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Pathogenesis of Feline Diabetes
Jacquie S. Rand, BVSc, DVSc, MANZVS, DACVIM

KEY POINTS
- Diabetes is essentially a disease of insulin secretory failure caused by damage to pancreatic islet b cells.
- Diabetes in cats is most commonly type 2, which is caused by b-cell failure in the presence of insulin resistance caused by obesity.
- The mechanisms of b-cell failure are still debated, but intracellular amyloid oligomers are a likely contributor in early stages, and glucose toxicity contributes to further b-cell damage and maintenance of the diabetic state.
- Other causes of b-cell failure include widespread damage to the pancreas by pancreatitis, and diseases that increase insulin resistance such as acromegaly.
- Diabetes is a disease of insulin deficiency.
- Insulin requirement can be increased by obesity, acromegaly, inflammation, and concurrent endocrine disease.
- Insulin secretion can be decreased by damage to pancreatic b cells by inflammation, glucose toxicity, reactive oxygen species, toxic intracellular oligomers, or mechanisms as yet unknown.

The Role of Diet in the Prevention and Management of Feline Diabetes
Debra L. Zoran, DVM, PhD, Jacquie S. Rand, BVSc, DVSc, MANZVS, DACVIM

KEY POINTS
- To maximize the probability of remission, a low-carbohydrate diet should be introduced soon after diagnosis of diabetes when the cat is eating well.
- Because diabetic remission is an important goal, frequent monitoring (both of body weight and glycemic control) and access to controlled amounts of low-carbohydrate/high-protein food is the best strategy.
- Low-carbohydrate diets should be continued after remission to minimize postprandial glycemia, and the demand on beta cells to secrete insulin.
- For cats already on insulin therapy, when changing from a high-carbohydrate to a low carbohydrate diet, the insulin dose initially should be reduced by 30% to 50% to avoid hypoglycemia.
- Combined with high protein to facilitate weight loss and maintenance of muscle mass, low-carbohydrate diets should be used in obese cats that have the potential to achieve remission.

Remission in Cats Including Predictors and Risk Factors
Susan Gottlieb, BVSc, MANZCVS, BSc(Vet), BAppSca, Jacquie S. Rand, BVSc, DVSc, MANZVS, DACVIM

KEY POINTS
- Early treatment of diabetes and obtaining good glycemic control is crucial to achieving remission.
- Frequent monitoring of blood glucose concentrations and appropriate adjustment of insulin dose is vital.
- Glargine and detemir have been associated with the highest rates of remission.
- A low-carbohydrate diet improves remission rates.
- Corticosteroid administration before the diagnosis of diabetes is a positive predictor for remission; however, administration once remission is achieved is a risk factor for relapse.
- Negative predictors for remission include a plantigrade stance and increased cholesterol concentrations.
- Age is positively associated with remission.

Management of Diabetic Cats with Long-acting Insulin
Kirsten Roomp, MSc, Dr rer nata, Jacquie S. Rand, BVSc, DVSc, MANZVS, DACVIM

KEY POINTS
- Glargine and detemir are associated with the highest remission rates reported in cats and the lowest occurrences of clinical hypoglycemic events.
Overall, glycemic control using glargine/detemir is superior to protamine zinc insulin because of the long duration of action of these insulin analogues, which reduces periods of hyperglycemia. However, it should be noted that no insulin type has been effective in controlling hyperglycemia in all cats, even with twice-daily administration. There is a narrow window of opportunity of treatment for diabetic cats; initiating effective treatment within days of diagnosis leads to remission rates greater than 90% using nonintensive blood glucose control protocols with glargine/detemir.

Management of Cats on Lente Insulin: Tips and Traps
Sarah M.A. Caney, BVSc, PhD, MRCVS
KEY POINTS
_ The majority of diabetic cats are non-ketotic, and their diabetes is analogous to human type 2 diabetes mellitus, characterized by insulin resistance, obesity, and pancreatic amyloid deposition.
_ Many cases of diabetes are straightforward to stabilize using Lente insulins, although it may take several weeks or months to identify an optimal insulin regime.
_ Detailed survival statistics for cats treated with Lente insulin are not available.
_ Median survival times for diabetic cats treated with Lente, Ultralente, or protamine zinc insulins are approximately 20 months.

Practical Use of Home Blood Glucose Monitoring in Feline Diabetics
KEY POINTS
_ Handheld glucometer technology has made accurate home blood glucose monitoring (home monitoring) possible for owners of diabetic cats.
_ Improvements in treatment and monitoring options change therapy goals from simply controlling observable clinical signs, and preventing consequences of overt hyperglycemia or hypoglycemia, to controlling the cat’s blood glucose in a near-normal range, and attempting to achieve resolution of the diabetic state.
_ Home monitoring allows for tight glycemic control and reversal of pancreatic glucose toxicity and significantly increases the likelihood of diabetic remission.
_ In the absence of home monitoring, the owner and veterinarian are unlikely to be aware of the day-to-day variation in blood glucose values, because cats are tolerant to both hypoglycaemia and hyperglycemia, often with a paucity of recognizable clinical signs.
_ Acute and chronic complications of diabetes can be avoided with home monitoring, leading to enhanced quality of life for the cat and owner.

Pancreatitis and Diabetes in Cats
Sarah M.A. Caney, BVSc, PhD, MRCVS
KEY POINTS
_ Pancreatitis, in particular chronic pancreatitis, is a common co-morbidity in diabetic patients.
_ Pancreatitis can complicate management of diabetes through reducing insulin secretion by the pancreas and increasing peripheral insulin resistance; however, in many patients, there is much controversy as to how much this condition affects diabetic stability and patient quality of life, especially in cases of chronic pancreatitis.
_ Presence of active pancreatic inflammation is most likely to complicate diabetic control.
_ Cats with evidence of acute pancreatitis around the onset of diabetes can achieve diabetic remission, and some may have no demonstrable residual impairment in glucose tolerance.

Hypersomatotropism, Acromegaly, and Hyperadrenocorticism and Feline Diabetes Mellitus
Stijn J.M. Niessen, DVM, PhD, PGCvetEd, FHEA, MRCVSa, b,*, David B. Church, BVSc, PhD, MACVSc, MRCVSa, Yaiza Forcada, DVM, MRCVSa
KEY POINTS
_ Diabetes mellitus in cats most commonly results from a primary disease process classified as type 2 diabetes, but in a proportion of cats, it is the consequence of another specific disease and classified as “other specific type of diabetes.”
Hypersomatotropism, which can result in acromegaly, usually results in diabetes classed as “other specific type of diabetes—subclass, endocrinopathies.” It has been reported to be a primary cause of feline diabetes in up to one-third of insulin-treated diabetic cats presented for assessment of glycemic control in UK primary practices.

Hyperadrenocorticism-induced diabetes is another example of “other specific type of diabetes” and although seemingly less common, when hyperadrenocorticism occurs, it will cause diabetes in 80% of cases. Recognition of these and other specific forms of diabetes, and specifically differentiation from type 2 diabetes, is crucial to enable election of the best possible treatment options and provision of the most accurate prognosis.

Diagnosis of both feline hypersomatotropism and feline hyperadrenocorticism requires careful consideration of the clinical picture and usually a combination of diagnostic tests.

Diabetic remission can be achieved when the diabetes is recognized to be a form of an “other specific type of diabetes” associated with insulin resistance, provided it is in an early phase and there is adequate treatment of the underlying etiology.

Diabetes and the Kidney in Human and Veterinary Medicine
Carly Anne Bloom, DVMa,* Jacquie S. Rand, BVSc, DVSc, MANZVS, DACVIMb

KEY POINTS
Clinical diabetic nephropathy is neither routinely recognized nor well studied in veterinary medicine; however, various studies in the past 40 years have suggested that some of the risk factors and structural renal changes of human diabetes also exist in diabetic dogs and cats.

Some diabetic cats and dogs do have risk factors or consequences of diabetes that are consistent with classification as diabetic nephropathy according to the American Diabetes Association, including renal azotemia, proteinuria, and hypercholesterolemia.

In human medicine, proteinuria is predictive for development and progression of diabetic nephropathy; although not widely studied, there is recent evidence to suggest that diabetic cats may be proteinuric.

Further study in this area is urgently needed to both confirm and understand the cause of proteinuria in feline diabetes mellitus.

Diabetic Ketoacidosis and Hyperosmolar Hyperglycemic State in Cats
Jacquie S. Rand, BVSc, DVSc, MANZVS, DACVIM

KEY POINTS
Diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state are life-threatening presentations of diabetes mellitus.

Treatment requires careful attention to restoring fluid volume, electrolyte deficits, and acid-base deficits.

Rapid-acting insulin is used to reverse ketoacidosis and should be administered until blood or urine ketone concentrations have normalized.

Insulin treatment itself can cause hypokalemia and hypophosphatemia; potassium and phosphate should be supplemented and their levels monitored frequently.

Hyperosmolar hyperglycemic state is a rare form of complicated diabetes mellitus with a high mortality rate.

Continuous Glucose Monitoring in Small Animals
Sean Surman, DVM, MS, DACVIMa,* Linda Fleeman, BVSc, PhD, MANZCVSb

KEY POINTS
Continuous glucose monitoring systems have proved to be accurate in small animal patients for monitoring sick/hospitalized and long-term stable diabetic patients.

The most important advantage of continuous glucose monitoring over intermittent blood glucose measurements is that it facilitates detection of brief periods of hypoglycemia and provides information overnight. A greater number of data points are obtained over a longer time frame allowing for identification of asymptomatic hypoglycemia and Somogyi phenomena that may be missed with traditional monitoring.

Monitoring overnight aids in the identification of nocturnal hypoglycemia.

Other advantages include that it is less time consuming for staff compared with traditional monitoring; reduces patient stress and stress-related hyperglycemia; reduces the frequency of venipuncture and duration of
indwelling catheterization; and affords the ability to make adjustments to treatment plans that may not be indicated based on traditional glucose monitoring methods.

Disadvantages include the initial cost associated with purchasing a system; limited recording range of 40 to 400 mg/dL (2.2–22.2 mmol/L) for the MiniMed Gold, Guardian Real-Time, i-Pro, Seven Plus, and FreeStyle Navigator, and 20 to 600 mg/dL (1.1–33.3 mmol/L) for the GlucoDay; difficulty initializing and calibrating when glucose values are outside the recording range; limited wireless range for the Guardian Real-Time of only 1.5 m; lack of accuracy in dehydrated, hypovolemic, or shock patients; and lag time that may be seen between changes in plasma and interstitial glucose.

**Oral Hypoglycemics in Cats with Diabetes Mellitus**
Carrie A. Palm, DVMa,*, Edward C. Feldman, DVMb

**KEY POINTS**
- Cats with diabetes mellitus often have type 2 disease.
- When owners are unwilling to administer insulin, use of oral hypoglycemic drugs can be considered.
- Several classes of oral hypoglycemic drugs have been evaluated in cats but these drugs have not been commonly used for treatment of diabetic cats.
- The use of older oral hypoglycemics has not become common in veterinary medicine; however, the advent of newer drugs, such as DPP-4 inhibitors, which may preserve B-cell function and thereby prevent development of type 1 diabetes mellitus, necessitates the need for further studies, some of which are currently in progress.

**New Incretin Hormonal Therapies in Humans Relevant to Diabetic Cats**
Claudia E. Reusch, DVM, Dr Med Vet*, Isabelle Padruyt, DVM

**KEY POINTS**
- In humans, glucagon-like peptide 1 (GLP-1) agonists and dipeptidylpeptidase-4 (DPP-4) inhibitors are novel therapeutic options for type 2 diabetes.
- Both classes enhance glucose-dependent insulin secretion, and reduce postprandial hyperglycemia and glucagon secretion.
- GLP-1 agonists additionally decelerate gastric emptying, induce satiety and weight loss, and may have beneficial effects on blood pressure.
- In cats, GLP-1 agonists and DPP-4 inhibitors have so far only been investigated in healthy individuals, resulting in a substantial increase in insulin secretion.
- Although results of clinical studies are not yet available and costs may currently be prohibitive, it is likely that incretin-based therapy opens up an important new area in feline diabetes.

**Australian Veterinary Journal**

**Sedation of hyperthyroid cats with subcutaneous administration of a combination of alfaxalone and butorphanol**
S Ramoo LA Bradbury GA Anderson LA Abraham

**Objective** To evaluate the sedative, respiratory and cardiovascular effects of subcutaneously administered alfaxalone and butorphanol in a group of hyperthyroid cats.

**Design** A prospective, single-centre observational study.

**Methods** Client-owned hyperthyroid cats (n = 20) were examined and sedated with alfaxalone (3 mg/kg) and butorphanol (0.2 mg/kg) administered subcutaneously. Sedation scores, heart rate, respiratory rate and blood pressure were measured at 15-min intervals during the 45-min observation period and compared with pre-sedation values. At the end of 45 min, cats were assessed to be adequately sedated for oral administration of iodine-131 if there was minimal resistance and an intact gag reflex.

**Results** The maximum median sedation score was reached 45 min after injection. The lowest mean heart and respiratory rates and blood pressure values occurred 30 min after injection. Significant decreases were noted in respiratory rates at all three time points (P < 0.001). Systolic, diastolic and mean blood pressure measurements were also significantly decreased at 15 and 30 min after injection (P < 0.05).
Conclusion Subcutaneously administered alfaxalone and butorphanol can be used for sedation in cats undergoing procedures of short duration. Blood pressure should be monitored because of transient decreases observed in some cats. Further studies are required to determine whether the sedative, respiratory and cardiovascular effects are similar in euthyroid cats.

**Journal of the American Veterinary Medical Association - April 1, 2013**

**Evaluation of fiber concentration in dry and canned commercial diets formulated for adult maintenance or all life stages of dogs by use of crude fiber and total dietary fiber methods**

Amy K. Farcas, DVM, DACVN; Jennifer A. Larsen, DVM, PhD, DACVN; Andrea J. Fascetti, VMD, PhD, DACVN, DACVIM

Objective—To assess differences among reported maximum crude fiber (CF), measured CF, and measured total dietary fiber (TDF) concentrations, and determine fiber composition in dry and canned nontherapeutic diets formulated for adult maintenance or all life stages of dogs.

Design—Prospective cross-sectional study.

Sample—Dry (n = 20) and canned (20) nontherapeutic canine diets.

Procedures—Reported maximum CF concentrations were obtained from product labels. Concentrations of CF and TDF were measured in samples of the diets for comparison. For each diet, percentages of TDF represented by insoluble dietary fiber (IDF) and soluble dietary fiber (SDF) were determined.

Results—For dry or canned diets, the median reported maximum CF concentration was significantly greater than the median measured value. Measured CF concentration was significantly lower than measured TDF concentration for all diets. Median percentage of TDF (dry-matter basis) in dry and canned diets was 10.3% and 6.5%, respectively (overall range, 3.9% to 25.8%). Fiber composition in dry and canned diets differed; median percentage of TDF provided by IDF (dry-matter basis) was 83.4% in dry diets and 63.6% in canned diets.

Conclusions and Clinical Relevance—Among the evaluated diets, measured CF concentration underrepresented measured TDF concentration. Diets provided a wide range of TDF concentration, and proportions of IDF and SDF were variable. In the absence of information regarding TDF concentration, neither reported maximum nor measured CF concentration appears to be a particularly reliable indicator of fiber concentration and composition of a given canine diet.

**Spatial and temporal patterns of *Leptospira* infection in dogs from northern California: 67 cases (2001–2010)**

Objective—To conduct an epidemiological analysis of the spatial and temporal distribution of canine leptospirosis cases in northern California and detect spatial clustering in any region.

Design—Retrospective case-control study.

Animals—67 dogs with leptospirosis and 271 control dogs.

Procedures—Medical records of case and control dogs were reviewed. Spatial coordinates of home addresses of the study population were analyzed visually and statistically via a Cuzick-Edwards test and spatial, temporal, and space-time permutation scan statistics.

Results—Cases were distributed around the San Francisco Bay region as well as in the Sierra Nevada foothills near Sacramento, Calif, whereas controls were principally distributed along route I-80 between San Francisco and Sacramento, Calif. Clustering was found for the second through sixth nearest neighboring cases via the global spatial cluster test. A local spatial cluster of 30 cases was identified in San Francisco (95% confidence interval, 1.3 to 7.0), and a temporal cluster of 18 cases was identified from May 2003 through May 2004 (95% confidence interval, 1.4 to 6.5). No significant space-time cluster was identified.

Conclusions and Clinical Relevance—The use of geographic information systems provided a visual representation of the results of statistical analysis for the location and time at which leptospirosis cases occurred. This useful tool can be used to educate veterinary practitioners and the public about a potentially fatal zoonotic disease and direct vaccination strategies to help prevent disease occurrence.
Outcome of ventriculoperitoneal shunt implantation for treatment of congenital internal hydrocephalus in dogs and cats: 36 cases (2001–2009)

Objective—To examine outcome data for cats and dogs with congenital internal hydrocephalus following treatment via ventriculoperitoneal shunting to determine treatment-associated changes in neurologic signs, the nature and incidence of postoperative complications, and survival time.

Design—Retrospective multicenter case series.

Animals—30 dogs and 6 cats with congenital internal hydrocephalus (confirmed via CT or MRI).

Procedures—Medical records for dogs and cats with internal hydrocephalus that underwent unilateral ventriculoperitoneal shunt implantation from 2001 through 2009 were evaluated. Data collected included the nature and incidence of postoperative complications, change in clinical signs following surgery, and survival time. To compare pre- and postoperative signs, 2-way frequency tables were analyzed with a 1-sided exact McNemar test.

Results—8 of 36 (22%) animals developed postoperative complications, including shunt malfunction, shunt infection, and seizure events. Three dogs underwent shunt revision surgery. Thirteen (36%) animals died as a result of hydrocephalus-related complications or were euthanized. Following shunt implantation, clinical signs resolved in 7 dogs and 2 cats; overall, 26 (72%) animals had an improvement of clinical signs. After 18 months, 20 animals were alive, and the longest follow-up period was 9.5 years. Most deaths and complications occurred in the first 3 months after shunt placement.

Conclusions and Clinical Relevance—Results indicated that ventriculoperitoneal shunt implantation is a viable option for treatment of dogs or cats with congenital hydrocephalus. Because complications are most likely to develop in the first 3 months after surgery, repeated neurologic and imaging evaluations are warranted during this period.


Objective—To determine the prevalence of urinary incontinence in spayed female dogs and categorize affected dogs by age at time of ovariohysterectomy, number of litters prior to ovariohysterectomy, body weight, treatment of affected dogs, and severity of incontinence and to determine associations among these variables.

Design—Retrospective case series.

Animals—566 ovariohysterectomized dogs.

Procedures—An attempt was made to contact owners of 912 dogs ovariohysterectomized between January 2003 and January 2008 to discuss presence or absence of urinary incontinence. The actual number of responders was 566. Those owners with incontinent pets received a questionnaire further assessing degree of incontinence, diagnostic testing, treatment, and history.

Results—The prevalence of acquired urinary incontinence was determined to be 5.12% (29/566 dogs) on the basis of results of phone surveys and questionnaires. There was no significant difference in the age at time of ovariohysterectomy between incontinent and continent groups. A significant association was found between body weight and incontinence, with incontinence rates higher among larger (≥ 15 kg [33.1 lb]) dogs. Larger dogs were approximately 7 times as likely (OR, 7.2 [95% confidence interval, 2.5 to 21.1]) to develop acquired urinary incontinence, compared with small dogs (< 15 kg).

Conclusions and Clinical Relevance—Although acquired urinary incontinence in female dogs is known to be associated with ovariohysterectomy, the prevalence in this study was low.

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Safety and efficacy of spinosad chewable tablets for treatment of flea infestations of cats

Tandy E. Paarlberg, MS; Scott Wiseman, PhD; Candace M. Trout, MS; Elizabeth A. Kee, DVM; Daniel E. Snyder, DVM, PhD, DACVM

Objective—To compare safety and efficacy of spinosad and selamectin and determine effects of those products on flea allergy dermatitis (FAD) in cats.

Design—Randomized clinical trial.

Animals—211 client-owned cats.
Procedures—Cats with ≥ 5 fleas evaluated at 8 veterinary clinics were allocated to receive spinosad (50 to 100 mg/kg [22.7 to 45.5 mg/lb], PO; n = 139) or selamectin (≥ 6 mg/kg [≥ 2.7 mg/lb], topically; 72) once per month. Flea comb counts and FAD scores were determined on day −1, between days 27 and 33, and between days 85 and 95 (evaluations 1, 2, and 3, respectively); day 0 was the first day of drug administration.

Results—The most common adverse event was vomiting (14.3% and 2.4% of spinosad- and selamectin-treated cats, respectively). Evaluation 2 and 3 geometric mean flea counts for spinosad-treated cats were significantly lower than those for selamectin-treated cats. Percentage reductions in flea counts for the spinosad and selamectin groups were 97.5% and 88.8% (evaluation 2) and 99.3% and 97.7% (evaluation 3), respectively. At evaluations 2 and 3, 70.6% and 92.6% of spinosad-treated cats and 29.4% and 64.7% of selamectin-treated cats were free of fleas, respectively. Weighted FAD scores for spinosad- and selamectin-treated cats decreased 94.2% and 80.0% during the study, respectively. Spinosad tablets were successfully administered during 98.1% of treatments.

Conclusions and Clinical Relevance—Results of this study indicated spinosad and selamectin both reduced flea counts and FAD scores for cats, although spinosad was more effective. Monthly oral administration of spinosad may be practical for treatment of flea infestations and FAD in cats.

Angharad H. K. Waite, VMD; Karen Jackson, BVSc, DACVP; Thomas P. Gregor, BS; Erika L. Krick, VMD, DACVIM

Objective—To evaluate the clinical response rate, progression-free survival time, overall survival time, and possible prognostic factors associated with a cyclophosphamide-, vincristine-, and prednisone (COP)-based chemotherapy protocol in cats with lymphoma.

Design—Retrospective case series.

Animals—114 cats with lymphoma.

Procedures—Medical records of cats receiving a weekly COP-based chemotherapy protocol from 1998 to 2008 at the Matthew J. Ryan Veterinary Hospital of the University of Pennsylvania were evaluated for information regarding signalment, anatomic site of involvement, cell morphology, treatment, and outcome. Retroviral status, baseline weight, substage, anatomic location, dose delays, dose reductions, and response to treatment were evaluated for prognostic importance.

Results—The majority of cases (94 [82.4%]) were substage b, and the most common anatomic site was the gastrointestinal tract (57 [50%]). Clinical response rate after the first chemotherapy cycle was 47.4%. Response to treatment was significantly associated with progression-free survival time and overall survival time, whereas substage was significantly associated with progression-free survival time. The median progression-free survival time and overall survival time were 65.5 and 108 days, respectively. Compared with nonresponders, responders had significantly longer median progression-free survival time (364 vs 31 days) and median overall survival time (591 vs 73 days).

Conclusions and Clinical Relevance—Clinical response after 1 cycle of COP-based chemotherapy was predictive for progression-free survival time and overall survival time in cats with lymphoma; therefore, response after 1 cycle of chemotherapy could be used to guide decisions about further treatment. No new prognostic factors were identified.

Outcome following gastrointestinal tract decontamination and intravenous fluid diuresis in cats with known lily ingestion: 25 cases (2001–2010)
Alice J. Bennett, BVSc; Erica L. Reineke, VMD, DACVECC

Objective—To describe the outcome of cats treated with gastrointestinal tract decontamination, IV fluid diuresis, or both after ingestion of plant material from lilies of the Lilium and Hemerocallis genera.

Design—Retrospective case series.

Animals—25 cats evaluated after ingestion of lily plants.

Procedures—Medical records of cats examined at the Matthew J. Ryan Veterinary Hospital of the University of Pennsylvania with known lily ingestion between July 2001 and April 2010 were reviewed. Inclusion in the study required evidence of lily plant ingestion within the preceding 48 hours. Type of lily ingested, time of
ingestion, gastrointestinal tract decontamination procedures performed, and IV fluid diuresis were recorded. The presence or absence of acute kidney injury was determined by evaluating BUN concentration, creatinine concentration, and urine specific gravity. Outcome was defined as survival to discharge, death, or euthanasia.

Results—The time from ingestion until evaluation at the Matthew J. Ryan Veterinary Hospital of the University of Pennsylvania ranged from < 30 minutes to 48 hours. Nineteen cats received gastrointestinal tract decontamination (18 cats at our hospital and 1 cat by the referring veterinarian). Twenty-three cats were admitted to the hospital for IV fluid diuresis, supportive care, and monitoring. Seventeen of these 23 (74%) cats had normal BUN and creatinine concentrations throughout hospitalization. At the time of discharge from the hospital, 2 of the 23 (9%) hospitalized cats had an increased BUN concentration, creatinine concentration, or both. All 25 (100%) cats survived to discharge from the hospital.

Conclusions and Clinical Relevance—In this series of cats treated with gastrointestinal tract decontamination, IV fluid diuresis, or both within 48 hours after sago ingestion, the outcome was good, with a low incidence of acute kidney injury. Future studies are needed to determine the most effective gastrointestinal tract decontamination procedures and optimal duration of IV fluid therapy.

Treatment of traumatic penile urethral stricture in a dog with a self-expanding, covered nitinol stent

Ann-Marie Della Maggiore, DVM; Michele A. Steffey, DVM, DACVS; Jodi L. Westropp, DVM, PhD, DACVIM

Case Description—An 8-month-old castrated male mixed-breed dog was evaluated because of hematuria, stranguria, and dysuria of approximately 2 weeks’ duration that developed immediately following elective castration.

Clinical Findings—Results of physical examination, ultrasonography, retrograde double-contrast cystourethrography, and urethroscopy were consistent with a traumatic urethral stricture immediately proximal to the os penis resulting in a partial obstruction of urine outflow. Results of ultrasonographic examination of abdominal organs were considered normal. Digital radiography revealed no evidence of calculi.

Treatment and Outcome—Balloon dilation of the urethral stricture was performed and was followed by 2 bougienage procedures during the subsequent 2 weeks when clinical signs returned. The owners declined scrotal urethrostomy, and a self-expanding, covered nitinol stent was placed approximately 3 weeks after the initial evaluation, resulting in amelioration of clinical signs. Results of follow-up urethroscopy and contrast cystourethrography 1 year after stent placement revealed a statically positioned, patent urethral stent, although a small number of polypoid mucosal structures were identified distal to the stent and 1 small structure consistent with tissue ingrowth into the stent was identified.

Clinical Relevance—Placement of a covered nitinol stent resulted in long-term resolution of clinical signs associated with traumatic stricture of the penile urethra in this young dog. Because the os penis in dogs limits radial expansion of the urethra, its presence may limit the use of stents in this location.

Compendium

Sago Palm Toxicosis in Dogs

Leyla Fatourechi, Louis A. DelGiudice, Nadrea Sookhoo

Cycads (also known as sago palms) are popular ornamental and landscaping plants that have historically been both a food source and a cause of toxicosis in humans and animals. This article summarizes the history of cycad toxicosis and reviews the available literature on the pathogenesis, clinical aspects, treatment, and prognosis of this toxicosis in dogs. Clinical signs of cycad ingestion are referable to the gastrointestinal, hepatic, and central nervous systems. Diagnosis of cycad ingestion must rely on clinical signs and historical information. Treatment consists of decontamination and supportive care, and the prognosis is variable. Because cycads are a cause of morbidity and mortality in dogs, clinicians should be aware of their toxic properties.

Surgical Views: Incisional Gastropexy to Prevent and Treat Canine Gastric Dilatation-Volvulus

Clarence Rawlings

Gastric dilatation-volvulus (GDV) is a life-threatening emergency in large-breed and deep-chested dogs. This article describes a technique for incisional gastropexy that can be used during emergency surgical treatment or,
preferably, as a preventive procedure in a healthy, GDV-susceptible dog. Gastropexy can be done during a traditional laparotomy, as described here, or as a laparoscopically assisted procedure, as described elsewhere.

Dental Care for Senior Pets
Heidi Lobprise
Clinical Snapshot: A Tennessee Walking Horse With Acute Dyspnea and Epistaxis
Sharon Tiros-Levy, Amir Steinman, Gal Kelmer

Journal of Feline Medicine and Surgery

Mechanisms, causes, investigation and management of vomiting disorders in cats: a literature review
Vomiting is a common presenting complaint in feline practice. This article differs from previous reviews in that it is an evidence-based review of the mechanisms, causes, investigation and management of vomiting in the domestic cat. Published evidence was reviewed, and then used to make recommendations for clinical assessment, diagnosis, antiemetic drug treatment, dietary management and monitoring of cats presenting with vomiting. The strength of the evidence on which recommendations are made (and areas where evidence is lacking for cats) has been highlighted throughout.

Treatment and long-term follow-up of cats with suspected primary epilepsy
Akos Pakozdy, Ali Asghar Sarchahi, Michael Leschnik, Alexander G Tichy, Peter Halasz, and Johann G Thalhammer
We report an evaluation of the treatment and outcome of cats with suspected primary epilepsy. Phenobarbital therapy was used alone or in combination with other anti-epileptic drugs. Outcome after treatment was evaluated mainly on the basis of number of seizures per year and categorised into four groups: seizure-free, good control (1–5 seizures per year), moderate control (6–10 seizures per year) and poor control (more than 10 seizures per year). About 40–50% of cases became seizure-free, 20–30% were considered good-to-moderately controlled and about 30% were poorly controlled depending on the year of treatment considered. The duration of seizure events after treatment decreased in 26/36 cats and was unchanged in eight cats. The subjective severity of seizure also decreased in 25 cats and was unchanged in nine cats. Twenty-six cats had a good quality of life, nine cats an impaired quality of life and one cat a bad quality of life. Despite being free of seizures for years, cessation of treatment may lead to recurrence of seizures in most cats.

Agreement between auricular and rectal measurements of body temperature in healthy cats
Marlos G Sousa, Roberta Carareto, Valdo A Pereira-Junior, and Monally CC Aquino
Measurement of body temperature is a routine part of the clinical assessment of a patient. However, this procedure may be time-consuming and stressful to most animals because the standard site of temperature acquisition remains the rectal mucosa. Although an increasing number of clinicians have been using auricular temperature to estimate core body temperature, evidence is still lacking regarding agreement between these two methods in cats. In this investigation, we evaluated the agreement between temperatures measured in the rectum and ear in 29 healthy cats over a 2-week period. Temperatures were measured in the rectum (using digital and mercury-in-glass thermometers) and ear once a day for 14 consecutive days, producing 406 temperature readings for each thermometer. Mean temperature and confidence intervals were similar between methods, and Bland–Altman plots showed small biases and narrow limits of agreement acceptable for clinical purposes. The interobserver variability was also checked, which indicated a strong correlation between two near-simultaneous temperature readings. Results are consistent with auricular thermometry being a reliable alternative to rectal thermometry for assessing core body temperature in healthy cats.
Litter box preference in domestic cats: covered versus uncovered
Emma K Grigg, Lindsay Pick, and Belle Nibblett
Feline inappropriate elimination (periuria and/or perichezia) remains a very common behavioral complaint of
the cat. Treatment recommendations often include improving the attractiveness of the litter boxes available
to the cat. One frequent recommendation is to avoid covered litter boxes, although this has not previously been
tested experimentally. The goal of this study was to assess whether, all else being equal, cats preferentially used
uncovered litter boxes over covered litter boxes. Twenty-eight cats were enrolled in the study and offered the
choice of a covered or uncovered box. Waste was scooped daily from each box, and the weight of waste in the
different box styles was compared and evaluated using paired t-tests and \( \chi^2 \) analyses. Overall, there was no
significant difference between use of the two box styles. Eight individual cats did exhibit a preference (four for
covered, four for uncovered), but individual preference results are not evenly distributed, with more cats than
expected showing no preference between litter box types. We postulate that, if boxes are kept sufficiently clean
(i.e., once daily minimum cleaning), most cats will not show a preference for either box type. The observation
that a minority of cats in the study exhibited a preference supports the recommendation of providing individual
cats with a ‘cafeteria’ of litter box styles, including a covered box, to determine whether such a preference
exists. These findings add to existing literature on the topic of feline inappropriate elimination and provide
additional information for clinicians recommending treatment options for cats exhibiting this behavior.

Magnetic resonance (MR) imaging and MR cholangiopancreatography findings in cats with cholangitis
and pancreatitis
Angela J Marolf, Susan L Kraft, Thomas R Dunphy, and David C Twedt
Cholangiohepatitis/cholangitis is second only to hepatic lipidosis as the most common liver disease in cats and
is often associated with concurrent pancreatitis. Magnetic resonance imaging (MRI) and MR
cholangiopancreatography (MRCP) have developed into an accurate, highly sensitive and specific imaging tool
for the diagnosis of biliary and pancreatic duct disorders in humans. In this prospective case series, 10 cats with
suspected cholangitis and/or pancreatitis were enrolled based on clinical history, physical examination and
appropriate diagnostic test results. MRI and MRCP sequences with secretin stimulation of the cranial abdomen
were performed, and sonography and laparoscopic biopsies for histologic diagnosis were obtained for
comparison. MRI detected pancreatic abnormalities in cats suspected of pancreatitis, including T1 pre-contrast
hypointense and T2 hyperintense pancreatic parenchyma and a dilated pancreatic duct. The MRI findings of the
liver were non-specific. Nine of 10 cats had biliary abnormalities, including gall bladder wall thickening, gall
bladder wall moderate contrast enhancement and/or gall bladder debris. Eight of 10 cats had histologic evidence
of pancreatitis, as well as hepatitis or cholangitis, with one cat diagnosed with hepatic lymphoma. The
advantages of MRI/MRCP over sonography of these cats included the striking pancreatic signal changes
associated with pancreatitis and the ability to comprehensibly assess and measure the pancreas and hepatobiliary
structures without operator dependence or interference from bowel gas. MRI/MRCP imaging of the feline
abdomen may be beneficial in cases with equivocal ultrasound imaging findings.

Samples with high virus load cause a trend toward lower signal in feline coronavirus antibody tests
Marina L Meli, Paul Burr, Nicola Decaro, Elizabeth Graham, Oswald Jarrett, Hans Lutz, Michael
McDonald, and Diane D Addie
Measurement of feline coronavirus (FCoV) antibody titres is utilised mainly for diagnosing feline infectious
peritonitis (FIP) and for quarantine purposes. However, occasional samples show a falsely low or negative
FCoV antibody test. We tested the hypothesis that such results are due to virus in the sample binding antibody
and rendering it unavailable to antigen in the test. Thirteen effusions, one plasma and three undefined samples
from cats with FIP, which gave unexpectedly low FCoV antibody titres, were examined by real-time reverse
transcriptase polymerase chain reaction (RT-PCR). Increasing amounts of virus correlated with lower signals in
indirect immunofluorescent, enzyme-linked immunosorbent assay and rapid immunomigration antibody tests.
However, five samples were negative by RT-PCR, so the presence of virus alone may not explain all cases of
false-negative FCoV antibody tests, although it is a possible explanation in 71% of discordant samples. We
conclude that falsely low or negative FCoV antibody tests can occur in samples rich in virus.
Amyloidosis in association with spontaneous feline immunodeficiency virus infection

Pietro Asproni, Francesca Abramo, Francesca Millanta, Davide Lorenzi, and Alessandro Poli

Tissues from 34 naturally feline immunodeficiency virus (FIV)-infected cats, 13 asymptomatic cats and 21 cats with signs of feline acquired immunodeficiency syndrome (F-AIDS), and 35 FIV-seronegative subjects were examined to determine the presence of amyloid deposits. Twenty experimentally FIV-infected cats and five specific pathogen-free (SPF) control cats were also included in the study. Paraffin-embedded sections from kidney and other organs were submitted to histological and histochemical analysis. Amyloid deposits were identified by a modified Congo red stain and confirmed by electron microscopy to demonstrate the presence of amyloid fibrils in amyloid positive glomeruli. In all positive cases, secondary amyloidosis was identified with potassium permanganate pretreatment and amyloid type was further characterised by immunohistochemistry using primary antibodies against human AA and feline AL amyloids. Amyloid deposits were present in different tissues of 12/34 (35%) naturally FIV-infected cats (seven presenting F-AIDS and five in asymptomatic phase) and in 1/30 FIV-seronegative cats. All the experimentally FIV-infected and SPF subjects showed no amyloid deposits. Amyloidosis has been reported in human lentiviral infections, and the data reported here demonstrate the need, in naturally FIV-infected cats, to consider the presence of amyloidosis in differential diagnosis of hepatic and renal disorders to better assess the prognosis of the disease.


Danny W Scott, William H Miller, and Hollis N Erb

Medical records of 1407 cats with dermatologic diagnoses made at Cornell University teaching hospital from 1988 to 2003 were tabulated. We expressed the diagnoses as counts, percentages of the cats with dermatologic disease (1407) and percentages of all cats seen at the university hospital (22,135) during the same period. A total of 1887 diagnoses were made in the 1407 cats. We compared the age, sex and breed group of our cases with all those 22,135 cats in (‘1-by-c’) χ² tests in which the hospital population was considered a standard (rather than a ‘sample’). The 10 most common dermatoses, their counts, and the proportions of dermatologic diagnoses and of the total cat population that the cats with these dermatoses represented were: allergy (298; 15.8%; 1.35%), atopic dermatitis (194; 10.3%; 0.88%), bacterial folliculitis/furunculosis (189; 10.0%; 0.85%), otodectic mange (115; 6.1%; 0.52%), flea infestation (99; 5.2%; 0.45%), feline acne (74; 3.9%; 0.33%), flea-bite allergy (70; 3.7%; 0.32%), cutaneous adverse drug reaction (56; 3.0%; 0.25%), idiopathic eosinophilic-granuloma complex (55; 2.9%; 0.25%) and abscess (51; 2.7%; 0.23%). Allergies of all types, combined, accounted for 32.7% of all the feline dermatoses. Relative to the standard of the total hospital population, cats < 2 years old and females (both intact and spayed) were significantly under-represented (all P ≤ 0.001) in the dermatologic case series. In contrast, Himalayans (compared with domestic short- or longhair, Persian, Siamese and other breeds) and males (both intact and neutered) were significantly over-represented (all P ≤ 0.001).

High incidence of ‘Dag-like’ sperm defect in the domestic cat

Ana Izabel S Balbin Villaverde, Eduarodo G Fioratti, Renata S Ramos, Renato C F Neves, Guilherme S Cardoso, Fernanda C Landim-Alvarenga, and Maria Denise Lopes

The occurrence of a high incidence of sperm tail defects in a male domestic cat resembling the known ‘Dag-like’ defect is reported. Sperm analyses were performed in ejaculated samples collected by an artificial vagina and in testicular and epididymal sperm cells after castration. The following alterations were observed using transmission electron microscope: heavily coiled sperm tails containing several axonemal units enclosed in the same common cell membrane; aberrations in the axonemal main structure; and swollen and unevenly distributed mitochondria in the midpiece. Abnormal modifications in the mitochondrial sheath were also found in sperm cells retrieved from testes and epididymides. Considering these findings, we can conclude that this is the Dag-like defect, described previously in other domestic species and a testicular origin may be involved.

A survey of North American shelter practices relating to feline upper respiratory management

Miranda E Spindel, Margaret R Slater, and Dawn Boothe

An internet-based survey was conducted to determine common strategies for control of feline upper respiratory infections (URI) in animal shelters. Two hundred and fifty-eight North American shelters responded, representing a spectrum of 57% private non-profit, 27% municipal and 16% combined private non-profit-
municipal shelters. All but nine shelters reported having a regular relationship with a veterinarian, 53% had full-time veterinarians and 62% indicated full-time (non-veterinarian) medical staff. However, in 35% of facilities, non-medical shelter management staff determined what medication an individual cat could receive, with 5% of facilities making that decision without indicating the involvement of a veterinarian or technician. Ninety-one percent of shelters had an isolation area for clinically ill cats. The most commonly used antimicrobial was doxycycline (52%), followed by amoxicillin/clavulanic acid (33%). Shelters are using a wide range of prevention measures and therapeutics, leaving room for studying URI in different settings to improve understanding of optimal protocols.

**Preliminary results in the redox balance in healthy cats: influence of age and gender**

Cristina Castillo, Víctor Pereira, Ángel Abuelo, Rebeca Guimarey, Marco García-Vaquero, José L Benedito, and Joaquín Hernández

Oxidative stress (OS) impairs organic function and is considered causally related to cellular senescence and death. This study aims to evaluate if the redox balance varies in relation to age and gender in healthy cats. To quantify the oxidative status of this species we determined the oxidative damage as serum reactive oxygen metabolites (ROM) and the total serum antioxidant capacity (SAC). In addition, we used the ratio of ROM to SAC as a measure of the oxidative balance, with higher values meaning higher oxidative stress (oxidative stress index). Our results suggest that the male population is at oxidative risk when compared with females, especially between the age of 2 and 7 years. Nutritional strategies in this population looking for additional antioxidant support would probably avoid the oxidative stress status that predisposes to chronic processes in senior male cats. Further clinical trials in this field are recommended.

**Three clinical cases of Anaplasma phagocytophilum infection in cats in Poland**

Łukasz Adaszek, Marta Górna, Maciej Skrzypczak, Krzysztof Buczek, Ireneusz Balicki, and Stanislaw Winiarczyk

The purpose of this study was to describe *Anaplasma phagocytophilum* infection of three cats in Poland showing signs of fever, swollen and painful joints, pale mucous membranes and epistaxis. Morulae consistent with *A. phagocytophilum* were present within the neutrophils of two of the cats. A polymerase chain reaction (PCR) was found targeting the 16S rRNA gene amplified DNA consistent with *A. phagocytophilum* in the blood of all three cats. The sequence of the PCR product obtained showed 99.6–100% homology with the sequence of *A. phagocytophilum*, gene number EU 090186 from Genbank. Applied therapy (including administration of tetracyclines for 3 weeks) resulted in a gradual clinical recovery.

**Primary brachial plexus neoplasia in cats**

Fikry Younan Hanna

Conditions affecting the brachial plexus and its branches can cause lameness and/or neurological deficits. There are few reports of schwannomas in cats. In reported cases, the tumours arose from the dermis or subcutis of the limbs, head and neck and thorax, but there are no reports of primary tumours that arose from the brachial plexus itself. The purpose of this study is to present the clinical, radiological, ultrasonographical and pathological findings of primary brachial plexus tumour in three cats.

**Intrathoracic pseudocyst in a kitten**

Orly Zemer, Ori Brenner, Roni Ginzburg, Liat Cohen, and Joshua Milgram

A 2-month-old, intact, female domestic shorthair kitten presented with a history of acute-onset dyspnoea. Severe dyspnoea and tachypnoea were noted on physical examination. Serosanguinous fluid, consistent with a modified transudate, was aspirated from the pleural cavity immediately after the physical examination, with an immediate decrease in respiratory rate and effort. The thorax was radiographed and the entire left hemithorax appeared to be filled with a large soft tissue density mass. Thoracic ultrasound was performed and a cystic structure, measuring 3.0 cm × 1.5 cm, was seen in the left hemithorax. An explorative thoracotomy was performed and a mass obliterating the left hemithorax was found. The mass was removed by a combination of blunt and sharp dissection. A final diagnosis of thoracic pseudocyst was made on histological examination of the tissue. The mass was described as a sterile process characteristic of an organised seroma or haematoma. Recovery from
surgery was uneventful and the kitten was discharged 48 h postoperatively. The kitten was still alive with no recurrence of clinical signs at the time of writing this report, 8 months postoperatively.

**Unilateral uterine segmentary aplasia, papillary endometrial hyperplasia and ipsilateral renal agenesis in a cat**
Francisco R Carvallo, Andrea N Wartluft, and Roberto M Melivilu
A 1-year-old, female, previously spayed domestic shorthair cat presented with abnormal behavior characterized by rubbing up against objects, vocalization and abnormal body posture. A diagnostic laparoscopy was performed and a dilated segment of the left uterus and ovary was found in association with ipsilateral renal agenesis. Papillary hyperplasia of the endometrium of the dilated segment was found on histopathology. The occurrence and findings of this condition are reviewed.

**Proliferative and necrotising otitis externa in a cat without pinnal involvement: video-otoscopic features**
Stefano Borio, Federico Massari, Francesca Abramo, and Silvia Colombo
Proliferative and necrotising otitis externa is a rare and recently described disease affecting the ear canals and concave pinnae of kittens. This article describes a case of proliferative and necrotising otitis externa in a young adult cat. In this case, the lesions did not affect the pinnae, but both ear canals were severely involved. Video-otoscopy revealed a digitally proliferative lesion, growing at 360° all around the ear canals for their entire length, without involvement of the middle ear. Histopathological examination confirmed the diagnosis, and the cat responded completely to a once-daily application of 0.1% tacrolimus ointment diluted in mineral oil in the ear canals. Video-otoscopy findings, not described previously, were very peculiar and may help clinicians to diagnose this rare disease.

**Treatment with Suprelorin in a pregnant cat**
Sandra Goericke-Pesch, Plamen Georgiev, Anatoli Atanasov, and Axel Wehrend
Suppression of oestrus is of major interest in feral cat populations, but also in breeding queens temporarily not intended for breeding. Slow release gonadotropin-releasing hormone (GnRH) agonist implants are a new off-label approach for reproduction control in cats. However, initially, oestrus induction may occur and no data exist regarding what happens if previously mated queens are treated. This case report presents a queen mismated 9 and 8 days before treatment with a 4.7 mg deslorelin implant. The queen delivered four healthy kittens 66 days after mismating, but showed no interest in the kittens and lactation was not adequate. Progesterone and oestradiol concentrations were monitored and the queen was followed until the return of oestrus and subsequent breeding. The next oestrus was observed 498 days after treatment and the queen was mated in the second oestrus afterwards, became pregnant and delivered two healthy kittens, both of which were raised successfully by the queen. This case report clearly shows that pregnancy following a GnRH-agonist implant may go to term, but maternal care might be influenced owing to hormonal changes induced by treatment. In addition, this is the first report demonstrating reversibility of effects induced by long-term treatment with a deslorelin implant (return to oestrus, fertility and normal maternal care).

**The Veterinary Journal**

**Canine elbow dysplasia: Aetiopathogenesis and current treatment recommendations.**
Jacob Michelsen.
Elbow dysplasia is a common debilitating condition of large and giant breed dogs. Environmental factors and a complex genetic heritability play a role in predisposing dogs to elbow dysplasia with two aetiopathogeneses suggested for the development of the disease. Osteochondrosis was initially thought to cause elbow dysplasia, but more recent evidence has strongly supported various forms of joint incongruity as the most likely cause in most cases. Radioulnar length discrepancies and humeroulnar curvature mismatch have been implicated as the cause of medial coronoid disease and ununited anconeal process, but radial incisure incongruity and biceps/brachialis muscle forces could possibly play a role in some dogs. Treatment of elbow dysplasia should address articular pathology, such as fragmented coronoid process, osteochondrosis, cartilage damage and ununited anconeal process as well as any identified underlying causes. Finally, several palliative procedures
have been developed to address more advanced elbow disease and might offer improved outcomes compared to conventional medical management.

**Characterisation of a group of endogenous gammaretroviruses in the canine genome.**


Bioinformatics were used to identify and characterise 39 pol, 34 gag and five env gammaretroviruses within the canine (*Canis lupus familiaris*) reference genome. These endogenous retroviruses are monophyletic to the *Canidae*, predate the divergence of dogs and foxes and are fixed in 20 canine breeds examined. They are transcribed in normal canine tissue but are unlikely to be replication competent in dogs.

**Multiple RT-PCR markers for the detection of circulating tumour cells of metastatic canine mammary tumours.**


In humans, detection of circulating tumour cells (CTCs) using nucleic acid-based methods such as reverse transcription polymerase chain reaction (RT-PCR) has proven to be of prognostic relevance. However, similar procedures are still lacking in veterinary oncology. To assess the correlation of CTC markers with the metastatic potential of canine mammary tumours, 120 peripheral blood samples from bitches with mammary carcinomas with (group 1) and without (group 2) histological evidence of vascular invasion and/or presence of lymph node metastases and mammary adenomas (group 3) were analyzed. Blood samples were collected in EDTA tubes and RNA was extracted within 48 h. Subsequently, the samples were tested by RT-PCR for a panel of seven CTC mRNA markers. CRYAB was the most sensitive single marker with a sensitivity of 35% and also the most specific marker with a specificity of 100% to detect group 1 blood samples. A multimarker assay combining four genes enhanced the sensitivity up to 77.5%, but decreased the specificity to 80%. CRYAB appeared to be highly specific but only moderately sensitive at detecting blood samples from dogs with metastatic tumours and detection significantly correlated with vascular invasion of primary mammary tumours. However, a multimarker assay of four genes significantly enhanced the sensitivity of the assay and is therefore preferable for CTC detection.

**Procollagen type III amino terminal propeptide concentrations in dogs with idiopathic pulmonary fibrosis compared with chronic bronchitis and eosinophilic bronchopneumopathy.**

Henna P. Heikkilä, Emilie Krafft, Pascale Jespers, Kathleen McEntee, Minna M. Rajamäki, Cecile Clercx.

Idiopathic pulmonary fibrosis (IPF) is characterised by an abnormal accumulation of collagen type III in the pulmonary interstitium. Procollagen type III amino terminal propeptide (PIIINP) is used as a marker of collagen type III synthesis. In this study, the concentrations of PIIINP were investigated in dogs with IPF (*n* = 15), dogs with chronic bronchitis (CB, *n* = 19), dogs with eosinophilic bronchopneumopathy (EBP, *n* = 13) and healthy dogs (*n* = 25). PIIINP concentrations in serum and bronchoalveolar lavage fluid (BALF) were analysed by radioimmunoassay. Serum PIIINP values did not differ between groups, indicating that serum PIIINP is not useful in evaluating respiratory diseases in dogs. BALF PIIINP was significantly elevated in dogs with IPF compared with healthy dogs (*P* = 0.002) and dogs with CB (*P* < 0.001). BALF PIIINP was significantly higher in dogs with EBP than in dogs with CB (*P* = 0.003) or healthy dogs (*P* = 0.022). There were no differences in BALF PIIINP concentrations between dogs with IPF and dogs with EBP or between dogs with CB and healthy dogs. These results indicate that IPF is associated with elevated BALF PIIINP concentrations. BALF PIIINP concentrations also are elevated in EBP, possibly due to secondary fibrotic changes.

**Skeletal morphology and morphometry of the lumbosacral junction in German shepherd dogs and an evaluation of the possible genetic basis for radiographic findings.**


The aim of this study was to identify skeletal variations in the lumbosacral junction (LSJ) of the German shepherd dog (GSD) compared with other large breeds. The radiographic traits of the LSJ were investigated in a group of 733 GSDs and a control group of 334 dogs of other breeds that were matched in terms of size. Nine
morphological and 17 morphometric traits were recorded and analysed. Furthermore, the possibility of a genetic basis for these radiographic features was evaluated by calculation of genetic variance components. Five of the morphological and 14 of the morphometric traits varied significantly between the GSD group and the control group (P < 0.05). Osteochondrosis of the sacral endplate (SOC) had a higher prevalence in the GSDs (10.1%) compared with controls (5.7%). The majority of LSJ degenerative changes recorded from the radiographs occurred in the GSDs. The extent and relative proportion of lumbosacral step formations were greater in the GSD group compared with controls (P < 0.001). The lumbosacral vertebral canal height was reduced in the GSD compared with the control dogs (P < 0.001) suggesting a primary stenosis. This was accentuated by an abrupt tapering of the vertebral canal at the level of the LSJ indicated by a lumbosacral ratio of 1.51 in the GSD. The skeletal morphology and morphometry of the LSJ in the GSD seem to be different from that found in other large dogs. For multiple traits frequently observed in GSD such as SOC, step formations, and LSJ stenosis, moderate to high non-zero heritabilities were noted. As these features are also assumed to promote lumbosacral disease, selection against these traits is suggested.

**Effects of thyroxin therapy on different analytes related to obesity and inflammation in dogs with hypothyroidism.**

A. Tvarijonaviciute, L. Jaillardon, J.J. Cerón, B. Siliart.

Hypothyroidism in dogs is accompanied by changes in intermediary metabolism including alterations in bodyweight (BW), insulin resistance, and lipid profile. In this study, changes in selected adipokines (adiponectin, leptin), butyrylcholinesterase (BChE), and acute phase proteins, including C-reactive protein, haptoglobin (Hp) and serum amyloid A (SAA), were studied in dogs with hypothyroidism under thyroxin therapy. Blood samples were collected when hypothyroidism was diagnosed (before treatment) and after treatment with thyroxin. Twenty-eight of 39 dogs exhibited a good therapeutic response (group A), whereas the remainder were considered to have been insufficiently treated (group B). Following treatment, group A dogs demonstrated a statistically significant decrease in canine thyroid stimulating hormone (cTSH) (P < 0.001) and an increase in free thyroxine (fT4) (P < 0.001) concentrations, associated with a significant decrease in BW (P < 0.05), leptin (P < 0.01), and adiponectin, (P < 0.001) and an increase in BChE (P < 0.01) and Hp (P < 0.05).

Group B dogs showed no statistically significant changes in cTSH, but had a significant increase in fT4 (P < 0.001) accompanied by a significant decrease in adiponectin (P < 0.05) of lower magnitude than group A. No significant changes in the mean circulating levels of APPs were observed in both groups, with the exception of an increase in Hp (P < 0.05) in group A. In summary, the successful treatment of hypothyroidism reduces circulating levels of adiponectin and leptin, while increasing BChE activity in dogs. The mean increase in Hp values and decrease in SAA for some of the dogs after treatment warrants further investigation.

**In vivo femorotibial subluxation during weight-bearing and clinical outcome following tibial tuberosity advancement for cranial cruciate ligament insufficiency in dogs.**


Ex vivo studies have been used extensively to investigate the mechanisms of tibial osteotomies but few have explored femorotibial alignment in vivo. The aim of this study was to assess femorotibial joint alignment under static weight-bearing conditions (and subsequent outcome) in dogs treated for cranial cruciate ligament (CrCL) insufficiency with tibial tuberosity advancement (TTA). Twenty-five dogs (30 stifles) with CrCL insufficiency treated by TTA were included. The distance from the origin to insertion of the CrCL (CrCLd) was measured on non-weight-bearing immediate post-operative radiographs and weight-bearing follow-up radiographs. CrCLd values were compared using a paired t test. The relationship between change in CrCLd (ΔCrCLd) and post-operative patellar tendon angle according to the common tangent method (PTACT) was assessed using Pearson’s correlation. Outcome was assessed with an owner-completed questionnaire, and peak vertical force (PVF) and vertical impulse (VI) as percentages of bodyweight (BW). Following TTA, 21/30 stifles were persistently subluxated at a follow-up of 18 ± 14 months (mean ± SD). Follow-up weight-bearing CrCLd was greater (P < 0.001) than post-operative non-weight-bearing CrCLd, with a mean ΔCrCLd of 5.8 ± 3.4 mm (16 ± 10%). Post-operative PTACT was 89 ± 3° and did not correlate with ΔCrCLd (r = 0.002, P = 0.994). Mean PVF and VI were 65 ± 10% BW and 9 ± 2% BW, respectively. All owners felt TTA provided improvement in lameness. The
results indicated that TTA does not normalize sagittal plane femorotibial stability during standing at a PTA<sub>CT</sub> of 90°, but most dogs return to good limb function regardless of femorotibial alignment.

**Population structure and genetic heterogeneity in popular dog breeds in the UK.**
There is increasing concern that reproductive isolation related to breed specifications in dogs, while maintaining genetic differences among breeds, is likely to promote breed-specific genetic disorders. This study examined genetic diversity among 13 popular dog breed groups in the UK. Most breeds showed high levels of homozygosity when compared with crossbreed animals. The Boxer and West Highland white terrier showed the lowest heterozygosity, while the Jack Russell terrier group (not a registered breed in the UK) had a level of heterozygosity comparable to crossbred dogs. Analysis of genetic distance between breeds showed significantly different inbreeding coefficients for pairwise comparisons among registered breeds, with the most divergent breeds being the Boxer and West Highland white terrier. The Rottweiler and Golden retriever showed the highest levels of inbreeding. The least distinct group contained crossbred dogs. The results show that the registered breeds are subject to a ‘breed barrier’ which promotes reduction in genetic diversity.

**A sub-Tenon’s capsule injection of lidocaine induces extraocular muscle akinesia and mydriasis in dogs.**
The effect of local anaesthetic on the extraocular muscles was investigated in dogs by injecting lidocaine into the space between Tenon’s capsule and the sclera. A cross-over design was used with both eyes from five Beagle dogs randomly injected, under general anaesthesia, with 1 mL of 2% lidocaine (1 mL-lidocaine group), 2 mL of 2% lidocaine (2 mL-lidocaine group) or 2 mL of normal saline (control group). Each eye was assigned to all treatments with a minimum 14 day interval between injections. Changes in eye position, pupil diameter, and intraocular pressure (IOP) were evaluated during the procedure. All eyes in the 2 mL-lidocaine group exhibited akinesia and mydriasis (pupil diameter >10 mm) with an onset time of 6.5 ± 4.9 and 4.2 ± 4.3 min, respectively. In the 1 mL-lidocaine group, akinesia was induced in nine eyes and mydriasis occurred in seven eyes at 10.7 ± 5.8 and 5.4 ± 2.4 min after the injection, respectively. No changes in eye position or pupil diameter were observed in the control group. Akinesia was maintained for 44.3 ± 26.7 min in the 1 mL-lidocaine group and for 88.5 ± 17.2 min in the 2 mL-lidocaine group. Duration of mydriasis was 51.7 ± 28.9 min in the 1 mL-lidocaine group and 82.9 ± 15.6 min in the 2 mL-lidocaine group. Marked chemosis and sub-conjunctival haemorrhage occurred in 16/30 and 15/30 eyes, respectively. No significant change in IOP was observed between the mean pre- and post-injection values in all groups. These results suggest that a sub-Tenon’s injection of 2 mL of 2% lidocaine provided effective extraocular muscle akinesia and mydriasis in dogs.

**Sugar expression in the mucosae of the canine uterus and vagina during the oestrous cycle and with pyometra.**
The pathogenesis of canine pyometra is still unclear, but bacterial infection of the endometrium, mediated by bacterial lectins, is suspected to induce pyometra. The aim of this study was to investigate sugar expression in the mucosae of the uterus and vagina of healthy dogs with normal oestrous cycles and in dogs with pyometra, using a panel of lectins to investigate the pathogenesis of pyometra. In dogs with pyometra, the uterine and vaginal mucosae were positive for lectins that selectively bind to glucose or mannose, especially during days 7–10 and 30–40 of dioestrus. These results suggest that temporal changes in sugar expression in the uterus and vagina present an opportunity for pathogens to infect the endometrium, causing pyometra.

**Evaluation of the cardiac toxicity of N-methyl-glucamine antimoniate in dogs with naturally occurring leishmaniasis.**
Alessia Luciani, Sarah Sconza, Carla Civitella, Carlo Guglielmini.
The aim of this study was to evaluate the cardiotoxic effects of pentavalent antimomial compounds in dogs with leishmaniasis. Twenty-eight dogs with clinical disease due to natural infection with *Leishmania infantum* were treated with 75 mg/kg meglumine antimoniate SC every 12 h for 60 days. Serum cardiac troponin I (cTnI)
concentrations were determined and routine and 24 h ambulatory electrocardiographic monitoring was performed before the onset (T₀) and at the end of treatment (T₆₀). No abnormalities were found in routine and 24 h electrocardiographic tracings before and after treatment. No statistical difference was found between serum cTnI concentrations or corrected QT intervals at T₀ and T₆₀. There was no evidence of laboratory or electrocardiographic features of cardiac toxicity in dogs with leishmaniasis treated with a therapeutic dose of meglumine antimoniate for 60 days.

Incidence and genetic aspects of patellar luxation in Pomeranian dogs in Thailand.
There is a high incidence of patellar luxation (PL) in Pomeranian dogs from Thailand. DNA samples were collected from 59 dogs originating from 15 families. PL was present in 75% of the dogs with a male:female ratio of 1:1.95. Polymorphic microsatellites situated close to the COL6A1, COL6A3, COL9A1, COL9A2, and COL9A3 genes were analyzed for linkage to the phenotype. Sibling-pair analysis revealed that none of the collagen markers analyzed had a high non-parametric linkage score with the highest score, 1.56, for COL9A2 (P = 0.07). The low LOD scores for these collagen genes indicated a non-involvement in the pathogenesis of PL in Pomeranians. An association study with a low density single nucleotide polymorphism (SNP) set indicated the possible involvement of a region on chromosome 7. The association of this region remained indicative when larger groups of 43 cases and 40 controls were compared (Chi square test P = 0.01).

Prevalence of the Leptospira serovars bratislava, grippotyphosa, mozdok and pomona in French dogs.
Although most French dogs are correctly vaccinated against leptospirosis with inactivated strains of canicola and icterohaemorrhagiae, the disease is still very prevalent in France raising the question of whether the vaccines used require updating. The aim of the present study was to provide serological data regarding circulation of the Leptospira serovars: grippotyphosa, bratislava, pomona and mozdok, which are contained in vaccines available in other parts of the world and which could be rapidly adapted for France. Results indicated that the epidemiology was consistent with the circulation of Leptospira belonging to the serogroups Australis and Grippotyphosa and that the case to support the inclusion of either pomona or mozdok in a dog vaccine for France was weak.

Journal of Small Animal Practice

Wolbachia, filariae and Leishmania coinfection in dogs from a Mediterranean area.
M.D. Tabar, L. Altet, V. Martínez and X. Roura.
Objectives: In an endemic area for leishmaniosis and filariasis, coinfection can occur and the immunomodulation triggered by Wolbachia infection might influence the clinical signs and progression of both diseases. The aims of this study were to determine the prevalence of Wolbachia in dogs infected with Dirofilaria immitis and other filarial nematodes, to evaluate the prevalence of coinfection of Leishmania infantum, filariae and Wolbachia and their association with clinical presentation. Methods; Polymerase chain reaction assays were performed to detect filarial species, Wolbachia species and Leishmania in 118 samples of dogs from southeastern Spain with leishmaniosis and/or filariasis. Results; Ninety-eight dogs were infected with Leishmania and 49 had filarial infection (29 were coinfected with both). Wolbachia DNA was detected in 30.6% of filariae-positive dogs (15/49). Dogs coinfected with Leishmania and filaria had more severe clinical signs. Wolbachia infection was significantly (P=0.026) more frequent in dogs that were not infected with Leishmania. There was no correlation between outcome and coinfection with these pathogens. Clinical Significance; This study highlights the increased sensitivity of polymerase chain reaction in the diagnosis of filariasis, confirms the presence of Wolbachia in dogs from the Mediterranean basin, shows the increased severity of clinical signs when Leishmania-filarial coinfection is present and suggests a protective role of Wolbachia in leishmaniosis.
Potential role of Alternaria and Cladosporium species in canine lymphoplasmacytic rhinitis.
E. Mercier, I. R. Peters, F. Billen, G. Battaille, C. Clercx, M. J. Day and D. Peeters. Objectives; To evaluate the possible role of Alternaria and Cladosporium species in the pathogenesis of canine lymphoplasmacytic rhinitis by comparing the amount of specific fungal DNA in nasal mucosal biopsies between dogs without nasal neoplasia and those with lymphoplasmacytic rhinitis or nasal neoplasia. Methods; Quantitative real-time polymerase chain reaction (qPCR) assays detecting DNA from Alternaria and Cladosporium fungi were applied to nasal mucosal biopsies collected from dogs with lymphoplasmacytic rhinitis (n = 8), dogs with nasal neoplasia (n = 10) and control animals (n = 10). A copy number for each sample was calculated using a standard curve of known copy number and differences amongst groups were assessed using Kruskal–Wallis tests. Results; No significant difference was found between the groups. Low levels of Alternaria DNA (10–100 copies/PCR) were detected in one sample; very low levels of DNA (<10 copies/PCR) were detected in 6 samples, and 21 samples were negative. Low levels of Cladosporium DNA were detected in 2 samples; very low levels of DNA in 18; and 8 were negative. Clinical Significance; Results of this study reveal that Alternaria and Cladosporium species are part of the canine nasal flora, and that these fungi are probably not involved in the pathogenesis of lymphoplasmacytic rhinitis.

Comparative accuracy of several published formulae for the estimation of serum osmolality in cats.
T. Dugger, M. S. Mellema, K. Hopper and S. E. Epstein. Objective; To determine the osmole gap utilizing 18 previously published formulae for the estimation of serum osmolality in cats. Procedures; Serum samples were frozen at −80°C after routine biochemical analysis. An Advanced Micro Osmometer 3300 was used to measure serum osmolality. Eighteen previously reported formulae were used to calculate osmolality from biochemical analysis results. The calculated osmolality was subtracted from the measured osmolality to determine the osmole gap. Osmole gaps for azotaemic and hyperglycaemic cats were compared to those from cats without azotaemia or hyperglycaemia using each formula. Results; The osmole gaps varied dependent on the formula used and the presence or absence of hyperglycaemia or azotaemia. Eleven formulae led to calculated osmolality and osmole gaps that were not statistically different when hyperglycaemia, azotaemia or both were present. Four of these 11 formulae resulted in osmole gaps near zero. For each formula used, the osmole gap increased with increasing osmolality. Clinical Significance; Multiple formulae to calculate serum osmolality can be used, but they result in significantly different osmole gaps. Clinicians should be aware of the specific reference interval for the formula being used. The formula [2(Na⁺) + glucose + BUN] is recommended as it is easy to use and reliable even in the presence of hyperglycaemia and/or azotaemia.

The efficacy of n-buty1-cyanoacrylate tissue adhesive for closure of canine laparoscopic ovariectomy port site incisions.
J. F. A. Pope and T. Knowles. Objectives; To evaluate the efficacy of n-buty1-cyanoacrylate used to close port site skin incisions following canine laparoscopic ovariectomy and to assess owner attitudes to surgical adhesive. Methods; The case records of dogs undergoing laparoscopic ovariectomy at a single centre during a 42-month period were examined. Dogs with incisions closed with n-buty1-cyanoacrylate were included. Cases with less than 8 weeks follow-up were excluded. Data relating to dehiscence, swelling, erythema, discharge and hypersensitivity postoperatively were recorded and reviewed. Postal questionnaires were sent to the dogs’ owners. Results; A total of 289 dogs satisfied inclusion criteria. No complications occurred in 602 of 695 (86% 6%) incisions. Complications occurred in 93 of 695 (13% 4%) incisions: 33 of 695 (4% 7%) dehisced, 38 of 695 (5% 5%) swelled postoperatively, 59 of 695 (8% 5%) developed erythema and 29 of 695 (4% 2%) developed a discharge. Complications were significantly more likely for a 10 mm incision than for a 5 mm incision (P < 0.001). There were no reported cases of hypersensitivity relating to the use of n-buty1-cyanoacrylate, nor any long-term adverse reactions. When owners scored incisions for scarring using a visual analogue scale (0: excellent, 10: poor) the mean and median scores were 0 and 7 and 0, respectively. Clinical Significance; This study suggests that n-buty1-cyanoacrylate is an acceptable method for closing laparoscopic port sites in dogs.
Evaluation of accuracy of the Finnish elbow dysplasia screening protocol in Labrador retrievers.
Objective: To determine whether the current Finnish screening method using a single flexed mediolateral view as scored by osteophyte is sufficient to diagnose mild elbow dysplasia in Labrador retrievers and to determine if an additional craniocaudal oblique projection would result in improvement in the screening protocol. Materials and Methods: Thirteen dogs with one mildly affected elbow joint and one elbow joint without radiological evidence of osteophytes were studied. Radiographic and computed tomography studies were performed and the results compared with each other. Results: Medial compartment disease was observed in 14 of 26 joints based on computed tomography. The sensitivity and specificity of the grading based mainly on osteoarthritis was 79 and 92%, respectively. A strong association existed between elbow dysplasia based on computed tomography and medial humeral epicondylar osteophytes on the craniocaudal projection. Clinical Significance: A single mediolateral flexed radiograph is reliable in diagnosing mild elbow dysplasia in Labrador retrievers. However, the craniocaudal oblique projection increases the specificity of the diagnosis, and it is proposed that it be included in the radiographic protocol in this breed.

Multi-system progressive angiomatosis in a dog resembling blue rubber bleb nevus syndrome in humans.
A six-year-old, neutered, female golden retriever was presented with generalised, dark purple to black cutaneous nodules and gastrointestinal haemorrhage. Histopathologically, all cutaneous nodules were diagnosed as benign cavernous haemangiomas. Endoscopic analysis revealed similar nodules in the oesophagus, stomach and duodenum. At laparotomy, similar nodules were seen on the visceral peritoneal lining of abdominal organs. Metastatic haemangiosarcoma was ruled out based on histological features and lack of primary tumour in spleen, liver or heart ultrasonographically. Blood loss associated with gastrointestinal haemorrhage was managed with blood transfusion. To the authors’ knowledge, this is the first canine case of multi-system progressive angiomatosis resembling blue rubber bleb nevus syndrome in humans.

Thelazia callipaeda ocular infection in two dogs in Belgium.
Y. Caron, J. Premont, B. Losson and M. Grauwels.
Nematode worms were retrieved from the left eyes of two dogs presented for unilateral ocular discharge in Belgium. Morphological and molecular identification were performed and the parasites were identified as Thelazia callipaeda. The history suggested that the infection had been acquired in south-western France and southern Italy where the disease has been observed regularly for the last 6 and 12 years, respectively. In these two regions, the disease is considered endemic and spreading. To the authors’ knowledge, this is the first case report of canine thelaziosis in Belgium.

Suspected exercise-induced seizures in a young dog.
L. Motta and E. Dutton.
A 12-month-old female neutered crossbreed was referred for investigation of seizure-like episodes occurring only at intense exercise. Thorough medical, neurological and cardiac investigations were performed and excluded the most commonly known causes of seizure-like activity. The dog was fitted with an ambulatory electrocardiography device and underwent another exercise-induced seizure. The electrocardiogram during the episode revealed a sinus tachycardia at approximately 300 beats/minute. A video recording of the episode revealed generalised tonic clonic limb activity with jaw chomping and frothing at the mouth typical of seizure activity. Antiepileptic medications were not prescribed and the owner was advised not to exercise the dog intensely. The dog responded well and did not seize after 12 months of mild-moderate off-lead exercise. As all the seizures in this case were triggered by intense physical activity, it is suggested that this may be a new form of reflex seizure activity.
Comparison between manual aspiration via polyethylene tubing and aspiration via a suction pump with a suction trap connection for performing bronchoalveolar lavage in healthy dogs.
Objective—To compare the diagnostic quality of bronchoalveolar lavage (BAL) fluid acquired from healthy dogs by manual aspiration via polyethylene tubing (MAPT) and via suction pump aspiration (SPA) with a suction trap connection. Animals—12 healthy adult Beagles. Procedures—BAL was performed with bronchoscopic guidance in anesthetized dogs. The MAPT was performed with a 35-mL syringe attached to polyethylene tubing wedged in a bronchus via the bronchoscope's biopsy channel. The SPA was performed with 5 kPa of negative pressure applied to the bronchoscope's suction valve via a suction trap. The MAPT and SPA techniques were performed in randomized order on opposite caudal lung lobes of each dog. Two 1 mL/kg lavages were performed per site. Samples of BAL fluid were analyzed on the basis of a semiquantitative quality scale, percentage of retrieved fluid, and total nucleated and differential cell counts. Results were compared with Wilcoxon signed rank tests. Results—Percentage of BAL fluid retrieved (median difference, 16.2%), surfactant score (median difference, 1), and neutrophil count (median difference, 74 cells/μL) were significantly higher for SPA than for MAPT. A higher BAL fluid epithelial cell score was obtained via MAPT, compared with that for samples obtained via SPA (median difference, 1). Conclusions and Clinical Relevance—Results indicated that in healthy dogs, SPA provided a higher percentage of BAL fluid retrieval than did MAPT. The SPA technique may improve the rate of diagnostic success for BAL in dogs, compared with that for MAPT. Further evaluation of these aspiration techniques in dogs with respiratory tract disease is required.

Comparison of overground and treadmill-based gaits of dogs.
Bryan T. Torres, Noel M. M. Moëns, Sami Al-Nadaf, Lisa R. Reynolds, Yang-Chieh Fu, Steven C. Budsberg.
Objective—To compare overground and treadmill-based gaits of dogs. Animals—5 clinically normal adult mixed-breed dogs. Procedures—To obtain dynamic gait data, 30 retroreflective markers were affixed bilaterally to specific regions of the hind limbs and pelvis of each dog. For each dog, 3-D joint motion data (sagittal [flexion and extension], transverse [internal and external rotation], and frontal [abduction and adduction] planes of motion) for the hip, femorotibial, and tarsal joints were acquired during walking and trotting through a calibrated testing space overground or on a treadmill. Comparison of data was performed via generalized indicator function analysis and Fourier analysis. Results—Both overground and treadmill-based gaits produced similar waveforms in all planes of motion. Fourier analysis revealed no difference between overground and treadmill-based gaits in the sagittal plane of motion; however, small differences were detected between overground and treadmill-based gaits in the other 2 planes of motion. Additionally, femorotibial joint motion during walking did not differ among planes of motion. Generalized indicator function analysis was able to detect differences between overground and treadmill-based gait waveforms in all planes of motion for all joints during walking and trotting. Conclusions and Clinical Relevance—in dogs, overground and treadmill-based gaits produced similar waveform shapes. Of the 3 planes of motion evaluated, only sagittal plane kinematic gait data were unaffected by mode of ambulation as determined via Fourier analysis. Sagittal kinematic gait data collected from dogs during overground or treadmill-based ambulation were comparable. However, analysis methods may affect data comparisons.

In vitro effects of lipid emulsion on platelet function and thromboelastography in canine blood samples.
Laura R. Tonkin, Nolie K. Parnell, Daniel F. Hogan.
Objective—To determine whether soybean oil emulsion has an in vitro effect on platelet aggregation and thromboelastography in blood samples obtained from healthy dogs. Animals—12 healthy adult dogs. Procedures—Blood samples were collected from each dog into tubes containing EDTA, hirudin, or sodium citrate for a CBC, collagen- and ADP-induced impedance aggregometry, or thromboelastography, respectively. Whole blood platelet aggregation, determined with ADP or collagen agonists, was measured in blood samples containing hirudin and final lipid concentrations of 0, 1, 10, and 30 mg/mL. The thromboelastographic variables R (reaction time), K (clotting time), a angle, and maximum amplitude were evaluated in blood samples containing sodium citrate and final lipid concentrations equivalent to those used for assessment of platelet aggregation. Results—Median maximum ADP- and collagen-induced
platelet aggregation in blood samples containing 1, 10, or 30 mg of lipid/mL did not differ significantly from the value for the respective lipid-free blood sample. Maximum amplitude determined via thromboelastography was significantly reduced in blood samples containing 10 and 30 mg of lipid/mL, compared with findings for lipid-free blood samples. Values of other thromboelastographic variables did not differ, regardless of lipid concentrations. Conclusions and Clinical Relevance—Maximum amplitude determined via thromboelastography in canine blood samples was significantly affected by the addition of lipid to final concentrations that are several orders of magnitude higher than clinically relevant lipid concentrations in dogs. Lipid treatment appears to have no significant effect on hemostatic variables in dogs, although clinical studies should be performed to confirm these in vitro findings.

Comparison of inferred fractions of n-3 and n-6 polyunsaturated fatty acids in feral domestic cat diets with those in commercial feline extruded diets. Robert C. Backus, David G. Thomas, Kevin L. Fritsche.
Objective—To compare presumed fatty acid content in natural diets of feral domestic cats (ferred from body fat polyunsaturated fatty acids content) with polyunsaturated fatty acid content of commercial feline extruded diets. Sample—Subcutaneous and intra-abdominal adipose tissue samples (approx 1 g) from previously frozen cadavers of 7 adult feral domestic cats trapped in habitats remote from human activity and triplicate samples (200 g each) of 7 commercial extruded diets representing 68% of market share obtained from retail stores. Procedures—Lipid, triacylglycerol, and phospholipid fractions in adipose tissue samples and ether extracts of diet samples were determined by gas chromatography of methyl esters. Triacylglycerol and phospholipid fractions in the adipose tissue were isolated by thin-layer chromatography. Diet samples were also analyzed for proximate contents. Results—For the adipose tissue samples, with few exceptions, fatty acids fractions varied only moderately with lipid fraction and site from which tissue samples were obtained. Linoleic, α-linolenic, arachidonic, eicosapentaenoic, and docosahexaenoic acid fractions were 15.0% to 28.2%, 4.5% to 18.7%, 0.9% to 5.0%, < 0.1% to 0.2%, and 0.6% to 1.7%, respectively. As inferred from the adipose findings, dietary fractions of docosahexaenoic and α-linolenic acid were significantly greater than those in the commercial feline diets, but those for linoleic and eicosapentaenoic acids were not significantly different. Conclusions and Clinical Relevance—The fatty acid content of commercial extruded feline diets differed from the inferred content of natural feral cat diets, in which dietary n-3 and possibly n-6 polyunsaturated fatty acids were more abundant. The impact of this difference on the health of pet cats is not known.

Evaluation of plasma diazepam and nordiazepam concentrations following administration of diazepam intravenously or via suppository per rectum in dogs. Curtis W. Probst, William B. Thomas, Tamberlyn D. Moyers, Tomas Martin, Sherry Cox. Objective—To evaluate the pharmacokinetics of diazepam administered per rectum via compounded (ie, not commercially available) suppositories and determine whether a dose of 2 mg/kg in this formulation would result in plasma concentrations shown to be effective for control of status epilepticus or cluster seizures (ie, 150 to 300 ng/mL) in dogs within a clinically useful interval (10 to 15 minutes). Animals—6 healthy mixed-breed dogs. Procedures—Dogs were randomly assigned to 2 groups of 3 dogs each in a crossover-design study. Diazepam (2 mg/kg) was administered IV or via suppository per rectum, and blood samples were collected at predetermined time points. Following a 6- or 7-day washout period, each group received the alternate treatment. Plasma concentrations of diazepam and nordiazepam were analyzed via reversed phase high-performance liquid chromatography. Results—Plasma concentrations of diazepam and nordiazepam exceeded the targeted range ≤ 3 minutes after IV administration in all dogs. After suppository administration, targeted concentrations of diazepam were not detected in any dogs, and targeted concentrations of nordiazepam were detected after 90 minutes (n = 2 dogs) or 120 minutes (3) or were not achieved (1). Conclusions and Clinical Relevance—On the basis of these results, administration of 2 mg of diazepam/kg via the compounded suppositories used in the present study cannot be recommended for emergency treatment of seizures in dogs.
Assessment of cord dorsum potentials from caudal nerves in anesthetized clinically normal adult dogs without or during neuromuscular blockade. James O. Campbell, Natasha J. Olby, Jonathan A. Hash, Duncan X. Lascelles. Objective—To assess the feasibility of measuring cord dorsum potentials (CDPs) in anesthetized clinically normal dogs after caudal nerve stimulation, determine the intervertebral site of maximum amplitude and best waveform of the CDP, and evaluate the effects of neuromuscular blockade. Animals—8 male and 4 female dogs (age, 1 to 5 years). Procedures—Dogs were anesthetized, and CDPs were recorded via needles placed on the dorsal lamina at intervertebral spaces L1–2 through L7–S1. Caudal nerves were stimulated with monopolar electrodes inserted laterally to the level of the caudal vertebrae. Dogs were tested without and during neuromuscular blockade induced with atracurium besylate. The CDP latency and amplitude were determined from the largest amplitude tracings. Results—CDPs were recorded in 11 of 12 dogs without neuromuscular blockade and in all dogs during neuromuscular blockade. The CDP was largest and most isolated at the L4–5 intervertebral space (3 dogs) or the L5–6 intervertebral space (9 dogs); this site corresponded to the segment of insertion of the first caudal nerve. Onset latencies ranged from 2.0 to 4.7 milliseconds, and there was no effect of neuromuscular blockade on latencies. Amplitudes of the CDPs were highly variable for both experimental conditions. Conclusions and Clinical Relevance—CDPs were recorded from all dogs tested in the study; neuromuscular blockade was not critical for successful CDP recording but reduced muscle artifact. This technique may be useful as a tool to assess the caudal nerve roots in dogs suspected of having compressive lumbosacral disease or myelopathies affecting the lumbar intumescence.

Western blot patterns of serum autoantibodies against optic nerve antigens in dogs with goniodysgenesis-related glaucoma. Stephanie A. Pumphrey, Stefano Pizzirani, Christopher G. Pirie, M. Sawkat Anwer, Tanya Logvinenko. Objective—To investigate whether differences existed between clinically normal dogs and dogs with goniodysgenesis-related glaucoma (GDRG) in serum autoantibodies against optic nerve antigens. Animals—16 dogs with GDRG, 17 healthy dogs with unremarkable pectinate ligament and iridocorneal angle morphology, and 13 euthanized dogs with no major ocular abnormalities or underlying diseases. Procedures—Western blotting was performed with optic nerve extracts from the euthanized dogs as an antigen source and serum from clinically normal dogs and dogs with GDRG as a primary antibody (autoantibody) source. Blots were evaluated for presence and density of bands. Results—Multiple bands were identified on western blots from all dogs with GDRG and all clinically normal dogs, with a high degree of variability among individual dogs. Dogs with GDRG were significantly more likely than healthy dogs to have bands present at 38, 40, and 68 kDa. Dogs with GDRG had significant increases in autoreactivity at 40 and 53 kDa and a significant decrease in autoreactivity at 48 kDa. Conclusions and Clinical Relevance—Significant differences in serum autoantibodies against optic nerve antigens were found in dogs with versus without GDRG. Although it remains unclear whether these differences were part of the pathogenesis of disease or were sequelae to glaucomatous changes, these findings provide support for the hypothesis that immune-mediated mechanisms play a role in the development or progression of GDRG. However, the high degree of variability among individual dogs and the considerable overlap between groups suggest that the clinical usefulness of this technique for distinguishing dogs with GDRG from clinically normal dogs is likely limited.

Effects of anesthetic induction with midazolam-propofol and midazolam-etomidate on selected ocular and cardiorespiratory variables in clinically normal dogs. Erin G. Gunderson, Victoria M. Lukasik, Marcella M. Ashton, Reuben E. Merideth, Richard Madsen. Objective—To compare effects of anesthetic induction with midazolam-propofol or midazolam-etomidate on intraocular pressure (IOP), pupillary diameter (PD), pulse rate, blood pressure, and respiratory rate in clinically normal dogs. Animals—18 dogs. Procedures—Dogs undergoing ophthalmic surgery received midazolam (0.2 mg/kg, IV) and either propofol or etomidate (IV) until intubatable. For all dogs, results of physical examinations, ophthalmic examinations of the nonoperated eye, and preanesthetic blood analyses were normal. Intraocular pressure, PD, blood pressure, pulse rate, and respiratory rate were measured in the nonoperated eye at 5 time points: just prior to the anesthetic induction sequence, after 5 minutes of preanesthetic oxygenation via face mask, after IV administration of midazolam, after IV anesthetic induction, and after endotracheal intubation. Results—PD decreased significantly from baseline by 4.4 ± 0.4 mm (mean ± SD) after anesthetic induction and 5.3 ± 0.4 mm after intubation in the etomidate group and by 1.2 ± 0.4 mm after intubation in the propofol group. Intraocular pressure was increased significantly from baseline.
by 3.2 ± 1.0 mm Hg after anesthetic induction in the etomidate group and by 4.7 ± 1.2 mm Hg after anesthetic induction and 4.5 ± 1.2 mm Hg after intubation in the propofol group. Pulse rate was significantly lower by 28.6 ± 12.6 beats/min after anesthetic induction in the etomidate group, compared with the propofol group.

Conclusions and Clinical Relevance—At the studied doses, midazolam-etomidate caused clinically important miosis and increased IOP. Midazolam-propofol caused an even greater increase in IOP but had minimal effects on PD.

**Evaluation of glomerular filtration rate in cats with reduced renal mass and administered meloxicam and acetylsalicylic acid.** Kathryn K. Surdyk, Cathy A. Brown, Scott A. Brown. Objective—To determine whether administration of meloxicam or acetylsalicylic acid alters glomerular filtration rate (GFR) in cats with renal azotemia. Animals—6 young adult cats. Procedures—3 sexually intact male cats and 3 sexually intact female cats had surgically reduced renal mass and azotemia comparable to International Renal Interest Society chronic kidney disease stages 2 and 3. Renal function was evaluated by measurement of serum creatinine concentration, urinary clearance of exogenously administered creatinine, and the urine protein-to-creatinine concentration ratio (UP:C). Measurements taken in cats receiving placebo at the beginning and end of the study were compared with results obtained at the end of 7 days of treatment with either meloxicam (0.2 mg/kg, SC, on day 1; 0.1 mg/kg, SC, on days 2 to 7) or acetylsalicylic acid (20 mg/kg, PO, on days 1, 4, and 7). Results—No significant treatment effects on urinary clearance of exogenously administered creatinine, serum creatinine concentration, or UP:C were detected. Mean ± SEM serum creatinine concentration and urinary clearance of exogenously administered creatinine measurements following 7 days of treatment with meloxicam (serum creatinine concentration, 2.67 ± 0.17 mg/dL; urinary clearance of exogenously administered creatinine, 1.34 ± 0.08 mL/min/kg) and acetylsalicylic acid (serum creatinine concentration, 2.62 ± 0.12 mg/dL; urinary clearance of exogenously administered creatinine, 1.35 ± 0.07 mL/min/kg) were not significantly different from the mean baseline values for these variables (serum creatinine concentration, 2.77 ± 0.14 mg/dL; urinary clearance of exogenously administered creatinine, 1.36 ± 0.07 mL/min/kg). Conclusions and Clinical Relevance—Neither meloxicam nor acetylsalicylic acid had a measurable effect on urinary clearance of exogenously administered creatinine, serum creatinine concentration, or UP:C. These results are consistent with the hypothesis that GFR of euvoletic cats with normal or reduced renal function is not dependent on cyclooxygenase function.

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