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June 2013 Abstracts

Journal of Small Animal Practice

Statistics: using regression models
M. Scott, D. Flaherty and J. Currall
In a previous article, we asked the simple question “Are we related?” and used scatterplots and correlation coefficients to provide an answer. In this article, we will take this question and reword it to “How are we related?” and will demonstrate the statistical techniques required to reach a conclusion.

Transverse sectioning for histological assessment of sebaceous glands in healthy dogs and canine sebaceous adenitis
R. Bond and H. Brooks
Objectives - To evaluate transverse sectioning for histological assessment of canine sebaceous glands in health and disease. Methods - Skin specimens were obtained from the cadavers of six healthy beagle dogs and from an archive of tissue sections of 24 dogs with a histological diagnosis of sebaceous adenitis. Results - In healthy beagle dogs, both the mean numbers of compound hair follicles and sebaceous lobes observed in transverse sections were approximately threefold higher (P < 0.001) than those seen in vertical sections. A similar relationship was noted in examples of sebaceous adenitis. In cases of sebaceous adenitis, there was a complete absence of sebaceous glands in paired transverse and vertical sections in 14 cases, whereas in 3 dogs glands were observed in transverse sections where none were seen in vertical sections. The percentages of hair follicles with associated sebaceous glands in affected dogs did not vary between transverse (12.3%) and vertical (13.3%) sections, whereas 89% (vertical) and 96% (transverse) of follicles had associated glands in the healthy beagle dogs. Significance - Transverse sectioning of canine skin specimens to allow visualization of the follicular isthmus or deep portion of the common infundibulum enhances the histological assessment of sebaceous glands in both health and disease.

Efficacy and safety of cimicoxib in the control of perioperative pain in dogs
E. Grandemangete, S. Fournel and F. Woehrlé
Objectives - To determine the efficacy and safety of cimicoxib (Cimalgex®; Vétoquinol SA) for the control of perioperative pain in dogs. Methods - A double-blind, randomized, controlled multi-centre field study was conducted in 237 dogs undergoing orthopaedic or soft tissue surgery. Pain was monitored by the attending veterinarian over the 7 days following the surgical procedure using two pain-scoring systems and a visual analogue scale. An enhanced monitoring protocol for postoperative pain was utilized during the first 24 hours after surgery. The dog owner's assessment of perceived analgesia during this time period was also recorded. Results - Cimicoxib demonstrated statistically significant non-inferiority compared to carprofen. These findings were confirmed by owners’ assessments and by the evolution of the pain scores. Both drugs were well tolerated throughout the study. Clinical Significance - Cimicoxib had non-inferior efficacy and tolerability when compared to carprofen for the control of perioperative pain in dogs undergoing orthopaedic or soft tissue surgery.

Prevalence, outcome and risk factors for postoperative pyothorax in 232 dogs undergoing thoracic surgery.
Objective - To determine the prevalence, outcome and risk factors for postoperative pyothorax in dogs undergoing thoracic surgery. Methods - Case records were reviewed retrospectively to identify dogs with post thoracic surgery pyothorax, defined as septic neutrophilic inflammation within the pleural space based on cytology and/or a positive bacterial culture of pleural fluid. Those identified were reviewed for potential risk factors for postoperative pyothorax based on biological plausibility and previously published data. These potential risk factors were explored by multivariable logistic regression. Results - Of 232 dogs undergoing thoracic surgery, 15 (6.5%) dogs developed pyothorax. Bacteria cultured included methicillin-resistant Staphylococcus aureus and multi-resistant Escherichia coli. Of these dogs, six died, four were euthanased and five were treated successfully. A diagnosis of idiopathic chylothorax [Odds Ratio (OR)=12.5, 95% Confidence Interval (CI)=2.7-58.5, P=0.001], preoperative intrathoracic biopsy (OR=14.3, 95% CI=1.7-118.7, P=0.014) and preoperative thoracocentesis (OR=11.2, 95% CI=1.6-78.2, P=0.015) were identified as independent risk factors for development of postoperative pyothorax. Clinical Significance - Idiopathic chylothorax, intrathoracic biopsy and prior thoracocentesis are independent risk factors for postoperative pyothorax, which was associated with a 67% mortality rate.
**Relationships between heart rate and age, bodyweight and breed in 10,849 dogs**
M. J. Hezzell, K. Hunn, S. G. Dennis, L. Agee and A. Boswood

Objectives - To evaluate relationships between heart rate and clinical variables in healthy dogs and dogs examined at a referral hospital. Methods - Clinical data were extracted from the electronic patient records of a first opinion group (5000 healthy dogs) and a referral hospital (5849 dogs). Univariable and multi-variable general linear models were used to assess associations between heart rate and clinical characteristics. Separate multi-variable models were constructed for first opinion and referral populations. Results - In healthy dogs, heart rate was negatively associated with bodyweight (P<0·001) but was higher in Chihuahua. The mean difference in heart rate between a 5 and 55 kg dog was 10·5 beats per minute. In dogs presenting to a referral hospital, heart rate was negatively associated with bodyweight (P<0·001) and the following breeds; border collie, golden retriever, Labrador retriever, springer spaniel and West Highland white terrier and positively associated with age, admitting service (emergency and critical care, emergency first opinion and cardiology) and the following breeds; Cavalier King Charles spaniel, Staffordshire bull terrier and Yorkshire terrier. Clinical Significance - Bodyweight, age, breed and disease status all influence heart rate in dogs, although these factors account for a relatively small proportion of the overall variability in heart rate.

**Surgical management of recurrent cervical sialoceles in four dogs**
V. Tsioli, L.G. Papazoglou, E. Basdani, P. Kosmas, G. Brellou, T. Foutahidis and S. Bagias

Recurrent cervical sialoceles were diagnosed in four dogs associated with inadequate excision of the sublingual gland. Three dogs were managed by resection of the remnants of the sublingual gland via an oral approach. One dog was managed through a ventral approach as identification of the sublingual gland was not possible with the oral approach. The outcome was favourable in all cases and no relapses were detected after a median follow-up time of 10 months.

**A novel approach to treatment of lymphangiosarcoma in a boxer dog**
A. Marcinowska, J. Warland, M. Brearley and J. Dobson

A five-year-old female boxer presented with a swelling in the area of the caudal mammary gland. The mass was surgically excised and histopathological examination revealed a poorly demarcated lesion, extending into mammary tissue and infiltrating the sinuses of adjacent lymph nodes. The diagnosis was lymphangiosarcoma. Full blood work, thoracic radiographs, abdominal and scar ultrasound were unremarkable, apart from possible inflammatory reactions in the latter and reactive/metastatic changes in inguinal lymph nodes. Doxorubicin treatment resulted in a 6-month recurrence free interval. At relapse, the dog was treated with metronomic chemotherapy using chlorambucil and meloxicam, which failed to adequately control the disease. Toceranib phosphate was introduced and resulted in almost complete regression of the mass, leaving just a skin plaque. To the authors’ knowledge this is the first report describing the use of two novel therapeutic approaches to treat canine lymphangiosarcoma that resulted in a higher than previously described survival time.

**American Journal of Veterinary Research**

**Repeatability and reproducibility of measurements obtained via two-dimensional speckle tracking echocardiography of the left atrium and time-left atrial area curve analysis in healthy dogs**

Objective—To evaluate left atrial phasic function in healthy dogs by means of 2-D speckle tracking echocardiography with time-left atrial area curve analysis and to assess repeatability and reproducibility of obtained measurements. Animals—6 healthy Beagles. Procedures—Each dog underwent echocardiography twice on different days (3 nonconsecutive examinations/d). Images were analyzed with offline software; area of the left atrium was automatically calculated in each frame throughout the cardiac cycle to derive time-left atrial area curves. Variables used to assess left atrial phasic function (total, passive, and active emptying area and emptying fractions and mean active and total emptying rates) were calculated. Agreement between variables measured via speckle tracking echocardiography and the manual tracing method was assessed with modified Bland–Altman analysis. Within-day and between-day coefficients of variation were determined. Results—Mean ± SD total, passive, and active emptying fractions of the left atrium were 49.8 ± 3.5%, 277 ± 4.0%, and 30.5 ± 4.3%, respectively. Mean ± SD total and active emptying rates were 16.0 ± 2.5 cm2/s and 25.1 ± 4.9 cm2/s, respectively. Within-day and between-day coefficients of variation were < 20% (range, 0.41% to 16.4%) for all variables except mean active emptying rate (between-day coefficient of variation, 29.2%). Agreement between variables measured via speckle tracking echocardiography and the manual tracing method was good, and differences between methods were nonsignificant. Conclusions and Clinical Relevance—Evaluation of left atrial phasic function via speckle tracking echocardiography was feasible; repeatability and reproducibility of
measurements were adequate in healthy dogs. Studies are needed to determine clinical applicability in canine patients.

**Evaluation of esophageal high-resolution manometry in awake and sedated dogs**


Objective—To evaluate the use of high-resolution manometry (HRM) in awake and sedated dogs and to assess potential effects of a standard sedation protocol. Animals—22 Beagles. Procedures—An HRM catheter with 36 pressure sensors was inserted intranasally in each dog. After an adaptation period of 5 minutes, each set of measurements included 5 swallows of a liquid and 5 swallows of a solid bolus. Measurements were repeated 30 minutes after IM administration of buprenorphine and acepromazine. Results—HRM was successfully performed in 14 dogs. Data sets of 8 dogs were adequate for analysis. For the upper esophageal sphincter, median values of baseline pressure, residual pressure, relaxation time to nadir, and relaxation duration were determined for awake and sedated dogs for liquid and solid swallows. For the lower esophageal sphincter, median values of peristaltic contractile integral, bolus transit time, and contractile front velocity were determined for awake and sedated dogs for liquid and solid swallows. For the lower esophageal sphincter, median values of baseline pressure and residual pressure were determined for awake and sedated dogs for liquid and solid swallows. Significant differences (awake vs sedated) were found for the upper esophageal sphincter residual pressure (liquid swallows), relaxation time to nadir (liquid swallows), bolus transit time (solid swallows), and contractile front velocity (solid swallows).

Conclusions and Clinical Relevance—HRM was feasible for evaluation of esophageal function in most awake dogs. Although sedation in uncooperative patients may minimally influence results of some variables, an overall assessment of swallowing should be possible.

**Systemic immune responses in Cytauxzoon felis-infected domestic cats**

Karelma Frontera-Acevedo, Nicole M. Balsone, Melissa A. Dugan, Cheryl R. Makemson, Llewelyn B. Sellers, Holly M. Brown, David S. Peterson, Kate E. Creevy, Bridget C. Garner, Kaori Sakamoto.

Objective—To characterize systemic immune responses in Cytauxzoon felis-infected cats. Sample—Blood and lung samples obtained from 27 cats. Procedures—Cats were allocated into 4 groups: cats that died of cytauxzoonosis, acutely ill F felis-infected cats, healthy survivors of C felis infection, and healthy uninfected cats. Serum concentrations of tumor necrosis factor-α and interleukin-1 β were measured and serum proteins characterized. Blood smears were stained immunocytochemically and used to assess immunoglobulin deposition. Immunohistochemical expression of CD18 and tumor necrosis factor-α were compared in lung tissues obtained from cats that died and healthy uninfected cats. A real-time reverse-transcription PCR assay for CD18 expression was performed on selected blood samples from all groups. Results—Concentrations of both cytokines were greater and serum albumin concentrations were significantly lower in cats that died of cytauxzoonosis, compared with results for all other groups. Erythrocytes from acutely ill cats and survivors of C felis infection had staining for plasmalemmal IgM, whereas erythrocytes from the other groups did not. Increased staining of C felis-infected monocytes and interstitial neutrophils for CD18 was detected. The real-time reverse-transcription PCR assay confirmed a relative increase in CD18 expression in cats that died of cytauxzoonosis and acutely ill cats, compared with expression in other groups. Immunostaining for TNF-α in lung samples confirmed a local proinflammatory response. Conclusions and Clinical Relevance—Results indicated immunopathologic responses were greater in cats that died of C felis infection than in cats that survived C felis infection.

**Acute and chronic effects of tepoxalin on kidney function in dogs with chronic kidney disease and osteoarthritis**

Amy L. Lomas, Shane D. Lyon, Michael W. Sanderson, Gregory F. Grauer.

Objective—To determine whether tepoxalin alters kidney function in dogs with chronic kidney disease (CKD). Animals—16 dogs with CKD (International Renal Interest Society stage 2 or 3) and osteoarthritis. Procedures—Kidney function was assessed via serum biochemical analysis, urinalysis, urine protein-to-creatinine concentration ratio, urine γ-glutamyl transeptidase-to-creatinine concentration ratio, iohexol plasma clearance, and indirect blood pressure measurement twice before treatment. Dogs received tepoxalin (10 mg/kg, PO, q 24 h) for 28 days (acute phase; n = 16) and an additional 6 months (chronic phase; 10). Recheck examinations were performed weekly (acute phase) and at 1, 3, and 6 months (chronic phase). Kidney function variables were analyzed via repeated-measures ANOVA. Results—There was no difference over time for any variables in dogs completing both phases of the study. Adverse drug events (ADEs) resulting in discontinuation of tepoxalin administration included increased serum creatinine concentration (1 dog; week 1), collapse (1 dog; week 1), increased liver enzyme activities (1 dog; week 4), vomiting and diarrhea (1 dog; week 8), hematochezia (1 dog; week 24), and gastrointestinal ulceration or perforation (1 dog; week 26). Preexisting medical conditions and concomitant drug use may have contributed to ADEs. Kidney function was not affected in the latter 5 dogs.
Discontinuation of tepoxalin administration stabilized kidney function in the former dog and resolved the ADEs in 4 of the 5 latter dogs.

Conclusions and Clinical Relevance—Tepoxalin may be used, with appropriate monitoring, in dogs with International Renal Interest Society stage 2 or 3 CKD and osteoarthritis.

**Canadian Veterinary Journal**

**A case of canine discospondylitis and epidural empyema due to Salmonella species**
Ioannis N. Plessas, Philip Jull, Holger A. Volk (page 595)

**Primary central nervous system T-cell lymphoma mimicking meningoencephalomyelitis in a cat**
Silvia Guil-Luna, Librado Carrasco, Jaime Gómez-Laguna, Monika Hilbe, Juan J. Mínguez, Kernt Köhler, Juana Martín de las Mulas (page 602)

**Electrochemotherapy for the treatment of recurring aponeurotic fibromatosis in a dog**
Enrico P. Spugnini, Giovanni Di Tosto, Scirin Salemme, Luca Pecchia, Maurizio Fanciulli, Alfonso Baldi (page 606)

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

**Effect of body position on indirect measurement of systolic arterial blood pressure in dogs**
Danielle A. Rondeau, DVM, DACVIM; Megan E. Mackalonis, VMD; Rebecka S. Hess, DVM, DACVIM
Objective—To determine whether a difference existed in Doppler ultrasonographic measurements of systolic arterial blood pressure (SAP) in sitting versus laterally recumbent dogs and to determine the degree of variability in measurements made in each position.
Design—Diagnostic test evaluation.
Animals—51 healthy or sick adult dogs, without recent sedation or anesthesia and with an SAP ≤ 300 mm Hg.
Procedures—In a crossover design, SAP was measured via Doppler ultrasonography when dogs were sitting (on hind limbs with nonmeasured forelimb bearing weight) and laterally recumbent, with the cuff position at the level of the right atrium for both positions. Seven measurements were obtained per position for each dog.
Results—Mean ± SD SAP was significantly higher in the sitting (172.1 ± 33.3 mm Hg) versus recumbent (147.0 ± 24.6 mm Hg) position, and this difference was evident for 44 of 51 (86%) dogs. The mean difference in measured SAP between the 2 positions was 25.1 ± 28.5 mm Hg. Blood pressure measurements had a significantly higher repeatability in the recumbent position than in the sitting position.
Conclusions and Clinical Relevance—Blood pressure measurements in dogs were significantly affected by body position, and they were higher for most dogs when sitting rather than laterally recumbent. Blood pressure measurements in the laterally recumbent position were less variable than in the sitting position.

**Associations among exercise duration, lameness severity, and hip joint range of motion in Labrador Retrievers with hip dysplasia**
Laura M. Greene, DVM; Denis J. Marcellin-Little, DEDV, DACVS, DACVSMR; B. Duncan X. Lascelles, BVSc, PhD, DACVS
Objective—to evaluate factors associated with lameness severity and hip joint range of motion in dogs with hip dysplasia and to assess the association between hip joint range of motion and degree of lameness.
Design—Prospective case series.
Animals—60 client-owned Labrador Retrievers with hip dysplasia.
Procedures—Owners completed a questionnaire regarding their dogs’ daily exercise duration and type (ie, low impact vs high impact) and lifestyle. Range of motion of affected hip joints was measured with a transparent plastic goniometer. The presence of subluxation or luxation of hip joints as a consequence of hip dysplasia and the size of the largest osteophytes or enthesophytes of hip joints on ventrodorsal radiographic images of the pelvis were recorded. Multivariate analyses were performed to identify factors associated with lameness, loss of hip joint flexion, and loss of hip joint extension and to identify factors associated with the presence of large osteophytes.
Results—Exercise was associated with a decrease in the severity of lameness in dogs with hip dysplasia. The strength of this inverse relationship increased with longer exercise duration. Lameness was more severe in dogs...
with hip joint luxation than in dogs without luxation. Hip joint extension was 1° lower for each year of age, and osteophyte or enthesophyte size was 1 mm larger with each 3-year increase in age.

Conclusions and Clinical Relevance—Longer daily exercise duration was associated with lower lameness scores in dogs with hip dysplasia. Dogs with hip joint luxation secondary to hip dysplasia had higher lameness scores than did dogs without hip joint luxation.

Metronomic administration of chlorambucil for treatment of dogs with urinary bladder transitional cell carcinoma
Diane R. Schrempp, DVM, DACVIM; Michael O. Childress, DVM, DACVIM; Jane C. Stewart, BS; Tiffany N. Leach, DVM; Kean Ming Tan, MS; Andrew H. Abbo, DVM, DACVIM; Amalia E. de Gortari, MVZ; Patty L. Bonney, BS; Deborah W. Knapp, DVM, MS, DACVIM

Objective—To determine the antitumor effects and toxicoses of metronomic oral administration of a low dose of chlorambucil in dogs with transitional cell carcinoma (TCC).

Design—Prospective clinical trial.

Animals—31 client-owned dogs with TCC for which prior treatments had failed or owners had declined other treatments.

Procedures—Chlorambucil (4 mg/m², PO, q 24 h) was administered to dogs. Before and at scheduled times during treatment, evaluations of dogs included physical examination, CBC, serum biochemical analyses, urinalysis, thoracic and abdominal imaging including cystosonography for measurement of TCCs, and grading of toxicoses.

Results—29 of 31 dogs had failed prior TCC treatment. Of the 30 dogs with available data, 1 (3%) had partial remission (≥ 50% reduction in tumor volume), 20 (67%) had stable disease (< 50% change in tumor volume), and 9 (30%) had progressive disease (≥ 50% increase in tumor volume or development of additional tumors); 1 dog was lost to follow-up. The median progression-free interval (time from the start of chlorambucil treatment to the day progressive disease was detected) for the dogs was 119 days (range, 7 to 728 days). The median survival time of dogs from the time of the start of chlorambucil treatment was 221 days (range, 7 to 747 days).

Few toxicoses were detected; chlorambucil administration was discontinued because of toxicoses in only 1 dog.

Conclusions and Clinical Relevance—Metronomic administration of chlorambucil was well tolerated, and 70% of dogs had partial remission or stable disease. Metronomic administration of chlorambucil may be a treatment option for dogs with TCC.

Comparison of automated versus manual neutrophil counts for the detection of cellular abnormalities in dogs receiving chemotherapy: 50 cases (May to June 2008)
Michelle C. Cora, DVM, DACVP; Jennifer A. Neel, DVM, DACVP; Carol B. Grindem, DVM, PhD, DACVP; Grace E. Kissling, PhD; Paul R. Hess, DVM, PhD, DACVIM

Objective—To determine the frequency of clinically relevant abnormalities missed by failure to perform a blood smear evaluation in a specific subset of dogs receiving chemotherapy and to compare automated and manual neutrophil counts in the same population.

Design—Retrospective case series

Animals—50 dogs receiving chemotherapy with a total nucleated cell count > 4,000 nucleated cells/μL.

Procedures—50 blood smears were evaluated for abnormalities that have strong potential to change the medical plan for a patient: presence of blast cells, band neutrophils, nucleated RBCs, toxic change, hemoparasites, schistocytes, and spherocytes. Automated and manual neutrophil counts were compared.

Results—Blood smears from 10 (20%) patients had ≥ 1 abnormalities. Blast cells were identified on 4 (8%) blood smears, increased nucleated RBCs were identified on 5 (10%), and very mild toxic change was identified on 2 (4%). Correlation coefficient of the neutrophil counts was 0.96. Analysis revealed a slight bias between the automated and manual neutrophil counts (mean ± SD difference, −0.43 × 10³/μL ± 1.10 × 10³/μL).

Conclusions and Clinical Relevance—In this series of patients, neutrophil count correlation was very good. Clinically relevant abnormalities were found on 20% of the blood smears. An automated CBC appears to be accurate for neutrophil counts, but a microscopic examination of the corresponding blood smear is still recommended; further studies are needed to determine whether the detection or frequency of these abnormalities would differ dependent on chemotherapy protocol, neoplastic disease, and decision thresholds used by the oncologist in the ordering of a CBC without a blood smear evaluation.
Thomas P. Bellumori, MS; Thomas R. Famula, PhD; Danika L. Bannasch, PhD, DVM; Janelle M. Belanger, MS; Anita M. Oberbauer, PhD
Objective—To determine the proportion of mixed-breed and purebred dogs with common genetic disorders.
Design—Case-control study.
Animals—27,254 dogs with an inherited disorder.
Procedures—Electronic medical records were reviewed for 24 genetic disorders: hemangiosarcoma, lymphoma, mast cell tumor, osteosarcoma, aortic stenosis, dilated cardiomyopathy, hypertrophic cardiomyopathy, mitral valve dysplasia, patent ductus arteriosus, ventricular septal defect, hyperadrenocorticism, hypoadrenocorticism, hypothyroidism, elbow dysplasia, hip dysplasia, intervertebral disk disease, patellar luxation, ruptured cranial cruciate ligament, atopy or allergic dermatitis, bloat, cataracts, epilepsy, lens luxation, and portosystemic shunt. For each disorder, healthy controls matched for age, body weight, and sex to each affected dog were identified.
Results—Genetic disorders differed in expression. No differences in expression of 13 genetic disorders were detected between purebred dogs and mixed-breed dogs (ie, hip dysplasia, hypo- and hyperadrenocorticism, cancers, lens luxation, and patellar luxation). Purebred dogs were more likely to have 10 genetic disorders, including dilated cardiomyopathy, elbow dysplasia, cataracts, and hypothyroidism. Mixed-breed dogs had a greater probability of ruptured cranial cruciate ligament.
Conclusions and Clinical Relevance—Prevalence of genetic disorders in both populations was related to the specific disorder. Recently derived breeds or those from similar lineages appeared to be more susceptible to certain disorders that affect all closely related purebred dogs, whereas disorders with equal prevalence in the 2 populations suggested that those disorders represented more ancient mutations that are widely spread through the dog population. Results provided insight on how breeding practices may reduce prevalence of a disorder.

Allyson C. Berent, DVM, DACVIM; Chick W. Weisse, VMD, DACVS; Erinne Branter, BVSC, DACVIM; Larry G. Adams, DVM, PhD, DACVIM; Alissa Aarhus; Nicole Smee, DVM; Rebecca Berg, DVM, DACVIM; Demetrius H. Bagley, MD
Objective—To describe the use of sclerotherapy for the renal-sparing treatment of idiopathic renal hematuria (IRH) in dogs and report clinical outcomes.
Design—Retrospective case series.
Animals—6 dogs (8 renal pelvises) with IRH.
Procedures—Medical records of dogs that underwent sclerotherapy were reviewed. Each ureterovesicular junction was identified cystoscopically to determine the side of bleeding, and a retrograde ureteropyelogram was performed with endoscopic and fluoroscopic guidance. A ureteropelvic junction balloon was used for ureteral occlusion, and pelvis filling volumes were recorded. A povidone iodine mixture, followed by a sterile silver nitrate solution, was infused into the renal pelvis. A double-pigtail ureteral stent was placed after the procedure. Information on preprocedure and postprocedure biochemical changes, imaging parameters, and clinical outcomes was obtained.
Results—6 dogs (5 males and 1 female) had sclerotherapy for unilateral (4) or bilateral (2) bleeding. Five were right-sided and 3 were left-sided. The median age and weight of dogs were 3 years and 42.4 kg (93.28 lb), respectively. Median procedure time was 150 minutes. One dog that did not have a ureteral stent placed following the procedure developed short-term signs of renal pain and pyelectasis. Cessation of macroscopic hematuria occurred in 4 of 6 dogs (median, 6 hours). Two additional dogs improved moderately. Median follow-up time was 8 months (range, 3.5 to 20.5 months).
Conclusions and Clinical Relevance—Topical sclerotherapy for IRH was safe and effective. Local sclerotherapy for IRH in dogs could be considered a valuable and minimally invasive renal-sparing treatment over ureteronephrectomy.

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Doxycycline concentration over time after storage in a compounded veterinary preparation
Mark G. Papich, DVM, MS, DACVCP; Gigi S. Davidson; Lisa A. Fortier, DVM, PhD, DACVS
Objective—To determine the concentration of doxycycline compounded from doxycycline hyclate tablets into liquid formulations for oral administration in veterinary species and stored for 28 days.
Design—Evaluation study.
Sample—Doxycycline hyclate tablets (100 mg) crushed and mixed with a 50:50 mixture of syrup and suspension vehicles for oral administration to produce 3 batches each of 2 doxycycline formulations: 33.3 and 166.7 mg/mL.

Procedures—Formulations were stored, protected from light, at room temperature (22° to 26°C [71.6° to 78.8°F]) and at a controlled cold temperature (refrigerated 2° to 8°C [35.6° to 46.4°F]). Doxycycline was extracted from the formulations, and concentration was measured by high-pressure liquid chromatography on days 0 (date of preparation), 1, 4, 7, 14, 21, and 28. Concentrations were compared with those of a US Pharmacopeial Convention reference standard. Formulation quality at each point was also assessed through color change, formulation consistency, and suspension uniformity.

Results—On days 0, 1, 4, and 7, the concentration of each formulation was within 90% to 110% of the reference standard (range, 93% to 109%), which was deemed acceptable. However, doxycycline concentrations had decreased dramatically by day 14 and remained low for the duration of the study period. Doxycycline concentrations on days 14, 21, and 28 were all < 20% (range, 14% to 18%) of the reference standard, and the quality of the formulations decreased as well. No effect of storage temperatures on doxycycline concentration was identified.

Conclusions and Clinical Relevance—The concentration of doxycycline, compounded from commercial tablets in the vehicles evaluated to yield doses of 33.3 and 166.7 mg/mL, cannot be assured beyond 7 days.

Development of a survey instrument to assess health-related quality of life in small animal cancer patients treated with chemotherapy

Maria A. Iliopoulou, DVM, MS; Barbara E. Kitchell, DVM, PhD, DACVIM; Vilma Yuzbasiyan-Gurkan, PhD

Objective—To develop a quality of life (QOL) survey for use in a canine cancer chemotherapy setting, validate the instrument's utility, identify key questions that facilitate client and clinician communication regarding decisions in patient care, and use human and veterinary QOL literature to develop a comprehensive yet simple proxy survey instrument.

Design—Survey.

Animals—29 canine chemotherapy patients.

Procedures—Patients were evaluated by both owners and veterinarians at the time of initial visit to the clinic and at 3 and 6 weeks after the initiation of chemotherapy. This survey consisted of a longitudinal evaluation of QOL with 6 components addressing the animal's QOL retrospectively, before onset of cancer; changes in the animal's QOL since manifestation of disease; changes in the animal's QOL with regard to treatment response; owner's QOL and its impact on priorities in decision making; clinician's impression of the owner's priorities and QOL; and clinician's impression of the dog's QOL.

Results—Multiple regression analysis indicated 3 significant predictors of canine cancer patient QOL to be play behaviors, signs of illness, and canine happiness as perceived by owners.

Conclusions and Clinical Relevance—The QOL instrument was easy to use and enhanced client perception of patient care and clinician concern. Owners enjoyed the opportunity to complete the survey. Since questions regarding play behaviors, clinical signs of disease, and canine happiness were significant indicators of changes in QOL, these should be included in future studies. Quality of life assessment may facilitate treatment decisions and assessment of canine patients undergoing chemotherapy.

Interobserver agreement and diagnostic accuracy of brain magnetic resonance imaging in dogs

Myléne-Kim Leclerc, DMV, DACVIM; Marc-André d'Anjou, DMV, DACVR; Laurent Blond, DMV, MS, DACVR; Éric Norman Carmel, DMV; Ruth Dennis, DMV, vetMB, MA; Susan L Kraft, DVM, PhD, DACVR, DACVR-RO; Andrea R. Matthews, DMV, DACVR; Joane M. Parent, DMV, MVetSc, DACVIM

Objective—To evaluate interobserver agreement and diagnostic accuracy of brain MRI in dogs.

Design—Evaluation study.

Animals—44 dogs.

Procedures—5 board-certified veterinary radiologists with variable MRI experience interpreted transverse T2-weighted (T2w), T2w fluid-attenuated inversion recovery (FLAIR), and T1-weighted-FLAIR; transverse, sagittal, and dorsal T2w; and T1-weighted-FLAIR postcontrast brain sequences (1.5 T). Several imaging parameters were scored, including the following: lesion (present or absent), lesion characteristics (axial localization, mass effect, edema, hemorrhage, and cavitation), contrast enhancement characteristics, and most likely diagnosis (normal, neoplastic, inflammatory, vascular, metabolic or toxic, or other). Magnetic resonance imaging diagnoses were determined initially without patient information and then repeated, providing history and signalment. For all cases and readers, MRI diagnoses were compared with final diagnoses established with
results from histologic examination (when available) or with other pertinent clinical data (CSF analysis, clinical response to treatment, or MRI follow-up). Magnetic resonance scores were compared between examiners with \( \kappa \) statistics.

Results—Reading agreement was substantial to almost perfect (0.64 < \( \kappa \) < 0.86) when identifying a brain lesion on MRI; fair to moderate (0.14 < \( \kappa \) < 0.60) when interpreting hemorrhage, edema, and pattern of contrast enhancement; fair to substantial (0.22 < \( \kappa \) < 0.74) for dural tail sign and categorization of margins of enhancement; and moderate to substantial (0.40 < \( \kappa \) < 0.78) for axial localization, presence of mass effect, cavitation, intensity, and distribution of enhancement. Interobserver agreement was moderate to substantial for categories of diagnosis (0.56 < \( \kappa \) < 0.69), and agreement with the final diagnosis was substantial regardless of whether patient information was (0.65 < \( \kappa \) < 0.76) or was not (0.65 < \( \kappa \) < 0.68) provided.

Conclusions and Clinical Relevance—The present study found that whereas some MRI features such as edema and hemorrhage were interpreted less consistently, radiologists were reasonably constant and accurate when providing diagnoses.

Interobserver agreement and diagnostic accuracy of brain magnetic resonance imaging in dogs
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Design—Evaluation study.
Animals—44 dogs.
Procedures—5 board-certified veterinary radiologists with variable MRI experience interpreted transverse T2-weighted (T2w), T2w fluid-attenuated inversion recovery (FLAIR), and T1-weighted-FLAIR; transverse, sagittal, and dorsal T2w; and T1-weighted-FLAIR postcontrast brain sequences (1.5 T). Several imaging parameters were scored, including the following: lesion (present or absent), lesion characteristics (axial localization, mass effect, edema, hemorrhage, and cavitation), contrast enhancement characteristics, and most likely diagnosis (normal, neoplastic, inflammatory, vascular, metabolic or toxic, or other). Magnetic resonance imaging diagnoses were determined initially without patient information and then repeated, providing history and signalment. For all cases and readers, MRI diagnoses were compared with final diagnoses established with results from histologic examination (when available) or with other pertinent clinical data (CSF analysis, clinical response to treatment, or MRI follow-up). Magnetic resonance scores were compared between examiners with \( \kappa \) statistics.

Results—Reading agreement was substantial to almost perfect (0.64 < \( \kappa \) < 0.86) when identifying a brain lesion on MRI; fair to moderate (0.14 < \( \kappa \) < 0.60) when interpreting hemorrhage, edema, and pattern of contrast enhancement; fair to substantial (0.22 < \( \kappa \) < 0.74) for dural tail sign and categorization of margins of enhancement; and moderate to substantial (0.40 < \( \kappa \) < 0.78) for axial localization, presence of mass effect, cavitation, intensity, and distribution of enhancement. Interobserver agreement was moderate to substantial for categories of diagnosis (0.56 < \( \kappa \) < 0.69), and agreement with the final diagnosis was substantial regardless of whether patient information was (0.65 < \( \kappa \) < 0.76) or was not (0.65 < \( \kappa \) < 0.68) provided.

Conclusions and Clinical Relevance—The present study found that whereas some MRI features such as edema and hemorrhage were interpreted less consistently, radiologists were reasonably constant and accurate when providing diagnoses.

Evaluation of risk factors for outcome associated with adrenal gland tumors with or without invasion of the caudal vena cava and treated via adrenalectomy in dogs: 86 cases (1993–2009)
Jessica S. Barrera, DVM, DACVS; Fabrice Bernard, DVM; E. J. Ehrhart, DVM, PhD, DACVP; Stephen J. Withrow, DVM, DACVS, DACVIM; Eric Monnet, DVM, PhD, DACVS
Objective—To evaluate risk factors for outcome for dogs with adrenal gland tumors with or without invasion of the caudal vena cava treated via adrenalectomy.
Design—Retrospective study.
Animals—86 dogs that underwent adrenalectomy for treatment of adrenal gland tumors.
Procedures—Medical records of dogs that underwent adrenalectomy for treatment of an adrenal gland tumor from 1993 to 2009 were reviewed; data collected including signalment, clinical signs, diagnostic test findings, treatments prior to surgery, findings at surgery including additional procedures performed and extent of caudal vena caval invasion (local invasion [caudal to the hepatic portion of the vena cava] or extensive invasion...
[cranial to the hepatic portion of the vena cava], procedures performed during surgery, histopathologic diagnosis, perioperative complications, follow-up data, and necropsy findings. Results—Of the 86 dogs, 14 had adenomas, 45 had adrenocortical carcinomas, and 27 had pheochromocytomas. Fourteen dogs had invasion of the caudal vena cava; of these tumors, 7 were locally invasive and 7 were extensively invasive. Risk factors for poor short-term survival (death within 14 days following surgery) were vena caval invasion, extent of invasion, pheochromocytoma, intraoperative transfusion, and postoperative factors including disseminated intravascular coagulation, pancreatitis, hypotension, hypoxemia, and renal failure. Multivariate analysis of risk factors for poor short-term survival revealed that extensive invasion was the most important factor. Regardless of extent of invasion or tumor type, long-term survival was possible. Conclusions and Clinical Relevance—Invasion of the caudal vena cava, particularly tumor thrombus extension beyond the hepatic hilus, was associated with a higher postoperative mortality rate, but did not affect long-term prognosis in dogs undergoing adrenalectomy because of an aden al gland tumor.

Structural and functional cardiovascular changes and their consequences following interventional patent ductus arteriosus occlusion in dogs: 24 cases (2000–2006) Christopher D. Stauthammer, DVM, DACVIM; Anthony H. Tobias, DVM, PhD, DACVIM; Damon B. Leeder, BVSc, DACVIM; Maxie U. Krüger, med vet Objective—To investigate cardiovascular changes and survival times following complete interventional device occlusion of uncomplicated left-to-right shunting patent ductus arteriosus in dogs. Design—Retrospective cohort study. Animals—24 dogs with uncomplicated patent ductus arteriosus that was fully occluded and reevaluated within 24 hours, approximately 3 months, and 1 year after the procedure. Procedures—Information on medical history, diagnostic imaging findings, treatment received, and survival times were obtained from medical records. Patients were allocated into 2 groups on the basis of age (< 1 year [n = 14] and ≥ 1 year [10]) at the time of the procedure. Additional follow-up information was obtained through interviews of owners and referral veterinarians. Results—Following ductal occlusion, decreases were detected in vertebral heart scale size, left ventricular chamber diameter in diastole and in systole, left atrial dimension, fractional shortening, aortic velocity, and ventricular wall thickness. There were no differences between age groups for postocclusion changes except vertebral heart scale size. Systolic dysfunction was detected in 14 (58%) patients on the final visit. Median survival time for all dogs after ductal occlusion was > 11.5 years. Conclusions and Clinical Relevance—Complete ductal occlusion resulted in immediate removal of the volume overload state and eventual return of cardiac chamber dimensions to reference range, suggesting regression of eccentric hypertrophy. Systolic dysfunction persisted in some dogs but appeared to be clinically unimportant. Most cardiovascular changes were independent of patient age at the time of the procedure.

Unilateral laryngeal paralysis subsequent to surgical ligation of a patent ductus arteriosus in an 8-week-old domestic shorthair cat Krista N. Adamovich-Rippe, DVM; Michele A. Steffey, DVM, DACVS; Winnie L. Ybarra, DVM; Lynelle R. Johnson, DVM, PhD, DACVIM Case Description—An 8-week-old female domestic shorthair cat was treated for patent ductus arteriosus (PDA) with surgical ligation. Seven weeks postoperatively, the cat was evaluated because of increased upper respiratory noise, inspiratory stridor, wheezing, and episodes of intermittent open-mouth breathing that had developed 1 week following the surgical ligation. Clinical Findings—The cat was sedated, and examination of the larynx revealed left-sided laryngeal paralysis. Treatment and Outcome—At the time left-sided laryngeal paralysis was diagnosed, the clinical signs of laryngeal dysfunction were not considered severe enough to warrant surgical intervention. No treatment was administered, and the owner monitored the cat for respiratory distress and worsening of clinical signs for an additional 5 months. During those 5 months, the clinical signs improved but persisted. Seven months after PDA ligation, the cat was again sedated and the larynx examined. The examination revealed persistent left arytenoid dysfunction, which was believed to be the result of permanent damage to the recurrent laryngeal nerve that was sustained during the surgical ligation of the PDA. The owner was counseled about surgical and medical treatment options for laryngeal paralysis but elected to forego treatment at that time. Clinical Relevance—Unilateral laryngeal paralysis caused by iatrogenic damage to the recurrent laryngeal nerve is a potential complication subsequent to surgical ligation of a PDA. The frequency of iatrogenically induced
laryngeal paralysis is likely underestimated in small animal patients. Laryngoscopy should be performed in any small animal with a history of PDA attenuation and clinical signs of respiratory tract disease.

**Australian Veterinary Journal**

**Methicillin-resistant Staphylococcus aureus: an issue for veterinary hospitals**

JL Allen1,*, LA Abraham2, K Thompson2, GF Browning1

Objective To investigate the spread of methicillin-resistant Staphylococcus aureus (MRSA) isolated from a cluster of clinical cases at a veterinary hospital by molecular epidemiological techniques.

Methods Antimicrobial susceptibility testing, spa typing, multilocus sequence typing and pulsed-field gel electrophoresis were used to compare 16 isolates of MRSA. Four isolates were cultured from clinical cases thought to be involved in the cluster. A single isolate that was unrelated to the cluster and the remaining 10 isolates were obtained from nasal swabs submitted by staff and students during a subsequent survey of MRSA carriage.

Results Isolates from four clinical cases and an isolate obtained from a staff member were the same strain of MRSA. Some key risk factors associated with transmission of MRSA within veterinary hospitals were identified.

Conclusion The information provided by these techniques was invaluable in developing procedures and identifying risk factors to help reduce the effect of future outbreaks within veterinary hospitals.

**Tidal breathing flow volume loop analysis of 21 healthy, unsedated, young adult male Beagle dogs**

KK Adamama-Moraitou1, D Pardal1,*, G Menexes2, LV Athanasiou3, G Kazakos4, TS Rallis1

Background Reference values for dogs regarding tidal breathing flow volume loop (TBFVL) parameters are scarce in the veterinary literature, so each new study requires a healthy reference population to be studied simultaneously with the diseased one.

Objectives To establish reference values for TBFVL parameters in healthy dogs, to detect any potential variability in loop shape and in various TBFVL parameters and to propose clinically useful parameters for TBFVL analysis.

Design Cross-sectional, prospective study.

Methods Twenty-one healthy, unsedated, untrained, young adult, male Beagle dogs, with minimum variability in body weight and somatometry were used. Their good health status was confirmed by physical examination, complete blood count, serum biochemistry, urinalysis, serology and parasitology for Dirofilaria immitis, faecal examination, arterial blood gas analysis, electrocardiography, and radiographic and endoscopic examinations of the respiratory tract. The shape of the TBFVLs was assessed initially. Volume, time and flow parameters, as well as their ratios, were calculated; in total 44 parameters were evaluated. Statistical indices, including Cronbach's α, discrimination index, coefficient of variation (CV) and 95% confidence intervals were estimated for each parameter.

Results One consistently reproducible type of TBFVL shape was identified that had a similar appearance to the letter D. Statistical analysis showed that only two parameters were found to have Cronbach's α lower than 0.80. The CV for the TBFVL parameters ranged from 1.5% to 49%, but the vast majority had values lower than 20%. Eight parameters had very low CV, indicating increased homogeneity.

Conclusions A large number of clinically applicable TBFVL parameters were identified. Parameters related to flow and time were considered to correlate more objectively to the functional capacity of the respiratory system of healthy, unsedated dogs.

**Indications, durations and outcomes of mechanical ventilation in dogs and cats with tick paralysis caused by Ixodes holocyclus: 61 cases (2008–2011)**

RA Webster1,*, PC Mills2, JM Morton3

Objectives The primary objectives of this research were to describe the indications for mechanical ventilation, the duration of mechanical ventilation and probability of survival in dogs and cats with respiratory failure induced by the Australian paralysis tick (Ixodes holocyclus).

Methods A retrospective case series and a retrospective single cohort study were conducted using dogs and cats with tick paralysis requiring mechanical ventilation. An index of oxygenating performance of the lung (PF ratio of partial pressure of oxygen in arterial blood to fraction of inspired oxygen) was derived from arterial blood gas analysis; patients euthanased because of veterinary costs were identified and Kaplan-Meier survival analyses performed.
Results In total, 36.6% of patients were ventilated because of hypoxaemia refractory to oxygen therapy, 38.3% because of hypoventilation, 18.3% because of unsustainable respiratory effort and 6.6% because of respiratory arrest. Median duration of mechanical ventilation was 23 h, median time hospitalised was 64 h and 63.9% of all patients requiring mechanical ventilation survived to discharge from the hospital. Survival probability increased to 75% when cases of cost-based euthanasia were right-censored rather than treated as deaths. The survival probability of patients ventilated because of hypoxaemia (52.6%) was significantly less than for those ventilated because of hypoventilation (90.5%). The first measured PF ratio after commencing mechanical ventilation was not significantly associated with survival probability.

Conclusions Dogs and cats with tick paralysis requiring mechanical ventilation to manage respiratory failure have reasonable survival probability. Dogs and cats requiring mechanical ventilation because of hypoventilation have a higher survival probability than those with oxygenation failure.

The Veterinary Journal

Low-dose megestrol acetate revisited: A viable adjunct to surgical sterilization in free roaming cats
Michael Greenberga, Dennis Lawlerb, Stephen Zawistowskic, Wolfgang Jöchled

Approximately 2–3 million cats are euthanised in animal shelters across the United States annually. Preventing pregnancy in cats is a key step to reducing this number. While surgery is generally a safe and effective tool for curbing reproduction in cats, it is not a practical method to achieve the reduction in numbers required for an appreciable impact on the cat population as a whole. Low-dose megestrol acetate (MA) is a synthetic progestin that has been used for the management of reproduction in free roving cat populations; however, there has been no regulatory oversight regarding the use of this product for this purpose. Additionally, there is a paucity of data regarding the safety and efficacy of the product for the management of reproduction in free roaming cats. The purpose of this review is: (1) to outline the need for a non-surgical contraceptive in cats; (2) to discuss the uses of MA in domestic cats; (3) to consider potential adverse effects of the drug, and (4) to discuss regulatory challenges associated with the use of MA in free roaming cat populations. In order to answer the questions posed in this review, more data will need to be collected in laboratory and field studies.

Characterisation of the normal canine serum proteome using a novel electrophoretic technique combined with mass spectrometry
M.J. Atherton, M. Braceland, J. Harvie, R.J. Burchmore, S. Eadie, P.D. Eckersall, J.S. Morris

One dimensional (1D) serum protein electrophoresis (SPE) on agarose gels is a frequently used diagnostic tool for canine diseases; however, little is known regarding the precise composition of the different protein fractions in normal or diseased animals. In this study, to analyse the canine serum proteome in more detail, conventional 1D SPE was combined with second dimension (2D) polyacrylamide gel electrophoresis (PAGE), followed by tandem mass spectrometry (MS). One dimensional SPE was performed on the sera of 17 healthy dogs to establish normal reference ranges for the albumin and globulin sub-fractions. Two representative serum samples from healthy dogs were further separated using a novel method of 2D PAGE, leading to the generation of 26 distinct bands across the six main sub-fractions, which were subjected to MS analysis. Thirty-two proteins were identified, most of which were found in both dogs. Twenty proteins belonged specifically to the species Canis lupus familiaris, with the remaining 12 proteins belonging to other mammalian species, likely reflecting incomplete sequencing knowledge of canine proteins. Two dimensional electrophoresis and MS allowed identification of canine serum albumin precursor, serpin peptidase inhibitor, kininogen-1, vitamin D binding protein, haemopexin, complement C4 and a variety of immunoglobulin class molecules, along with localisation of these proteins within serum protein subfractions.

Changes in the serum proteome of canine lymphoma identified by electrophoresis and mass spectrometry
M.J. Atherton, M. Braceland, S. Fontaine, M.M. Waterston, R.J. Burchmore, S. Eadie, P.D. Eckersall, J.S. Morris

The serum proteome of canine lymphoma was characterised by one dimensional (1D) serum protein electrophoresis (SPE) on agarose gels, two dimensional (2D) polyacrylamide gel electrophoresis (PAGE) and tandem mass spectrometry (MS). Results were compared with serum proteome data collected previously from the sera of healthy dogs. Twenty-one dogs with high grade multicentric lymphoma had significantly elevated quantities of α2 globulins on 1D SPE. Further separation of the serum proteins was performed on three dogs using a 2D PAGE system. Thirty-six different proteins were identified in 38 bands submitted for MS. Most of the proteins were the same as those previously identified in the sera of healthy dogs. Haptoglobin was identified in the sera of all three dogs with lymphoma and could account for the increased levels of α2 globulins. α2 Macroglobulin, α-antichymotrypsin and inter-α-trypsin inhibitor were also present in dogs with lymphoma. Clusterin, an anti-apoptotic protein, was identified in the serum of one dog with lymphoma. Kininogen, which is present in the sera of healthy dogs, was absent in all three dogs with lymphoma. The 2D electrophoresis
Identification of feline panleukopenia virus proteins expressed in Purkinje cell nuclei of cats with cerebellar hypoplasia

Luc Poncelet, Céline Héraud, Marie Springinsfeld, Kunie Ando, Anna Kabova, Andreas Beineke, Dominique Peeters, Anne Op De Beeck, Jean-Pierre Brion

Parvoviruses depend on initiation of host cell division for their replication. Undefined parvoviral proteins have been detected in Purkinje cells of the cerebellum after experimental feline panleukopenia virus (FPV) infection of neonatal kittens and in naturally occurring cases of feline cerebellar hypoplasia. In this study, a parvoviral protein in the nucleus of Purkinje cells of kittens with cerebellar hypoplasia was shown by immunoprecipitation to be the FPV viral capsid protein VP2. In PCR-confirmed, FPV-associated feline cerebellar hypoplasia, expression of the FPV VP2 protein was demonstrated by immunohistochemistry in Purkinje cell nuclei in 4/10 cases and expression of the FPV non-structural protein NS1 was demonstrated in Purkinje cell nuclei in 5/10 cases. Increased nuclear ERK1 expression was observed in several Purkinje cells in 1/10 kittens. No expression of the G1 and S mitotic phase marker proliferating cell nuclear antigen (PCNA) was evident in Purkinje cell nuclei. These results support the hypothesis that FPV is able to proceed far into its replication cycle in post-mitotic Purkinje cells.
Expression of transferrin receptor 1, proliferating cell nuclear antigen, p27Kip1 and calbindin in the fetal and neonatal feline cerebellar cortex.

Luc Poncet, Marie Springinsfeld, Kunie Ando, Céline Héraud, Anna Kabova, Jean-Pierre Brion

Cerebellar cortices from feline fetuses with estimated gestational ages of 40–66 days and from kittens aged 2 days to 2 months, all negative for feline panleukopenia virus (FPV) infection, were analysed for expression of the transferrin receptor 1 (TrFR1), proliferating cell nuclear antigen (PCNA), p27Kip1 and calbindin. TrFR1, the receptor used by FPV to enter target cells, was expressed in capillary endothelial cells in the cerebellum at all fetal stages investigated and in Purkinje cells of a 3-week-old kitten, but not in the neuroblasts in the external granule layer (EGL). PCNA was expressed in cells of the superficial layer of the EGL. The cyclin-dependent kinase inhibitor p27Kip1 was expressed in cells of the deep layer of the EGL. Purkinje cells expressed calbindin from the earliest fetal stage investigated. Co-expression of PCNA and calbindin could not be demonstrated, indicating that feline Purkinje cells are post-mitotic from at least 40 days gestation.

Circadian rhythms and the effect of glucocorticoids on expression of the clock gene period1 in canine peripheral blood mononuclear cells.

Keitaro Ohmori, Sho Nishikawa, Keisuke Oku, Kumiko Oida, Yosuke Amagai, Naoki Kajiwara, Kyungsook Jung, Akira Matsuda, Akane Tanaka, Hiroshi Matsuda

Circadian rhythms have a periodicity of approximately 24 h and, in mammals, are regulated by clock genes. In this study, expression profiles of clock genes (per1, per2, clock, bmal1 and cry1) were investigated over a single 24 h period by real-time PCR in peripheral blood mononuclear cells (PBMCs) of healthy dogs and canine PBMCs treated in vitro and in vivo with glucocorticoids. Only per1 mRNA exhibited daily rhythms in canine PBMCs. Canine PBMCs cultured with dexamethasone in vitro had dose- and time-dependent increases in per1 mRNA expression. Intravenous injection of dexamethasone increased expression of per1 in canine PBMCs in vivo. Rhythmic expression of per1 in PBMCs could be used as a molecular marker for monitoring circadian rhythms and the effects of drugs on clock genes in dogs.

Survival and clinical outcome of dogs with ischaemic stroke


The objectives of the present study were to investigate survival time, possible predictors of survival and clinical outcome in dogs with ischaemic stroke. A retrospective study of dogs with a previous diagnosis of ischaemic stroke diagnosed by magnetic resonance imaging (MRI) was performed. The association between survival and the hypothesised risk factors was examined using univariable exact logistic regression. Survival was examined using Kaplan–Meier and Cox regression. Twenty-two dogs were identified. Five dogs (23%) died within the first 30 days of the stroke event. Median survival in 30-day survivors was 505 days. Four dogs (18%) were still alive by the end of the study. Right-sided lesions posed a significantly increased risk of mortality with a median survival time in dogs with right-sided lesions of 24 days vs. 602 days in dogs with left sided lesions (P = 0.006). Clinical outcome was considered excellent in seven of 17 (41%) 30-day survivors. Another seven 30-day survivors experienced new acute neurological signs within 6–17 months of the initial stroke event; in two of those cases a new ischaemic stroke was confirmed by MRI. In conclusion, dogs with ischaemic stroke have a fair to good prognosis in terms of survival and clinical outcome. However, owners should be informed of the risk of acute death within 30 days and of the possibility of new neurological events in survivors. Mortality was increased in dogs with right-sided lesions in this study.

Feline mammary carcinoma stem cells are tumorigenic, radioresistant, chemoresistant and defective in activation of the ATM/p53 DNA damage pathway


Cancer stem cells were identified in a feline mammary carcinoma cell line by demonstrating expression of CD133 and utilising the tumour spheroid assay. A population of cells was identified that had an invasive, mesenchymal phenotype, expressed markers of pluripotency and enhanced tumour formation in the NOD-SCID mouse and chick embryo models. This population of feline mammary carcinoma stem cells was resistant to chemotherapy and radiation, possibly due to aberrant activation of the ATM/p53 DNA damage pathway. Epithelial–mesenchymal transition was a feature of the invasive phenotype. These data demonstrate that cancer stem cells are a feature of mammary cancer in cats.

The effects of formulation on the penetration and retention of budesonide in canine skin in vitro

Liisa A. Ahlstrom, Sheree E. Cross, Paul C. Mills

This study investigated the effects of formulation on the penetration and retention kinetics of budesonide through canine skin in vitro. Full thickness, thoracic, dog skin was mounted in Franz-type diffusion cells and randomly assigned to receive one of three 0.025% (0.25 mg/mL) budesonide-containing formulations: Barazole (BZ, a novel formulation), isopropyl myristate (IPM) or propylene glycol (PG). At regular intervals over 84 h,
the amount of budesonide penetrating or retained within the skin was quantified using high performance liquid chromatography. The restricted (or residual) maximum likelihood mixed model predicted that the flux of budesonide from BZ was 9.2-fold (P < 0.001) and 105-fold (P < 0.001) greater than from IPM and PG, respectively. Similarly, the skin retention of budesonide from BZ was more than 3-fold (P < 0.0001) and nearly 6-fold (P < 0.0001) greater than from IPM and PG, respectively. This study has demonstrated that the formulation can greatly affect the skin penetration and retention of budesonide in dogs, and consequently could be selected to maximise drug concentration and retention at the site of action. This has the potential to improve the efficacy and safety of, and owner compliance with, topical glucocorticoid therapy in dogs.

Validation of the prognostic value of histopathological grading or c-kit mutation in canine cutaneous mast cell tumours: A retrospective cohort study
Yoshinori Takeuchi, Yasuhiro Fujino, Manabu Watanabe, Masashi Takahashi, Takayuki Nakagawa, Ayano Takeuchi, Makoto Bonkobara, Tetsuya Kobayashi, Koichi Ohno, Kazuyuki Uchida, Kazushi Asano, Ryohei Nishimura, Hiroyuki Nakayama, Sumio Sugano, Yasuo Ohashi, Hajime Tsujimoto

The objective of this retrospective cohort study was to validate the prognostic value of histological grading of canine cutaneous mast cell tumours (MCTs) according to the Patnaik (grades I–III) and Kiupel (low, high) grading systems, and to confirm the prognostic significance of internal tandem duplications (ITDs) within exon 11 of the c-kit gene (ITD-Exon11). The baseline characteristics and outcome data from 47 dogs diagnosed with cutaneous MCTs were collected and reviewed. Tumours were graded according to both grading systems and the nucleotide sequence of c-kit was evaluated. Results were analyzed to evaluate predictive factors for overall survival (OS) and progression-free survival (PFS). Log-rank tests indicated that dogs with Patnaik grade III MCTs had significantly reduced OS and PFS compared to those with either grade I or II tumours. However, no significant difference in OS or PFS was observed between grade I and II tumours. The dogs with Kiupel high-grade MCTs had significantly shorter OS and PFS than dogs with low-grade MCTs. The presence of ITD-Exon11 was significantly associated with shorter PFS. The result of Cox regression analysis showed that the Kiupel grading system for OS and PFS, and lymph node metastasis for OS, independently predicted prognosis. Kappa statistics confirmed a significantly higher inter-observer consistency for the Kiupel compared to the Patnaik grading system. These findings demonstrate that the Kiupel grading system is a useful prognostic tool for canine cutaneous MCTs in predicting OS and PFS, while the occurrence of ITD-Exon11 appeared to be a useful predictor for PFS.

d-penicillamine treatment of copper-associated hepatitis in Labrador retrievers
Hille Fieten, Karen Dirksen, Ted S.G.A.M. van den Ingh, Esther A. Winter, Adrian L. Watson, Peter A.J. Leegwater, Jan Rothuizen

d-penicillamine is effectively used in the lifelong treatment of copper toxicosis in Bedlington terriers and Wilson’s disease in humans. A complex form of copper-associated hepatitis has recently been characterized in the Labrador retriever. The aims of this study were to evaluate the effectiveness of d-penicillamine treatment for copper-associated hepatitis in this breed, to study the effects on hepatic copper, iron and zinc concentrations, and to evaluate parameters to predict optimal duration of treatment. Forty-three client-owned Labrador retrievers that were diagnosed with increased hepatic copper were treated with d-penicillamine and underwent at least one follow-up examination including a liver biopsy for histopathological scoring of inflammatory lesions. Hepatic copper, iron and zinc concentrations were determined in the initial and follow-up biopsies by instrumental neutron activation analysis. The influence of initial hepatic copper concentration, sex, age, d-penicillamine formulation and the occurrence of side effects were investigated for their influence on hepatic copper concentration after a certain period of treatment by generalized mixed modelling. d-penicillamine proved to be effective in reducing hepatic copper concentration and associated inflammatory lesions. Parameters derived from the model can be used to estimate the necessary duration of d-penicillamine treatment for Labrador retrievers with increased hepatic copper concentration. Continuous, lifelong d-penicillamine treatment is not recommended in this breed, as there may be a risk for hepatic copper and zinc deficiency.

Identification of dasatinib as an in vitro potent growth inhibitor of canine histiocytic sarcoma cells
Keita Ito, Shiori Kuroki, Masato Kobayashi, Kenichiro Ono, Tsukimi Washizhu, Makoto Bonkobara

Canine histiocytic sarcoma (HS) is an aggressive and fatal neoplasm that has a high recurrence rate and metastatic nature. In the present report, compounds were screened for their growth inhibitory activity in two HS cell lines using a chemical library known to target specific signalling pathways. Among 171 compounds screened, dasatinib, which targets several types of kinases, clearly inhibited cell growth in one of the two HS lines. The growth inhibitory properties of dasatinib were then examined using six HS cell lines and MDCK cells. Dasatinib demonstrated potent growth inhibitory activity against four HS cell lines with calculated IC50 values of 5.4–54.5 nM, while the IC50 values in the other cell lines were in the micromolar range. In
conclusion, a kinase enzyme targeted by dasatinib appears to be crucial for growth in some subsets of HS and the on-target activity of dasatinib could underlie the marked growth inhibition in HS cells.

**Compendium**

**Feline Small Cell Lymphosarcoma Versus Inflammatory Bowel Disease: Diagnostic Challenges**
Suliman Al-Ghazlat, Christian Eriksson de Rezende, Jean Ferreri
Inflammatory bowel disease (IBD) and small cell lymphosarcoma (SCLSA) are common causes of chronic gastrointestinal (GI) tract disease in cats. The history, clinical signs, and results of blood work and imaging for these conditions are nonspecific and often overlap. After a thorough diagnostic workup and treatment trials to rule out other conditions, a definitive diagnosis requires histopathologic evaluation of GI tract biopsy specimens. Full-thickness tissue samples appear to be superior to endoscopic biopsy samples in providing an accurate diagnosis. Adding advanced diagnostics such as polymerase chain reaction and immunohistochemistry to traditional histopathology may improve the diagnostic utility of small samples such as the ones obtained via endoscopy. Treatment of and prognosis for IBD and SCLSA are discussed in a companion article.

**Feline Small Cell Lymphosarcoma Versus Inflammatory Bowel Disease: Treatment and Prognosis**
Christian Eriksson de Rezende, DVM, MS, Suliman Al-Ghazlat, DVM, DACVIM
Feline inflammatory bowel disease is a diagnosis of exclusion and a common cause for chronic gastrointestinal signs such as weight loss, variation in appetite, vomiting, diarrhea, and lethargy. Patients with intestinal small cell lymphosarcoma can present with identical clinical signs, and differentiating between these two conditions can be a challenge. A companion article discusses the value of performing immunohistochemistry and polymerase chain reaction testing on intestinal biopsy samples for this purpose.

**Hepatic Encephalopathy: Etiology, Pathogenesis, and Clinical Signs**
Melissa Salgado, Yonaira Cortes
Hepatic encephalopathy (HE) is a manifestation of clinical signs that may result from a variety of liver diseases. In small animals, HE is most commonly a result of portosystemic shunting. The pathogenesis is not completely understood, although it is likely multifactorial. Theories of pathogenesis include altered ammonia metabolism and glutamine and glutamate transmission, an increase in γ-aminobutyric acid agonists and benzodiazepine-like substances, alterations of the serotonergic system and amino acid metabolism, elevated taurine levels, contributions from inflammatory mediators, and toxic effects of manganese. An understanding of the underlying mechanisms that result in HE may lead to new treatments in the future.

**Hepatic Encephalopathy: Diagnosis and Treatment**
Melissa Salgado, Yonaira Cortes
Hepatic encephalopathy (HE) is a neurologic syndrome resulting from the synergistic action of multiple pathologic factors, which are discussed in a companion article. Early recognition of the clinical signs can improve treatment outcome, as well as reduce the incidence of risk factors. Multimodal treatment of HE is usually indicated. Studies on the pathogenesis and treatment of HE in people may shed new light on further treatment modalities in small animal patients.

**Focus on Nutrition: Dietary Management of Gastrointestinal Disease**
Marge Chandler
Nutrition plays a key role in the management of gastrointestinal disease, and some patients may be managed by dietary therapy alone. Dietary ingredients can have a negative or positive effect on the bowel. Negative factors in a diet may include toxins, allergens, toxic dietary excesses, or nutritional deficiencies. Diet also has a direct effect on intestinal physiology, affecting motility, cell renewal rate, intestinal microbiome, enzyme production, ammonia production, and volatile fatty acid content. This article discusses dietary therapy of acute gastroenteritis, chronic gastroenteropathies, and feline constipation.

**Australian Veterinary Practitioner**

**Assessment of serum hepatic profiles of healthy dogs receiving ursodeoxycholic acid**
Lucena R, Guil-Luna S, Blanco B, Ginel PJ
Ursodeoxycholic acid (UDCA) is a bile acid present in trace amounts in canine bile. Ursodeoxycholic acid has been administered to dogs with hepatopathy for its choleretic, hepatoprotectant and immunomodulatory properties. This study investigated whether UDCA administration induced changes in serum biochemical variables in healthy dogs. Ursodeoxycholic acid was administered at 15 mg/kg PO once daily for 15 days to 12 healthy dogs. Serum concentrations of bile acids and total bilirubin, and activities of alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP) and gamma glutamyl transferase (GGT) were measured on days 1, 7 and 15 of UDCA administration. No clinical side effects were observed in any dogs during the study. All mean concentrations and activities of serum variables remained within the reference intervals at each time point. The mean serum total bilirubin concentration was significantly lower on day 15 compared to day 1 (P=0.007). The mean serum AST and GGT activities were significantly increased on day 15 from day 1 (P=0.042, P=0.028 respectively). Ursodeoxycholic acid administration at 15 mg/kg PO once daily for 15 days in 12 healthy dogs induced some statistically significant changes in concentrations and activities of several serum biochemical variables but all variables remained within the reference intervals. Thus, changes in concentrations and activities seen in dogs receiving UDCA may reflect something other than any direct drug effect expected in a healthy dog.

**Frequency of hypotension in a historical cohort of anaesthetised dogs undergoing elective desexing**

Costa RS, Raisis A, Musk GC, Hosgood G

The aim of this study was to determine the frequency of hypotension (based on mean arterial pressure measurements; MAP) in healthy dogs that were anaesthetised for elective desexing at Murdoch University Veterinary Hospital (MUVH). The secondary aim was to explore any association between gender, age, body mass, heart rate and anaesthetic induction agent with MAP. We hypothesised that MAP less than 60 mmHg would occur in at least 40% of healthy anaesthetised dogs. A historical cohort study was performed using anaesthetic records from dogs desexed by clinicians in the general practice service at MUVH between 2007 and 2011. Each dog was categorised according to the following criteria: I) hypotension - the lowest MAP present for at least two consecutive measurements was less than 60 mmHg, II) mild hypotension - the lowest MAP present for at least two measurements was between 60–79 mmHg and III) normotension - all MAP measurements were between 80–120 mmHg. The frequency of each category (point estimate, 95% confidence interval - CI) was calculated. Records from 188 dogs were included with 87/188 (0.46; 95% CI 0.39–0.53) categorised as hypotensive, 72/188 (0.38; 95% CI 0.31–0.45) as mildly hypotensive and 29/188 (0.15; 95% CI 0.10–0.21) as normotensive. Normotensive dogs were significantly older than hypotensive and mildly hypotensive dogs (P=0.0003 and 0.009 respectively) and hypotensive dogs had significantly lower body mass than mildly hypotensive dogs and normotensive dogs (P=0.008 and P=0.015 respectively). The frequency of hypotension was significantly higher when acepromazine and methadone was administered compared to acepromazine and morphine. The frequency of hypotension observed in the current study was at least as high as hypothesised at approximately 40%. This supports the concern that the development of hypotension is not infrequent and monitoring and managing blood pressure in healthy dogs is important. The significantly higher frequency of hypotension in younger and smaller dogs suggests modification of anaesthetic techniques may be warranted.

**Haemangiosarcoma of the ureter of a dog**

Yudelman C, Nimmo J, Snelling SR, Holloway SA

Haemangiosarcoma involving the ureter was diagnosed in an 11-year-old spayed female golden retriever. The dog presented with clinical signs consistent with abdominal pain and pyrexia. Palpation of the abdomen identified the presence of a large, firm mass in the left craniodorsal quadrant. Abdominal ultrasonography detected a mass encasing the left ureter, with left hydronephrosis and left proximal hydroureter. The left kidney and ureter with surrounding mass were resected. A diagnosis of haemangiosarcoma (HSA) was made after histologic and immunohistochemical (Factor VIII) examination of the mass. The dog was treated with adjuvant chemotherapy comprising five treatments of doxorubicin and was euthanised 442 days following surgery because of metastatic disease. A ureteral mass should be considered as a differential diagnosis when unilateral hydronephrosis is identified. This report describes HSA involving the ureter in a dog. Computed tomography was performed to better define the mass, demonstrate contralateral renal excretion of intravenous iodinated-contrast, and screen for pulmonary metastases. This information was critical for clinical decision-making.
Autogenous free pad grafts to reconstruct a weight-bearing surface in a cat
Shaw T, Laverty P
Extensive trauma to the distal extremities of dogs and cats resulting in loss of the paw pads can have a debilitating effect on the animal’s ability to ambulate and often gives justification for amputation. This report describes the use of autogenous free pad grafts to reconstruct a weight-bearing surface in a cat following a degloving injury to its left hindleg. This resulted in a functional limb with a weight-bearing surface covered with pad tissue, although there was some reduction in limb length.

Review of the radiographic signs of intestinal obstruction
Day JL, Pechman RD
The width of the small intestine is the most useful radiographic indicator of small intestinal obstruction. In dogs, a ratio of the small intestine width to the height of the fifth lumbar vertebral body that is greater than 1.6–2.0 is supportive of a diagnosis of mechanical small intestine obstruction. In cats, small intestinal diameter greater than 12 mm indicates dilation. Other signs of small intestinal obstruction are abnormal gas opacities (which may indicate a linear foreign body or intussusception), ‘gravel sign’ (accumulation of granular material in the small intestine indicating partial obstruction), and the presence of a foreign body. History and clinical findings are essential in the diagnosis of a functional ileus and partial small intestinal obstruction. If there is doubt about the diagnosis, then repeat radiography in 12-24 hours, ultrasound, or gastrointestinal contrast studies may be indicated. Justification for exploratory coeliotomy requires combining historical and clinical findings in light of results of diagnostic imaging. In the absence of a foreign body or obvious pathology at coeliotomy, biopsies are indicated.

Journal of Feline Medicine and Surgery

Changes in haematology measurements with the Sysmex XT-2000iV during storage of feline blood sampled in EDTA or EDTA plus CTAD
Fanny Granat, Anne Geffrê, Nathalie Bourgês-Abella, Jean-Pierre Braun, and Catherine Trumel
In veterinary medicine a complete blood cell count (CBC) cannot always be performed within 24 h as usually recommended, particularly for specimens shipped to a reference laboratory. This raises the question of the stability of the variables, especially in ethylenediamine tetra-acetic acid (EDTA) feline blood specimens, known to be prone to in vitro platelet aggregation. Citrate, theophylline, adenosine and dipyridamole (CTAD) has been reported to limit platelet aggregation in feline blood specimens. The aim of this study was to measure the stability of the haematological variables and the platelet aggregation score in EDTA and EDTA plus CTAD (EDCT) feline blood specimens during 48 h of storage at room temperature. Forty-six feline EDTA and EDCT blood specimens were analysed with a Sysmex XT-2000iV analyser, and the platelet count and score of platelet aggregation were estimated immediately and after 24 and 48 h of storage. A significant increase in mean corpuscular volume, haematocrit, reticulocyte and eosinophil counts, and a significant decrease in mean corpuscular haemoglobin concentration and monocyte count were observed. Haemoglobin, mean corpuscular haemoglobin, and red blood cell, white blood cell, neutrophil and lymphocyte counts remained stable. Changes in reticulocyte indexes with time (low fluorescence ratio, medium fluorescence ratio, high fluorescence ratio and immature reticulocyte fraction) were not significant. Changes were generally more pronounced in EDTA than in EDCT. Platelet aggregation decreased markedly in initially highly aggregated EDTA specimens, and increased slightly in initially non-or mildly-aggregated EDTA or EDCT specimens. Platelet counts increased and decreased, or remained stable, respectively. CTAD can reduce storage-induced changes of the haematological variables in feline samples, thus improving the reliability of a CBC and limiting clinical misinterpretations.

Ultrasonographic appearance of adrenal glands in healthy and sick cats
Anaïs Combès, Pascaline Pey, Dominique Paepe, Dan Rosenberg, Sylvie Daminet, Ingrid Putcuyps, Anne-Sophie Bedu, Luc Duchateau, Pauline de Fornel-Thibaud, Ghita Benchekroun, and Jimmy H Saunders
The first part of the study aimed to describe prospectively the ultrasonographic features of the adrenal glands in 94 healthy cats and 51 chronically sick cats. It confirmed the feasibility of ultrasonography of adrenal glands in healthy and chronically sick cats, which were not statistically different. The typical hypoechoic appearance of the gland surrounded by hyperechoic fat made it recognisable. A sagittal plane of the gland, not in line with the aorta, may be necessary to obtain the largest adrenal measurements. The reference intervals of adrenal measurements were inferred from the values obtained in the healthy and chronically sick cats (mean ± 0.96 SD): adrenal length was 8.9–12.5 mm; cranial height was 3.0–4.8 mm; caudal height was 3.0–4.5 mm. The second part of the study consisted of a retrospective analysis of the ultrasonographic examination of the adrenal glands.
in cats with adrenal diseases (six had hyperaldosteronism and four had pituitary-dependent hyperadrenocorticism) and a descriptive comparison with the reference features obtained in the control groups from the prospective study. Cats with hyperaldosteronism presented with unilateral severely enlarged adrenal glands. However, a normal contralateral gland did not preclude a contralateral infiltration in benign or malignant adrenal neoplasms. The ultrasonographic appearance of the adrenal glands could not differentiate benign and malignant lesions. The ultrasonographic appearance of pituitary-dependent hyperadrenocorticism was mainly a symmetrical adrenal enlargement; however, a substantial number of cases were within the reference intervals of adrenal size.

**Urinary tract infections in cats with chronic kidney disease**
Joanna D White, Mark Stevenson, Richard Malik, David Snow, and Jacqueline M Norris
Routine urine cultures were performed in cats with chronic kidney disease (CKD) to assess the overall prevalence and clinical signs associated with a positive urine culture (PUC). An occult urinary tract infection (UTI) was defined as a PUC not associated with clinical signs of lower urinary tract disease or pyelonephritis. Multivariate logistic and Cox proportional hazard regression models were used to evaluate the risk factors for an occult UTI and its relationship with survival. There were 31 PUCs from 25 cats. Eighty-seven percent of PUCs had active urine sediments. The most common infectious agent was *Escherichia coli* and most bacteria were sensitive to amoxicillin-clavulanate. Eighteen of 25 cats had occult UTIs. Among cats with occult UTI, increasing age in female cats was significantly associated with PUC; no significant association between occult UTI and survival was found and serum creatinine was predictive of survival in the short term (200 days) only. In conclusion, among cats with CKD, those with occult UTI were more likely to be older and female, but there was no association with severity of azotaemia. The presence of an occult UTI, when treated, did not influence survival.

**Feline degenerative joint disease: a genomic and proteomic approach**
Xiangming Gao, Junyu Lee, Sukhaswami Malladi, Lynda Melendez, B Duncan X Lascelles, and Samer Al-Murrani
The underlying disease mechanisms for feline degenerative joint disease (DJD) are mostly unidentified. Today, most of what is published on mammalian arthritis is based on human clinical findings or on mammalian models of human arthritis. However, DJD is a common occurrence in the millions of domestic felines worldwide. To get a better understanding of the changes in biological pathways that are associated with feline DJD, this study employed a custom-designed feline GeneChip, and the institution’s unique access to large sample populations to investigate genes and proteins from whole blood and serum that may be up- or down-regulated in DJD cats. The GeneChip results centered around three main pathways that were affected in DJD cats: immune function, apoptosis and oxidative phosphorylation. By identifying these key disease-associated pathways it will then be possible to better understand disease pathogenesis and diagnose it more easily, and to better target it with pharmaceutical and nutritional intervention.

**Comparison of renal ultrasonographic measurements between healthy cats of three cat breeds: Ragdoll, British Shorthair and Sphynx**
Katrien Debruyn, Dominique Paepke, Sylvie Daminet, Anaïs Combes, Luc Duchateau, Kathelijne Peremans, and Jimmy H Saunders
Healthy cats of three cat breeds — Sphynx (n = 11), British Shorthair (n = 15) and Ragdoll (n = 15) — were included in this study. All cats underwent an ultrasonographic examination to assess renal length, cortical thickness, medullary thickness and corticomedullary ratio. Of all ultrasonographic measurements, renal length showed the highest variation. For all ultrasonographic dimensions, individual and kidney side (left vs right) variation were much more pronounced than interbreed variation. Sphynx cats tended to have larger kidneys (4.09 ± 0.33 cm) than British Shorthair (3.77 ± 0.43 cm) and Ragdoll cats (3.87 ± 0.41 cm). British Shorthair cats, however, tended to have a thinner cortex (0.67 ± 0.13 cm) and medulla (0.76 ± 0.18 cm) than Sphynx (0.76 ± 0.14 cm and 0.90 ± 0.25 cm, respectively) and Ragdoll cats (0.75 ± 0.13 cm and 0.91 ± 0.22 cm, respectively). However, statistical tests did not reveal significant differences between these cat breeds. The corticomedullary ratio was similar for the three cat breeds (Sphynx: 0.93 ± 0.43; British Shorthair: 0.91 ± 0.26; Ragdoll: 0.88 ± 0.31). The left kidney (3.83 ± 0.42 cm) was significantly smaller than the right kidney (3.99 ± 0.40 cm) and showed a thicker medulla (left: 0.93 ± 0.21 cm, right: 0.79 ± 0.22 cm), and thus a lower corticomedullary ratio (left: 0.80 ± 0.23, right: 1.01 ± 0.32). For the cortical thickness, no significant difference was observed between the left (0.71 ± 0.14 cm) and right kidney (0.74 ± 0.14 cm).
Pharmakokinetics of imipenem after intravenous, intramuscular and subcutaneous administration to cats
Gabriela A Albarelos, Graciela A Denamiel, Laura Montoya, Pamela C Quaine, Martín P Lupi, and María F Landoni
The study describes the pharmakokinetics and predicted efficac of imipenem after intravenous (IV), intramuscular (IM) and subcutaneous (SC) administration to five adult cats at a dose of 5 mg/kg. Susceptibility to imipenem [minimum inhibitory concentration (MIC)] was determined for antimicrobial resistant Escherichia coli (n = 13) and staphylococci (n = 3) isolated from domestic cat infections (urinary system, skin and conjunctiva). Maximum plasma concentrations of imipenem were 13.45 µg/ml (IV), 6.47 µg/ml (IM) and 3.83 µg/ml (SC). Bioavailability was 93.18% (IM) and 107.90% (SC). Elimination half-lives for IV, IM and SC administration were 1.17, 1.44 and 1.55 h, respectively. All tested bacteria were susceptible to imipenem; MIC values were 0.03 µg/ml for Staphylococcus species and <0.25–0.5 µg/ml for E. coli. Mean imipenem concentrations remained above a MIC of 0.5 µg/ml for approximately 4 h (IV and IM) and 9 h (SC). Imipenem would be predicted to be effective for the treatment of antimicrobial resistant bacterial infections in cats at a dosage of 5 mg/kg every 6–8 h (IV, IM), or longer for the SC route. However, clinical trials are mandatory to establish its efficac and proper dosing.

Computed tomography characteristics of fibrosarcoma — a histological subtype of feline injection-site sarcoma
Olga Travetti, Mauro di Giancamillo, Damiano Stefanello, Roberta Ferrari, Chiara Giudice, Valeria Grieco, and Jimmy H Saunders
Feline injection-site sarcoma (FISS) may be a consequence of subcutaneous injection. In the present study, the medical records and the computed tomography (CT) features of 22 cats with a FISS, histopathological subtype fibrosarcoma, were used. The majority of the fibrosarcomas (45%) were located in the interscapular region. All fibrosarcomas, except one with mild enhancement, showed strong contrast uptake, characterised as ring (42%), heterogeneous (36%), homogeneous (9%), heterogeneous/ring (6.5%) or mixed heterogeneous/homogeneous enhancement (6.5%). The longest axis of the mass was in a cranio-caudal (68%) or dorso-ventral (32%) direction. The median volume calculated on CT was 7.57 cm³. Common features were a marked local invasiveness of the musculature and heterogeneity of the tissue in the periphery of the neoplasia. When the fibrosarcoma was interscapular, performing an additional post-contrast scan with the forelimbs positioned caudally along the body, in addition to the standard protocol with the forelimbs extended cranially, allowed better evaluation of the actual relationship between the tumour and the surrounding tissues. The mean number of muscles involved with the tumour was 2.09 with extended and 1.95 with flexed forelimbs. When a lower number of structures was considered infiltrated through the double positioning, a less invasive surgical approach to underlying muscles and scapula was performed.

An online survey to determine owner experiences and opinions on the management of their hyperthyroid cats using oral anti-thyroid medications
Sarah MA Caney
Hyperthyroidism is the most common feline endocrinopathy. Treatment options comprise anti-thyroid medication, iodine-restricted diet, surgical thyroidectomy and radioiodine. One hundred and eleven owners of hyperthyroid cats completed a detailed survey asking about their experiences and views on the management of hyperthyroidism. Male cats were slightly over-represented (60 cats, 54%). Concurrent chronic kidney disease was reported in 27% of the cats. Oral anti-thyroid medication was offered to 92% of owners. The final treatment decision was usually based on the veterinarian’s recommendation or joint decision-making between the owner and the veterinarian. Almost all of the cats (103, 93%) had received oral anti-thyroid medication at some point in the course of their disease. Sixty-nine cats (62%) were receiving oral anti-thyroid medication at the time of survey completion. Management of hyperthyroidism using UK veterinary-licensed oral anti-thyroid medication (Vidalta; MSD Animal Health, Felimazole; Dechra Veterinary Products) was associated with 72–75% success rates in terms of owner-assessed clinical outcome. The most important treatment priorities for owners were the prescription of the most accurate dose of medication and use of the lowest possible dose. None ranked once-daily treatment as most important to them, and 79% of owners said that they were, or would be, happy to dose their cat twice daily to control its hyperthyroidism. For 62% of owners, pilling their cat twice daily was not a problem. These results suggest that most cat owners are not a barrier to prescribing twice-daily anti-thyroid medication, if required.
Complications of Stamey percutaneous loop cystostomy catheters in three cats
Geraldine B Hunt, William TN Culp, Steven Epstein, Karl Jandrey, Marianna Ivanov, and Jodi L Westropp
Complications associated with the Stamey percutaneous loop cystostomy catheter (Cook Medical), including exposure of the most proximal side-hole and leakage of urine from the bladder, were encountered following percutaneous placement in three cats. In all cats, surgical exploration for removal of the catheter was performed.

Long-term use of gabapentin for musculoskeletal disease and trauma in three cats
Nina D Lorenz, Eithne J Comerford, and Isabelle Iff
Gabapentin has been widely used in human medicine to control acute and chronic pain. Although the exact mechanism of action has yet to be determined, its use in veterinary medicine is increasing. The clinical use of gabapentin for analgesia in cats has been reported in review articles and one case report. Managing chronic pain, particularly in the feline patient, poses a challenge to veterinary surgeons. This report details the long-term use of gabapentin for musculoskeletal pain or head trauma in three cats. All cats received gabapentin for several months at an average dose of 6.5 mg/kg q12h. Clinical signs suggestive of pain, such as aggression, avoiding human interaction and loss of appetite, were observed to decrease with the administration of gabapentin, used as part of an analgesia regime or as sole medication. Long-term follow-up with the owners of all cats indicated that satisfactory pain management was achieved, administration was easy and no obvious side effects during the period of administration occurred. We conclude that long-term treatment with gabapentin is of potential benefit in controlling pain in cases of head trauma, as well as musculoskeletal disease. It may provide a valuable adjunct for the management of chronic pain in cats and should be investigated further for its clinical use and safety.

A case of combined bilothorax and bile peritonitis secondary to gunshot wounds in a cat
Daniela Murgia
This report describes a case of bile peritonitis and bilothorax associated with diaphragmatic laceration secondary to gunshot wounds in a cat. Surgical treatment comprising cholecystectomy, placement of a chest tube for thoracic lavage and tube feeding led to an uneventful recovery. Bilothorax and bile peritonitis are a rare presentation in cats. There are only four cases reported in the literature and combined bilothorax and bile peritonitis secondary to gunshot lesion has not been documented before. This report describes positioning of the chest tube for pleural lavage through the diaphragmatic defect created by a pellet’s trajectory. The tube was then allowed to exit the laparotomy incision instead of exiting the thoracic wall.

Atypical feline sporotrichosis resembling vaccine-induced sarcoma: clinical and histopathological aspects
Isabele Barbieri dos Santos, Leonardo Pereira Quintella, Luisa Helena Monteiro de Miranda, Marcele Nogueira de Sousa Trotte, Tânia Maria Pacheco Schubach, and Rogerio Tortelly
A 7-year-old Siamese cat presenting with three ulcerated cutaneous nodules in the lumbosacral region was seen at the Laboratory for Clinical Research on Dermatozoonoses in Domestic Animals in Rio de Janeiro, Brazil. Histopathological analysis showed that the lesions consisted of polyhedral and spindle-shaped voluminous mononuclear cells with loose chromatin and clearly visible nucleoli, few giant cells, and foci of coagulative and caseous necrosis — findings suggestive of a vaccine-induced sarcoma. No significant mitotic rate, cytological atypias or asteroid bodies were observed. Special histopathological staining with periodic acid–Schiff and Grocott’s silver stain demonstrated the presence of small yeast cells characterized by simple and narrow-base budding compatible with Sporothrix schenckii. Mycological culture grew S. schenckii. Cytopathology was negative for yeast cells. These atypical clinical and histopathological signs support the importance of histopathological analysis with special staining techniques, in addition to mycological culture in the diagnosis of feline sporotrichosis.

Surgical correction of labial fusion with vaginoplasty in a cat
Tanja Plavec and Darja Pavlin
A spayed female domestic shorthair cat was first examined at the age of 16 months because of persistent licking of the perineal area. The cat had a grossly enlarged and oedematous vulva with pronounced superficial pyoderma of the perivulvar area, which responded favourably to systemic antibiotics, analgesics and local corticosteroids. A month after the initial examination, the cat was re-presented owing to pollakiuria, stranguria and dyschezia. The oedema of the vulva had disappeared and the vulvar labia were fused together; there was only a fistulous tract with a diameter of 1 mm present in the area of the vulva, and the cat strained to urinate through that opening. A contrast study revealed normal transit through the lower urinary tract, but labial adhesions resulted in the development of dilation cranially, where the vaginal vestibule was supposed to be. Vaginoplasty was subsequently performed, the cat recovered normally and, 10 months after the procedure, the lumen of the vaginostoma is preserved and the cat is urinating without difficulty.
Journal of Veterinary Internal Medicine (no journal this month)

Journal of the American Animal Hospital Association (no journal this month)

Veterinary Clinics of North America (no journal this month)

New Zealand Veterinary Journal (no journal this month)