and interobserver variability of CT in the detection of bullae associated with spontaneous pneumothorax in dogs.

Design—Retrospective case series.

Animals—19 dogs with spontaneous pneumothorax caused by rupture of bullae.

Procedures—Dogs that had CT for spontaneous pneumothorax caused by rupture of bullae confirmed at surgery (median sternotomy) or necropsy were included. Patient signalment, CT protocols, and bulla location, size, and number were obtained from the medical records. Computed tomographic images were reviewed by 3 board-certified radiologists who reported on the location, size, and number of bullae as well as the subjective severity of pneumothorax.

Results—Sensitivities of the 3 readers for bulla detection were 42.3%, 57.7%, and 57.7%, with positive predictive values of 52.4%, 14.2%, and 8.4%, respectively, with the latter 2 readers having a high rate of false-positive diagnoses. There was good interobserver agreement (κ = 0.640) for correct identification of bullae.
Increasing size of the bulla was significantly associated with a correct CT diagnosis in 1 reader but not in the other 2 readers. Correct diagnosis was not associated with slice thickness, ventilation protocol, or degree of pneumothorax.

Conclusions and Clinical Relevance—Sensitivity and positive predictive value of CT for bulla detection were low. Results suggested that CT is potentially an ineffective preoperative diagnostic technique in dogs with spontaneous pneumothorax caused by bulla rupture because lesions can be missed or incorrectly diagnosed. Bulla size may affect visibility on CT.

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GM2 Gangliosidosis (B Variant) in Two Japanese Chins: Clinical, Magnetic Resonance Imaging and Pathological Characteristics
Case Report

A Single Sample Method for Estimating Glomerular Filtration Rate in Cats
N.C. Finch, R. Heiene, J. Elliott, H.M. Syme, and A.M. Peters
Background: Validated methods of estimating glomerular filtration rate (GFR) in cats requiring only a limited number of samples are desirable.
Hypothesis/Objectives: To test a single sample method of determining GFR in cats.
Animals: The validation population (group 1) consisted of 89 client-owned cats (73 nonazotemic and 16 azotemic). A separate population of 18 healthy nonazotemic cats (group 2) was used to test the methods.
Methods: Glomerular filtration rate was determined in group 1 using corrected slope-intercept iohexol clearance. Single sample clearance was determined using the Jacobsson and modified Jacobsson methods and validated against slope-intercept clearance. Extracellular fluid volume (ECFV) was determined from slope-intercept clearance with correction for the 1 compartment assumption and by deriving a prediction formula for ECFV (ECFVPredicted) based on the body weight. The optimal single sample method was tested in group 2.
Results: A blood sample at 180 minutes and ECFVPredicted were optimal for single sample clearance. Mean SD GFR in group 1 determined using the Jacobsson and modified Jacobsson formulae was 1.78 0.70 and 1.65 0.60 mL/min/kg, respectively. When tested in group 2, the Jacobsson method overestimated multisample clearance. The modified Jacobsson method (mean SD 2.22 0.34 mL/min/kg) was in agreement with multisample clearance (mean SD 2.19 0.34 mL/min/kg).
Conclusions and Clinical Importance: The modified Jacobsson method provides accurate estimation of iohexol clearance in cats, from a single sample collected at 180 minutes postinjection and using a formula based on the body weight to predict ECFV. Further validation of the formula in patients with very high or very low GFR is required.

Effects of Diagnostic Test Accuracy and Treatment Efficacy on the Occurrence of Suspected Failure of Heartworm Prophylaxis in Dogs
B.W. Rohrbach and S. Patton
Background: Food and Drug Administration Center for Veterinary Medicine (FDA/CVM) cited concern regarding failure of heartworm prophylaxis. The positive and negative predictive value of the heartworm antigen test is an estimate of the probability of adult heartworm infection.
Hypothesis/Objectives: Assess the sensitivity, specificity, and predictive value of heartworm antigen tests. Explore the role of heartworm test accuracy and treatment with immiticide to generate reports of suspected failure of heartworm prophylaxis.
Methods: Literature searches for published information on the accuracy of heartworm antigen tests and efficacy of immiticide for treatment of the adult heartworm.
Results: Weighted averages for heartworm antigen test sensitivity and specificity were 78.2 and 97.3%, respectively. Efficacy of immiticide by 2-injection or alternate dose protocols were 88.3 and 89.1%, respectively. Depending on prevalence, the positive predictive value of the heartworm antigen test ranged from 15 to 54% and negative predictive value from 99 to 99.9%. For a hospital testing 1,000 dogs per year, false-positive test results may vary from 24 to 27 dogs. If these dogs were on heartworm preventive, they may undergo treatment and be classified as prophylaxis failures. Ten percent of dogs who were treated and continued or placed on prophylaxis at the time of treatment may have adult heartworms when tested 1 year later and be presumed to represent failure of prophylaxis.
Conclusions: When interpreting heartworm antigen test results, clinical signs, history, and regional prevalence of heartworm disease should be considered in estimating the predictive value of the test result. Limitations of test and treatment should be discussed with clients as part of the decision-making process.

Clinical Findings and Survival in Cats Naturally Infected with Feline Immunodeficiency Virus

B.P. Liem, N.K. Dhand, A.E Pepper, V.R. Barrs, and J.A. Beatty

Background: The clinical course and outcome of natural feline immunodeficiency virus (FIV) infection are variable and incompletely understood. Assigning clinical relevance to FIV infection in individual cats represents a considerable clinical challenge.

Objective: To compare signalment, hematologic and biochemical data, major clinical problem, and survival among client-owned, FIV-infected, and uninfected domestic cats.

Animals: Client-owned, domestic cats tested for FIV (n = 520).

Methods: Retrospective, case control study. Logistic regression analyses were conducted to identify risk factors for FIV infection and to compare hematologic and biochemical data between cases and controls, after adjusting for potential confounders. Survival times were compared using Kaplan–Meier curves.

Results: The prevalence of FIV infection was 14.6%. Mixed breed, male sex, and older age were risk factors for FIV infection. Hematologic abnormalities, biochemical abnormalities or both were common in both FIV-infected and uninfected cats. Lymphoid malignancies were slightly more common in FIV-infected than uninfected cats. Survival of FIV-infected cats was not significantly different from that of uninfected cats.

Conclusions and Clinical Importance: Multiple hematologic and biochemical abnormalities are common in old, sick cats regardless of their FIV status. Their presence should not be assumed to indicate clinical progression of FIV infection. A negative effect of FIV on survival was not apparent in this study.

A Comparison of Hepatic Sonographic Features and Histopathologic Diagnosis in Canine Liver Disease: 138 Cases


Background: Ultrasound examination is commonly used in the diagnostic evaluation of liver disease in dogs.

Hypothesis/Objectives: To determine if hepatic sonographic features were predictive of findings on liver histopathology.

We hypothesized that there would be a relationship between sonographic features and the category of liver disease based on histologic assessment.

Animals: One hundred and thirty-eight dogs in which the liver was evaluated by both abdominal ultrasound examination and histopathologic examination. Twenty-five dogs were included in each of the following categories based on histopathology: normal, degenerative, vascular, inflammatory, and neoplasia. Thirteen dogs had nodular regeneration.

Methods: Retrospective study. Medical records of dogs from 2005 to 2010 were searched for cases in which the liver was evaluated by abdominal ultrasound examination as well as by histopathology. After independent evaluation of ultrasound images, the recorded sonographic features were analyzed to identify abnormalities associated with each histopathologic diagnosis or degree of fibrosis.

Results: Sixty-four percent of sonographically unremarkable livers had histologic abnormalities. Both microhepatia and the identification of abnormal vasculature were significantly associated with a histopathologic diagnosis of vascular disease. Hepatic masses were significantly associated with a diagnosis of neoplasia. Dilated common bile duct and thickened gall bladder wall were significantly associated with hepatitis. There were no sonographic findings consistently present with hepatic fibrosis.

Conclusion and Clinical Importance: Although some ultrasonographic findings, including masses, microhepatia, anomalous veins, and biliary changes, are associated with specific histopathologic abnormalities, sonographic findings are inconsistently detected in many disorders. Overall, hepatic ultrasonographic abnormalities have substantial limitations in predicting the underlying disease.

Chronic Kidney Disease in Dogs in UK Veterinary Practices: Prevalence, Risk Factors, and Survival


Background: The prevalence for chronic kidney disease (CKD) in dogs varies widely (0.05–3.74%). Identified risk factors include advancing age, specific breeds, small body size, and periodontal disease.

Hypothesis/Objectives: To estimate the prevalence and identify risk factors associated with CKD diagnosis and survival in dogs. Purebred dogs were hypothesized to have higher CKD risk and poorer survival characteristics than crossbred dogs.

Animals: A merged clinical database of 107,214 dogs attending 89 UK veterinary practices over a 2-year period (January 2010–December 2011).

Methods: A longitudinal study design estimated the apparent prevalence (AP) whereas the true prevalence (TP) was estimated using Bayesian analysis. A nested case-control study design evaluated risk factors. Survival
analysis used the Kaplan-Meier survival curve method and multivariable Cox proportional hazards regression modeling.

Results: The CKD AP was 0.21% (95% CI: 0.19–0.24%) and TP was 0.37% (95% posterior credibility interval 0.02–1.44%). Significant risk factors included increasing age, being insured, and certain breeds (Cocker Spaniel, Cavalier King Charles Spaniel). Cardiac disease was a significant comorbid disorder. Significant clinical signs included halitosis, weight loss, polyuria/polydipsia, urinary incontinence, vomiting, decreased appetite, lethargy, and diarrhea. The median survival time from diagnosis was 226 days (95% CI 112–326 days). International Renal Interest Society stage and blood urea nitrogen concentration at diagnosis were significantly associated with hazard of death due to CKD.

Conclusions and Clinical Importance: Chronic kidney disease compromises dog welfare. Increased awareness of CKD risk factors and association of blood biochemistry results with survival time should facilitate diagnosis and optimize case management to improve animal survival and welfare.

An Observational Study with Long-Term Follow-Up of Canine Cognitive Dysfunction: Clinical Characteristics, Survival, and Risk Factors
R. Fast, T. Schütz, N. Toft, A. Møller, and M. Berendt

Background: Canine cognitive dysfunction (CCD) is a neurodegenerative condition affecting geriatric dogs and sharing several characteristics with human Alzheimer’s disease (AD). CCD manifests as alterations of behavioral patterns and daily routines. Clinical signs are associated with neurodegenerative changes (eg, cortical atrophy and amyloid-beta deposits).

Objectives: To investigate clinical characteristics, survival, and risk factors with CCD. Vitamin E was investigated as a potential marker of CCD.

Methods: Ninety-four dogs >8 years of age were investigated with a validated CCD questionnaire and allocated to CCD, borderline CCD (b-CCD) and non-CCD groups. The dogs were included in 2008–2009 and followed up in an observational study until follow-up in 2012.

Results: Four key clinical signs dominated in dogs with CCD: sleeping during the day and restless at night, decreased interaction, disorientation at home, and anxiety. A number of borderline CCD cases developed into CCD over time indicating that a prodromal stage of CCD may exist. CCD did not influence survival negatively. Small breeds did not show better survival than large breeds (P = .055) and there was no difference between sexes (P = .99).

Conclusions and Clinical Importance: A few key questions addressing sleep-wake cycle, interaction, and signs of confusion and anxiety can be used as a clinical marker of CCD. Special attention should be paid to anxiety in dogs with CCD because it may be especially stressful to both dog and owner. Dogs with CCD seem to have a good chance of living a full lifespan if supported by the veterinarian and the owner.

A Retrospective Study of Acute Kidney Injury in Cats and Development of a Novel Clinical Scoring System for Predicting Outcome for Cats Managed by Hemodialysis
G. Segev, R. Nivy, P.H. Kass, and L.D. Cowgill

Background: Information regarding acute kidney injury (AKI) in cats is limited, and there are no reliable tools to objectively assess disease severity and predict outcome.

Objectives: To assess clinical signs, clinicopathologic abnormalities, etiology, and outcome of cats with AKI, and to develop models using clinical metrics and empirically derived scores to predict outcome.

Animals: One hundred and thirty-two client-owned cats.

Methods: Retrospective study. Bivariate logistic regression analyses were performed to identify variables predictive of 30-day survival. Continuous variables outside the reference range were divided into quartiles to yield quartile-specific odds ratios (OR) for survival. Models were developed incorporating weighting factors assigned to each quartile based on the OR. A predictive score for each model was calculated for each cat by summing all weighting factors. A second, multivariable logistic regression model was created from actual values of the same variables. Receiver operating characteristic curve analyses were performed to determine the models’ performance. Models were further tested using a subset of cases not used in initial assessment.

Results: Fifty five of 132 cats (42%) remained dialysis-independent for at least 30 days after discharge, and the remaining 77 cats either died (n = 37, 28%) or were euthanized (n = 40, 30%). The most common etiology was ureteral obstruction (n = 46, 35%). Higher scores were associated with decreased probability of survival (P < .001). Models correctly classified outcomes in 75–77% of the cases and 84–89% of the cases in the subsequent evaluation.

Conclusions and Clinical Importance: Models can provide objective guidance in assessing AKI prognosis and severity, but should be validated in other cohorts of cats.

Clinical Evaluation and Endoscopic Classification of Bronchomalacia in Dogs
E. Bottero, C. Bellino, D. De Lorenzi, P. Ruggiero, A. Tarducci, A. D’Angelo, and P. Gianella
Background: Little information is available about the association between bronchomalacia and historical or clinicopathologic data. Also, studies applying an endoscopic classification scheme that differentiates between static and dynamic bronchial collapse and based on a scoring system are lacking.

Objectives: To describe the clinical presentation of bronchomalacia in dogs, to classify endoscopic findings, and to evaluate associations among historical, clinicopathologic data, and endoscopic findings.

Animals: Fifty-nine client-owned dogs with an endoscopic diagnosis of bronchomalacia.

Methods: In this retrospective study, medical records were analyzed and video documentation was reviewed to assign a score to endoscopic findings. Univariate analysis was performed on categorical variables organized in contingency tables, and a stepwise logistic regression model was used for multivariate analysis.

Results: Of the 59 dogs included in the study, 2 were affected by static bronchial collapse (SBC), 35 by dynamic bronchial collapse (DBC), and 22 by both SBC and DBC. The association between SBC and DBC was more frequently seen in the dogs with higher body weight, pulmonary hypertension, a bronchial type of radiographic pattern, and nodularity at endoscopic examination. Thirty-one dogs were presented with tracheomalacia and bronchomalacia; an association emerged between these concurrent disorders in dogs living indoors. Multivariate analysis of the endoscopic scores showed a correlation between DBC severity and cough duration.

Conclusion and Clinical Importance: Results of this study provide evidence for 2 different types of bronchial collapse. Endoscopic scoring scheme has proved to be promising in the bronchomalacia classification, although further evaluation of its applicability in larger canine populations is needed.

Incidence, Nature, and Etiology of Metabolic Alkalosis in Dogs and Cats

Y.-S. Ha, K. Hopper, and S.E. Epstein

Background: The incidence and causes of metabolic alkalosis in dogs and cats have not been fully investigated.

Objectives: To describe the incidence, nature, and etiology of metabolic alkalosis in dogs and cats undergoing blood gas analysis at a veterinary teaching hospital.

Animals: Dogs and cats at a veterinary medical teaching hospital.

Methods: Acid–base and electrolyte results for dogs and cats measured during a 13-month period were retrospectively collected from a computer database. Only the first measured (venous or arterial) blood gas analyzed in a single hospitalization period was included. Animals with a base excess above the reference range for the species were included.

Results: A total of 1,805 dogs and cats were included. Of these, 349 (19%) were identified as having an increased standardized base excess, 319 dogs and 30 cats. The mixed acid–base disorder of metabolic alkalosis with respiratory acidosis was the most common abnormality identified in both dogs and cats. Hypokalemia and hypochloremia were more common in animals with metabolic alkalosis compared to animals without metabolic alkalosis. The 4 most commonly identified underlying diseases were respiratory disease, gastrointestinal tract obstruction, furosemide administration, and renal disease.

Conclusions and Clinical Importance: Metabolic alkalosis was less common than metabolic acidosis in the same population of animals. Evidence of contraction alkalosis was present in many patients in this study. Hypokalemia and hypochloremia were more frequent in patients with metabolic alkalosis and suggest the importance of evaluation of acid–base status in conjunction with serum electrolyte concentrations.

Phylogenetic Diversity of Bacteria Isolated from Sick Dogs Using the BAPGM Enrichment Culture Platform

A.C. Davenport, P.E. Mascarelli, R.G. Maggi, and E.B. Breitschwerdt

Background: Bartonella alpha-Proteobacteria growth medium (BAPGM) enrichment culture has proven useful for documenting Bartonella species infection and has facilitated growth of other fastidious bacteria from human samples. Purpose: To report non-Bartonella bacterial isolates obtained from canine samples cultured using BAPGM enrichment culture. Animals: Between 2004 and 2008, 695 specimens from 513 dogs were tested by the NCSU-IPRL using the BAPGM enrichment culture. Over the same period of time, blood samples from 270 dogs were cultured by the NCSU-CML using Bactec-Plus Aerobic/F media. Methods: BAPGM isolates were characterized using Bartonella genus primers and 16S rDNA primers followed by DNA sequencing. NCSU medical records were retrospectively reviewed. Blood culture results from the NCSU-CML were compared with BAPGM blood culture results. Results: Seventy-nine non-Bartonella isolates were obtained from 69/513 dogs. The most commonly isolated phylum was Proteobacteria (48.1%) with alpha-Proteobacteria being the most commonly isolated class. Staphylococcus and Sphingomonas were the most commonly isolated genera. The majority of the remaining isolates were bacteria that are rarely isolated from canine samples. Comparison of NCSU-CML and IPRL (BAPGM) blood culture isolates showed alpha-Proteobacteria were isolated more often from BAPGM. Conclusions and Clinical Importance: Use of insect cell culture enrichment medium, such as BAPGM, appears to enhance the growth of alpha-Proteobacteria, but also results in isolation of non-alpha-Proteobacteria from sick dogs. Future studies are needed to elucidate the utility of BAPGM and other
A Comprehensive Pathological Survey of Duodenal Biopsies from Dogs with Diet-Responsive Chronic Enteropathy


Background: The detailed pathological phenotype of diet-responsive chronic enteropathy (CE) and its modulation with dietary therapy remain poorly characterized.

Hypothesis/Objectives: Key mucosal lesions of diet-responsive CE resolve with dietary therapy.

Methods: This was a prospective observational study of 20 dogs with diet-responsive CE. Endoscopic duodenal biopsies collected before and 6 weeks after the start of a dietary trial were assessed by means of qualitative and quantitative histopathological, immunohistochemical, and ultrastructural criteria. Control duodenal biopsies were obtained from 10 healthy Beagle dogs on 1 occasion.

Results: Compared with control dogs, the CE dogs had higher villus stunting scores and higher overall WSAVA scores, a lower villus height-to-width ratio, and higher lamina propria density of eosinophils. The CE dogs also had ultrastructural lesions of the mitochondria and brush border. In common with other studies in which the disease and control populations are not matched for breed, age, sex, and environment, these comparisons should be interpreted with caution. Comparing biopsies collected at presentation and 6 weeks after starting the dietary trial, mean lamina propria mononuclear cell score and lamina propria densities of eosinophils and mononuclear cells decreased. Dietary therapy also improved ultrastructural lesions of the mitochondria and brush border, eliciting a decrease in intermicrovillar space and an increase in microvillus height.

Conclusions and Clinical Importance: In dogs with diet-responsive CE, the remission of clinical signs with dietary therapy is associated with subtle decreases in lamina propria density of eosinophils and mononuclear cells, and resolution of ultrastructural lesions of the enterocyte.

Left Ventricular Twist and Circumferential Strain in Dogs with Myxomatous Mitral Valve Disease


Background: During the cardiac cycle, the ventricle undergoes a twisting motion because of the oblique orientation of the left ventricular (LV) myofibers. This can be quantified by speckle-tracking echocardiography (STE). In mitral regurgitation (MR) in humans, the short axis deformation has been suggested as being pivotal to LV function. Decreased and delayed LV twist has been described in experimental MR, but has not been studied in myxomatous mitral valve disease (MMVD).

Hypotheses: (1) Magnitude (CSt) and rate (CSRs) of systolic circumferential deformation decrease before the onset of congestive heart failure (CHF); (2) magnitude and rate of LV twist decrease, and onset of untwist is delayed, with increasing MMVD severity.

Animals: A total of 97 privately owned small- to medium-sized dogs.

Methods: Severity of MMVD was assessed by echocardiography and presence of clinical signs of CHF. Magnitude and rate of LV twist and circumferential deformation were evaluated by STE.

Results: Dogs with CHF receiving treatment had increased CSt, CSRs, early diastolic untwisting rate, and delayed onset of untwist compared to dogs with minimal MMVD and increased systolic twist compared to dogs with mild MMVD (all P < .01). CSt and time to onset of untwist increased with echocardiographic variables of MR severity (all P < .002). CSRs and several LV twist variables decreased with increasing systolic LV internal diameter (all P < .01).

Conclusions and Clinical Importance: No STE-derived variable was decreased before onset of CHF. In dogs with CHF receiving treatment, the delayed onset of relaxation might indicate LV dysfunction and the hyperdynamic CSt and LV twist reflect compensatory mechanisms.

Left Atrial Ejection Fraction Assessed by Real-Time 3-Dimensional Echocardiography in Normal Dogs and Dogs with Myxomatous Mitral Valve Disease

A. Tidholm, K. Hoglund, J. Haggstrom, A. Bodegard-Westling, and I. Ljungvall

Background: Real-time 3-dimensional (RT3D) echocardiography provides a novel technique for assessing left atrial ejection fraction (LAEF) in dogs.

Hypothesis: Left atrial ejection fraction is associated with severity of myxomatous mitral valve disease (MMVD).

Animals: Privately owned dogs; 101 with MMVD and 52 healthy control dogs.
Methods: Prospective observational study using RT3D echocardiographic estimations of LA volumes at atrial end-diastole and atrial end-systole to calculate LAEF in comparison with conventional 2-dimensional echocardiographic variables.

Results: Left atrial ejection fraction decreased with increasing LA to aortic ratio (LA/Ao), percentage increase in left ventricular (LV) internal dimension, corrected for body weight (BW), in diastole (LVIDd inc%) and systole (LVIDs inc%), and age for MMVD dogs, and with BW for control dogs. The final models in the multiple regression analyses included LVIDd inc% and age for MMVD dogs, and BW alone for control dogs. LAEF varied widely in both MMVD dogs and control dogs.

Conclusion and clinical importance: The wide variation of LAEF and the fact that LAEF does not appear to be an independent marker of disease severity suggest that the clinical importance of determining LAEF in dogs with MMVD might be limited.

Bradyarrhythmias and Pacemaker Therapy in Dogs with Chagas Disease

Background: Chagas disease (Trypanosomiasis) is a cause of myocarditis in the southern United States causing cardiac conduction abnormalities, arrhythmias, and heart failure.

Objectives: To report clinical findings and outcome in Chagas positive (CP) dogs requiring pacemaker implantation for bradyarrhythmias.

Animals: One hundred and forty-four client-owned dogs requiring pacemaker implantation.

Methods: Retrospective case series. Information regarding history, physical exam, laboratory and diagnostic imaging findings, treatment, and survival were obtained from medical records, with additional follow-up information obtained by contacting referring veterinarians and owners.

Results: Of the 144 dogs requiring pacemaker implantation from January 2001 to May 2010, 83 (57.6%) had a Chagas titer performed and 9 (10%) were CP. Concurrent ventricular arrhythmias (odds ratio 1.61, P = .005) or atrioventricular (AV) block (odds ratio 4.18, P < .001) increased the likelihood that a Chagas titer was submitted. Median age for CP dogs was 6.2 years (range, 0.3–10); 7 were male. Bradyarrhythmias included high-grade 2nd or 3rd degree AV block (n = 8) and sinus bradycardia with 1st degree AV block (n = 1); 5 had concurrent ventricular arrhythmias. A positive Chagas titer had a negative impact on survival (hazard ratio 4.04; 95% CI 1.36–12.1, P = .012) with a reported median survival time of 365 days (interquartile range, 84–973 days).

Conclusions and Clinical Importance: Bradyarrhythmias can result in clinical signs requiring pacemaker implantation in CP dogs, and although the diagnosis negatively impacts survival, pacemaker therapy is a viable treatment option.

Prognostic Importance of Myocardial Injury in Critically Ill Dogs with Systemic Inflammation
R. Langhorn, M.A. Oyama, L.G. King, M.C. Machen, D.J. Trafny, V. Thawley, J.L. Willesen, I. Tarnow, and M. Kjelgaard-Hansen

Background: In noncardiac critical disease in humans, myocardial injury as detected by cardiac troponin I and T (cTnI and cTnT) has been linked to high intensive care unit (ICU) death independent of prognostic composite scoring.

Hypothesis: Presence of myocardial injury predicts short-term death in critically ill dogs with systemic inflammation and provides additional prognostic information when combined with established canine prognostic composite scores.

Animals: Forty-two dogs admitted to the ICU with evidence of systemic inflammation and no primary cardiac disease.

Methods: Prospective cohort study. Blood samples were obtained at ICU admission for the measurement of cTnI and cTnT, C-reactive protein, and several cytokines. The acute patient physiologic and laboratory evaluation (APPLE) score and the survival prediction index were calculated within the first 24 hours of admission. Receiver operating characteristic (ROC) curves were used to examine the prognostic capacity of each biomarker and severity score. Multiple logistic regression analysis was performed to evaluate whether cardiac markers significantly contributed to severity scores.

Results: Twenty-eight day case fatality rate was 26% (11/42 dogs). cTnI concentrations were (median [range]) 0.416 [0.004–141.5] ng/mL and cTnT concentrations were 13.5 [<13–3,744] ng/L. cTnI, cTnT, and the APPLE score were all significant prognosticators with areas under the ROC curves [95% CI] of 0.801 [0.649; 0.907], 0.790 [0.637; 0.900], and 0.776 [0.621; 0.889], respectively. cTnI significantly contributed to the APPLE score in providing additional prognostic specificity (P = .025).

Conclusions and Clinical Importance: Markers of myocardial injury predict short-term death in dogs with systemic inflammation and cTnI significantly contributes to the APPLE score.
Prognostic Value of 24-Hour Ambulatory ECG (Holter) Monitoring in Boxer Dogs
P.F. Mõtskula, C. Linney, V. Palermo, D.J. Connolly, A. French, J. Dukes McEwan, and V. Luis Fuentes

Background: Boxer dogs are reported to be predisposed to arrhythmogenic right ventricular cardiomyopathy (ARVC), but the natural history has not been well characterized and inconsistent diagnostic criteria have been applied to identify affected dogs. Echocardiographic examination findings are unremarkable in many affected Boxer dogs, and in these dogs, 24-hour ambulatory ECG (Holter) monitoring often is used for diagnostic and prognostic purposes, despite limited information available relating Holter findings to outcome.

Hypothesis/Objectives: Boxers with complex ventricular arrhythmias at initial presentation will have shorter survival times. The objective was to investigate the prognostic value of Holter monitoring in Boxer dogs.

Animals: One hundred and twenty-two Boxer dogs seen at 3 university referral hospitals.

Methods: Retrospective study. Survival times were obtained for Boxer dogs evaluated by echocardiography and a 24-hour Holter ECG. Kaplan-Meier survival analysis was used to estimate the median survival time and Cox proportional hazards analysis was used to identify variables independently associated with cardiac mortality.

Results: Outcome data were obtained for 122/163 dogs meeting the inclusion criteria. Of the 70 dogs that had died, 45 were considered to have suffered cardiac-related deaths. Median survival was significantly longer in dogs with a left ventricular systolic diameter (LVIDs) < 35 mm compared with those with LVIDs > 35 mm (P < .001). Multivariable analysis in dogs with LVIDs < 35 mm showed that the presence of ventricular tachycardia, age >4.5 years, and male sex were independent predictors of cardiac mortality.

Conclusions and Clinical Importance: Holter monitoring in Boxer dogs provides valuable prognostic information.

Ultrasonographic Findings of the Pancreas in Cats with Elevated Serum Pancreatic Lipase Immunoreactivity

Background: Pancreatitis is a common disease in cats that is difficult to diagnose.

Hypothesis/Objectives: To determine the sensitivity and specificity of ultrasonographic changes of the pancreas with serum feline pancreatic lipase immunoreactivity (fPLI) as the standard for diagnosis of pancreatitis.

Animals: 35 cats with clinical signs consistent with pancreatitis with an abdominal ultrasound examination and serum fPLI concentration measured within 3 days of the ultrasound.

Methods: Retrospective study: Pancreatic thickness, pancreatic margination, pancreatic echogenicity, and peripancreatic fat echogenicity were evaluated. Sensitivity and specificity were calculated with an elevated serum fPLI concentration indicative of pancreatitis as the standard for diagnosis.

Results: Serum fPLI was elevated and diagnostic for pancreatitis in 19 of 35 cats. The single ultrasound characteristic with the highest sensitivity was hyperechoic peripancreatic fat at 68% (95% confidence interval = 44–87%), indicating a moderate probability that cats with pancreatitis will have this abnormality on ultrasonographic examination. Specificity was >90% for each of increased pancreatic thickness, abnormal pancreatic margin, and hyperechoic peripancreatic fat. The sensitivity and specificity of ultrasound were 84% (95% confidence interval = 60–97%) and 75% (95% confidence interval = 48–93%), respectively, in cats with elevated serum fPLI indicative of pancreatitis.

Conclusions and Clinical Importance: The presence of a thick left limb of the pancreas, severely irregular pancreatic margins, and hyperechoic peripancreatic fat in cats with appropriate clinical signs and elevated serum fPLI are highly supportive of pancreatitis.

Evaluation of Baseline Cortisol, Endogenous ACTH, and Cortisol/ACTH Ratio to Monitor Trilostane Treatment in Dogs with Pituitary-Dependent Hypercortisolism
W.A. Burkhardt, F.S. Boretti, C.E. Reusch, and N.S. Sieber-Ruckstuhl

Background: The effectiveness of trilostane treatment is currently monitored by regular ACTH stimulation tests, which are time-consuming and expensive. Therefore, a monitoring system without a stimulation protocol and with less client expense would be preferable.

Hypothesis/Objectives: The aim of our study was to evaluate if baseline cortisol, endogenous ACTH (ACTH) concentration or the baseline cortisol to ACTH ratio (cortisol/ACTH ratio) could replace the ACTH stimulation test.

Animals: Forty trilostane-treated dogs with pituitary-dependent hypercortisolism (PDH) were included in this prospective study.

Methods: A total of 148 ACTH stimulation tests and 77 ACTH concentrations and cortisol/ACTH ratios were analyzed. Control of cortisol release was classified according to cortisol concentration after ACTH administration as excessive (<1.5 lg/dL; group 1), adequate (1.5–5.4 lg/dL; group 2), or inadequate (>5.4 lg/dL; group 3).
Results: Baseline cortisol concentrations had considerable overlap between excessively, adequately, and inadequately controlled dogs. Only baseline cortisol >4.4 lg/dL (in 12% of tests) was a reliable diagnosis of inadequate control. Endogenous ACTH concentrations did not differ between groups. The overlap of the cortisol/ACTH ratio between groups was large. Correct classification was only possible if the cortisol/ACTH ratio was >15, which occurred in 4% of tests.

Conclusions and Clinical Importance: To monitor trilostane treatment the ACTH stimulation test cannot be replaced by baseline cortisol, ACTH concentration, or the cortisol/ACTH ratio.

Clinical and Pathological Analysis of Epidural Inflammation in Intervertebral Disk Extrusion in Dogs
A. Fadda, A. Oevermann, M. Vandevelde, M.G. Doherr, F. Forterre, and D. Henke

Background: Little is known about the pathologic changes in the epidural space after intervertebral disk (IVD) extrusion in the dog.

Objectives: To analyze the pathology of the epidural inflammatory response, and to search for correlations between this process and clinical findings.

Methods: Clinical data from 105 chondrodystrophic (CD) and nonchondrodystrophic (NCD) dogs with IVD extrusion were recorded. Epidural material from these dogs was examined histopathologically and immunohistochemically. Using statistical analysis, we searched for correlations between severity of epidural inflammation and various clinical and pathologic variables.

Results: Most dogs exhibited an epidural inflammatory response, ranging from acute invasion of neutrophils to formation of chronic granulation tissue. The mononuclear inflammatory infiltrates consisted mostly of monocytes and macrophages and only few T and B cells. Surprisingly, chronic inflammatory patterns also were found in animals with an acute clinical history. Severity of the epidural inflammation correlated with degree of the epidural hemorrhage and nucleus pulposus calcification (P = .003 and .040), but not with age, chondrodystrophic phenotype, neurologic grade, back pain, pretreatment, or duration. The degree of inflammation was statistically (P = .021) inversely correlated with the ability to regain ambulation.

Conclusion and Clinical Importance: Epidural inflammation occurs in the majority of dogs with IVD extrusion and may develop long before the onset of clinical signs. Presence of calcified IVD material and hemorrhage in the epidural space may be the triggers of this lesion rather than an adaptive immune response to the nucleus pulposus as suggested in previous studies. Because epidural inflammation may affect outcome, further research is warranted.

Effect of Ovariohysterectomy at the Time of Tumor Removal in Dogs with Benign Mammary Tumors and Hyperplastic Lesions: A Randomized Controlled Clinical Trial

Background: Nonmalignant mammary tumors (NMT) are common in intact female dogs. Little is known about the clinical significance of these tumors, and the effect of ovariohysterectomy (OHE) on their development.

Hypothesis: Ovarian hormone ablation through OHE decreases the risk of new tumors and thereby improves long-term prognosis for dogs with NMT.

Animals: Eighty-four sexually intact bitches with NMT.

Methods: Dogs were allocated to undergo OHE (n = 42) or not (n = 42) at the time of NMT removal in a randomized clinical trial. Tumor diagnosis was confirmed histologically in all subjects. Information about new tumor development was collected via follow-up phone calls and recheck examinations. Separate survival analyses were performed with the endpoints new tumor development and death. Cause of death was classified as related or unrelated to mammary tumor. In addition to OHE status, the influence of age, body weight, breed, tumor size, tumor number, tumor duration, type of surgery, and tumor histology was investigated.

Results: New mammary tumor(s) developed in 27 of 42 (64%) intact dogs and 15 of 42 (36%) ovariohysterectomized dogs (hazard ratio 0.47, P = .022). Nine of the 42 dogs (21%) which developed new tumors were euthanized because of mammary tumor. Survival was not significantly different between the 2 treatment groups. In the intact group, nine dogs subsequently developed ovarian–uterine diseases.

Conclusion: Ovariohysterectomy performed at the time of mammary tumor excision reduced the risk of new tumors by about 50% among dogs with NMT. Survival was not significantly affected. Adjuvant OHE should be considered in adult dogs with mammary tumors.

Phase I Clinical Trial of Vinorelbine in Tumor-Bearing Cats
J.A. Pierro, C.L. Mallett, and C.F. Saba

Background: Vinorelbine (VRL) has been investigated in dogs, but its use in cats has not been studied.

Hypothesis/Objectives: To determine the maximal tolerated dose (MTD) and dose-limiting toxicity (DLT) of VRL in tumor-bearing cats.

Animals: Cats were included in this prospective phase I trial if they had confirmed malignancy, received 1 VRL
treatment, and had adequate follow-up. Previous treatment was acceptable, but concurrent chemotherapy or radiotherapy was not permitted.

Methods: Using a modified phase I design, cats were enrolled in cohorts of 3 at a starting dosage of 9 mg/m². Cats tolerating the first treatment well were eligible to receive additional VRL treatments at escalating dosages; escalations beyond the perceived MTD were permitted based on individual tolerance. Intended treatment interval was 7 days. Patient histories, physical examinations, and complete blood counts were performed weekly.

Results: Nineteen cats were included. Sixty-one VRL treatments were administered. Median number of treatments was 2 (range, 1–9). Starting dosages were 9–12 mg/m². Maximal dosage administered was 15.5 mg/m². The MTD was 11.5 mg/m². Acute DLTs were neutropenia, vomiting, and nephrotoxicity. Other notable toxicities were weight loss and anemia.

Conclusions and Clinical Importance: Vinorelbine is tolerated in cats at a weekly interval. Recommended starting dosage is 11.5 mg/m². Neutropenia was transient, lasting <7 days; vomiting was self-limiting in most cases. Although VRL-associated nephrotoxicity has not been reported, potential attribution of this toxicity to VRL must not be discounted. Further investigation of the efficacy of VRL in feline malignancies is warranted.

Clinical Characteristics and Outcome in Dogs with Splenic Marginal Zone Lymphoma

Background: Splenic marginal zone lymphoma (MZL) is a form of indolent B-cell lymphoma that is not well characterized in dogs.

Hypothesis/Objectives: The purpose of this study was to describe clinical characteristics and outcome in dogs with splenic MZL confirmed by histopathology, immunophenotyping, and molecular clonality assessment. We hypothesized that affected dogs would have prolonged survival time with splenectomy alone.

Animals: Thirty-four dogs were included. Twenty-nine dogs were diagnosed after splenectomy, and 5 dogs were diagnosed at necropsy.

Methods: Pathology records were searched for dogs with histologically confirmed splenic MZL. Clinical and outcome data were retrospectively collected by medical record review, and prognostic factors were evaluated. Histopathology was reviewed by a board-certified pathologist, and tissue sections were subjected to immunophenotyping and molecular clonality assessment by PCR.

Results: Immunohistochemistry confirmed a B-cell phenotype for all dogs. Molecular clonality assessment was performed in 33 of 34 dogs, of which 24 had clonal rearrangement of immunoglobulin (Ig) loci, 3 had pseudoclonal rearrangement, and 6 had polyclonal rearrangement. The overall median survival time (MST) for the 29 dogs that underwent splenectomy was 383 days. The MST for 14 of 29 asymptomatic dogs that underwent splenectomy for MZL was 1,153 days as compared to 309 days for 15/29 dogs with clinical signs referable to splenic MZL (P = .018). Lymph node involvement, hemoabdomen, anemia, chemotherapy, and concurrent malignancy did not affect survival outcome.

Conclusions and Clinical Importance: Dogs diagnosed with splenic MZL can have prolonged survival with splenectomy alone, without the use of adjuvant chemotherapy. Asymptomatic dogs may have a better survival outcome.

Association between Absolute Tumor Burden and Serum Bone-Specific Alkaline Phosphatase in Canine Appendicular Osteosarcoma

Background: In dogs with appendicular osteosarcoma (OSA), increased pretreatment serum bone-specific alkaline phosphatase (BALP) activity is a negative prognostic factor, associated with shorter disease-free intervals and survival times, but a biologic basis for observed differential serum BALP activities in canine OSA patients remains incompletely defined.

Objective: Serum BALP activity will correlate with absolute tumor burden in dogs with OSA.

Animals: This study included 96 client-owned dogs with appendicular OSA.

Methods: In canine OSA cell lines, the expression and membranous release of BALP was evaluated in vitro. The correlation between serum BALP activity and radiographic primary tumor size was evaluated in OSA-bearing dogs. In dogs developing visceral OSA metastases, serial changes in serum BALP activities were evaluated in relation to progression of macroscopic metastases, and visceral metastatic OSA cells were evaluated for BALP expression.

Results: In vitro, BALP expression was not associated with either tumorigenic or metastatic phenotype, rather the quantity of membranous BALP released was proportional with cell density. In dogs devoid of macroscopic metastases, there was a positive correlation between serum BALP activity and absolute primary tumor size. In
dogs with progressive OSA metastases, serum BALP activity increased and coincided with the development of macroscopic metastases. OSA cells derived from visceral metastatic lesions retained BALP expression. Conclusions and Clinical Importance: Tumor burden is a determinant of serum BALP activity in dogs with appendicular OSA. The association between increased pretreatment BALP activity and negative clinical prognosis may simply be attributed to greater initial tumor burden, and consequently more advanced tumor stage.

**Evaluation of Hemostatic Activity of Canine Frozen Plasma for Transfusion by Thromboelastography**

R. Urban, C. Guillermo Couto, and M. Cristina Iazbik

Background: In humans, fresh frozen plasma (FFP) loses factor V and VIII activities after 1 year. It then becomes frozen plasma (FP), and theoretically is unsuitable for use in patients with coagulopathies. These findings have not been reported for dogs.

Hypothesis: Canine FP is hemostatically active after 5 years of storage.

Animals: Fresh plasma (Group FsP; n = 15) and 5-year-old FP (Group FzP; n = 10) from blood bank donors.

Methods: Group FsP and Group FzP samples were evaluated by thromboelastography (TEG), one-stage prothrombin time (OSPT), activated partial thromboplastin time (APTT), fibrinogen, and antithrombin. Fresh plasma (n = 6) and a subset of Group FzP (n = 8) were evaluated for clotting factor activities (V, VIII, IX, X). A 2nd experiment using shortterm storage of thawed FP under suboptimal conditions (refrigerated [4°C] or refrozen [20°C]) by TEG was performed to simulate general practice storage capabilities.

Results: Group FzP had shorter reaction time (P = .0007) and larger angle (P = .0004) compared with Group FsP by TEG, suggesting hypercoaguability. Factor VIII and X activities were lower in Group FzP (P = .02 and .005, respectively). Fibrinogen, OSPT, and APTT were significantly lower or longer for Group FzP than Group FsP (P < .05), but most values remained within reference intervals for dogs.

Conclusions and Clinical Importance: Five-year-old canine FP stored at 30°C is hemostatically active and should be clinically evaluated in patients with coagulopathies. If active, the monetary savings of using older plasma will be substantial.

**Endothelin-1 Concentrations in Bronchoalveolar Lavage Fluid of Cats with Experimentally Induced Asthma**

C.R. Sharp, T.M. Lee-Fowler, and C.R. Reinero

Background: There is a need for biomarkers for diagnosis, therapeutic monitoring, and prognosis for asthma in cats. Endothelin-1 (ET-1) is implicated in the pathogenesis of inflammatory airway diseases in other species but not the cat.

Objective: To conduct a prospective experimental study to show that experimentally asthmatic cats, but not control cats without airway inflammation, would have increased concentrations of ET in BALF.

Animals: Eleven healthy, adult research cats.

Methods: Prospective experimental study. Six healthy cats without airway inflammation were used as controls. Asthma was induced using Bermuda grass allergen (BGA) in 5 cats. Collection of BALF for total nucleated cell and differential counts was performed. The concentration of ET-1 in cell-free BALF samples was determined. Data were analyzed using a Mann–Whitney U-test with P < .05 considered significant.

Results: The median [range] BALF total cell numbers, eosinophil numbers, and eosinophil percentages were significantly higher in the cats following experimental induction of asthma (1,870 cells/IL [1,450–3,440], 711 cells/IL [356–1,686] and 38% [20–49]) compared to baseline control parameters (462 cells/IL [239–780], 18 cells/IL [18–62] and 3.5% [0–8]) (P < .01). The median [range] BALF ET concentration was also significantly higher after induction of asthma (1.393 fmol/mL [0.977–2.247]) compared to healthy control cats (0.83250 fmol/mL [0.625–1.038]) (P = .012).

Conclusions and Clinical Importance: This study suggests that BAL ET-1 concentration can be used to differentiate normal cats from those with experimentally induced asthma. If the same holds true for cats with naturally developing asthma, BAL ET-1 may prove a useful diagnostic biomarker for asthma.

**Short-Term Effects of Atorvastatin in Normal Dogs and Dogs with Congestive Heart Failure Due to Myxomatous Mitral Valve Disease**

S.M. Cunningham, J.E. Rush, and L.M. Freeman

Background: 3-Hydroxy-3-methylglutaryl coenzyme A reductase inhibitors (statins) may improve heart failure class and survival in people with congestive heart failure (CHF) of various etiologies.

Hypothesis/Objectives: To evaluate the tolerability of atorvastatin in healthy dogs, and the short-term effects of atorvastatin on clinical markers of disease severity, lipid profiles, and markers of systemic inflammation and oxidative stress in dogs with CHF.

Animals: Eleven normal dogs and 12 client-owned animals with CHF attributable to myxomatous mitral valve disease.
Methods: Prospective nonblinded observational study. Normal dogs (n = 11) were first treated with atorvastatin and re-evaluated after 14 and 30 days for clinical tolerability and alterations in certain laboratory results. Subsequently, dogs with CHF (n = 12) were treated with atorvastatin at a dosage of 2 mg/kg q24h for 8 weeks. Echocardiography, blood pressure (BP), quality of life questionnaire, and blood sampling were performed pre and post atorvastatin administration.

Results: Atorvastatin was well tolerated and did not result in apparent adverse effects or biochemical abnormalities in healthy dogs and in dogs with CHF. Healthy dogs experienced a decrease in total cholesterol (TC) concentration (P = .03) after atorvastatin administration. Decreases in TC concentration (P = .02), non-HDL cholesterol concentration (P = .02), total white blood cell count (P = .03), neutrophils (P = .01), and systolic BP (P = .01) were noted in the CHF group after 8 weeks of atorvastatin.

Conclusions and Clinical Importance: Atorvastatin was well tolerated at clinically relevant doses in healthy dogs and dogs with CHF. Further investigation into the effects of statin treatment in dogs with CHF is warranted.

Compendium

Applied Dermatology: Cutaneous Viral Dermatoses in Dogs and Cats
Masahiko Nagata, Wayne S. Rosenkrantz
Cutaneous viral dermatoses are often underdiagnosed in dogs and cats because they are rare, and because it is difficult to identify an exact causative agent. Even so, practitioners in primary care may encounter some characteristic clinical features. This article reviews commonly encountered dermatoses, particularly papillomavirus-associated dermatoses in dogs and cats. It also provides a brief overview of several other dermatoses associated with feline herpesvirus, feline calcivirus, FeLV, and feline poxvirus.

Hidden Dangers in the Kitchen: Common Foods Toxic to Dogs and Cats
Kim Gugler, Christopher M. Piscitelli, Jeffery Dennis
Many foods and food additives that are safe for human consumption can be extremely toxic to pets. Recognizing the clinical signs and clinicopathologic changes associated with these toxins allows prompt initiation of appropriate therapy. As with many other toxins, decontamination and supportive care are the mainstays of therapy for food toxicosis. Educating owners about foods and food additives that are unsafe for dogs and cats can help prevent toxicosis.

Heatstroke: Clinical Signs, Diagnosis, Treatment, and Prognosis
Carey Hemmelgarn, Kristi Gannon
Heatstroke is a complex disease process that, in its most severe form, can result in multiorgan dysfunction and death. Heatstroke stems from the failure of the body’s thermoregulatory mechanisms, resulting in cellular damage and death. The organ systems most commonly affected in this disease process include the gastrointestinal tract and the coagulation, renal, cardiac, pulmonary, and central nervous systems. Heatstroke is diagnosed based on the patient history, physical examination, and clinicopathologic findings. Treatment should be instituted immediately to improve patient outcome and includes active cooling, fluid resuscitation, and supportive care. Patients with altered mental status, hypoglycemia, prolonged prothrombin time, and prolonged activated partial thromboplastin time at admission have increased mortality rates. Additional negative prognostic indicators include elevated serum creatinine level, delayed admission to the hospital, seizures, and obesity.

Heatstroke: Thermoregulation, Pathophysiology, and Predisposing Factors
Carey Hemmelgarn, Kristi Gannon
Heatstroke is a common veterinary emergency that, depending on the severity of injury, can progress to a life-threatening condition. Heatstroke can be classic (nonexertional) or exertional. Classic heatstroke develops when the body is exposed to high external temperatures, whereas exertional heatstroke is caused by strenuous exercise. Thermoregulation is the intrinsic ability of the body to maintain core body temperature within normal limits through an intricate balance of heat conservation and heat dissipation. Severe disease ensues when persistent hyperthermia causes injury to the body for which these mechanisms can no longer adequately compensate. The first stages of heatstroke are characterized by initial thermoregulation, acute phase response, and activation of heat shock proteins. The organ systems most commonly affected during heatstroke are the gastrointestinal tract and the coagulation, renal, cardiac, pulmonary, and central nervous systems.
Cardiovascular Effects of Thyroid Disease
Jodi K. Sangster, David L. Panciera, Jonathan A. Abbott
Thyroid hormones have many effects on cardiovascular function, and deficiency or excess of thyroid hormones can result in cardiac dysfunction. Abnormalities of the cardiovascular system are often identified during examination of hyperthyroid and hypothyroid patients. This article addresses the effects of thyroid hormones on the cardiovascular system and the clinical relevance of the cardiovascular response to thyroid dysfunction. In addition, treatment recommendations are presented.

Journal of Feline Medicine and Surgery

ABCD: Update of the 2009 guidelines on prevention and management of feline infectious diseases
Marian C Horzinek, Diane Addie, Sándor Belák, et al.
In this article, the ABCD guidelines published in the JFMS Special Issue of July 2009 (Volume 11, Issue 7, pages 527–620) are updated by including previously unavailable and novel information. For a better picture, the reader is advised to consult that issue before focusing on the novel features.

Matrix Vaccination Guidelines: ABCD recommendations for indoor/ outdoor cats, rescue shelter cats and breeding catteries
Margaret J Hosie, Diane Addie, Sándor Belák, et al.
This article presents, in a user-friendly, tabulated form, the ABCD’s current vaccination recommendations for four broad categories of cats: outdoor cats (ie, those with access outdoors that come into contact with other cats outdoors); indoor cats (ie, those with no contact with other cats from outdoors); rescue shelter cats; and cats in breeding catteries. Note that it is not always possible to make a clear distinction between these various categories and the definition in any individual case is left up to the veterinary surgeon conducting the vaccination interview.

Prevention of infectious diseases in cat shelters: ABCD guidelines
Karin Möstl, Herman Egberink, Diane Addie et al.
Overview: Recommendations are given in relation to infectious diseases in rescue shelters. The ABCD recognises that there is a wide variation in the design and management of shelters, and that these largely reflect local pressures. These guidelines are written with this diverse audience in mind; they point to the ideal, and also provide for some level of compromise where this ideal cannot immediately be attained. In addition consideration should be given to general requirements in order to optimise overall health and wellbeing of cats within the shelter.

Housing: Compartmentalisation of the shelter into at least three individual sections (quarantine area for incoming cats, isolation facilities for sick or potentially infectious cats, and accommodation for clinically healthy, retrovirus-negative cats) can facilitate containment of a disease outbreak, should it occur.

Standard of care: Incoming cats should receive a full health check by a veterinary surgeon, should be dewormed and tested for retrovirus infections (feline leukaemia virus [FeLV] and/or feline immunodeficiency virus [FIV]) in regions with high prevalence and in shelters that allow contact between cats. Cats which are not rehomed should receive a regular veterinary check-up at intervals recommended by their veterinarian.

Vaccination: Each cat should be vaccinated as soon as possible against feline panleukopenia virus (FPV), feline herpesvirus (FHV-1) and feline calicivirus (FCV) infections.

Hygiene: Adequate hygiene conditions should ensure that contact between shedders of infectious agents and susceptible animals is reduced as efficiently as possible by movement control, hygiene procedures of care workers, barrier nursing, cleaning and disinfection.

Stress reduction: Stress reduction is important for overall health and for minimising the risk of recrudescence and exacerbation of infectious diseases. In general, a special effort should be made to rehome cats as soon as possible.

Aujeszky’s Disease/Pseudorabies in Cats: ABCD guidelines on prevention and management
Etienne Thiry, Diane Addie, Sándor Belák et al.
Although pseudorabies in swine – Aujeszky’s disease – has been eradicated from many pork-producing countries, the virus may still lurk in other vertebrate species and cause feline cases. Infection occurs through the ingestion of uncooked meat and organ material and presents as an acute encephalitis with a short incubation period and a rapidly fatal outcome. The ABCD considers this reason enough to include a review of this, now very rare, condition in this Special Issue.

Cowpox Virus Infection in Cats: ABCD guidelines on prevention and management
Karin Möstl, Diane Addie, Sándor Belák et al.
The misnomer ‘cowpox’ has historical roots: cats rather acquire the virus from small rodents. It has a wide host spectrum (including man) and causes skin lesions, predominantly on the head and paws. Progressive proliferative ulcerations in kittens and immunosuppressed cats may take a fatal course. Cat owners should be informed about the zoonotic risk.

Feline Viral Papillomatosis: ABCD guidelines on prevention and management
Herman Egberink, Etienne Thiry, Karin Möstl et al.
Overview: Papillomaviruses are epitheliotropic and cause cutaneous lesions in man and several animal species, including cats.
Infection: Cats most likely become infected through lesions or abrasions of the skin. Species-specific viruses have been detected but human and bovine related sequences have also been found, suggesting cross-species transmission.
Clinical signs: In cats, papillomaviruses are associated with four different skin lesions: hyperkeratotic plaques, which can progress into Bowenoid in situ carcinomas (BISCs) and further to invasive squamous cell carcinomas (ISCCs); cutaneous fibropapillomas or feline sarcoids; and cutaneous papillomas. However, papillomaviruses have also been found in normal skin.
Diagnosis: Papillomavirus-induced skin lesions can be diagnosed by demonstration of papillomavirus antigen in biopsies of skin lesions, or detection of papillomavirus-like particles by electron microscopy and papillomavirus DNA by polymerase chain reaction (PCR).
Treatment: Spontaneous regression might be expected. In cases of ISCC, complete excision should be considered if possible.

Bartonella Species Infection in Cats: ABCD guidelines on prevention and management
Maria Grazia Pennisi, Fulvio Marsilio, Katrin Hartmann et al.
Overview: Over 22 Bartonella species have been described in mammals, and Bartonella henselae is most common worldwide. Cats are the main reservoir for this bacterium. B henselae is the causative agent of cat scratch disease in man, a self-limiting regional lymphadenopathy, but also of other potentially fatal disorders in immunocompromised people.
Infection: B henselae is naturally transmitted among cats by the flea Ctenocephalides felis felis, or by flea faeces. A cat scratch is the common mode of transmission of the organism to other animals, including humans. Blood transfusion also represents a risk.
Disease signs: Most cats naturally infected by B henselae do not show clinical signs but cardiac (endocarditis, myocardiitis) or ocular (uveitis) signs may be found in sporadic cases. B vinsonii subspecies berkhoffii infection has reportedly caused lameness in a cat affected by recurrent osteomyelitis and polyarthritis.
Diagnosis: Isolation of the bacterium is the gold standard, but because of the high prevalence of infection in healthy cats in endemic areas, a positive culture (or polymerase chain reaction) is not confirmatory. Other compatible diagnoses must be ruled out and response to therapy gives a definitive diagnosis. Serology (IFAT or ELISA) is more useful for exclusion of the infection because of the low positive predictive value (39–46%) compared with the good negative predictive value (87–97%). Laboratory testing is required for blood donors.
Disease management: Treatment is recommended in the rare cases where Bartonella actually causes disease.

Pasteurella Multocida Infection in Cats: ABCD guidelines on prevention and management
Herman Egberink, Diane Addie, Sándor Belák et al.
Overview: Q fever is a zoonotic disease caused by Coxiella burnetii. Farm animals and pets are the main reservoirs of infection.
Infection: Cats become infected by ingestion or inhalation of organisms from contaminated carcasses of farm animals, or tick bites. Infection is common, as shown by several serological studies.
Clinical signs: Experimentally, fever, anorexia and lethargy have been noted. In the field, infection usually remains subclinical. Abortion might occur. \textit{C. burnetii} has been isolated from the placenta of aborting cats, but also from cats experiencing normal parturition.

Diagnosis: Infection with \textit{C. burnetii} can be diagnosed by isolation of the agent or serology.

Prevention: Most important is the potential zoonotic risk. Cats suspected of having been exposed to \textit{C. burnetii} might shed organisms during parturition. Wearing gloves and a mask when attending parturient or aborting cats can minimise the risk of infection. Tick prevention is recommended.

\textbf{Leptospira Species Infection in Cats: ABCD guidelines on prevention and management}

Katrin Hartmann, Herman Egberink, Maria Grazia Pennisi et al.

Overview: Leptospirosis is a bacterial disease affecting a variety of domestic and wild animals as well as humans worldwide. Leptospirosis has been reported in over 150 mammalian species. It is considered an emerging infectious disease in humans and in dogs. Subclinically infected wild and domestic animals serve as reservoir hosts and are a potential source of infection for incidental hosts and humans.

Infection: Reports of leptospirosis in cats are rare, but the importance of cats shedding \textit{Leptospira} species and serving as a source of infection has recently gained attention. \textit{Leptospira} species antibodies are commonly present in the feline population, and \textit{Leptospira} species shedding of cats with outdoor exposure has been demonstrated. Cats mostly become infected through transmission from hunting rodents.

Significance: The role of healthy carrier cats as a source of contamination, as well as the role of leptospires as a pathogen in cats, are likely underestimated.

\textbf{Yersinia Pestis Infection in Cats: ABCD guidelines on prevention and management}

Maria Grazia Pennisi, Herman Egberink, Katrin Hartmann et al.

Overview: Plague, the medieval ‘Black Death’, is caused by a Gram-negative coccobacillus, \textit{Yersinia pestis}, which also infects cats. As in people, it is transmitted from rodents through flea bites; it occurs in Asia, Africa and the Americas in flea-infested regions, all year round, and where rodent reservoirs are abundant. A poor prognosis is associated with high fever, and the pulmonary and septicaemic forms. Antibiotic therapy, flea control and avoidance of rodent contacts have made this infection manageable.

\textbf{Francisella Tularensis Infection in Cats: ABCD guidelines on prevention and management}

Maria Grazia Pennisi, Herman Egberink, Katrin Hartmann et al.

Overview: Disease in cats after infection with the zoonotic bacterium \textit{Francisella tularensis} has been reported only from North America; rodents and lagomorphs are the more susceptible hosts. Tularaemia is transmitted by ticks, but also acquired by direct contact, bite, scratch, ingestion or inhalation. Clinical signs range from mild chronic localised infections to fatal acute disease; antibiotic therapy is efficient. Acquiring the infection from cats is a risk for owners of outdoor cats, veterinarians and technicians.

\textbf{Capnocytophaga Canimorsus Infection in Cats: ABCD guidelines on prevention and management}

Albert Lloret, Herman Egberink, Diane Addie et al.

Overview: \textit{Capnocytophaga canimorsus} and \textit{Capnocytophaga cynodegmi} are part of the normal bacterial flora of the oral cavity of dogs and cats. \textit{C. canimorsus} is more pathogenic and causes more severe infections in humans.

Infection: Disease is less frequently seen after a cat bite, scratch or close contact than after dog contacts. Serious disease has been reported in people, especially associated with immunocompromise and alcoholism. Disease in cats is not well documented; two cases of respiratory infection have been associated with the presence of these bacteria.

Diagnosis: Diagnosis is based on culture in specific media, but these are slow growing bacteria; polymerase chain reaction and sequencing may aid in diagnosis and species identification.

Treatment: Penicillin or beta-lactams are the treatment options of choice.

Zoonotic potential: Based on incidence surveys, the zoonotic potential is low. The risk may be higher for immunocompromised persons, where dog and cat ownership must be discussed.

\textbf{Mycobacterioses in Cats: ABCD guidelines on prevention and management}

Albert Lloret, Katrin Hartmann, Maria Grazia Pennisi et al.

Overview: Mycobacterial infections are important in humans and animals. Cats can be infected by several \textit{Mycobacterium} species, which may cause different syndromes, mainly tuberculosis, atypical or non-tuberculous mycobacteriosis and leprosy. In recent years, awareness has increased about how to recognise and
confirm these infections. More cases are diagnosed today, which probably means that the disease has escaped
detection in the past.

**Infection:** Most cases in cats are cutaneous, presenting as nodules in the skin and draining tracts, ulceration and
local lymphadenopathy; however, systemic dissemination may also occur.

**Diagnosis:** Definitive diagnosis is difficult when the bacterium cannot be detected by histology or culture.
However, species confirmation is essential for treatment and prognosis, so material for culture and polymerase
chain reaction should be submitted in every suspected case.

**Treatment:** Treatment is challenging. A combination of two or three antibiotics is needed, and treatment must
be continued for some months, which makes owner compliance especially difficult in cats.

**Zoonotic risk:** There is a zoonotic risk associated with some mycobacterial species. Concerns should be
communicated in every case of an immunocompromised owner in contact with an infected cat.

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**Dermatophytosis in Cats: ABCD guidelines on prevention and management**
Tadeusz Frymus, Tim Gruffydd-Jones, Maria Grazia Pennisi et al.

**Overview:** Dermatophytosis, usually caused by *Microsporum canis*, is the most common fungal infection in
cats worldwide, and one of the most important infectious skin diseases in this species. Many adult cats are
asymptomatic carriers. Severe clinical signs are seen mostly in kittens or immunosuppressed adults. Poor
hygiene is a predisposing factor, and the disease may be endemic in shelters or catteries. Humans may be easily
infected and develop a similar skin disease.

**Infection:** Infectious arthrospores produced by dermatophytes may survive in the environment for about a year.
They are transmitted through contact with sick cats or healthy carriers, but also on dust particles, brushes,
clothes and other fomites.

**Disease signs:** Circular alopecia, desquamation and sometimes an erythematous margin around central healing
(‘ringworm’) are typical. In many cats this is a self-limiting disease with hair loss and scaling only. In
immunosuppressed animals, the outcome may be a multifocal or generalised skin disease.

**Diagnosis:** Wood’s lamp examination and microscopic detection of arthrospores on hairs are simple methods to
confirm *M canis* infection, but their sensitivity is relatively low. The gold standard for detection is culture on
Sabouraud agar of hairs and scales collected from new lesions.

**Disease management:** In shelters and catteries eradication is difficult. Essential is a combination of systemic
and topical treatments, maintained for several weeks. For systemic therapy itraconazole is the drug of choice,
terbinafine an alternative. Recommended topical treatment is repeated body rinse with an enilconazole solution
or miconazole with or without chlorhexidine. In catteries/shelters medication must be accompanied by intensive
decontamination of the environment.

**Vaccination:** Few efficacy studies on anti-*M canis* vaccines (prophylactic or therapeutic) for cats have been
published, and a safe and efficient vaccine is not available.

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**Aspergillosis in Cats: ABCD guidelines on prevention and management**
Katrin Hartmann, Albert Lloret, Maria Grazia Pennisi et al.

**Overview:** Aspergillosis is a sporadic mycosis that occurs worldwide in mammals and birds and leads to a
usually chronic, and only rarely acute, disease that mainly affects the nasal cavity and sinuses.

**Infection:** *Aspergillus* species infections are commonly associated with predisposing local or systemic factors.
Local disease can spread and involve the central nervous system or the lungs. Some *Aspergillus* species can also
disseminate, causing systemic infections. In contrast to dogs, in which (nasal) aspergillosis is relatively
common, aspergillosis is rare in cats, but considered an emerging infection.

**Clinical signs:** There are two clinical forms of aspergillosis in cats, the sinonasal form (characterised by signs
of chronic nasal infection) and the newly emerging, more invasive sino-orbital form (characterised by signs of
orbital and surrounding tissue invasion). Sino-orbital involvement has been described now in approximately half
of the reported cases.

**Disease management:** Treatment should consist of local and systemic antifungal therapy.

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**Cryptococcosis in cats: ABCD guidelines on prevention and management**
Maria Grazia Pennisi, Katrin Hartmann, Albert Lloret et al.

**Overview:** Cryptococcosis is worldwide the most common systemic fungal disease in cats; it is caused by
the *Cryptococcus neoformans– Cryptococcus gattii* species complex, which includes eight genotypes and some
subtypes (strains) with varying geographical distribution, pathogenicity and antimicrobial susceptibility. Cats
acquire the infection from a contaminated environment. The prognosis is favourable in most cases, provided a
diagnosis is obtained sufficiently early and prolonged treatment is maintained.
Infection: Basidiospores are the infectious propagules of *Cryptococcus* species as they penetrate the respiratory system and induce primary infection. Asymptomatic colonisation of the respiratory tract is more common than clinical disease. Avian guanos, particularly pigeon droppings, offer favourable conditions for the reproduction of *C. neoformans*. Both *Cryptococcus* species are associated with decaying vegetation.

**Disease signs:** Cryptococcosis caused by *C. neoformans* or *C. gattii* is indistinguishable clinically. The disease can present in nasal, central nervous system (which can derive from the nasal form or occur independently), cutaneous and systemic forms.

**Diagnosis:** An easy and reliable test for cryptoccocosis diagnosis is antigen detection in body fluids. Only isolation and polymerase chain reaction allow identification of the species genotype.

**Disease management:** Amphotericin B, ketoconazole, fluconazole and itraconazole have all been used to treat cats. Surgical excision of any nodules in the skin, nasal or oral mucosa assists recovery. Continued treatment is recommended until the antigen test is negative.

**Prevention:** Efficient preventive measures have not been demonstrated. Vaccines are not available.

**Sporotrichosis in cats: ABCD guidelines on prevention and management**

**Overview:** Sporotrichosis is an important subcutaneous fungal infection of humans and animals in some endemic tropical and subtropical areas. Among domestic species, cats are the most frequently infected.

**Infection:** The primary mode of transmission is traumatic inoculation of fungal conidia from plants and soil. Contact with infected cats is the major mode of transmission to humans, especially in endemic areas like Brazil, where a large epidemic has occurred in the past decade.

**Disease signs:** Most cases in cats are cutaneous, presenting as multiple ulcerated nodules and draining tracts in the skin. Lymphadenopathy, respiratory signs and systemic dissemination may also occur.

**Diagnosis:** Diagnosis is based on fungal detection by cytology and/or histology, and confirmation by culture.

**Treatment:** Treatment consists of at least 2 months’ systemic antifungal therapy, with itraconazole as the first-choice agent. The prognosis is favourable provided there is good owner compliance and adverse drug effects do not occur.

**Prevention:** Contact with infected cats carries a high zoonotic risk. Cat owners travelling to endemic areas should be warned and advised to keep their cats indoors to prevent infection. Professionals must wear gloves when handling cats with skin nodules and ulcers and dealing with diagnostic samples.

**Rare systemic mycoses in cats: blastomycosis, histoplasmosis and coccidioidomycosis: ABCD guidelines on prevention and management**

**Overview:** Rare fungal infections, including those hitherto not reported in Europe, may occur sporadically in non-endemic areas, or imported cases may be seen.

**Infections:** Blastomycosis is mainly seen in North America; no cases have been reported in Europe. Histoplasmosis, which is endemic in the eastern US, Central and South America, has been diagnosed in Japan and Europe. Coccidioidomycosis is endemic in the southwestern US, Central and South America; only one imported case has been reported in Europe. The primary mode of transmission is inhalation of conidia or spores from the environment.

**Disease signs:** Most feline cases present with a combination of clinical signs (mainly respiratory, along with skin, eye, central nervous system and bone). Lymphadenopathy and systemic signs may be present.

**Diagnosis:** Diagnosis is based on fungal detection by cytology and/or histology. Commercial laboratories do not routinely perform fungal culture. Diagnosis of coccidioidomycosis, which is more difficult, may be supported by antibody detection.

**Treatment:** Treatment consists of prolonged systemic antifungal therapy, with itraconazole as the first-choice agent for histoplasmosis and blastomycosis. The prognosis is good if owner compliance is adequate and adverse drug effects do not occur.

**Prevention:** Cat owners travelling to endemic areas should be warned about these diseases. There is no zoonotic risk.

**Rare opportunistic mycoses in cats: phaeohyphomycosis and hyalohyphomycosis: ABCD guidelines on prevention and management**

**Overview:** Phaeohyphomycoses and hyalohyphomycoses are rare opportunistic infections acquired from the environment. More cases have been reported in recent years in humans and cats.
Disease signs: Single or multiple nodules or ulcerated plaques (which may be pigmented) in the skin are the typical lesions. In some cases the infection disseminates or involves the central nervous system (CNS).

Diagnosis: Diagnosis is based on fungal detection by cytology and/or histology. Culture provides definitive diagnosis and species identification.

Treatment: Treatment involves surgical excision in cases of localised skin disease followed by systemic antifungal therapy, with itraconazole as the agent of first choice. Relapses after treatment are common. Itraconazole and other systemic antifungal agents have been used to treat systemic or neurological cases, but the response is unpredictable. The prognosis is guarded to poor in cats with multiple lesions and systemic or neurological involvement.

Zoonotic risk: There is no zoonotic risk associated with contact with infected cats.

Toxoplasma Gondii Infection in Cats: ABCD guidelines on prevention and management
Katrin Hartmann, Diane Addie, Sándor Belák et al.

Overview: Toxoplasma gondii infection is common in cats, but the clinical disease is rare. Up to 50% of cats, especially free-roaming ones, have antibodies indicating infection and the presence of cystic stages.

Disease signs: Clinical signs only appear in few cats when they become immunosuppressed – in these situations cystic stages can be reactivated. Commonly affected are the central nervous system (CNS), muscles, lungs and eyes.

Human infection: Cats can pose a risk for humans when they shed oocysts. However, this happens only once in their lifetime, usually only for 3–10 days after ingestion of tissue cysts. Thus, cats that have antibodies to T gondii no longer shed oocysts, and do not pose a risk to humans.

Leishmaniosis in cats: ABCD guidelines on prevention and management
Maria Grazia Pennisi, Katrin Hartmann, Albert Lloret et al.

Overview: Leishmania infection is less known in cats than in dogs and humans; felids were traditionally considered a resistant species, and canids as the main reservoir. Only sporadic cases of feline disease have been reported worldwide, mainly caused by L infantum. Epidemiological investigations have confirmed, however, that feline infections are not rare and that disease occurrence might be underestimated in endemic areas.

Infection: Cats are infected by the same Leishmania species that infect dogs and humans in tropical and subtropical areas worldwide. Sand fly vectors take blood meals from cats and are competent vectors for L infantum, as shown experimentally.

Disease signs: Skin lesions (ulcerative, crusty, nodular or scaly dermatitis) are the most frequent clinical manifestations and sometimes the only findings on physical examination. Lymph node enlargement, weight loss, ocular involvement (nodular blepharitis, uveitis, panophthalmitis), decreased appetite, chronic gingivostomatitis and lethargy are the most frequent non-cutaneous findings, alone or in combination.

Diagnosis: Direct confirmation can be obtained by cytology, histology, isolation or polymerase chain reaction (PCR) on samples of skin, lymph nodes, blood or any affected tissue. Serology using a validated immunofluorescence test, ELISA, direct agglutination or Western blot has been used to assess infection frequencies.

Disease management: Little information is available about treatment with follow-up reports. Long-term administration of allopurinol (10–20 mg/kg q12h or q24h) is usually clinical effective. Vaccines are licensed for dogs only.

Babesiosis in Cats: ABCD guidelines on prevention and management
Katrin Hartmann, Diane Addie, Sándor Belák et al.

Overview: Babesiosis is a tick-borne protozoan disease caused by parasites of the genus Babesia that belong to the Piroplasmida. The disease is named after the Romanian bacteriologist Victor Babeş. Babesiosis is also known as piroplasmosis (from Latin pirum, meaning ‘pear’, and plasma, ‘image, formation’).

Infection: Babesiosis affects domestic and wild animals and humans worldwide. While the disease is recognised in dogs around the world, it is found only rarely in cats.

Human disease: Babesia species are common blood parasites of mammals. Human babesiosis is uncommon, but more cases in people have been reported recently, most likely because of rising awareness.

Tritrichomoniasis in Cats: ABCD guidelines on prevention and management
Tim Gruffydd-Jones, Diane Addie, Sándor Belák et al.

Overview: Tritrichomonas foetus is a protozoan organism that is specific to cats and can cause large bowel diarrhoea. It is distinct from other Tritrichomonas species and not considered to be zoonotic. Infection is most common in young cats from multicat households, particularly pedigree breeding catteries.
**Disease signs:** Affected cats show frequent fetid diarrhoea, often with mucus, fresh blood and straining, but generally remain bright and do not lose weight.

**Diagnosis:** Diagnosis of infection is usually based on direct microscopic examination of freshly voided faeces. Polymerase chain reaction (PCR) testing is more sensitive but may detect infections unrelated to diarrhoea and, therefore, requires care in interpretation.

**Treatment:** The treatment of choice is ronidazole, which should be used with care as it is an unlicensed drug for cats with a narrow safety margin. Clinical signs are generally self-limiting in untreated cases, but may take months to resolve.

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**Giardiasis in cats: ABCD guidelines on prevention and management**

Tim Gruffydd-Jones, Diane Addie, Sándor Belák et al.

**Overview:** *Giardia* is a protozoan parasite that infects the small intestine of cats and can cause diarrhoea. The biotypes that affect cats do not appear to infect humans. Infection is most common in young cats, particularly from multiset backgrounds.

**Disease signs:** Infected cats that develop clinical signs show small intestinal diarrhoea and there may be associated weight loss.

**Diagnosis:** Diagnosis of infection is usually based on an in-practice ELISA for faecal antigen or zinc sulphate flotation of several pooled faecal samples. Polymerase chain reaction (PCR) tests are available but not used so widely. Infection can be detected in clinically healthy cats so interpretation of a positive result in cats with diarrhoea requires care.

**Treatment:** Fenbendazole or metronidazole are regarded as the treatments of choice. Secondary gut changes may be slow to resolve and so diarrhoea may continue for some time after infection has been eliminated.

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**American Journal of Veterinary Research**

**Effect of dexmedetomidine, morphine-lidocaine-ketamine, and dexmedetomidine-morphine-lidocaine-ketamine constant rate infusions on the minimum alveolar concentration of isoflurane and bispectral index in dogs.**

Lisa Sams Ebner, Phillip Lerche, Richard M. Bednarski, John A. E. Hubbell,

Objective—To determine the effect of dexmedetomidine, morphine-lidocaine-ketamine (MLK), and dexmedetomidine-morphine-lidocaine-ketamine (DMLK) constant rate infusions on the minimum alveolar concentration (MAC) of isoflurane and bispectral index (BIS) in dogs. Animals—6 healthy adult dogs.

Procedures—Each dog was anesthetized 4 times with a 7-day washout period between anesthetic episodes. During the first anesthetic episode, the MAC of isoflurane (baseline) was established. During the 3 subsequent anesthetic episodes, the MAC of isoflurane was determined following constant rate infusion of dexmedetomidine (0.5 μg/kg/h), MLK (morphine, 0.2 mg/kg/h; lidocaine, 3 mg/kg/h; and ketamine, 0.6 mg/kg/h), or DMLK (dexmedetomidine, 0.5 μg/kg/h; morphine, 0.2 mg/kg/h; lidocaine, 3 mg/kg/h; and ketamine 0.6 mg/kg/h). Among treatments, MAC of isoflurane was compared by means of a Friedman test with Conover posttest comparisons, and heart rate, direct arterial pressures, cardiac output, body temperature, inspired and expired gas concentrations, arterial blood gas values, and BIS were compared with repeated-measures ANOVA and a Dunn test for multiple comparisons.

Results—Infusion of dexmedetomidine, MLK, and DMLK decreased the MAC of isoflurane from baseline by 30%, 55%, and 90%, respectively. Mean heart rates during dexmedetomidine and DMLK treatments was lower than that during MLK treatment. Compared with baseline values, mean heart rate decreased for all treatments, arterial pressure increased for the DMLK treatment, cardiac output decreased for the dexmedetomidine treatment, and BIS increased for the MLK and DMLK treatments. Time to extubation and sternal recumbency did not differ among treatments.

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

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**Modulation of inflammation and oxidative stress in canine chondrocytes**

David L. Dycus, Angela Y. Au, Mark W. Grzanna, Jennifer L. Wardlaw, Carmelita G. Frondoza.

Objective—To determine whether oxidative stress could be induced in canine chondrocytes in vitro. Sample—Chondrocytes obtained from healthy adult mixed-breed dogs. Procedures—Harvested chondrocytes were maintained at 37°C with 5% CO2 for 24 hours. To assess induction of oxidative stress, 2 stimuli were used:
hydrogen peroxide and a combination of interleukin-1β (IL-1β) and tumor necrosis factor-α (TNF-α). To determine the effect of hydrogen peroxide, a set of chondrocyte-seeded plates was incubated with control medium alone or hydrogen peroxide (100, 200, or 300μM) for 24 hours. For inhibition of oxidative stress, cells were incubated for 24 hours with N-acetylcysteine (NAC; 10mM) before exposure to hydrogen peroxide. Another set of chondrocyte-seeded plates was incubated with control medium alone or with IL-1β (10 ng/mL) and TNF-α (1 ng/mL) for 24 hours. Supernatants were obtained for measurement of prostaglandin E2 production, and cell lysates were used for measurement of superoxide dismutase (SOD) activity and reduced-glutathione (GSH) concentration. Results—Chondrocytes responded to the oxidative stressor hydrogen peroxide with a decrease in SOD activity and GSH concentration. Exposure to the antioxidant NAC caused an increase in SOD activity in hydrogen peroxide–stressed chondrocytes to a degree comparable with that in chondrocytes not exposed to hydrogen peroxide. Similarly, NAC exposure induced significant increases in GSH concentration. Activation with IL-1β and TNF-α also led to a decrease in SOD activity and increase in prostaglandin E2 production. Conclusions and Clinical Relevance—Canine chondrocytes responded to the oxidative stress caused by exposure to hydrogen peroxide and cytokines. Exposure to oxidative stress inducers could result in perturbation of chondrocyte and cartilage homeostasis and could contribute to the pathophysiology of osteoarthritis. Use of antioxidants, on the other hand, may be helpful in the treatment of arthritic dogs.

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

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

Objective—To evaluate the accuracy and reproducibility of left ventricular (LV) volumetric and function variables determined via contrast-enhanced cardiac CT and cardiac MRI in healthy dogs.

Animals—10 healthy Beagles.

Procedures—Cardiac MRI and cardiac CT were performed in anesthetized Beagles; both examinations were conducted within a 2-hour period. Cardiac MRI was performed with a 3.0-T magnet, and contrast-enhanced cardiac CT was performed with a 64-row detector CT machine. Data sets were acquired during apnea with simultaneous ECG gating. Short-axis images were created to determine functional variables via the Simpson method.

Results—Cardiac CT values for mean end-diastolic and end-systolic LV volumes had excellent correlation (r = 0.95) with cardiac MRI measurements, whereas LV stroke volume (r = 0.67) and LV ejection fraction (r = 0.75) had good correlations. The only variable that differed significantly between imaging modalities was end-diastolic LV volume. For each pair of values, Bland-Altman analysis revealed good limits of agreement.

Conclusions and Clinical Relevance—The 3-D modalities cardiac CT and cardiac MRI were excellent techniques for use in assessing LV functional variables. Similar results were obtained for LV volume and function variables via both techniques. The major disadvantage of these modalities was the need to anesthetize the dogs for the examinations.

Endoscopic ultrasonographic evaluation of the esophagus in healthy dogs.

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

Objective—To characterize the ultrasonographic appearance of the canine esophagus. Animals—14 healthy Beagles. Procedures—Endoscopic ultrasonography (EUS) examinations were performed with a radial ultrasonographic gastroscope in anesthetized dogs. Images were obtained at 3-cm intervals along the esophageal length to allow evaluation of the esophageal wall. Images were obtained with the probe in direct contact with the esophageal wall and with a water-filled balloon as a standoff.

Results—Images were obtained with (12 dogs) and without (10) the water-filled balloon. Median thickness of the esophageal wall was 2.19 mm (range, 1.03 to 5.62 mm) in the proximal third of the esophagus, 2.15 mm (range, 1.10 to 4.45 mm) in the middle third, and 2.84 mm (range, 1.35 to 5.92 mm) in the distal third. Wall thickness differed significantly between proximal and distal thirds. Results were similar when the water-filled balloon was used. Esophageal wall layers appeared as 5 alternating hyperechoic and hypoechic bands that could not be consistently identified in all dogs. All layers could be identified in 26 of 198 (13%) images, 3 layers could be identified in 67 of 198 (34%) images, and 105 of 198 (53%) images had no layers. Visual identification of layers in images obtained with and without the balloon did not differ significantly.
Conclusions and Clinical Relevance—EUS appeared to be a useful technique for assessing esophageal wall integrity in dogs; however, complete evaluation of all layers could not be accomplished in all instances. Further studies with this technique in dogs are needed.

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

Journal of Small Animal Practice

Arterial blood gas parameters in pet rabbits anaesthetized using a combination of fentanyl-fluanisone-midazolom-isoflurane.
L. Benato, M. Chesnel, K. Eatwell and A. Meredith
Objectives; Blood gas analysis is a well-recognized method to monitor pulmonary function, blood oxygenation, ventilation and acid–base status during general anaesthesia. The aim of this study was to report blood gas analysis results in pet rabbits (Oryctolagus cuniculus) obtained during general anaesthesia using a portable clinical analyser. Methods; Thirty-two rabbits were premedicated with 0·2 mL/kg fentanyl and fluanisone. Anaesthesia was induced with 0·2 mg/kg midazolam and maintained with 2% isoflurane in oxygen via endotracheal tube. Arterial blood samples were taken from the central ear artery 10 minutes after induction of anaesthesia. Results; Respiratory acidaemia was observed during anaesthesia. Mean ±sd (range) arterial blood pH was 7·33 ±0·08 (7·15 to 7·48). PaCO2 and PaO2 were, respectively, 55·02 ±10·5 (37·7 to 92·1) mmHg and 370·0 ±120·5 (67 to 561) mmHg. Base excess was 2·8 ±3·6 (−3 to 11) mmol/L, HCO3 was 28·73 ±3·07 (23·7 to 35·4) mmol/L, and TCO2 was 30·4 ±3·2 (25 to 37) mmol/L. None of the rabbits developed haematoma during arterial blood collection or ischaemia of the pinna during the hospitalization period. Clinical Significance; Arterial blood gas analysis is a safe and easy to perform diagnostic technique that can contribute to improved safety of rabbit anaesthesia, by providing information on the respiratory and metabolic status of the patient.

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

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

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

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

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

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

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

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

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

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

Mast cell tumours are one of the most common neoplasms in dogs. Mutations in the proto-oncogene c-kit, especially internal tandem duplications of exon 11, are considered to play a crucial role in mast cell tumourigenesis. In this report, two cases that suffered from multiple mast cell tumours containing an internal tandem duplication in the primary lesion but not in the secondary lesions are described. This finding indicates the existence of heterogenous c-kit gene mutations in each site of multiple mast cell tumours. Additionally, these results raise the possibility that the contribution of internal tandem duplications in the malignant transformation of mast cells is quite limited. It is proposed that, for clinicians, genetic analysis of several regions of multiple mast cell tumours is necessary for predicting prognosis and tumour response to KIT inhibitors.

**Successful wound healing over exposed metal implants using vacuum-assisted wound closure in a dog**
J. Bertran, M. Farrell and N. Fitzpatrick

An eight-month-old Labrador retriever was presented with a grade IIIb open shearing injury of the left tarsus. Acute severe surgical site infection developed 2 days after pan-tarsal arthrodesis, resulting in wound dehiscence. Vacuum-assisted wound therapy was carried out for 12 days to treat an extensive full-thickness soft tissue defect with exposure of metal implants. New granulation tissue formation covering most of the defect was achieved by day 10 of this therapy. Epithelialization was achieved by second intention healing with open wound management. To the authors’ knowledge, this is the first veterinary clinical case report documenting complete healing over exposed metal implants without any requirement for surgical revision.

**Duplicated ectopic ureter in a nine-year-old Labrador**
R. Novellas, J. Stone, K. Pratschke and G. Hammond

A nine-year-old male neutered Labrador retriever presented with a history of chronic urinary tract infections and occasional dribbling of urine. Abdominal ultrasound showed changes suggestive of a left ectopic ureter. A pneumocystogram revealed an air-filled distended tubular and tortuous structure extending from the region of the prostatic urethra to the left kidney, consistent with an ectopic ureter. Intravenous urography depicted the presence of an additional left ureter with only slightly larger diameter than the right and with normal insertion in the bladder neck. A duplicated ectopic left ureter was suspected and confirmed during surgery. To the authors’ knowledge, this is the first description of a duplicated ectopic ureter in the canine species. The combination of ultrasound and contrast radiography was important to reach the diagnosis.
The Veterinary Journal (no relevant articles in July)

Australian Veterinary Practitioner (no journal this month)