Small Animal Article Summaries – FELINE MEDICINE & SURGERY

July-October, 2015

Contributor

ISFM
The International Society of Feline Medicine

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The International Society of Feline Medicine (ISFM) was established in 1996 as the veterinary focus for the work of the charity and, together with the American Society of Feline Practitioners, it publishes the Journal of Feline Medicine and Surgery.
Abaidani IA, Abri SA, Prakash KP, Hussain MH, Hussain MH, Rawahi AH
Animal bites and rabies are under-reported in many developing countries and there is poor understanding of the disease burden. The aim of this study was to map the epidemiology of animal bites and rabies in Oman over the period 1991-2013. In a cross-sectional, descriptive, surveillance-based study, all data about animal bites and rabies from the national communicable disease surveillance system were analysed. A total of 22,788 cases of animal bites were reported. Most bites were to males (70%) and the 10-19 year age group (26%). Cats were the most common animal and upper extremities were the most common bite site. There were 8 rabies cases reported during the study period, mostly due to bites from wild animals, with 100% mortality. Of 758 suspected animals tested, 56.1% were positive for rabies; foxes had the highest positivity rate (70.1%). The high incidence of animal bites in Oman emphasizes the importance of a rabies prevention and control programme. Abstract available from the publisher.

A COLQ Missense Mutation in Sphynx and Devon Rex Cats with Congenital Myasthenic Syndrome.
Abitbol M, Hitte C, Bossé P et al.
An autosomal recessive neuromuscular disorder characterized by skeletal muscle weakness, fatigability and variable electromyographic or muscular histopathological features has been described in the two related Sphynx and Devon Rex cat breeds (Felis catus). Collection of data from two affected Sphynx cats and their relatives pointed out a single disease candidate region on feline chromosome C2, identified following a genome-wide SNP-based homozygosity mapping strategy. In that region, we further identified COLQ (collagen-like tail subunit of asymmetric acetylcholinesterase) as a good candidate gene, since COLQ mutations were identified in affected humans and dogs with endplate acetylcholinesterase deficiency leading to a synaptic form of congenital myasthenic syndrome (CMS). A homozygous c.1190G>A missense variant located in exon 15 of COLQ, leading to a C397Y substitution, was identified in the two affected cats. C397 is a highly-conserved residue from the C-terminal domain of the protein; its mutation was previously shown to produce CMS in humans, and here we confirmed in an affected Sphynx cat that it induces a loss of acetylcholinesterase clustering at the neuromuscular junction. Segregation of the c.1190G>A variant was 100% consistent with the autosomal recessive mode of inheritance of the disorder in our cat pedigree; in addition, an affected, unrelated Devon Rex cat recruited thereafter was also homozygous for the variant. Genotyping of a panel of 333 cats from 14 breeds failed to identify a single carrier in non-Sphynx and non-Devon Rex cats. Finally, the percentage of healthy carriers in a European subpanel of 81 genotyped Sphynx cats was estimated to be low (3.7%) and 14 control Devon Rex cats were genotyped as wild-type individuals. Altogether, these results strongly support that the neuromuscular disorder reported in Sphynx and Devon Rex breeds is a CMS caused by a unique c.1190G>A missense mutation, presumably transmitted through a founder effect, which strictly and slightly disseminated in these two breeds. The presently available DNA test will help owners avoid matings at risk.

Combinations of dexmedetomidine and alfaxalone with butorphanol in cats: application of an innovative stepwise optimisation method to identify optimal clinical doses for intramuscular anaesthesia.
Adami C, Imboden T, Giovannini AE, Spadavecchia C
OBJECTIVES: The aim of this study was to optimise dexmedetomidine and alfaxalone dosing, for intramuscular administration with butorphanol, to perform minor surgeries in cats. METHODS: Initially, cats were assigned to one of five groups, each composed of six animals and receiving, in addition to 0.3 mg/kg butorphanol intramuscularly, one of the following: (A) 0.005 mg/kg dexmedetomidine, 2 mg/kg alfaxalone; (B) 0.008 mg/kg dexmedetomidine, 1.5 mg/kg alfaxalone; (C) 0.012 mg/kg dexmedetomidine, 1 mg/kg alfaxalone; (D) 0.005 mg/kg dexmedetomidine, 1 mg/kg alfaxalone; and (E) 0.012 mg/kg dexmedetomidine, 2 mg/kg alfaxalone. Thereafter, a modified ‘direct search’ method, conducted in a stepwise manner, was used to optimise drug dosing. The quality of anaesthesia was evaluated on the basis of composite scores (one for anaesthesia and one for recovery), visual analogue scales and the propofol requirement to suppress spontaneous movements. The medians or means of these variables were used to rank the treatments; ‘unsatisfactory’ and ‘promising’ combinations were identified to calculate, through the equation first described by Berenbaum in 1990, new dexmedetomidine and alfaxalone doses to be tested in the next step. At each step, five combinations (one new plus the best previous four) were tested. RESULTS: None of the tested combinations resulted in adverse effects. Four steps and 120 animals were necessary to identify the optimal drug combination (0.014 mg/kg dexmedetomidine, 2.5 mg/kg alfaxalone and 0.3 mg/kg butorphanol). CONCLUSIONS AND RELEVANCE: The investigated drug mixture, at the doses found with the optimisation method, is suitable for cats undergoing minor clinical procedures.

Prevalence of filarial parasites in domestic and stray cats in Selangor State, Malaysia.
Al-Abd NM, Nor ZM, Kassim M et al.
OBJECTIVE: To determine the prevalence of the filarial parasites, i.e., Brugia malayi, Brugia, Brugia pahangi (B. pahangi), Dirofilaria immitis and Dirofilaria repens (D. repens) in domestic and stray cats. METHODS: A total of 170 blood sample were collected from domestic and stray cats and examined for filarial worm parasites in two localities, Pulau Carey and Bukit Gasing, Selangor State, Malaysia. RESULTS: The overall prevalence of infection was 23.5% (40/170; 95% CI = 17.4-30.6). Of this, 35% (14/40; 95% CI = 22.1-50.5) and 50% (20/40; 95% CI = 35.2-64.8) were positive for single B. pahangi and D. repens, respectively. The remaining of 15% (6/40; 95% CI = 7.1-29.1) were positive for mixed B. pahangi and D. repens. In addition, 75% of the infected cats were domestic, and 25% were strays. No Brugia malayi and Dirofilaria immitis was detected. Eighty-four cats were captured at Pulau Carey, of which 35.7% (30/84) were infected. Among the cats determined to be infected, 93% (28/30; 95% CI = 78.7-98.2) were domestic, and only 6.7% (2/30; 95% CI = 19.0-21.3) were strays. Conversely, the number of infected cats was three times lower in Bukit Gasing than in Pulau Carey, and most of the cats were stray. CONCLUSIONS: B. pahangi and D. repens could be the major parasites underlying filariasis in the study area. Adequate prophylactic plans should be administrated in the cat population in study area.

Pharmacokinetics of meropenem after intravenous, intramuscular and subcutaneous administration to cats.
Albarellos GA, Montoya L, Passini SM, Lupi MP, Lorenzini PM, Landoni MF
OBJECTIVES: The aim of the study was to describe the pharmacokinetics and predicted efficacy of meropenem after intravenous (IV), intramuscular (IM) and subcutaneous (SC) administration to cats at a single dose of 10 mg/kg. METHODS: Five adult healthy cats were used. Blood samples were withdrawn at predetermined times over a 12 h period. Meropenem concentrations were determined by microbiological assay. Pharmacokinetic analyses were performed with computer software. Initial
estimates were determined using the residual method and refitted by non-linear regression. The time that plasma concentrations were greater than the minimum inhibitory concentration (T >MIC) was estimated by applying bibliographic MIC values and meropenem MIC breakpoint. RESULTS: Maximum plasma concentrations of meropenem were 101.02 µg/ml (Cp(0), IV), 27.21 µg/ml (Cmax, IM) and 15.57 µg/ml (Cmax, SC). Bioavailability was 99.69% (IM) and 96.52 % (SC). Elimination half-lives for the IV, IM and SC administration were 1.35, 2.10 and 2.26 h, respectively.

CONCLUSIONS AND RELEVANCE: Meropenem, when administered to cats at a dose of 10 mg/kg every 12 h, is effective against bacteria with MIC values of 6 µg/ml, 7 µg/ml and 10 µg/ml for IV, IM and SC administration, respectively. However, clinical trials are necessary to confirm clinical efficacy of the proposed dosage regimen.

**Diagnosis of Small Intestinal Disorders in Dogs and Cats.**

Allenspach K


Laboratory tests are an important part of the workup of small intestinal diseases in dogs and cats. Especially in chronic cases, when extragastrointestinal causes need to be ruled out, it is important to adhere to a systematic workup. This article details the newest available data on tests to aid this diagnostic process. Once the diagnosis of a chronic enteropathy is made, there are many laboratory tests that can help in monitoring the disease and providing prognostic information. Several new tests being evaluated for clinical usefulness are discussed.

**Tick-borne agents in domesticated and stray cats from the city of Campo Grande, state of Mato Grosso do Sul, midwestern Brazil.**

André MR, Herrera HM, Fernandes SJ et al.


Anaplasmataceae agents, piroplasmids and Hepatozoon spp. have emerged as important pathogens among domestic and wild felines. The present work aimed to detect the presence of species belonging to the Anaplasmataceae family, piroplasms and Hepatozoon spp. DNA in blood samples of domesticated and stray cats in the city of Campo Grande, state of Mato Grosso do Sul, midwestern Brazil. Between January and April 2013, whole blood samples were collected from 151 cats (54 males, 95 females and two without gender registration) in the city of Campo Grande, state of Mato Grosso do Sul, Brazil. DNA extracted from cat blood samples was submitted to conventional PCR assays for Theileria/Babesia/Cytauxzoon spp. (18S rRNA, ITS-1), Ehrlichia spp. (16S rRNA, dsb, groESL), Anaplasma spp. (16S rRNA, groESL) and Hepatozoon spp. (18S rRNA) followed by phylogenetic reconstructions. Out of 151 sampled cats, 13 (8.5%) were positive for Ehrlichia spp. closely related to Ehrlichia canis, 1 (0.66%) for Hepatozoon spp. closely related to Hepatozoon americanum and Hepatozoon spp. isolate from a wild felid, 1 (0.66%) for Cytauxzoon sp. closely related do Cytauxzoon felis, and 18 (11.9%) for Babesia/Theileria (one sequence was closely related to Babesia bigemina, eight for Babesia vogeli, five to Theileria spp. from ruminants [Theileria ovis, Theileria lestoquardi] and four to Theileria sp. recently detected in a cat). The present study showed that Ehrlichia spp., piroplasmids (B. vogeli, Theileria spp. and Cytauxzoon spp.) and, more rarely, Hepatozoon spp. circulate among stray and domesticated cats in the city of Campo Grande, state of Mato Grosso do Sul, midwestern Brazil.

**Levels of Toxocara infections in dogs and cats from urban Vietnam together with associated risk factors for transmission.**
Anh NT, Thuy DT, Hoan DH, Hop NT, Dung DT
*J Helminthol* (2015) 1-3

The aims of the present study were to assess the prevalence of Toxocara infection in household cats and dogs, together with the presence of anti-Toxocara IgG antibodies in humans and the level of egg contamination in soil and vegetable samples from the local environment. Prevalence values of 47.8% of 253 cats and 37.7% of 284 dogs were recorded, together with 35.8% of eggs in soil samples, 25.0% in garden vegetables and in 56.3% of 16 dog-hair samples. The risk of the infection was higher for dogs and cats in households with egg-contaminated soil compared to those without evidence of soil contamination. The high prevalence of dog and cat Toxocara infection and their indiscriminate defecation behaviour contribute to a significant risk of transmission to humans as 58.7% of human blood samples were seropositive for Toxocara. Anthelmintic treatment of dogs and cats, plus educating household members, must be emphasized in any prevention programme in Vietnam.

**Pathology and behaviour in feline medicine: investigating the link between vomeronasalitis and aggression.**

Asproni P, Cozzi A, Verin R et al.

**OBJECTIVES:** The aim of the study was to investigate if the feline vomeronasal organ (VNO) can be affected by inflammatory lesions and if these changes are associated with behavioural alterations.

**METHODS:** VNOs from 20 cats were sampled during necropsy, submitted for routine tissue processing and stained with haematoxylin and eosin for histopathological evaluation. Of the 20 cats, data on the presence of aggressive behaviours towards cats or humans were collected by questionnaire survey at the point of death. Inflammatory lesions were classified depending on the duration of the process as acute or chronic, both in vomeronasal sensory epithelium (VNSE) and in non-sensory epithelium (NSE). Fisher’s exact test was used to compare VNO inflammation with behavioural data.

**RESULTS:** The VNSE was inflamed in 11/20 VNOs (55%) while the NSE was inflamed in 13/20 (65%). Overall, the VNO was affected by inflammation in 14/20 (70%) cats, and all the lesions were classified as chronic. Five out of 20 cats (25%) had documented intraspecific aggressive behaviours and 8/20 (40%) had shown aggression towards humans. Fisher’s exact test showed a statistically significant correlation between inflammation of the VNSE and intraspecific aggression (P = 0.038). No statistically correlations were observed between VNSE inflammation and aggression towards humans and between NSE inflammation and aggression towards cats or humans.

**CONCLUSIONS AND RELEVANCE:** Our results show, for the first time, the existence of vomeronasalitis in animals and its possible association with intraspecific aggressive behaviours. The inflammatory microenvironment could impair VNSE functionality, causing intraspecific communication alterations, probably through a reduction in chemical communication action and perception. Owing to the pivotal role of the VNO in the social life of cats and other species, this report provides a rationale to further investigate this disease in relation to a variety of behavioural disorders.

**Development of anemia, phlebotomy practices, and blood transfusion requirements in 45 critically ill cats (2009-2011).**

Balakrishnan A, Drobatz KJ, Reineke EL

**OBJECTIVE:** To describe the incidence of the development of anemia, the number of phlebotomies performed daily, the approximate volume of blood withdrawn, the transfusion requirements and their association with duration of hospitalization and survival to discharge in critically ill cats.

**DESIGN:** Retrospective study from January 2009 to January 2011. **SETTING:** University teaching hospital.
ANIMALS: Cats hospitalized in the intensive care unit (ICU) for >48 hours. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Medical records of cats hospitalized for >48 hours in the ICU were examined. Of the 45 cats included, 60% (27/45) were not anemic upon admission to the ICU. Of these, 74.1% (20/27) developed anemia during their ICU stay. Development of anemia was associated with a longer duration of hospitalization (P = 0.002) but not with survival (P = 0.46). Fourteen cats (31.1%; 14/45) received one or more packed red blood cell transfusions and had significantly longer ICU stays (P < 0.001). Transfusion requirements were not associated with survival (P = 0.66). The median number of phlebotomies per day for all cats in the ICU was 3 (range 1-6). This was significantly associated with the development of anemia (P = 0.0011) and higher transfusion requirements (P = 0.16) in the 14 cats that received a transfusion. The estimated volume phlebotomized was significantly (P < 0.001) greater in cats that required a transfusion (median volume 3.32 mL/kg/ICU stay) compared to cats that did not require a transfusion (median volume 1.11 mL/kg/ICU stay) but was not associated with survival to discharge (P = 0.84). CONCLUSIONS: Development of anemia necessitating blood transfusions is common in critically ill cats and leads to significantly longer duration of ICU hospitalization. Iatrogenic anemia from frequent phlebotomies is an important cause for increased transfusion requirement. Fewer phlebotomies and other blood conserving strategies in these patients may help reduce the incidence of anemia and decrease transfusion requirements, as well as result in shorter hospital stays.

Neurogenic urinary retention in cats following severe cluster seizures.
Balducci F, De Risio L, Shea A, Canal S, Stabile F, Bernardini M


CASE SERIES SUMMARY: Four cats that presented with severe cluster seizures developed neurogenic urinary retention in the postictal phase. None of the cats had previous seizures. Micturition was reported as normal in all cats for 3 or more years before seizure onset. All cats required a continuous rate infusion of propofol to control the seizure activity. In all cats manual bladder expression was performed every 8 h until recovery of normal micturition. One cat was started on phenoxybenzamine to reduce internal urethral sphincter tone. All cats recovered normal micturition within 4 weeks of the end of cluster seizures. RELEVANCE AND NOVEL INFORMATION: Transient neurogenic urinary retention has not previously been reported in dogs and cats following severe cluster seizures. Urinary retention should be considered a potential postictal deficit, promptly recognised and treated to avoid urinary tract infection and detrusor muscle atony.

Assessments of feline plasma biochemistry reference intervals for three in-house analysers and a commercial laboratory analyser.
Baral RM, Dhand NK, Krockenberger MB, Govendir M


For each species, the manufacturers of in-house analysers (and commercial laboratories) provide standard reference intervals (RIs) that do not account for any differences such as geographical population differences and do not overtly state the potential for variation between results obtained from serum or plasma. Additionally, biases have been demonstrated for in-house analysers which result in different RIs for each different type of analyser. The objective of this study was to calculate RIs (with 90% confidence intervals [CIs]) for 13 biochemistry analytes when tested on three commonly used in-house veterinary analysers, as well as a commercial laboratory analyser. The calculated RIs were then compared with those provided by the in-house analyser manufacturers and the commercial laboratory. Plasma samples were collected from 53 clinically normal cats. After centrifugation, plasma was divided into four aliquots; one aliquot was sent to the commercial laboratory and the remaining three
were tested using the in-house biochemistry analysers. The distribution of results was used to choose
the appropriate statistical technique for each analyte from each analyser to calculate RIs. Provided
reference limits were deemed appropriate if they fell within the 90% CIs of the calculated reference
limits. Transference validation was performed on provided and calculated RIs. Twenty-nine of a
possible 102 provided reference limits (28%) were within the calculated 90% CIs. To ensure proper
interpretation of laboratory results, practitioners should determine RIs for their practice populations
and/or use reference change values when assessing their patients’ clinical chemistry results.

Bias in feline plasma biochemistry results between three in-house analysers and a commercial
laboratory analyser: results should not be directly compared.
Baral RM, Dhand NK, Morton JM, Krockenberger MB, Govendir M
In-house analysers are commonplace in small animal practices but cannot be calibrated by the operator;
therefore, any bias in the generated plasma analyte values cannot be corrected. Guidelines such as
grading of renal disease and published reference intervals (RIs) in veterinary textbooks assume plasma
biochemistry values generated by different analysers are equivalent. This study evaluated the degree of
bias, as well as if bias was constant or proportional, for feline plasma biochemical analytes assessed by
three in-house biochemistry analysers compared with a commercial laboratory analyser. Blood samples
were collected on 101 occasions from 94 cats and, after centrifugation, plasma was divided into four
aliquots. One aliquot was sent to the commercial laboratory and the remaining three were tested using
the in-house biochemistry analysers. Results from each analyser were compared with the commercial
laboratory results by difference plots and analyses, and by comparing percentages of results within
provided RIs. Substantial bias was evident relative to the results of the commercial analyser for at least
half of the analytes tested for each machine. In most cases, bias was proportional, meaning that the
difference between the methods varied with the concentration of the analyte. The results demonstrate
that values obtained from these analysers should not be directly compared and that RIs are not
transferable between these analysers. Potential effects of bias on clinical decision-making may be
overcome by use of appropriately generated RIs, or reference change values which, for most
biochemistry analytes, are more appropriate than subject-based RIs.

Description of the Anatomy, Surgical Technique, and Outcome of Hemipelvectomy in 4 Dogs and
5 Cats.
Barbur LA, Coleman KD, Schmiedt CW, Radlinsky MG
OBJECTIVE: To provide (1) a comprehensive description of hemipelvectomy; and (2) report clinical
application and outcome of hemipelvectomy in dogs and cats. STUDY DESIGN: Descriptive report
and retrospective case series. ANIMALS: Dogs (n = 4) and 5 cats. METHODS: Cadaveric dissection
was performed for imaging purposes using 4 mixed breed dogs euthanatized for reasons unrelated to
this study. Medical records (2005-2012) were reviewed for dogs and cats that had hemipelvectomy.
Data collected included signalment, body weight, body condition score, clinical presentation,
diagnostic imaging findings, location and extent of tumor, definitive diagnosis, use of adjuvant therapy,
ability to ambulate postoperatively, complications, and survival. RESULTS: The most common
indication for hemipelvectomy in cats was injection site sarcoma (ISS) and in dogs, osteosarcoma or
peripheral nerve sheath tumor (PNST). Complete tumor excision was achieved in 6 (67%) cases.
Incomplete excision occurred in 2 dogs with lumbosacral PNST and 1 cat having a 2nd surgery for ISS.
Complications included intraoperative hemorrhage (n = 2), postoperative soft tissue infection (2), and
discharge from the incision site (1). All but 1 animal were ambulatory at the time of discharge.
Hospitalization ranged from 1-10 days (median, 4 days). Survival after surgery was individually assessed. CONCLUSION: With in-depth anatomic familiarity, hemipelvectomy can be successful for excision of neoplastic lesions of the proximal aspect of the pelvic limb, with only minor complications.

**Urolithiasis.**
Bartges JW, Callens AJ
Uroliths occur commonly in the bladder and/or urethra of dogs and cats and can be life-threatening if urethral obstruction occurs. The majority of uroliths are composed of struvite or calcium oxalate; however, other minerals such as urate and cystine occur. Uroliths may be composed of more than one mineral. Some uroliths are amenable to medical dissolution (e.g., struvite, urate, and cystine) while others (e.g., calcium oxalate) are not. Medical management involves decreasing urine saturation for the minerals that form uroliths.

**Lack of cross-protection against Mycoplasma haemofelis infection and signs of enhancement in “Candidatus Mycoplasma turicensis”-recovered cats.**
Baumann J, Novacco M, Willi B et al.
Mycoplasma haemofelis” and “Candidatus Mycoplasma turicensis” are feline hemoplasmas that induce hemolytic anemia. Protection from homologous re-challenge was recently demonstrated in cats recovered from primary infection. Here, we determined if cats recovered from “Cand. M. turicensis” infection were protected against infections with the more pathogenic M. haemofelis. Ten specified pathogen-free cats were exposed to M. haemofelis. Five of the ten cats had recovered from “Cand. M. turicensis” bacteremia (group A), and five cats were naïve controls (group B). No cross-protection was observed. By contrast, the “Cand. M. turicensis”-recovered cats displayed faster M. haemofelis infection onset (earlier PCR-positive and anemic) than the controls. No “Cand. M. turicensis” was detected in any cat. M. haemofelis shedding was observed in saliva, feces and urine. In both groups, evidence of a Th1 response was observed (high IFN-γ, low IL-4), but IL-10 levels were also high. In group A, total, CD4+ and CD8+ T cells increased within days after M. haemofelis exposure. At times of maximal bacteremia, macrocytic hypochromic anemia, neutropenia, monocytosis and a decrease in leukocyte, eosinophil, and lymphocyte counts and subsets thereof (B- and T-cells, CD4+, CD8+ and CD4+CD25+ cells) were particularly significant in group A. Moreover, an increase in protein concentrations, hypoalbuminemia and a polyclonal hypergammaglobulinemia were observed. Five of ten M. haemofelis-infected cats subsequently cleared bacteremia without antibiotic treatment. In conclusion, the study suggests that a previous hemoplasma infection, even when the cat has ostensibly recovered, may influence subsequent infections, lead to an enhancement phenomenon and other differences in infection kinetics.

**Influence of two administration rates of alfaxalone at induction on its relative potency in cats: a pilot study.**
Bauquier SH, Warne LN, Carter JE, Whittem T, Beths T
OBJECTIVES: The aim of the study was to evaluate, in a controlled randomised masked clinical trial, the influence of administration rate of alfaxalone at induction on its relative potency in cats and to report the incidence of cardiorespiratory adverse effects. METHODS: Twelve healthy female domestic cats admitted for ovariohysterectomy were premedicated with buprenorphine 20 µg/kg intramuscularly
and alfaxalone 3.0 mg/kg subcutaneously. Sedation scores were established (using a published scale ranging from 1 [no sedation] to 5 [profound sedation]) prior to anaesthesia induction with alfaxalone intravenously at 2 mg/kg/min (group A2; n = 6) or 0.5 mg/kg/min (group A0.5; n = 6) to effect until orotracheal intubation was achieved. Sedation scores and alfaxalone induction doses were compared between the groups, using a Mann-Whitney exact test. Results are reported as median and range. Presence of apnoea (no breathing for more than 30 s) or hypotension (mean arterial blood pressure <60 mmHg) within 5 mins postintubation was also reported. RESULTS: Although sedation scores (1.5 [range 1.0-3.0] and 2.5 [range 1.0-3.0] for A2 and A0.5, respectively) were not significantly different (P = 0.32), cats in group A2 required significantly more alfaxalone (4.3 mg/kg [range 3.4-7.0 mg/kg]) than group A0.5 (2.1 mg/kg [range 1.5-2.5 mg/kg]) (P = 0.002). Two cats in each group presented postinduction apnoea, and two cats in group A2 and three cats in group A0.5 presented postinduction hypotension. CONCLUSIONS AND RELEVANCE: The use of a slower induction infusion rate resulted in an increase in the alfaxalone relative potency without obvious cardiorespiratory benefit.

Bell CM, Soukup JW
Vet Pathol (2015) 52:910-918
The objective of this study was to characterize clinical, radiologic, and histologic patterns of alveolar bone expansion and osteomyelitis in cats. Based on case materials submitted as surgical biopsy specimens, alveolar bone pathology was diagnosed in 28 cats. These cats had a total of 37 oral lesions with clinical and radiologic changes that involved bone and/or teeth, including periodontitis, bone expansion, tooth resorption, and/or chronic osteomyelitis; 32 lesions were evaluated by histopathology. Canine teeth were affected in 19 cats (27 affected teeth), with bilateral lesions in 5 (26.3%) cats. The caudal premolar and/or molar regions were affected in 10 cats (10 affected sites). All biopsy sites evaluated by a review of clinical images and/or radiographs had evidence of periodontitis. Clinical photographs showed expansion of alveolar bone in 13 of 16 (81%) biopsy sites evaluated. Radiologically, rarifying osseous proliferation of alveolar bone was seen at 26 of 27 (96%) biopsy sites, and tooth resorption occurred at 15 of 18 (83%) sites. Histologically, the tissue samples from canine sites had compressed trabeculae of mature remodeled bone, loose fibrous stroma with paucicellular inflammation, and mild proliferation of woven bone. Tissue samples from the premolar/molar biopsy sites were often highly cellular with mixed lymphoplasmacytic and chronic suppurative inflammation, ulceration with granulation tissue, and robust proliferation of woven bone. Alveolar bone expansion and osteomyelitis in cats occurs in conjunction with periodontal inflammation and frequently with tooth resorption.

Marked struvite crystalluria and its association with lower urinary tract signs in a cat with feline idiopathic cystitis.
Bell ET, Lulich JP
CASE REPORT: We describe a case of a large amount of mineralised material, presumed to be struvite crystals, within the urinary bladder of a cat with feline idiopathic cystitis. The presence of this material coincided with episodes of lower urinary tract signs in this cat over a 2-year period. CLINICAL SIGNIFICANCE: Although struvite crystalluria is widely considered to be clinically insignificant, this generalisation may not be true for all cats with lower urinary tract disease. Imaging of the urinary tract is recommended in all cats with lower urinary tract signs.
Analgesic efficacy of intraperitoneal administration of bupivacaine in cats.
Benito J, Monteiro B, Lavoie AM, Beauchamp G, Lascelles BD, Steagall PV

OBJECTIVES: The aim of this study was to evaluate the analgesic efficacy of intraperitoneal (IP) bupivacaine in cats undergoing ovariohysterectomy. METHODS: Forty-five cats were included in a randomized, prospective, blinded study after owners’ written consent was obtained. The anesthetic protocol included acepromazine-buprenorphine-propofol-isoflurane. A ventral midline incision was made and cats (n = 15/group) were administered either IP saline 0.9% (negative and positive control groups; NG and PG, respectively) or IP bupivacaine (2 mg/kg; bupivacaine group; BG). Cats in the PG received meloxicam (0.2 mg/kg SC). An ovariohysterectomy was performed and postoperative pain was evaluated using a dynamic interactive visual analog scale (DIVAS), the UNESP-Botucatu multidimensional composite pain scale (MCPS) and mechanical nociceptive thresholds (MNT) for up to 8 h after the end of surgery. Postoperative sedation was evaluated using DIVAS. Rescue analgesia was provided with buprenorphine and/or meloxicam. Repeated measures linear models and a Cochran-Mantel-Haenszel test were used for statistical analysis (P <0.05). RESULTS: There was a significant effect of treatment on the number of times rescue analgesia was administered (P = 0.002) (PG, n = 2, 13%; NG, n = 12, 80%; BG, n = 4, 27%) with the number of rescues being higher in the NG group than in the PG (P = 0.0004) and BG (P = 0.02) groups. The DIVAS, MCPS and MNT were significantly different when compared with baseline values at different time points; however, data were not significantly different among groups. CONCLUSIONS AND RELEVANCE: Treatments PG and BG produced similar analgesia in terms of pain scores, number of times rescue analgesia was administered and MNT. Based on rescue analgesia, IP administration of bupivacaine provides analgesia in cats after ovariohysterectomy.

Ear tips to ear tags: Marking and identifying cats treated with non-surgical fertility control.
Benka VA

CURRENT APPROACHES: Trap-neuter-return (TNR) introduced a humane means of managing free-roaming and feral (‘community’) cats; it also necessitated a method of marking and identifying these cats as sterilized. Although multiple identification methods have been studied or attempted in the field, ear tipping (or, less commonly, ear notching) has proven to be the best option and is used internationally. However, ear tipping must be performed under general anesthesia, and it conveys only binary information: yes, a cat has gone through a TNR program (and is sterilized); or, no, a cat has not gone through a TNR program (and may or may not be sterilized). FUTURE REQUIREMENTS: Future non-surgical feline fertility control options will require an alternative to ear tipping for identifying community cats, one that does not require anesthesia in order to mark the animal as treated. Long-term contraceptives (vs permanent sterilants) will also require a marker that can denote the time when a cat was last treated. OBJECTIVES AND PROGRESS: To address this need, the Alliance for Contraception in Cats & Dogs is working with an interdisciplinary team from Cornell University, USA, to develop an effective, humane marking method. Their focus is a new generation of ear tag. The prototype design uses different shapes and materials, and a different application process, than tags used to date. The objective is to minimize tag weight, application discomfort, and likelihood of blood loss and infection, while simultaneously allowing for coding of information, including treatment time period.
Vaccines for feline contraception: GonaCon GnRH-hemocyanin conjugate immunocontraceptive.
Benka VA, Levy JK

**VACCINE:** GonaCon™ is the trade name of a GnRH-hemocyanin conjugate immunocontraceptive vaccine formulation shown to prevent reproduction and inhibit production of sex hormones in numerous mammalian species for extended durations. GonaCon is currently registered with the US Environmental Protection Agency (EPA) for contraception of female white-tailed deer, and GonaCon™-Equine for female wild horses and burros. Multiple formulations of this GnRH-hemocyanin conjugate immunocontraceptive vaccine have been developed at the National Wildlife Research Center in the United States. **EVIDENCE BASE:** Three studies employing an early generation vaccine formulation indicated its potential for multi-year contraception of female cats (median duration of effect in excess of 39.7 months). The contraceptive effect for male cats was less predictable and of shorter duration (median duration of effect 14 months). Since these initial feline studies there have been formulation composition changes, and further investigation of the safety, efficacy and duration of this contraceptive vaccine for cats is warranted. **FUTURE PROSPECTS:** Individual country regulations will determine if GonaCon could be registered for unowned, free-roaming and/or pet cats.

Prevalence of selected rickettsial infections in cats in Southern Germany.
Bergmann M, Englert T, Stuetzer B, Hawley JR, Lappin MR, Hartmann K

Prevalence of *Anaplasma*, *Ehrlichia*, *Neorickettsia*, and *Wolbachia* DNA in blood of 479 cats collected in different veterinary clinics in Southern Germany was determined using a previously published conventional PCR using 16S-23S intergenic spacer primers (5’ CTG GGG ACT ACG GTC GCA AGA C 3’ - forward; 5’ CTC CAG TTT ATC ACT GGA AGT T 3’ - reverse). Purified amplicons were sequenced to confirm genus and species. Associations between rickettsial infections, and feline immunodeficiency virus (FIV), as well as feline leukemia virus (FeLV) status were evaluated. Rickettsial prevalence was 0.4% (2/479; CI: 0.01-1.62%). In the two infected cats, *Anaplasma phagocytophilum* DNA was amplified. These cats came from different environment and had outdoor access. Both were ill with many of their problems likely related to other diseases. However, one cat had neutrophilia with left shift and the other thrombocytopenia potentially caused by their A. phagocytophilum infection. There was no significant difference in the FIV and FeLV status between A. phagocytophilum-negative and -positive cats. *A. phagocytophilum* can cause infection in cats in Southern Germany, and appropriate tick control is recommended.

Spontaneous gastrointestinal perforation in cats: a retrospective study of 13 cases.
Bernardin F, Martinez Rivera L, Ragetly G, Gomes E, Hernandez J

**OBJECTIVES:** The aim of this study was to describe the clinical characteristics and the frequency of malignant vs non-malignant causes for spontaneous gastrointestinal perforation in cats. **METHODS:** The medical records of cats diagnosed as having gastrointestinal perforation between August 2010 and July 2013 were reviewed. Diagnosis was confirmed by exploratory surgery. Patients with incomplete records, perforation due to external trauma, leakage at previous enterotomy or anastomotic sites, or foreign bodies were excluded. Each record was examined for different information pertaining to signalment, medical history, clinical and clinicopathological data, imaging findings, abdominal fluid examination, surgical findings, histopathological examination, treatment received after surgery and outcome. **RESULTS:** Thirteen cats were included. Five of these cats had concurrent illnesses, including...
viral upper respiratory tract disease, pancreatitis and chronic kidney disease. Two cats had previously received non-steroidal anti-inflammatory drugs and four had received corticosteroids. Clinical signs and clinicopathological abnormalities were not specific. Six of 13 patients were diagnosed during surgery with gastric perforations, four patients with duodenal perforations and three patients with jejunal perforations. Histopathological examination of the ulcerated wall was performed in 11/13 cats. Alimentary lymphoma was diagnosed in six cats. Non-neoplastic lesions (lymphocytic-plasmacytic inflammatory bowel disease, necrotic suppurative enteritis) were observed in the other five cats. The major limitation of the study was the small sample size. CONCLUSIONS AND RELEVANCE: Lymphoma may be a frequent cause of spontaneous perforation in cats. Therefore, histological examination of ulceration is essential in all cases. The direct and sole implication of anti-inflammatory administration in a gastrointestinal perforation is not clearly established in this study.

**Analgesia in the Perioperative Period.**
Berry SH
Untreated or undermanaged perioperative pain has systemic effects that may negatively impact a patient’s welfare and return to function. A consistent analgesic plan that assesses a patient’s pain and comfort at regular intervals during the perioperative period should be incorporated into practice. Validated pain assessment tools are available for use in dogs and cats. Multimodal analgesic plans should be created for individual patients and modified according to pain assessments. These plans, based on a thorough history, physical examination, and knowledge of the expected pain, should be combinations of an opioid, a nonsteroidal anti-inflammatory drug, a local anesthetic, and nonpharmacologic analgesic techniques.

**Management of Orbital Diseases.**
Betbeze C
Orbital diseases are common in dogs and cats and can present on emergency due to the acute onset of many of these issues. The difficulty with diagnosis and therapy of orbital disease is that the location of the problem is not readily visible. The focus of this article is on recognizing classical clinical presentations of orbital disease, which are typically exophthalmos, strabismus, enophthalmos, proptosis, or intraconal swelling. After the orbital disease is confirmed, certain characteristics such as pain on opening the mouth, acute vs. chronic swelling, and involvement of nearby structures can be helpful in determining the underlying cause. Abscesses, cellulitis, sialoceles, neoplasia (primary or secondary), foreign bodies, and immune-mediated diseases can all lead to exophthalmos, but it can be difficult to determine the cause of disease without advanced diagnostic imaging, such as ultrasound, magnetic resonance imaging, or computed tomography scan. Fine-needle aspirates and biopsies of the retrobulbar space can also be performed.

**Anatomopathological staging of feline hypertrophic cardiomyopathy through quantitative evaluation based on morphometric and histopathological data.**
Biasato I, Francescone L, La Rosa G, Tursi M
Diagnosis of feline hypertrophic cardiomyopathy (HCM) is both clinical and anatomopathological. Since standardized echocardiographic parameters have previously been established for its diagnosis and classification, the aim of the present study is to provide an original, complete and repeatable
quantitative anatomopathological evaluation of this myocardial disease. Since ES-HCM is a clearly defined clinicopathological entity of feline HCM, the present study also aims to investigate its temporal evolution. The hearts of 21 cats with previous diagnosis or suspicion of HCM and 6 control animals were submitted for morphometric and histopathological investigations. The proposed quantitative assessment of gross and histopathological features of HCM appears to be original and repeatable. Correlations between morphometric data allow to establish that the progression to the end-stage phenotypes, primarily characterized by increase in left ventricular fibrous tissue deposition, is accompanied by dilation of left ventricular lumen (P=0.0004) and left atrium (P=0.0017) and increase in intramural coronary arteriosclerosis (P=0.0293).

**Diagnosis of Disorders of Iron Metabolism in Dogs and Cats.**
Bohn AA  
Iron is an essential element and is used by every cell in the body. This article summarizes iron metabolism and disorders associated with iron metabolism in dogs and cats. The diagnostic tests currently in use for assessing iron status are discussed.

**Signalment, clinical features, echocardiographic findings, and outcome of dogs and cats with ventricular septal defects: 109 cases (1992-2013).**
Bomassi E, Misbach C, Tissier R et al.  
OBJECTIVE: To determine the signalment, clinical features, echocardiographic findings, and outcome of dogs and cats with ventricular septal defects (VSDs). DESIGN: Retrospective case series. ANIMALS: 56 dogs and 53 cats with VSDs. PROCEDURES: Medical records of dogs and cats with VSDs diagnosed by means of conventional and Doppler echocardiography were reviewed. Signalment, clinical status, echocardiographic findings, and outcome data were recorded. Variables of interest were analyzed for the study population and subgroups according to species and clinical status. RESULTS: VSDs were isolated (ie, solitary defects) in 53 of 109 (48.6%) patients. Most (82/109 [75.2%]) VSDs were membranous or perimembranous. Terriers and French Bulldogs were commonly represented canine breeds. Most isolated VSDs were subclinical (43/53 [81%]) and had a pulmonary-to-systemic flow ratio < 1.5 (24/32 [75%]). The VSD diameter and VSD-to-aortic diameter ratio were significantly correlated with pulmonary-to-systemic flow ratio in dogs (r = 0.529 and r = 0.689, respectively) and in cats (r = 0.713 and r = 0.829, respectively). One dog underwent open surgical repair for an isolated VSD and was excluded from survival analysis. Of the remaining animals with isolated VSDs for which data were available (37/52 [71%]), no subclinically affected animals developed signs after initial diagnosis, and median age at death from all causes was 12 years. CONCLUSIONS AND CLINICAL RELEVANCE: Most dogs and cats with isolated VSDs had a long survival time; few had clinical signs at diagnosis, and none with follow-up developed clinical signs after diagnosis.

**Diagnostic value of cytological analysis of tumours and tumour-like lesions of the oral cavity in dogs and cats: a prospective study on 114 cases.**
Bonfanti U, Bertazzolo W, Gracis M et al.  
*Vet J* (2015) **205**:322-327  
Neoplastic or non-neoplastic masses are common findings in the oral cavity of cats and dogs. The aim of this prospective study was to compare the results of cytological examinations of lesions of the oral cavity following fine-needle aspiration (FNA), fine-needle insertion (FNI), and impression smear (IS)
with histopathological results being considered as the diagnostic gold standard. In total, 85 dogs and 29 cats were included in the study. Cases were included when histology and cytology (FNA, FNI, and/or IS) were available from the same lesion; \( \kappa \)-agreement and accuracy between cytological and histopathological results were calculated. Eighteen cytological specimens were excluded, with a retrieval rate of 84.2%. Of the 96 samples analysed, FNA, FNI, and IS were available from 80, 76, and 73 animals, respectively. Overall, 60/67 (89.6%) and 21/29 (72.4%) lesions were neoplastic in dogs and cats, respectively, with the remaining being non-neoplastic. For all lesions, \( \kappa \)-values obtained by FNA, FNI, and IS were in dogs 0.83 (95% confidence interval [CI]: 0.77-0.90), 0.87 (95% CI: 0.81-0.93) and 0.75 (95% CI: 0.67-0.84), respectively, and in cats 0.92 (95% CI: 0.87-0.96), 0.92 (95% CI: 0.88-0.97) and 0.86 (95% CI: 0.79-0.92), respectively. The diagnostic accuracies of FNA, FNI, and IS in dogs with neoplasia were 98.2%, 98.1%, and 91.8%, respectively, and in cats with neoplasia were 95.6%, 95.6% and 95.8%, respectively. In conclusion, the high agreement with histopathology suggests that cytological examinations by FNI, FNA, and IS are all appropriate methods to correctly diagnose lesions of the oral cavity in dogs and cats.

Dysregulation of tyrosine kinases and use of imatinib in small animal practice.
Bonkobara M
_Vet J_ (2015) **205**:180-188
Imatinib inhibits the activity of several tyrosine kinases, including BCR-ABL, KIT and platelet-derived growth factor receptor (PDGFR). Dysregulation of KIT is found in mast cell tumours (MCTs) and KIT is mutated in approximately 30% and 70% of canine and feline MCTs, respectively. KIT mutations have also been reported in canine and feline gastrointestinal stromal tumours (GISTs), canine acute myeloid leukaemia and canine melanoma. In addition, BCR-ABL and PDGFR mutations have been found in canine leukaemia and haemangiosarcoma, respectively. Imatinib has anti-tumour activity with tolerable toxicity towards a certain subset of MCTs in dogs and cats. Favourable clinical responses are likely to be associated with the presence of KIT mutation. Anti-tumour activity of imatinib has also been demonstrated in canine GISTs with a KIT mutation and in feline hypereosinophilic syndrome; however, to date only one of each of these cases has been reported. In conclusion, analysis of KIT mutations appears to provide valuable data for individual treatment with imatinib in dogs and cats.

Better trap-neuter-return for free-roaming cats: Using models and monitoring to improve population management.
Boone JD
OVERVIEW: Trap-neuter-return (TNR) for cat management is transitioning from an enterprise driven mainly by an urge to ‘help’ into an enterprise that draws useful guidance and precedent from the fields of population biology and wildlife management. This transition is in its infancy, however. At the present time many TNR programs do not produce substantial and persistent reductions in cat populations, and those that do often fail to effectively document this achievement or to publicize their success. CHALLENGES: As a result, TNR has become increasingly controversial, with TNR advocates and wildlife conservationists often staking out fundamentally incompatible positions. This may ultimately prove to be an unproductive debate, since public opinion in developed countries is unlikely to support a total abandonment of TNR in favor of widespread cat management using lethal methods, and since wildlife advocates are unlikely to support TNR as it is typically practiced. ADVANCEMENTS: In contrast, improving the effectiveness of TNR as a population management tool can benefit both cats and wildlife, potentially on a broad scale. Making these advancements requires the diligent promotion, dissemination and adoption of tools like population modeling, population
monitoring and adaptive management. By virtue of their training and exposure to the scientific method, veterinarians are uniquely well positioned to translate the more technical aspects of these approaches to TNR practitioners, and to facilitate their wider use. AIM: The purpose of this review is to describe for a veterinary audience how to facilitate more effective sterilization-based management of outdoor cats, using a combination of theoretical knowledge derived from population modeling and empirical knowledge derived from population monitoring. Using both of these information sources synergistically can offer a viable pathway to better management outcomes.

Slipped capital femoral epiphysis in 17 Maine Coon cats.
Borak D, Wunderlin N, Brückner M, Schwarz G, Klang A
OBJECTIVES: From May 2009 to January 2015, 208 Maine Coon cats presented to the Tierklinik Hollabrunn - a small animal referral and first-opinion centre - and 17 (8.17%) cats were diagnosed with a slipped capital femoral epiphysis (SCFE). Over the same time period, 29 (0.67%) of 4348 cats (all breeds) were diagnosed with SCFE. METHODS: Clinical and orthopaedic examinations and diagnostic imaging were performed on all affected Maine Coons. Age at first presentation, sex, body weight, body condition score (BCS), unilateral or bilateral manifestation of the disease, activity level and duration of lameness, age at neutering and known family history of disease were recorded. Sixteen of 17 Maine Coons were surgically treated. Surgically removed femoral tissue samples were histologically examined in 13 cases. RESULTS: The mean age at first presentation was 21.47 months; male to female ratio was 16:1; mean body weight was 7.5 kg (range 5.3-9.3 kg); and mean BCS was 5.06/9.0. Seven cats were bilaterally affected; the median duration of decreased activity level and lameness was 2 weeks; mean age at neutering was 7.7 months (range 3.0-12.0 months); and four cats were littermates. Fourteen femoral head and neck ostectomy, eight total hip replacements and one primary fixation were performed. All 13 histologically available samples confirmed the diagnosis of SCFE. CONCLUSIONS AND RELEVANCE: To date, SCFE has been reported only occasionally in Maine Coon cats. However, the results of this study indicate that Maine Coons are approximately 12-fold more likely to develop SCFE than the overall population of cats presenting to the Tierklinik Hollabrunn over the same time period. Male sex, neutering, delayed physeal closure and breed-specific high body weight may play an important role in the pathogenesis of SCFE in Maine Coon cats.

Surgical Treatment of Cor Triatriatum Sinister in a Cat Under Cardiopulmonary Bypass.
Borenstein N, Gouni V, Behr L et al.
OBJECTIVE: To report the surgical repair of cor triatriatum sinister (CTS) incorporating heart-beating cardiopulmonary bypass (CPB) in a cat. STUDY DESIGN: Clinical case report. ANIMAL: Fourteen-month-old, 5.9-kg male castrated Maine Coon cat. MATERIALS AND METHODS: The cat had a 3 month history of inappetance, weight loss, and recurrent pulmonary edema. CTS with severe systolic pulmonary arterial (SPA) hypertension (124 mm Hg) was diagnosed by 2D echocardiography, color flow and continuous wave Doppler modes, and left atrial and pulmonary angiography. Surgery was performed through a left intercostal thoracotomy. CPB was initiated and the heart was kept beating. The left atrial appendage was opened and the intra-atrial membrane was excised. RESULTS: After 48 hours, the cat was doing well. Reduced SPA pressure (52 mm Hg) with decreased right heart enlargement was observed on ultrasound examination and the cat was discharged 6 days after surgery with oral antibiotics for 10 days, aspirin, and furosemide. Four months after surgery, the cat presented with increased activity and weight gain and was completely asymptomatic. Transthoracic echocardiography showed a marked improvement of all echo-Doppler variables with disappearance of
SPA hypertension (24 mm Hg). Four years after surgery, the cat was still doing well with no recurrence of clinical signs despite the lack of medical treatment. CONCLUSION: CTS in the cat may be successfully treated by surgery facilitated by use of CPB leading to early and long-term substantial improvement in clinical status and cardiac function. CTS can safely be repaired under CPB in cats.


Injectable anaesthesia for adult cat and kitten castration: effects of medetomidine, dexmedetomidine and atipamezole on recovery.
Bruniges N, Taylor PM, Yates D
OBJECTIVES: Rapid recovery from injectable anaesthesia benefits cat shelter neutering programmes. The effects of medetomidine, dexmedetomidine and atipamezole on recovery were evaluated in adult cats and kittens (≤6 months old). METHODS: One hundred healthy male cats (age range 2-66 months, weight range 0.7-5.3 kg) admitted forneutering were randomly allocated to groups of 25. Anaesthesia was induced with 60 mg/m(2) ketamine, 180 µg/m(2) buprenorphine, 3 mg/m(2) midazolam and either 600 µg/m(2) medetomidine (groups M and MA) or 300 µg/m(2) dexmedetomidine (groups D and DA) intramuscularly (IM). Groups MA and DA also received 1.5 mg/m(2) atipamezole IM after 40 mins. Preparation time, surgical time, and times to sternal recumbency and standing were recorded. Data were analysed using the Kruskall-Wallis test, unpaired t-tests and ANOVA. Statistical significance was deemed to be P <0.05. RESULTS: Groups did not differ significantly in age, body weight, preparation or surgical time. The time to sternal recovery in group MA (64 ± 34 mins) was less than in group M (129 ± 32 mins), and in group DA it was less than in group D (54 ± 6 mins vs 110 ± 27 mins) (P <0.001). There were no differences in duration of recovery to sternal recumbency between groups M and D or MA and DA. The time to standing in group MA (79 ± 51 mins) was less than in group M (150 ± 38 mins) (P <0.001), and in group DA it was less than in group D (70 ± 22 mins vs 126 ± 27 mins) (P <0.01). Time to standing in group D (126 ± 27 mins) was less than in group M (150 ± 38 mins) (P <0.05). Time to standing in groups DA and MA were not different. Kittens recovered faster than adults after atipamezole. Minimal adverse effects were seen. CONCLUSIONS AND RELEVANCE: Atipamezole reliably reduced recovery time after anaesthesia incorporating either dexmedetomidine or medetomidine; however, the choice of dexmedetomidine or medetomidine had little effect. Recovery was faster in kittens.

Respective associations between ureteral obstruction and renomegaly, urine specific gravity, and serum creatinine concentration in cats: 29 cases (2006-2013).
Bua AS, Dunn ME, Pey P
OBJECTIVE: To determine the respective associations between ureteral obstruction and renomegaly, urine specific gravity (USG), and serum creatinine concentration and to assess the reliability of abdominal palpation for detection of renomegaly in cats. DESIGN: Retrospective case series. ANIMALS: 89 client-owned cats with (n = 29) or without ureteral obstruction and with (30) or without (30) kidney disease. PROCEDURES: Medical records of cats that underwent abdominal ultrasonography at a veterinary teaching hospital from January 2006 through April 2013 were reviewed. Cats were categorized as having ureteral obstruction (obstructed group) or no ureteral obstruction with (KD group) or without kidney disease (NKD group). Renomegaly and renal
asymmetry were defined on the basis of mean renal length for NKD cats. Prevalence of renomegaly and renal asymmetry, mean USG and serum creatinine concentration, and abdominal palpation and ultrasonographic findings were compared among the groups. RESULTS: Renomegaly was identified in 2 obstructed cats and 1 KD cat and was not associated with ureteral obstruction. Renal asymmetry was detected in 18 obstructed cats and 11 KD cats. For obstructed and KD cats, the mean USG was significantly lower and the mean serum creatinine concentration was significantly greater than those for NKD cats. Twenty-eight of 29 cats with ureteral obstruction had hypercreatininemia. Abdominal palpation was not a reliable method for detection of renomegaly. CONCLUSIONS AND CLINICAL RELEVANCE: Results indicated renomegaly was not associated with ureteral obstruction in cats, and abdominal palpation was an unreliable method for detection of renomegaly. The most consistent abnormal finding for cats with ureteral obstruction was hypercreatininemia.

Micturition disorders.
Byron JK
Evaluation of dogs and cats with micturition disorders can be challenging. It is important to determine the duration, timing, and frequency of the disorder, as well as assessing for any additional medical problems, such as neurologic or orthopedic disease, that may be affecting micturition. Observation of the patient during voiding can be particularly helpful in determining the type of disorder. Treatment of micturition disorders is varied and outcome depends on an accurate diagnosis. Patient response is also highly variable, even with appropriate therapy, and owners’ expectations must be set accordingly.

Efficacy of Emodepside/Praziquantel Spot-on (Profender®) against adult Aelurostrongylus abstrusus Nematodes in Experimentally Infected Cats.
Böhm C, Wolken S, Schnyder M et al.
The adulticidal efficacy of a topical combination of emodepside 2.1 % (w/v) plus praziquantel 8.6 % (w/v) (Profender® spot-on for cats, Bayer) against adult Aelurostrongylus abstrusus nematodes was evaluated in two randomised, placebo-controlled laboratory efficacy studies. Each study involved 16 cats experimentally inoculated with L3 (800 and 600 each in studies no. 1 and 2, respectively) and randomised into two study groups of 8 cats each after onset of patency. While cats in the treatment group in study no. 1 received a single spot-on application at the minimum therapeutic dose (3 mg/kg emodepside and 12 mg/kg praziquantel), cats in study no. 2 were treated twice with an interval of 14 days. The faecal output of first stage larvae was monitored throughout the study. Necropsy was conducted 4 or 5 weeks after the (first) treatment and the worm counts were used for efficacy calculations. The control groups showed a geometric mean of the total worm count (live and dead worms) of 28.8 (study no. 1) and 17.6 (study no. 2), respectively. All control animals were infected. While the single treatment in study no. 1 resulted in a reduction of the total worm burden by 73.0 % (p = 0.0070), the treatment protocol in study no. 2 was 99.2 % effective (p = 0.0035). Based on live worm counts, the efficacy in study no. 2 was 100 % (p = 0.0030). It is concluded that two applications of Profender® spot-on given two weeks apart represent a safe and highly efficacious treatment regime against feline aelurostrongylosis.

Prevention of Lactogenic Toxocara cati Infections in Kittens by Application of an Emodepside/Praziquantel Spot-on (Profender®) to the Pregnant Queen.
Böhm C, Petry G, Schaper R, Wolken S, Strube C
This study aimed to evaluate the efficacy of an emodepside 2.1 % (w/v)/praziquantel 8.6 % (w/v) topical solution (Profender® spot-on for cats) in the prevention of lactogenic Toxocara cati infections. A controlled test was performed with two groups of 8 cats with confirmed pregnancy. All cats were infected with daily doses of 2000 T. cati eggs for 10 consecutive days starting 50 days post conception to produce an acute infection. Treatment was performed 60 days post conception. Queens in the treatment group received the emodepside/praziquantel solution at the minimum therapeutic dose (3 mg/kg emodepside and 12 mg/kg praziquantel), while the control group was treated with a placebo spot-on. Efficacy was evaluated 56 days post partum by necropsy of one randomly selected kitten of each litter and comparison of the worm burdens between the study groups. Additionally the necropsy results were supported by quantification of worms expelled with the faeces after deworming of the remaining kittens and all queens. The treatment in late pregnancy resulted in an efficacy of 98.7 % (p < 0.0001). All necropsied control kittens were infected (geometric mean 30.6). Seven of 8 kittens from treated mothers were free of T. cati (geometric mean 0.4). Worm counts after deworming reflected the results obtained at necropsy. No side effects of the treatment were observed. It is concluded that treatment with an emodepside/praziquantel spot-on solution during late pregnancy effectively prevents lactogenic transmission of T. cati to the offspring. The study design facilitated the generation of reliable data, while at the same time a minimum number of animals was sacrificed.

Suspected poisoning of domestic animals by pesticides.
Caloni F, Cortinovis C, Rivolta M, Davanzo F
A retrospective study was carried out by reviewing all suspected cases of domestic animal poisoning attributed to pesticides, reported to the Milan Poison Control Centre (MPCC) between January 2011 and December 2013. During this period, pesticides were found to be responsible for 37.3% of all suspected poisoning enquiries received (815). The most commonly species involved was the dog (71.1% of calls) followed by the cat (15.8%), while a limited number of cases involved horses, goats and sheep. Most cases of exposure (47.1%) resulted in mild to moderate clinical signs. The outcome was reported in 59.9% of these cases, with death occurring in 10.4% of them. Insecticides (40.8%) proved to be the most common group of pesticides involved and exposure to pyrethrins-pyrethroids accounted for the majority of calls. According to the MPCC data, there has been a decrease in the number of suspected poisonings cases attributed to pesticides that have been banned by the EU, including aldicarb, carbofuran, endosulfan and paraquat. In contrast, there has been an increase of suspected poisoning cases attributed to the neonicotinoids, imidacloprid and acetamiprid, probably due to their widespread use in recent years. Cases of suspected poisoning that involved exposure to rodenticides accounted for 27.6% of calls received by the MPCC and anticoagulant rodenticides were the primary cause of calls, with many cases involving brodifacoum and bromadiolone. Herbicides were involved in 14.2% of calls related to pesticides and glyphosate was the main culprit in cases involving dogs, cats, horses, goats and sheep. As far as exposure to molluscsicides (11.5%) and fungicides (5.9%), most of the cases involved dogs and the suspected poisoning agents were metaldehyde and copper compounds respectively. The data collected are useful in determining trends in poisoning episodes and identifying newly emerging toxicants, thus demonstrating the prevalence of pesticides as causative agents in animal poisonings.
OBJECTIVE: To report clinical features and outcomes of cats undergoing excision of intracranial meningiomas. STUDY DESIGN: Retrospective, multicenter case series. SAMPLE POPULATION: One hundred and twenty-one cats. METHODS: Signalment, clinical signs, duration of clinical signs, preoperative drug therapy, diagnostic imaging reports, surgery, histopathology, and outcome were collected from records of cats undergoing excision of intracranial meningiomas. Survival estimates were made using Kaplan-Meier analysis. RESULTS: There were 76/121 neutered males and 83/121 domestic short-hairs. Body weight ranged from 1.5-8.7 kg (median 5.0 kg). Age at diagnosis ranged from 3-18 years (median 12 years). Clinical signs included changes in behavior, ataxia, seizures, visual deficits, circling, and paresis. Duration of neurologic signs ranged from <1-23 months (median 1.25 months). At the time of writing, 13 cats were alive, 54 were dead or euthanatized, and 54 were lost to followup. Seven cats (13% of cats that died; 6% of all cats) died or were euthanatized in the immediate postoperative period (<1 month post-surgery) and 9 cats (17% of all cats that died; 7% of all cats) died from causes related to the meningioma but outside the immediate perioperative period. The median survival time for all cats was 37 months (95% confidence interval 28-54 months). CONCLUSION: Cats undergoing excision of intracranial meningiomas had a low perioperative mortality and a long-term prognosis of more than 3 years.

Comparison of the effects of propofol or alfaxalone for anaesthesia induction and maintenance on respiration in cats.
Campagna I, Schwarz A, Keller S, Bettschart-Wolfensberger R, Mosing M

OBJECTIVE: To compare the effects of propofol and alfaxalone on respiration in cats. STUDY DESIGN: Randomized, ‘blinded’, prospective clinical trial. ANIMALS: Twenty cats undergoing ovariohysterectomy. METHODS: After premedication with medetomidine 0.01 mg kg(-1) intramuscularly and meloxicam 0.3 mg kg(-1) subcutaneously, the cats were assigned randomly into two groups: group A (n = 10) were administered alfaxalone 5 mg kg(-1) minute(-1) followed by 10 mg kg(-1) hour(-1) intravenously (IV) and group P (n = 10) were administered propofol 6 mg kg(-1) minute(-1) followed by 12 mg kg(-1) hour(-1) IV for induction and maintenance of anaesthesia, respectively. After endotracheal intubation, the tube was connected to a non-rebreathing system delivering 100% oxygen. The anaesthetic maintenance drug rate was adjusted (± 0.5 mg kg(-1) hour(-1)) every 5 minutes according to a scoring sheet based on physiologic variables and clinical signs. If apnoea > 30 seconds, end-tidal carbon dioxide (Pe’CO2) > 7.3 kPa (55 mmHg) or arterial haemoglobin oxygen saturation (SpO2) < 90% occurred, manual ventilation was provided. Methadone was administered postoperatively. Data were analyzed using independent-samples t-tests, Fisher’s exact test, linear mixed-effects models and binomial test. RESULTS: Manual ventilation was required in two and eight of the cats in group A and P, respectively (p = 0.02). Two cats in both groups showed apnoea. Pe’CO2 > 7.3 kPa was recorded in zero versus four and SpO2 < 90% in zero versus six cats in groups A and P respectively. Induction and maintenance dose rates (mean ± SD) were 11.6 ± 0.3 mg kg(-1) and 10.7 ± 0.8 mg kg(-1) hour(-1) for alfaxalone and 11.7 ± 2.7 mg kg(-1) and 12.4 ± 0.5 mg kg(-1) hour(-1) for propofol. CONCLUSION AND CLINICAL RELEVANCE: Alfaxalone had less adverse influence on respiration than propofol in cats premedicated with medetomidine. Alfaxalone might be better than propofol for induction and maintenance of anaesthesia when artificial ventilation cannot be provided.

Clinical Signs, Treatment, and Outcome in Cats with Myeloma-Related Disorder Receiving Systemic Therapy.
Myeloma-related disorder (MRD) is an uncommon disease in cats, for which there is no established standard of care. In this retrospective study, we evaluated presentation, response to treatment, and toxicity in cats with MRD receiving systemic treatment. Previously reported prognostic factors were evaluated for their impact on survival in cats receiving chemotherapy. Of fifteen cases identified, thirteen received melphalan or cyclophosphamide +/- corticosteroids as first-line therapy. Chlorambucil was commonly used as rescue therapy in cats with progressive disease, or in cases of chemotherapy-related toxicity with first line agents. Overall response rates were 71% and 83% for melphalan- and cyclophosphamide-treated cats, respectively. Discontinuation of melphalan due to toxicity was common. Survival times for cats initially treated with melphalan or cyclophosphamide were not significantly different (median 252 and 394 days, respectively), and no statistically significant prognostic factors were identified. This study suggests that the combination of cyclophosphamide and corticosteroids is well tolerated and may be considered as first-line therapy for cats with systemic MRD.

Lower urinary tract cancer.
Cannon CM, Allstadt SD
Lower urinary tract neoplasia is uncommon in dogs and cats, though transitional cell carcinoma (TCC) is the most common tumor of the lower urinary tract in both species. Clinical signs are not specific for neoplasia, but neoplasia should be considered in patients that are older, have specific risk factors, or have persistent, severe, or relapsing signs. Local disease is often the cause of death or euthanasia; local control is challenging owing to tumor size and location. Systemic therapy is the mainstay of treatment. Prognosis is generally guarded, but therapy can result in improvement in clinical signs and quality of life.

Detection and molecular characterization of caliciviruses (vesivirus and norovirus) in an outbreak of acute diarrhea in kittens from Brazil.
Castro TX, Cubel Garcia RC, Fumian TM et al.
_Vet J_ (2015) **206**:115-117
Feline caliciviruses (FCVs) have occasionally been described in cats in association with enteric disease, but an etiological role for these viruses in acute gastroenteritis is still unclear. In this study, molecular characterization of FCV and feline norovirus (FNoV) was undertaken using real-time PCR (RT-PCR) and sequence analysis of the ORF1 region in fecal specimens from 29 diarrheic cats. The specimens were also screened for parvovirus, coronavirus, astrovirus and group A rotavirus. A quantitative one step RT-PCR was also performed to detect and quantitate NoV genogroup IV and the role of these animal caliciviruses in feline gastroenteritis was investigated. This is the first description of enteric FCV and FNoV in South America.

Intravenous lipid emulsion and dexmedetomidine for treatment of feline permethrin intoxication: a report from 4 cases.
Ceccherini G, Perondi F, Lippi I, Grazia G, Marchetti V
_Open Vet J_ (2015) **5**:113-121
Four cases of feline permethrin intoxication are described. The cause of intoxication is the application of canine permethrin spot-on product (Advantix®, Bayer) by the owners. Principal clinical guidelines
recommends the use of anticonvulsant drugs to treat seizures or neurological symptoms after initial stabilization and dermal decontamination. The use of lipid emulsion had an increasing interest in the last decade for treatment of toxicosis caused by lipophylic drugs as reported in human and in veterinary medical practices. All cats presented in this study, were treated with intravenous lipid emulsion (ILE) at variable dosages, and dexmedetomidine was also administered by intravenous way. No adverse reaction such as thrombophlebitis, overload circulation or others was noticed during and after administration of ILE. Dexmedetomidine was proved to be helpful in tranquilizing the cats. All cats were discharged in good condition faster than other cases treated without their use.

A Laboratory Diagnostic Approach to Hepatobiliary Disease in Small Animals.
Chapman SE, Hostutler RA
Routine biochemical tests generally include serum enzymes, proteins, and other markers useful for identifying hepatobiliary disease in dogs and cats. Obtaining results outside the reference intervals can occur with direct hepatocellular injury, enzyme induction by hepatocytes or biliary epithelium, or decreased hepatic function. However, detection of biochemical abnormalities does not necessarily indicate clinically significant disease. For a comprehensive approach to detection and treatment of hepatobiliary disease, the laboratory results must be correlated with the history and physical examination findings, diagnostic imaging results, and other assays.

Detection of indoxyl sulfate levels in dogs and cats suffering from naturally occurring kidney diseases.
Cheng FP, Hsieh MJ, Chou CC, Hsu WL, Lee YJ
_Vet J_ (2015) 205:399-403
Indoxyl sulfate (IS), a protein-bound uraemic toxin, has been found to accumulate in the serum of people with renal diseases and is associated with free radical induction, nephrotoxicity cardiovascular toxicity, and osteoblast cytotoxicity. Although IS has been studied in humans and in experimental models, the role of IS in dogs and cats with kidney disease has not been investigated. A high performance liquid chromatography system was applied to detect plasma IS concentrations in non-azotaemic animals (63 dogs, 16 cats) and in animals with renal azotaemia (66 dogs, 69 cats). The IS levels of azotaemic animals were significantly higher (P <0.01) than those of non-azotaemic animals (median [IQR] 20.4 (9.5) mg/L vs. 7.2 (8.8) mg/L for dogs; median [IQR] 21 (18.9) mg/L vs. 14.8 (12.3) mg/L for cats). The IS level was significantly correlated with blood urea nitrogen, serum creatinine and phosphate concentrations. Dogs with acute kidney injury had significantly higher IS levels (P <0.01) than those with chronic kidney diseases (CKD) (median [IQR] 57.7 (40.8) mg/L vs. 17.7 (25.1) mg/L). When CKD was graded using the International Renal Interest Society (IRIS) staging system, IS levels were correlated with CKD severity in both dogs and cats. The IS concentration is directly related to loss of renal function. Further studies are necessary to determine whether measurement of IS provides any additional diagnostic or prognostic information in dogs and cats with kidney disease.

Bovine herpesvirus 4 DNA is not detected in free-ranging domestic cats from California, Colorado or Florida.
Chiu E, Troyer RM, Lappin MR, VandeWoude S
OBJECTIVES: Several studies have reported that domestic cats can be naturally infected with bovine...
herpesvirus 4 (BHV4). Cats experimentally inoculated with BHV4 developed clinical signs involving the urinary tract, leading to the hypothesis that natural infection with BHV4 may be associated with feline lower urinary tract diseases. However, the question of whether BHV4 infection is common in cats remains equivocal. In this study, we sought to determine whether BHV4 is a common natural infection of domestic cats in the USA. METHODS: We used a sensitive nested PCR protocol specific to the BHV4 thymidine kinase gene to screen free-ranging domestic cat blood DNA samples (n = 101) collected from California, Colorado and Florida. RESULTS: Cats within this cohort were positive for seven other common pathogens of domestic cats, demonstrating the relatively high exposure of this population to endemic feline infections. In contrast, all domestic cat blood samples were negative for BHV4, while BHV4-containing tissue culture extracts were strongly positive. CONCLUSIONS AND RELEVANCE: BHV4 has been detected in tissues of latently infected cattle, though viral DNA is typically also detected in peripheral blood cells throughout infection. Our results suggest that persistent presence of BHV4 DNA in the blood of domestic cats is either rare or non-existent. We thus conclude that BHV4 is unlikely to be a major pathogen of cats.

Effectiveness of a new dietetic weight management food to achieve weight loss in client-owned obese cats.
Christmann U, Bečvářová I, Werre SR, Meyer HP
OBJECTIVES: The aim of the study was to evaluate weight loss and maintenance parameters in cats fed a novel weight management food and to assess the owner’s perception of the cat’s quality of life. METHODS: This study was designed as a prospective, uncontrolled/unmasked clinical trial. One hundred and thirty-two overweight/obese, otherwise healthy, client-owned cats were enrolled. Initial evaluation included physical examination, nutritional assessment, ideal body weight determination and weight-loss feeding guidelines development. Follow-up evaluations (monthly for 6 months) encompassed determination of body weight, body condition score, body fat index, muscle condition score and feeding practices. Quality of life assessment by owners included the cat’s level of energy, happiness, appetite, begging behavior, flatulence, stool volume and fecal score. RESULTS: Eighty-three percent of the cats lost weight with an average ± SEM weight loss of 11.0 ± 1.8% over 6 months and an average ± SE weekly weight loss rate of 0.45 ± 0.02%. The mean ± SEM duration of weight loss was 134.0 ± 4.8 days. Fourteen percent of cats achieved an ideal body weight. Seventy-nine percent of cats ate more calories from novel weight management food than the recommended daily energy requirement for weight loss, and the majority of these cats still lost weight. Body condition score and body fat index decreased over time compared with baseline from weeks 12-24 and from weeks 8-24, respectively. Owners perceived an increase in energy and happiness (>week 12) in the cats that lost weight, without changes in appetite or begging behavior. CONCLUSIONS AND RELEVANCE: This study confirmed the effectiveness of the novel weight management food in achieving weight loss in overweight/obese client-owned cats. Owners reported significant improvements in their quality of life without negative side effects.

Toxoplasma gondii, Dirofilaria immitis, feline immunodeficiency virus (FIV), and feline leukemia virus (FeLV) infections in stray and pet cats (Felis catus) in northwest China: co-infections and risk factors.
Cong W, Meng QF, Blaga R, Villena I, Zhu XQ, Qian AD
This study was conducted to estimate the prevalence of Toxoplasma gondii, Dirofilaria immitis, feline immunodeficiency virus (FIV), and feline leukemia virus (FeLV) infections among stray and pet cats in
Lanzhou, northwest China, and to identify the influence of age, gender, and regions on seropositivity. T. gondii antibodies were examined in cat sera by the modified agglutination test (MAT). The circulating antigens of D. immitis and FeLV and specific antibodies to FIV were examined using kits commercially available. The overall prevalence of T. gondii, FIV, FeLV, and D. immitis was 19.34, 9.12, 11.33, and 3.04 %, respectively. For the genetic characterization of T. gondii genotypes in cats, genomic DNA was extracted from the seropositive cats and the T. gondii B1 gene was amplified using a semi-nested PCR. DNA samples giving positive B1 amplification were then genotyped using multilocus PCR-RFLP. Two T. gondii genotypes (ToxoDB#9 and ToxoDB#1) were identified. Results of the multivariate logistic regression analysis showed that older cats are more likely to be seropositive than juveniles for T. gondii, FIV, FeLV, and D. immitis. This is the first report of T. gondii genotypes in cats in northwest China. Moreover, the present study is the first study of retrovirus and D. immitis seroprevalence in cats in China. The results revealed that T. gondii, FIV, and FeLV infections are common in stray and pet cats in northwest China.

**Coagulation abnormalities in 5 cats with naturally occurring cytauxzoonosis.**

Conner BJ, Hanel RM, Brooks MB, Cohn LA, Birkenheuer AJ


OBJECTIVE: To characterize hemostasis and determine if disseminated intravascular coagulation (DIC) is present in cats with cytauxzoonosis. DESIGN: Cross-sectional study. SETTING: University teaching hospital. ANIMALS: Five client-owned cats with cytologic and PCR-confirmed cytauxzoonosis. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Admission samples were collected for hemostasis testing including platelet count, activated partial thromboplastin time, prothrombin time, fibrinogen, antithrombin (AT), d-dimer, protein C, plasminogen, antiplasmin, factors VII, VIII, IX, X, and XI, von Willebrand factor, and thromboelastography. Results were compiled for combined criteria used to define DIC, and all 5 cats satisfied criteria using a previously described modified scoring system for DIC in cats. The abnormalities found in all 5 cats included thrombocytopenia, low protein C activity, and prolonged prothrombin time; however, none of the cats had low AT activity. None of the cats had clinical signs of hemorrhage despite thrombocytopenia, coagulation factor deficiency (5/5 cats), and thromboelastographic evidence of hypocoagulability (2/5 cats). Three of 5 cats survived to hospital discharge. The nonsurvivors had disseminated cytauxzoonosis with schizont-laden macrophages in vessels of various organs. CONCLUSIONS: This is the first report that comprehensively describes the hemostatic status of cats with naturally occurring infection with *Cytauxzoon felis*. All 5 cats had laboratory evidence of overt DIC. Unlike human and canine models of sepsis-induced DIC, AT deficiency was not found in this series of cats. Further research is warranted to investigate therapeutic strategies targeting thrombotic DIC to improve survival in cats with cytauxzoonosis.


**Associations between meal size, gastric emptying and post-prandial plasma glucose, insulin and lactate concentrations in meal-fed cats.**

Coradini M, Rand JS, Filippich LJ, Morton JM, O’Leary CA


Plasma glucose and insulin concentrations are increased for 12-24 h in healthy cats following moderate- to high-carbohydrate meals. This study investigated associations between gastric emptying
time and post-prandial plasma glucose, insulin and lactate concentrations in cats fed an extruded dry, high-carbohydrate, moderate-fat, low-protein diet (51, 28, 21% metabolizable energy, respectively) once daily by varying meal volume. Eleven healthy, non-obese, neutered adult cats were enrolled in a prospective study and fed to maintain body weight. Ultrasound examinations were performed for up to 26 h, and blood collections over 24 h after eating meals containing approximately 100% and 50% of the cats’ daily caloric intake (209 and 105 kJ/kg BW, respectively). Gastric emptying time was increased after a meal of 209 kJ/kg BW compared with 105 kJ/kg BW (median gastric emptying times 24 and 14 h, respectively; \( p = 0.03 \)). Time for glucose to return to fasting was longer after the 209 kJ/kg BW meal (median 20 h; 25th and 75th percentiles 15 and 23 h, respectively) than the 105 kJ/kg BW meal (13, 12 and 14 h; \( p < 0.01 \)); however, peak glucose was not higher after the 209 kJ/kg BW meal compared with the 105 kJ/kg BW meal \([\text{mean} \pm \text{SD}] 6.6 \pm 0.6 \) and 7.8 \(\pm 1.2 \) mmol/l, respectively, \( p = 0.07 \]). Times for insulin to return to fasting were not significantly longer after the 209 kJ/kg BW meal than the 105 kJ/kg BW meal \( (p = 0.29) \). d- and l-lactate concentrations were not associated with gastric emptying time or post-prandial blood glucose and insulin. Based on results obtained, prolonged gastric emptying contributes to prolonged post-prandial hyperglycemia in cats meal fed a high-carbohydrate, low-protein, dry diet and fasting times for cats’ meal-fed diets of similar composition should be 14-26 h, depending on meal size.

**Safety of ultrasound-guided fine-needle aspiration of the feline pancreas: a case-control study.**
Crain SK, Sharkey LC, Cordner AP, Knudson C, Armstrong PJ

The safety of fine-needle aspiration (FNA) of the feline pancreas has not been reported. The incidence of complications following ultrasound-guided pancreatic FNA in 73 cats (pancreatic aspirate [PA] cats) with clinical and ultrasonographic evidence of pancreatic disease was compared with complications in two groups of matched control cats also diagnosed with pancreatic disease that either had abdominal organs other than the pancreas aspirated (control FNA, \( n = 63 \)) or no aspirates performed (control no FNA, \( n = 61 \)). The complication rate within 48 h of the ultrasound and/or aspirate procedure did not differ among the PA cats (11%), control FNA (14%) or control no FNA (8%) cats. There was no difference in rate of survival to discharge (82%, 84% and 83%, respectively) or length of hospital stay among groups. The cytologic recovery rate for the pancreatic samples was 67%. Correlation with histopathology, available in seven cases, was 86%. Pancreatic FNA in cats is a safe procedure requiring further investigation to establish diagnostic value.

**Incidentally detected heart murmurs in dogs and cats: executive summary 2015.**
Côté E, Edwards NJ, Ettinger SJ et al.

**Outcome of Donor Cats After Unilateral Nephrectomy as Part of a Clinical Kidney Transplant Program.**
Danielson KC, Hardie RJ, McAnulty JF
*Vet Surg* (2015) **44**:914-919

OBJECTIVE: To compare 1) complications between 2 ureteral harvest techniques (ureteral papilla harvest [UPH] and ureteral transection [UT]); 2) to investigate the prevalence of kidney failure in a population of kidney donors; and 3) to evaluate owner satisfaction with commercially sourced cats adopted after kidney donation. STUDY DESIGN: Retrospective case series. ANIMALS: Cats (\( n = 72 \))
that had unilateral nephrectomy for kidney donation. METHODS: Medical records were reviewed and information on short- and long-term complications and evidence of kidney failure was recorded. Clients were interviewed by telephone to ascertain their satisfaction with the adopted donor cats as pets. RESULTS: Seventy-two cats had unilateral nephrectomy. Forty-two owners were able to be contacted for survey data. Twenty-eight cats had complete medical records including serum BUN, creatinine, and urine specific gravity. For these 28 cats, mean age at nephrectomy was 1.9 years (median, 1.1 years; range, 0.5-9.3 years) and mean age at follow-up was 6.8 years (median, 5.1 years; range, 1.0-18.7 years). There was no difference in major or minor complication rates between UPH and UT techniques. Kidney failure occurred in 17.8% of cats. All owners were satisfied with the adopted donor cats, which were obtained from commercial facilities. CONCLUSIONS: UPH is a safe technique in cats being used for kidney donation. Commercially sourced cats make suitable pets after kidney donation. The prevalence of kidney failure in the donor population appears to be higher than that in the general population, but definitive conclusions cannot be made based on this study. Further, prospective study is needed to identify the true prevalence of kidney failure in cats after unilateral nephrectomy.

Oral Manifestations of Chronic Kidney Disease and Renal Secondary Hyperparathyroidism: A Comparative Review.
Davis EM
Recent epidemiological studies have demonstrated that significant associations exist between oral disease and diseases involving non-oral tissues. Occasionally, the roles may be reversed and the oral cavity can be severely affected by systemic disease originating in another part of the body. Renal secondary hyperparathyroidism is a common endocrinopathy that occurs as a consequence of chronic azotemic kidney disease. Renal osteodystrophy, the most dramatic clinical consequence of renal secondary hyperparathyroidism is uncommon, but can result in demineralization of maxillofacial bones, loosening of teeth, and pathological jaw fractures. The purpose of this report is to update the current understanding of the pathophysiology of this endocrine disease and to compare the oral manifestations of renal secondary hyperparathyroidism in humans and companion animals. A 50-year review of the veterinary literature was undertaken to examine the clinical presentation of renal osteodystrophy in dogs, and to determine what clinical consequences of renal secondary hyperparathyroidism have been reported in domestic cats.

Doppler and Contrast-Enhanced Ultrasonography of Testicles in Adult Domestic Felines.
de Brito M, Feliciano M, Coutinho LN et al.
The objective was to characterize the vascular patterns of testicular blood flow of adult cats, measuring the systolic velocity (SV), diastolic velocity (DV), resistance index (RI), gate time (wash-in) peak enhancement and output time (wash-out) of the contrast and addition of tissue fill characteristics. Forty-five adult cats were selected, and the echotexture, echogenicity, size, contours and margins of testicles were assessed via ultrasound. By Doppler were evaluated the blood flow and determined of vascular index in testicular artery (SV, DV and RI) and via contrast-enhanced ultrasonography determine the time for phases: wash-in, wash-out and peak enhancement. Sonographic findings presented normal. Testicular artery was observed in the spermatic cord with tortuous patter and showed monophasic-patterned waves and low vascular resistance and with systolic peak evident. Values of indices vascular were as follows: SV = 6.73 cm/s, DV = 2.8 cm/s and RI = 0.54 for left testicles; and SV = 6.23 cm/s, DV = 2.77 cm/s and RI = 0.53 for right testicles. Contrast filled the subcapsular vascular structures and after a few seconds, a homogeneous moderate enhancement of the parenchyma,
with parenchymal vessels still distinguishable and after the peak phase, a rapid homogeneous decrease in echogenicity. Values of time for contrast-enhanced ultrasonography were as follows: wash-in = 8.78 s, peak enhancement = 21.62 s and wash-out = 75.36 for left testicles; and wash-in = 10.76 s, peak enhancement = 21.50 s and wash-out = 81.81 for right testicles. Doppler and contrast-enhanced ultrasonography of the testicles in healthy adult cats was easily implemented and may provide baseline data for this organ to allow the use of these techniques as a diagnostic tool for evaluating testicular abnormalities in sick cats.

**Evaluation of prognostic factors and survival rates in malignant feline mammary gland neoplasms.**
De Campos CB, Damasceno KA, Gamba CO et al.  
OBJECTIVES: To investigate the association of prognostic factors of feline mammary gland neoplasms, correlating them with overall survival (OS). METHODS: Fifty-six primary malignant mammary gland neoplasms and 16 metastatic lymph nodes from 37 female cats were analyzed. Clinical staging, histologic type and grade, and immunohistochemistry for Ki-67, progesterone and estrogen receptor, human epidermal growth factor receptor type 2 (HER-2), cyclooxygenase-2 (COX-2) and vascular endothelial growth factor (VEGF) were evaluated. Follow-up was performed in order to correlate prognostic factors with OS. RESULTS: Lymph node metastasis was found in 35% of cases. Clinical stage III, tubulopapillary carcinomas and histologic grade II cases prevailed in the study. Most neoplasms were positive for hormonal receptors, negative for HER-2 overexpression and presented VEGF overexpression. Immunoreactivity for Ki-67 (P = 0.046) and COX-2 (P = 0.007) was higher in metastases than in primary tumors. COX-2 (P = 0.089), HER-2 (P = 0.012) and histologic grade (P = 0.080) were correlated with OS. CONCLUSIONS AND RELEVANCE: The data suggest that inhibition of ovarian hormones and COX-2 may represent a therapeutic option for malignant feline mammary gland neoplasms. COX-2 scores and Ki-67 index should be analyzed in primary tumors and metastases, and histologic grade, HER-2 status and COX-2 scores had a direct influence in OS. Prognostic factors allow for a better understanding of disease outcome in a condition that is characterized by a poor prognosis. The present work highlights the need for further studies on endocrine therapy and COX-2 inhibitors, which could influence OS.

**A Review of Fibrocartilaginous Embolic Myelopathy and Different Types of Peracute Non-Compressive Intervertebral Disk Extrusions in Dogs and Cats.**
De Risio L  
This review discusses terminology, pathological, clinical, and magnetic resonance imaging (MRI) findings, treatment, outcome, and prognostic factors of fibrocartilaginous embolic myelopathy (FCEM), acute non-compressive nucleus pulposus extrusion (ANNPE), and intradural/intramedullary intervertebral disk extrusion (IIVDE). FCEM, ANNPE, and IIVDE have a similar clinical presentation characterized by peracute onset of neurological dysfunction that is generally non-progressive after the initial 24-48 h. Differentiating between these conditions can be challenging, however, certain clinical and imaging findings can help. FCEM can occur in both adult and immature animals, whereas ANNPE or IIVDE have been reported only in animals older than 1 year. In dogs, ANNPE and IIVDE most commonly occur in the intervertebral disk spaces between T12 and L2, whereas FCEM has not such site predilection. In cats, FCEM occurs more frequently in the cervical spinal cord than in other locations. Data on cats with ANNPE and IIVDE are limited. Optimal MRI definition and experience in neuroimaging can help identify the findings that allow differentiation between FCEM, ANNPE, and
IIVDE. In animals with ANNPE and IIVDE, the affected intervertebral disk space is often narrowed and the focal area of intramedullary hyperintensity on T2-weighted images is located above the affected intervertebral disk space. In dogs with ANNPE signal changes associated with the extruded nucleus pulposus and epidural fat disruption can be identified in the epidural space dorsal to the affected intervertebral disk. Identification of a linear tract (predominantly hyperintense on T2-weighted images, iso to hypointense on T1-weighted images and hypointense on T2*-weighted gradient recall echo images) extending from the intervertebral disk into the spinal cord parenchyma is highly suggestive of IIVDE. Treatment of FCEM and ANNPE is conservative. Dogs reported with IIVDE have been managed either conservatively or surgically. Prognostic factors include degree of neurological dysfunction (particularly loss of nociception) and disease-specific MRI variables.

Poisoning of cats and dogs by the carbamate pesticides aldicarb and carbofuran.

de Siqueira A, Salvagni FA, Yoshida AS et al.


The intentional and accidental poisoning of animals and people is a threat to public health and safety worldwide. Necropsies and histopathological examinations of 26 cats and 10 dogs poisoned by the carbamates aldicarb and carbofuran, confirmed by thin layer chromatography (TLC) and high performance liquid chromatography with diode-array detector (HPLC-DAD) were analysed, with variable post mortem interval and conservation of the carcass. Biological matrices were collected for toxicological and histopathological analyses. High performance liquid chromatography with diode-array detector (HPLC-DAD) was utilized to detect aldicarb and its metabolites, aldicarb sulphoxide and aldicarb sulphone, and carbofuran. The variable post mortem interval and the method of conservation of the carcass may be harmful to toxicological, necroscopic and histopathological analyses, that should be performed in order to provide reliable evidences to investigate possible poisoning of animals, which is cruel crime, and are usually linked to domestic or social conflict.

Treatment of cranial cruciate ligament rupture in the feline stifle. Biomechanical comparison of a standard fabella-tibial suture and lateral sutures placed between quasi-isometric points.

De Sousa R, Sutcliffe M, Rousset N, Holmes M, Langley-Hobbs SJ

Vet Comp Orthop Traumatol (2015) 28:401-408

OBJECTIVE: To determine whether a lateral suture placed with bone anchors between quasi-isometric points in a cat is superior to a standard fabella-tibial suture for the stabilization of cranial cruciate ligament (CrCL) rupture compared to an intact stifle joint. STUDY DESIGN: Biomechanical cadaveric study. METHODS: Six stifles joints with intact cruciate ligaments from three skeletally mature cats were placed in a loading mounting set and tested with axial loads of 20N and 60N at three different joint angles (75°, 130° and 160°). The procedure was repeated with a transected CrCL; a stabilized stifle joint after a combination of three lateral suture techniques (fabella-tibial suture technique [SFT]; femoro-tibial suture technique 1 [FTS-1] and femoro-tibial suture technique 2 [FTS-2]). Radiographic examination of the relative position of the tibia to the fixed femur was compared. RESULTS: Stabilization of the stifle joint with lateral sutures had comparable stability to the intact specimens in the cranio-caudal direction (p = 0.2) but not in the proximo-distal direction for the SFT (p = 0.04) and FTS-2 technique (p = 0.03). There was no significant difference between the three stabilization techniques (p >0.05). CLINICAL SIGNIFICANCE: Lateral sutures placed with bone anchors at quasi-isometric points performed better than SFT and FTS-2 in stabilizing the feline stifle after CrCL rupture in the proximo-distal plane. Biomechanical stability in the cranio-caudal plane after placement of a lateral suture across the feline stifle was similar to the intact CrCL.
Postoperative pain control in cats: clinical trials with pre-emptive lidocaine epidural co-administered with morphine or methadone.
DeRossi R, Hermeto LC, Jardim PH, de Andrade Bicudo N, de Assis KT

OBJECTIVES: To evaluate the effectiveness of epidural lidocaine in combination with either methadone or morphine for postoperative analgesia in cats undergoing ovariohysterectomy.

METHODS: Under general anesthesia, 24 cats that underwent ovariohysterectomy were randomly allocated into three treatments groups of eight each. Treatment 1 included 2% lidocaine (4.0 mg/kg); treatment 2 included lidocaine and methadone (4.0 mg/kg and 0.3 mg/kg, respectively); and treatment 3 included lidocaine and morphine (4.0 mg/kg and 0.1 mg/kg, respectively). All drugs were injected in a total volume of 0.25 ml/kg via the lumbosacral route in all cats. During the anesthetic and surgical periods, the physiological variables (respiratory and heart rate, arterial blood pressure and rectal temperature) were measured at intervals of time zero, 10 mins, 20 mins, 30 mins, 60 mins and 120 mins. After cats had recovered from anesthesia, a multidimensional composite pain scale was used to assess postoperative analgesia at 2, 4, 8, 12, 18, and 24 h after epidural. RESULTS: The time to first rescue analgesic was significantly (P <0.05) prolonged in cats that received both lidocaine and methadone or lidocaine and morphine treatments compared with those that received the lidocaine treatment. All cats that received lidocaine treatment alone required rescue analgesic within 2 h of epidural injections. All treatments had significant cardiovascular and respiratory changes but they were within acceptable range for healthy animals during the surgical period. CONCLUSIONS AND RELEVANCE: The two combinations administered via epidural allowed ovariohysterectomy with sufficient analgesia in cats, and both induced prolonged postoperative analgesia.

Felid Lungworms and Heartworms in Italy: More Questions than Answers.
Di Cesare A, Veronesi F, Traversa D

Nematodes infecting the cardiorespiratory system of cats have recently stimulated high scientific interest. Over the past few years, different aspects of these parasites have been clarified and various issues elucidated. This increased knowledge has improved awareness on this topic but, at the same time, some dilemmas have not been solved and new questions have been raised. In this review, we underline and discuss current knowledge of, and new doubts relating to, feline lungworms and heartworms, with the aim of stimulating new studies to fill gaps of basic (i.e., epidemiology and biology) and applied (i.e., clinical aspects) knowledge of the old and new parasites affecting the cardiorespiratory system of cats.

Novel Molecular Assay for Simultaneous Identification of Neglected Lungworms and Heartworms Affecting Cats.
Di Cesare A, Veronesi F, Frangipane di Regalbono A, Iorio R, Traversa D

Feline lungworms and heartworms are stimulating the interest of the scientific community due to their clinical impact and apparent geographical expansion. Diagnosis of the infections caused by these nematodes is indeed challenging. This report describes a novel multiplex PCR able to identify simultaneously three species of lungworms (*Aelurostrongylus abstrusus* and *Troglostrongylus brevior*) and heartworms (*Angiostrongylus chabaudi*) affecting felids. Epidemiological and clinical perspectives are discussed.
Respiratory nematodes in cat populations of Italy.
Di Cesare A, Veronesi F, Grillotti E et al.
The occurrence of common respiratory parasites of domestic cats (the metastrongyloid “cat lungworm” Aelurostrongylus abstrusus and the trichuroid Capillaria aerophila) and of neglected respiratory nematodes of felids (Troglostrongylus brevior, Angiostrongylus chabaudi and Oslerus rostratus) was here evaluated in two and three geographical sites of Northern and Central Italy, respectively. In 2014-2015, individual fecal samples of 868 domestic cats were examined microscopically and genetically, and epidemiological data related to parasitic infections were evaluated as possible risk factors by binary logistic regression models. The most common parasite was A. abstrusus in both mono- and poli-specific infections, followed by T. brevior and C. aerophila, while cats scored negative for other parasites. Cats positive for A. abstrusus (1.9-17 % infection rate) and C. aerophila (0.9-4.8 % infection rate) were found in all examined sites, while cats scored positive for T. brevior (1-14.3 % infection rate) in four sites. Also, T. brevior was here found for the first time in a domestic cat from a mountainous area of Northern Italy. The occurrence of lungworms was statistically related to the presence of respiratory signs and more significant in cats with mixed infection by other lungworms and/or intestinal parasites. Cats living in site C of Central Italy resulted statistically more at risk of infection for lungworms than cats living in the other study sites, while animals ageing less than 1 year were at more risk for troglostrongylosis. Finally, the presence of lungworms was more significant in cats with mixed infection by other lungworms and/or intestinal parasites. These results are discussed under epidemiological and clinical points of views.

Dog and cat management through sterilization: Implications for population dynamics and veterinary public policies.
Dias RA, Baquero OS, Guilloux AG et al.
The present study aimed to compare different sterilization scenarios allowing the adoption of the most adequate strategy to control owned dog and cat population sizes as the official veterinary public policy for animal control in an urban area of Campinas municipality, Brazil. To achieve this goal, the vital parameters of the owned pet population were measured in a neighborhood of Campinas called Jardim Vila Olimpia through questionnaires used in two census studies performed in February 2012 and June 2013. Different hypothetical sterilization scenarios were compared with the scenario of a single sterilization campaign performed in the study area between the census studies. Using a deterministic mathematical model, population dynamics were simulated for these different scenarios. We have observed that for both owned dogs and cats, the impact on the population size achieved by a single sterilization campaign would be diluted over the years, equating to the impact achieved by the usual sterilization rate practiced before the sterilization campaign yearly. Moreover, using local and global sensitivity analyses, we assessed the relative influence on animal population evolution of each vital parameter used in the mathematical models. The more influential parameters for both species were the carrying capacity of the environment and sterilization rates of males and females (for both species). We observed that even with sterilizing 100% of the intact animals annually, it would not be possible to obtain proportions greater than 86% and 88% of sterilized dogs and cats, respectively, after 20 years due to the high introduction of new intact animals. There is no public dog and cat sterilization service in place in the city, and sporadic and local sterilization campaigns are performed with a prior communication to the owners to bring their animals to be sterilized in a selected veterinary facility. If a sterilization campaign was performed annually in the study area, it would have the most favorable cost
effectiveness ratio after 20 years compared to the scenarios of 50% and 100% sterilization of intact animals annually. These results allowed the veterinary public policy stakeholders to make decisions based on scientific evidence to implement adequate control of dog and cat populations in urban areas, aiming to reduce zoonosis transmission to humans and other problems associated with uncontrolled animal populations.

**Health screening to identify opportunities to improve preventive medicine in cats and dogs.**
Diez M, Picavet P, Ricci R et al.
OBJECTIVES: To describe the results of a prevention campaign in terms of participation and pet health status and to identify opportunities to improve preventive medicine in cats and dogs.
METHODS: An awareness campaign was designed to highlight the role of veterinarians and emphasise the benefits of a veterinary visit. Owners were invited to make an appointment for a free pet health check in a voluntarily participating veterinary clinic. Observations recorded by the veterinarians were entered in a database and subsequently analysed using simple descriptive statistics. RESULTS: A total of 5305 completed health check forms were analysed. The percentages of overweight and obese dogs and cats were 34 and 36%, respectively; this was the most common finding, followed by dental calculus (31% in dogs, 21% in cats). In total 67% of cats did not undergo flea control and 59% were not vaccinated. CLINICAL SIGNIFICANCE: Opportunities for increased quality of care are numerous given the high percentage of intact, unvaccinated or non-permanently identified pets and the low level of worm and flea control. Animal health should benefit from preventive measures, and improved management can be undertaken after early detection of diseases.

**Neutering of cats and dogs in Ireland; pet owner self-reported perceptions of enabling and disabling factors in the decision to neuter.**
Downes MJ, Devitt C, Downes MT, More SJ
*PeerJ* (2015) 3:e1196
Background. Failure among pet owners to neuter their pets results in increased straying and overpopulation problems. Variations in neutering levels can be explained by cultural differences, differences in economic status in rural and urban locations, and owner perceptions about their pet. There are also differences between male and female pet owners. There is no research pertaining to Irish pet owner attitudes towards neutering their pets. This paper identified the perceptions of a sample of Irish cat and dog owners that influenced their decisions on pet neutering. Methods. This study was conducted using social science (qualitative) methods, including an interview-administered survey questionnaire and focus group discussions. Data was coded and managed using Nvivo 8 qualitative data analysis software. Results. Focus groups were conducted with 43 pet (cats and dogs) owners. Two major categories relating to the decision to neuter were identified: (1) enabling perceptions in the decision to neuter (subcategories were: controlling unwanted pet behaviour; positive perceptions regarding pet health and welfare outcomes; perceived owner responsibility; pet function; and the influence of veterinary advice), and (2) disabling perceptions in the decision to neuter (subcategories were: perceived financial cost of neutering; perceived adequacy of existing controls; and negative perceptions regarding pet health and welfare outcomes). Discussion. Pet owner sense of responsibility and control are two central issues to the decision to neuter their pets. Understanding how pet owners feel about topics such as pet neutering, can help improve initiatives aimed at emphasising the responsibility of population control of cats and dogs.
West Nile virus infection in cats: ABCD guidelines on prevention and management.
Eggerink H, Addie DD, Boucraut-Baralon C et al.

OVERVIEW: West Nile virus (WNV) is a zoonotic mosquito-borne virus with a broad host range that infects mainly birds and mosquitoes, but also mammals (including humans), reptiles, amphibians and ticks. It is maintained in a bird-mosquito-bird transmission cycle. The most important vectors are bird-feeding mosquitoes of the Culex genus; maintenance and amplification mainly involve passerine birds. WNV can cause disease in humans, horses and several species of birds following infection of the central nervous system. INFECTION IN CATS: Cats can also be infected through mosquito bites, and by eating infected small mammals and probably also birds. Although seroprevalence in cats can be high in endemic areas, clinical disease and mortality are rarely reported. If a cat is suspected of clinical signs due to an acute WNV infection, symptomatic treatment is indicated.

Defining the local nerve blocks for feline distal thoracic limb surgery: a cadaveric study.
Enomoto M, Lascelles BD, Gerard MP

OBJECTIVES: Though controversial, onychectomy remains a commonly performed distal thoracic limb surgical procedure in cats. Peripheral nerve block techniques have been proposed in cats undergoing onychectomy but evidence of efficacy is lacking. Preliminary tests of the described technique using cadavers resulted in incomplete staining of nerves. The aim of this study was to develop nerve block methods based on cadaveric dissections and test these methods with cadaveric dye injections. METHODS: Ten pairs of feline thoracic limbs (n = 20) were dissected and superficial branches of the radial nerve (RSbr n.), median nerve (M n.), dorsal branch of ulnar nerve (UDbr n.), superficial branch of palmar branch of ulnar nerve (UPbrS n.) and deep branch of palmar branch of ulnar nerve (UPbrDp n.) were identified. Based on these dissections, a four-point block was developed and tested using dye injections in another six pairs of feline thoracic limbs (n = 12). Using a 25 G × 5/8 inch needle and 1 ml syringe, 0.07 ml/kg methylene blue was injected at the site of the RSbr n., 0.04 ml/kg at the injection site of the UDbr n., 0.08 ml/kg at the injection site of the M n. and UPbrS n., and 0.01 ml/kg at the injection site of the UPbrDp n. The length and circumference of each nerve that was stained was measured. RESULTS: Positive staining of all nerves was observed in 12/12 limbs. The lengths stained for RSbr n., M n., UDbr n., UPbrS n. and UPbrDp n. were 34.9 ± 5.3, 26.4 ± 4.8, 29.2 ± 4.0, 39.1 ± 4.3 and 17.5 ± 3.3 mm, respectively. The nerve circumferences stained were 93.8 ± 15.5, 95.8 ± 9.7, 100 ± 0.0, 100 ± 0.0 and 93.8 ± 15.5%, respectively. CONCLUSIONS AND RELEVANCE: This described four-point injection method may be an effective perioperative analgesia technique for feline distal thoracic limb procedures.

Prevalence and risk factors of gammaherpesvirus infection in domestic cats in Central Europe.
Ertl R, Korb M, Langbein-Detsch I, Klein D

BACKGROUND: Gammaherpesviruses (GHVs) are a large group of dsDNA viruses that can infect humans and several animal species. The two human GHVs, Epstein-Barr virus and Kaposi’s sarcoma-associated herpesvirus are known for their oncogenic properties in individuals with immunodeficiency. Recently, the first feline GHV, Felis catus gammaherpesvirus 1 (FcaGHV1) was discovered and frequently found in domestic cats in Australia, Singapore and the USA. FcaGHV1 is more likely to be detected in cats co-infected with the feline immunodeficiency virus (FIV). FINDINGS: The prevalence of FcaGHV1 in pet cats from Germany and Austria was 16.2 % (95 % CI = 12.38-20.02). The odds for GHV infection were greater for FIV positive (OR = 4.5), male (OR = 13.32) and older (OR = 2.36) cats.
Furthermore, FcaGHV1 viral loads were significantly higher in FIV-infected cats compared to matched controls. CONCLUSIONS: GHV infections are common in domestic cats in Central Europe. The worldwide distribution of FcaGHV1 can be assumed. A potential role as a co-factor in FIV-induced pathogeneses is supported.


OBJECTIVE: Impression cytology is a noninvasive investigation of the ocular surface. It uses the adhesive features of different filter papers to collect a monolayer of epithelial cells from the cornea and/or conjunctiva. Samples obtained by impression cytology exhibit all characteristics of an ideal cytology specimen. The aim of this study was to test the feasibility of impression cytology and determine the most appropriate filter paper to achieve maximum diagnostic value of the feline eye.

ANIMALS STUDIED: Ten healthy cats. PROCEDURES: The study was conducted in two phases. In the first phase, eight different filter papers (FPs) with various pore sizes were tested: 3.0-, 1.2-, 0.8-, 0.45-, 0.22-, 0.05- and 0.025-µm cellulose acetate papers and a 0.4-µm Biopore membrane (BM). Samples were obtained from the superior bulbar and from the inferior palpebral conjunctiva. In the second phase, three different sampling methods - with and without topical anesthesia, and with topical anesthesia and drying of the conjunctiva - were compared employing the BM encased in the intended BM device (BMD). Samples were evaluated for cellularity and quality of cells. RESULTS: In the first phase, samples obtained from the superior bulbar conjunctiva with the BM had the most sufficient cellularity and quality. In the second phase, BMD with topical anesthesia and additional drying of the conjunctiva was the most ideal method. CONCLUSION: The BMD may prove to be a suitable diagnostic tool for clinicians. Sampling is quick, processing is simple, and a large area of intact cells can be harvested.

Zoonotic helminths parasites in the digestive tract of feral dogs and cats in Guangxi, China. Fang F, Li J, Huang T, Guillot J, Huang W


BACKGROUND: In Guangxi, a province of southern China, an important number of dogs and cats roam freely in rural settings, and the presence of these animals in proximity of people may represent a risk of parasitic zoonoses. The objective of the present study was to investigate the presence and identify gastrointestinal helminths in feral carnivores in Guangxi province. Therefore, post mortem examination was performed in 40 dogs and in 39 cats. RESULTS: The Gastrointestinal helminths were found in all the necropsied dogs and in 37 out of 39 cats. Fifteen species were identified including 7 trematodes, 3 cestodes and 5 nematodes. Most of them may be responsible for zoonotic infections. CONCLUSIONS: Major zoonotic gastrointestinal helminths, including liver and intestinal flukes, *Toxocara* spp., and *Ancylostoma* spp., are present in feral dogs and cats in Guangxi, and may represent a significant risk for public health.


Clinical signs of upper respiratory tract infection can be hard to manage in cats, particularly those in shelters. In this study, clinical data were collected from chronically ill (3-4 weeks’ duration) cats with
suspected feline herpesvirus-1 (FHV-1) or feline calicivirus (FCV) infections after administration of one of two novel therapies. Group A cats were administered a commercially available formulation of human interferon-α2b at 10,000 U/kg subcutaneously for 14 days, and group B cats were administered one dose of a FHV-1 and FCV intranasal vaccine. Molecular assays for FHV-1 and FCV were performed on pharyngeal samples, and a number of cytokines were measured in the blood of some cats. A clinical score was determined daily for 14 days, with cats that developed an acceptable response by day 14 returning to the shelter for adoption. Those failing the first treatment protocol were entered into the alternate treatment group. During the first treatment period, 8/13 cats in group A (61.5%) and all 12 cats in group B (100%) had apparent responses. The seven cats positive for nucleic acids of FHV-1 or FCV responded favorably, independent of the treatment group. There were no differences in cytokine levels between cats that responded to therapy or failed therapy. Either protocol assessed here may be beneficial in alleviating chronic clinical signs of suspected feline viral upper respiratory tract disease in some cats that have failed other, more conventional, therapies. The results of this study warrant additional research involving these protocols.

Mirtazapine toxicity in cats: retrospective study of 84 cases (2006-2011).
Ferguson LE, McLean MK, Bates JA, Quimby JM

OBJECTIVES: Mirtazapine is commonly used in veterinary medicine at doses of 1.88 or 3.75 mg as an appetite stimulant. The objectives of this study were to determine the most common adverse effects reported and the dose associated with these signs. METHODS: Records of cats with mirtazapine exposure (2006-2011) were obtained from the American Society for the Prevention of Cruelty to Animals’ Animal Poison Control Center. The following parameters were recorded: signalment, weight, outcome, agent ingested, amount ingested, route of exposure, clinical signs observed, intent of use, onset time of signs and duration of signs. RESULTS: The 10 most commonly observed adverse effects reported in 84 cats exposed to mirtazapine included vocalization (56.0% of cats; mean dose 2.56 mg/kg), agitation (31.0%; 2.57 mg/kg), vomiting (26.2%; 2.92 mg/kg), abnormal gait/ataxia (16.7%; 2.87 mg/kg), restlessness (14.3%; 3.55 mg/kg), tremors/trembling (14.3%; 2.43 mg/kg), hypersalivation (13.0%; 2.89 mg/kg), tachypnea (11.9%; 3.28 mg/kg), tachycardia (10.7%; 3.04 mg/kg) and lethargy (10.7%; 2.69 mg/kg). Fifty-nine (70.2%) cases were considered accidental ingestions and 25 (29.8%) cases were given mirtazapine as prescribed. The doses associated with signs of toxicity were 15.00 mg (40 cats), 3.75 mg (25 cats), 7.50 mg (four cats), 30.00 mg (one cat), 18.75 mg (one cat), 11.25 mg (one cat), 5.80 mg (one cat) and 1.88 mg (one cat). For cats with available information, the onset of clinical signs ranged from 15 mins to 3 h, and resolution of clinical signs ranged from 12-48 h. CONCLUSIONS AND RELEVANCE: The greater number of adverse effects at 3.75 mg rather than 1.88 mg suggests that the latter may be a more appropriate starting dose for stimulating appetite while limiting toxicity. The benefit of dispensing exact doses of mirtazapine is implied given the likelihood of accidental administration of a full tablet (15 mg) and the resulting toxicity.

Clinical and computed tomography tumour dimension assessments for planning wide excision of injection site sarcomas in cats: how strong is the agreement.
Ferrari R, Di Giancamillo M, Stefanello D et al.
Vet Comp Oncol (2015)

In injection site sarcoma (ISS) in cats lateral as well as deep margins should be correctly planned for a successful surgical outcome. The discrepancy between clinical and computed tomography (CT) measurements of dimension in resectable tumour has led to possible bias that affects the subsequent
surgical dose. The aim of this study was to prospectively investigate the agreement between clinical and CT measurements of dimension in newly diagnosed ISS in cats. Fifty-three client-owned cats that underwent both clinical and CT measurements of the length and width of ISS were included. CT measurements showed a tendency towards being larger than clinical dimensions, and this difference increased with increasing tumour size. Based on our results, in further studies focusing on ISS in cats, the kind of assessment used to define tumour dimensions (CT versus clinic) should be declared and specified to properly consider surgical results and prognostic impact of this variable.

Identification of a third feline Demodex species through partial sequencing of the 16S rDNA and frequency of Demodex species in 74 cats using a PCR assay.
Ferreira D, Sastre N, Ravera I et al.
BACKGROUND: Demodex cati and Demodex gatoi are considered the two Demodex species of cats. However, several reports have identified Demodex mites morphologically different from these two species. The differentiation of Demodex mites is usually based on morphology, but within the same species different morphologies can occur. DNA amplification/sequencing has been used effectively to identify and differentiate Demodex mites in humans, dogs and cats. HYPOTHESIS/OBJECTIVES: The aim was to develop a PCR technique to identify feline Demodex mites and use this technique to investigate the frequency of Demodex in cats. METHODS: Demodex cati, D. gatoi and Demodex mites classified morphologically as the third unnamed feline species were obtained. Hair samples were taken from 74 cats. DNA was extracted; a 330 bp fragment of the 16S rDNA was amplified and sequenced. RESULTS: The sequences of D. cati and D. gatoi shared >98% identity with those published on GenBank. The sequence of the third unnamed species showed 98% identity with a recently published feline Demodex sequence and only 75.2 and 70.9% identity with D. gatoi and D. cati sequences, respectively. Demodex DNA was detected in 19 of 74 cats tested; 11 DNA sequences corresponded to Demodex folliculorum, three to D. cati and two to Demodex brevis.
CONCLUSIONS AND CLINICAL IMPORTANCE: Three Demodex species can be found in cats, because the third unnamed Demodex species is likely to be a distinct species. Apart from D. cati and D. gatoi, DNA from D. canis, D. folliculorum and D. brevis was found on feline skin.

Indications, outcome and complications with axial pattern skin flaps in dogs and cats: 73 cases.
Field EJ, Kelly G, Pleuvry D, Demetriou J, Baines SJ
OBJECTIVE: To determine the indications, frequency of complications and long term outcome associated with axial pattern flaps used to repair wound defects in dogs and cats. METHODS: Medical records from two independent referral centres for dogs and cats undergoing wound repair with an axial pattern flap were reviewed. RESULTS: Seventy-three animals were included, 49 dogs: 24 cats. Indications for axial pattern flaps were chronic wounds (43/73; 59%) and closure following tumour resection (30/73; 41%). Axial pattern flaps used were: thoracodorsal, caudal superficial epigastric, reverse saphenous conduit, superficial brachial, deep circumflex iliac, superficial cervical, caudal auricular, lateral thoracic, cranial superficial epigastric, genicular and superficial temporal. Postoperative complications occurred in 64 patients (89%) and 8 patients (11%) had no complications. Complications were: dehiscence, swelling of the flap, necrosis, infection, discharge and seroma. Flap outcome was excellent in 16 patients (23%), good in 29 (41%), fair in 21 (30%) and poor in 5 (7%). CLINICAL SIGNIFICANCE: There is a high complication rate associated with axial pattern flaps but these are usually easily managed and long term outcome is excellent, in either species.
Field comparison of tolerance of a collar containing 10.0% imidacloprid/4.5% flumethrin (Seresto) and a placebo collar placed on cats.
Fink H, Wennogle S, Davis WL, Von Simson C, Lappin MR
OBJECTIVES: A collar containing 10.0% imidacloprid/4.5% flumethrin (Seresto; Bayer Animal Health) controls flea and tick infestations for 8 months and is effective in preventing transmission of Bartonella henselae and Cytauxzoon felis among cats. The purpose of this study was to compare tolerance of client-owned cats for the 10.0% imidacloprid/4.5% flumethrin collar or a physically identical placebo collar. METHODS: A total of 96 client-owned cats were enrolled in the study. Cats that were systemically ill, of hairless breed or declawed in all four limbs were excluded. Cats were randomized by household to wear a placebo collar for 14 days followed by the 10.0% imidacloprid/4.5% flumethrin collar for 14 days or the 10.0% imidacloprid/4.5% flumethrin collar for 28 days. Examinations by a veterinarian were performed on days 0, 14 and 28. Owners recorded daily systemic and local health observations. RESULTS: All but two cats, including one that entrapped the mandible in the collar and one that developed local pyodermatitis (10.0% imidacloprid/4.5% flumethrin collar), completed the 28-day study. The majority of the local lesions or licking associated with the collars occurred in the first 14 days, and licking (but not skin lesions) was more common in cats wearing the 10.0% imidacloprid/4.5% flumethrin collars. No local lesions were reported for placebo cats after switching to the 10.0% imidacloprid/4.5% flumethrin collar, and only one cat wearing the 10.0% imidacloprid/4.5% flumethrin collar had reports of licking after day 14. Housing status, single or multiple cat household, and whether a collar had been worn previously were not associated with side effects. CONCLUSIONS AND RELEVANCE: Adverse events detected for cats wearing 10.0% imidacloprid/4.5% flumethrin collars were similar to those for cats wearing placebo collars and to cats wearing identification collars in a separate study. The data suggest that most cats originally intolerant of collars become receptive over time.

Bartonella Infection among Cats Adopted from a San Francisco Shelter, Revisited.
Fleischman DA, Chomel BB, Kasten RW et al.
Bartonella infection among cats from shelters can pose a health risk to adopters. Bartonella henselae is the most common species, with B. clarridgeiae and B. koehlerae being less common. The lower rates of infection by the latter species may reflect their rarity or an inefficiency of culture techniques. To assess the incidence of infection, blood cultures, serology, and PCR testing were performed on 193 kittens (6 to 17 weeks old) and 158 young adult cats (5 to 12 months old) from a modern regional shelter. Classical B. henselae culture medium was compared to a medium supplemented with insect cell growth factors. Bartonella colonies were isolated from 115 (32.8%) animals, including 50 (25.9%) kittens and 65 (41.1%) young adults. Therefore, young adults were twice as likely to be culture positive as kittens. Enhanced culture methods did not improve either the isolation rate or species profile. B. henselae was isolated from 40 kittens and 55 young adults, while B. clarridgeiae was cultured from 10 animals in each group. B. koehlerae was detected in one young adult by PCR only. B. henselae genotype II was more commonly isolated from young adults, and genotype I was more frequently isolated from kittens. Kittens were 4.7 times more likely to have a very high bacterial load than young adults. A significantly higher incidence of bacteremia in the fall and winter than in the spring and summer was observed. Bartonella antibodies were detected in 10% (19/193) of kittens and 46.2% (73/158) of young adults, with culture-positive kittens being 9.4 times more likely to be seronegative than young adults.
Impact of queen infection on kitten susceptibility to different strains of Bartonella henselae.
Fleischman DA, Chomel BB, Burgos K et al. 

Domestic cats are the natural reservoir of Bartonella henselae, the agent of cat scratch disease in humans. In kittens, maternal IgG antibodies are detectable within two weeks postpartum, weaning in six to ten weeks postpartum and kittens as young as six to eight weeks old can become bacteremic in a natural environment. The study’s objective was to evaluate if maternal antibodies against a specific B. henselae strain protect kittens from infection with the same strain or a different strain from the same genotype. Three seronegative and Bartonella-free pregnant queens were infected with the same strain of B. henselae genotype II during pregnancy. Kittens from queens #1 and #2 were challenged with the same strain used to infect the queens while kittens from queen #3 were challenged with a different genotype II strain. All queens gave birth to non-bacteremic kittens. After challenge, all kittens from queens infected with the same strain seroconverted, with six out of the seven kittens presenting no to very low levels of transitory bacteremia. Conversely, all four kittens challenged with a different strain developed high bacteremia (average 47,900CFU/mL by blood culture and 146,893 bacteria/mL by quantitative PCR). Overall, qPCR and bacterial culture were in good agreement for all kittens (Kappa Cohen’s agreement of 0.78). This study demonstrated that young kittens can easily be infected with a different strain of B. henselae at a very young age, even in the presence of maternal antibodies, underlining the importance of flea control in pregnant queens and young kittens.

Effect of feeding a weight loss food beyond a caloric restriction period on body composition and resistance to weight gain in cats.
Floerchinger AM, Jackson MI, Jewell DE, MacLeay JM, Hahn KA, Paetau-Robinson I

OBJECTIVE: To determine the effect of feeding a food with coconut oil and supplemental L-carnitine, lysine, leucine, and fiber on weight loss and maintenance in cats. DESIGN: Prospective clinical study. ANIMALS: 50 overweight cats. PROCEDURES: The study consisted of 2 trials. During trial 1, 30 cats were allocated to 3 groups (10 cats/group) to be fed a dry maintenance cat food to maintain body weight (group 1) or a dry test food at the same amount on a mass (group 2) or energy (group 3) basis as group 1. During trial 2, each of 20 cats was fed the test food and caloric intake was adjusted to maintain a weight loss rate of 1%/wk (weight loss phase). Next, each cat was fed the test food in an amount calculated to maintain the body weight achieved at the end of the weight loss phase (weight maintenance phase). Cats were weighed and underwent dual-energy x-ray absorptiometry monthly. Metabolomic data were determined before (baseline) and after each phase. RESULTS: During trial 1, cats in groups 2 and 3 lost significantly more weight than did those in group 1. During trial 2, cats lost a significant amount of body weight and fat mass but retained lean body mass during the weight loss phase and continued to lose body weight and fat mass but gained lean body mass during the weight maintenance phase. Evaluation of metabolomic data suggested that fat metabolism was improved from baseline for cats fed the test food. CONCLUSIONS AND CLINICAL RELEVANCE: Results suggested that feeding overweight cats the test food caused weight loss and improvements in body condition during the weight maintenance phase, possibly because the food composition improved energy metabolism.

Long-term contraception in a small implant: A review of Suprelorin (deslorelin) studies in cats.
Fontaine C
RATIONALE: Deslorelin (Suprelorin®; Virbac) is a gonadotropin-releasing hormone (GnRH) agonist licensed in select countries for the long-term suppression of fertility in adult male dogs and male ferrets. This article summarizes studies investigating the use of deslorelin implants for the long-term suppression of fertility in male and female domestic cats. EVIDENCE BASE: Slow-release deslorelin implants have been shown to generate effective, safe and reversible long-term contraception in male and female cats. In pubertal cats, a 4.7 mg deslorelin implant suppressed steroid sex hormones for an average of approximately 20 months (range 15-25 months) in males and an average of approximately 24 months (range 16-37 months) in females. Reversibility has been demonstrated by fertile matings approximately 2 years post-treatment in both male and female adult cats. In prepubertal female cats of approximately 4 months of age, puberty was postponed to an average of approximately 10 months of age (range 6-15 months) by a 4.7 mg deslorelin implant. CHALLENGES: The large variability in the duration of suppression of gonadal activity makes the definition of the optimal time for reimplantation quite challenging. In addition, the temporary stimulation phase occurring in the weeks following deslorelin implantation can induce in adult female cats a fertile estrus that needs to be managed to avoid unwanted pregnancy. Longer duration and larger scale controlled field studies implementing blinding, a negative control group and a carefully controlled randomization to each group are needed. Furthermore, the effects of repeated treatment need to be investigated. Finally, the effect of treatment on growth and bone quality of prepubertal cats needs to be assessed. However, the ease of use, long-lasting effects and reversibility of deslorelin implants are strong positive points supporting their use for controlling feline reproduction.

Feline hippocampal and piriform lobe necrosis as a consequence of severe cluster seizures in two cats in Finland.
Fors S, Van Meervenne S, Jeserevics J, Rakauskas M, Cizinauskas S
Feline hippocampal and piriform lobe necrosis (FHN) has been reported from several countries worldwide and is considered an important aetiology for feline epileptic seizures. The aetiology of FHN remains unclear, however it is suspected that FHN might occur secondary to intense epileptic activity as described in humans and dogs although this has not yet been documented in cats. The purpose of our report is to describe the first cases of FHN in Finland diagnosed by magnetic resonance imaging (MRI) and histopathology. The two cases we describe had a well documented history of pre-existing seizures with normal brain MRI at the onset of cluster seizures but MRI done when the cats exhibited clinical deterioration secondary to severe seizure activity, revealed lesions in the hippocampus and piriform lobes typical of FHN. Our report confirms that feline hippocampus and piriform lobe necrosis does occur in the Finnish cat population and should therefore be considered as a differential diagnosis in cats with seizures. In addition, the presentation, clinical findings, results of MRI and/or histopathology shows that cats may develop FHN secondary to severe seizure activity.

Comparative Speed of Kill, Repellent (anti-feeding) and Acaricidal Efficacy of an Imidacloprid/Flumethrin Collar (Seresto®) and a Fipronil/(S)-Methoprene/Eprinomectin/Praziquantel Spot-on (Broadline®) against Ixodes ricinus (Linné, 1758) on Cats.
Fourie JJ, Horak IG, de Vos C, Deuster K, Schunack B
Speed of kill, repellent (anti-feeding) and acaricidal efficacy of an imidacloprid 10 % (w/w) /flumethrin 4.5 % (w/w) collar (Seresto®, Bayer) and a spot-on formulation of fipronil 8.3 % (w/v) /(S)-
methoprene 10 % (w/v) /eprinomectin 0.4 % (w/v) /praziquantel 8.3 % (w/v) (Broadline®, Merial) against artificially induced infestations with Ixodes ricinus on cats, were assessed in a parallel group design, randomised, controlled study. Twenty-four cats were included and randomly allocated to treatment groups or a non-treated control group. Starting on Day (D) 7 after treatment until D28, cats were each infested with 50 I. ricinus at weekly intervals. Ticks were counted in situ on the cats at 6, 12 and 24 h and upon removal 48 h after each infestation. Based on arithmetic means, Seresto® proved to be 100 % effective against adult I. ricinus at all assessment times (6, 12, 24 and 48 h after infestation) throughout the month-long study. Broadline® was 0 % to 16.7 % effective at 6 h, 26.8 % to 50.0 % effective at 12 h, while at 24 h after infestation efficacy peaked at 81.5 % on D15 declining to 31.5 % on D29. Based on the 48 h tick counts, the efficacy of Broadline® peaked at 100 % on D16 after treatment and decreased to 83.2 % by D30. The Seresto® collar provided significantly faster speed of kill and better persistent acaricidal effectiveness against Ixodes ricinus on cats compared to Broadline® spot-on. The additional repellent (anti-feeding) effect of Seresto® prevents parasites from taking a blood meal and thereby reduces the risk of vector-borne disease pathogen transmission.

Concurrent idiopathic vestibular syndrome and facial nerve paralysis in a cat.
Fraser AR, Long SN, le Chevoir MA
CASE REPORT: A 4-year-old male neutered Domestic Medium-hair cat was referred for right head tilt and ataxia of 2 weeks duration. On examination it was determined that the cat had right facial nerve paralysis and peripheral vestibular signs. Haematology and serum biochemical testing were performed in addition to magnetic resonance imaging of the brain and ears, and cerebrospinal fluid analysis. An underlying condition was not identified. A diagnosis of idiopathic vestibular syndrome and concurrent idiopathic right facial nerve paralysis was consequently made. The cat was re-evaluated over the following weeks and was determined to have complete resolution of clinical signs within 7 weeks. CONCLUSION: Vestibular dysfunction and concurrent facial nerve paralysis have previously been reported in the cat, but not of an idiopathic nature.

Acceptance and effects of a therapeutic renal food in pet cats with chronic kidney disease.
Fritsch DA, Jewell DE, Leventhal PS et al.
Vet Rec Open (2015) 2:e000128
INTRODUCTION: Renal foods are used to manage chronic kidney disease (CKD) in dogs and cats, but their effectiveness may be limited by the ability to transition animals to them. MATERIAL AND METHODS: In a prospective study, pet cats with previously undiagnosed kidney disease (20 International Renal Interest Society (IRIS) 1, 61 IRIS 2, 14 IRIS 3/4, 33 at risk for CKD) were transitioned to a renal food. Markers of renal function were measured and owners answered questionnaires about their pet over one year. RESULTS: All but eight cats (120/128; 94 per cent) successfully transitioned to the renal food. Most of the time, cats moderately or extremely liked the food (89 per cent), ate at least half (73 per cent) and were moderately or extremely enthusiastic while eating (68 per cent). Cats rarely disliked the food (2 per cent) or refused to eat it (1 per cent). Markers of renal function were unchanged in IRIS 1 and 2 cats and changed little in IRIS 3/4 cats. In all groups, owner-assessed quality of life improved initially and then remained stable. Mean bodyweight did not change in cats with CKD. CONCLUSIONS: Most cats with CKD successfully transitioned to the renal food. The results also support previous studies that the renal food can help stabilise cats with CKD.

Streptococcal infections in cats: ABCD guidelines on prevention and management.
OVERVIEW: Streptococcus canis is most prevalent in cats, but recently S equi subsp zooepidemicus has been recognised as an emerging feline pathogen. S CANIS INFECTION: S canis is considered part of the commensal mucosal microflora of the oral cavity, upper respiratory tract, genital organs and perianal region in cats. The prevalence of infection is higher in cats housed in groups; and, for example, there may be a high rate of vaginal carriage in young queens in breeding catteries. A wide spectrum of clinical disease is seen, encompassing neonatal septicaemia, upper respiratory tract disease, abscesses, pneumonia, osteomyelitis, polyarthritis, urogenital infections, septicaemia, sinusitis and meningitis. S EQUI SUBSP ZOOEPIDEMICUS INFECTION: S equi subsp zooepidemicus is found in a wide range of species including cats. It was traditionally assumed that this bacterium played no role in disease of cats, but it is now considered a cause of respiratory disease with bronchopneumonia and pneumonia, as well as meningoencephalitis, often with a fatal course. Close confinement of cats, such as in shelters, appears to be a major risk factor. As horses are common carriers of this bacterium, contact with horses is a potential source of infection. Additionally, the possibility of indirect transmission needs to be considered. DIAGNOSIS: Streptococci can be detected by conventional culture techniques from swabs, bronchoalveolar lavage fluid or organ samples. Also real-time PCR can be used, and is more sensitive than culture. TREATMENT: In suspected cases, treatment with broad-spectrum antibiotics should be initiated as soon as possible and, if appropriate, adapted to the results of culture and sensitivity tests.

Postobstructive diuresis in cats with naturally occurring lower urinary tract obstruction: incidence, severity and association with laboratory parameters on admission.
Fröhlich L, Hartmann K, Sautter-Louis C, Dorsch R
OBJECTIVES: The objective of this retrospective study was to investigate the actual incidence of postobstructive diuresis after relief of urethral obstruction in cats, as well as to identify changes in blood and urine parameters that might be associated with postobstructive diuresis (POD), and to assess the impact of fluid therapy. METHODS: The medical records of 57 male cats with urethral obstruction that were treated with an indwelling urinary catheter were retrospectively analysed. Absolute urine output in ml/kg/h every 4 h and the incidence of cats with polyuria (urine volume >2 ml/kg/h) at any time point over a 48 h period after the re-establishment of urine flow were investigated. In addition, postobstructive diuresis in relation to fluid therapy (PODFR) was defined as urine output greater than the administered amount of intravenous fluids on at least two subsequent time points. Polyuria and PODFR were investigated for their association with blood and urine laboratory parameters. RESULTS: After 4 h, 74.1% (40/54) of the cats had polyuria, with a urine output of >2 ml/kg/h. Metabolic acidosis was present in 46.2% of the cats. Venous blood pH and bicarbonate were inversely correlated with urine output in ml/kg/h after 4 h. The overall incidence of POD within 48 h of catheterisation was 87.7%. There was a significant correlation between intravenous fluid rate at time point x and urine output at time point x + 1 at all the time points except for the fluid rate at time point 0 and the urine output after 4 h. PODFR was seen in 21/57 cats (36.8%). CONCLUSIONS AND RELEVANCE: POD is a frequent finding in cats treated for urethral obstruction, and can be very pronounced. Further studies are required to determine whether or not a change in venous blood pH actually interferes with renal concentration ability. The discrepancy between the frequency of cats with polyuria and PODFR (87.7% vs 36.8%) in the present study indicates that administered intravenous fluid therapy might be the driving force for the high incidence of polyuria in some cats with naturally occurring obstructive feline lower urinary tract disease.
Changes in fatty acid composition in tissue and serum of obese cats fed a high fat diet.
Fujiwara M, Mori N, Sato T et al.

BACKGROUND: Obesity and overweight have been frequently observed in dogs and cats in recent years as in humans. The compositions of fatty acids (FAs) in the accumulated lipids in tissues of obese animals may have important roles in the process and mechanisms related to the onset of metabolic disorders. The purpose of this study was to evaluate the effects of a high fat (HF) diet, which contained a higher proportion of saturated FAs, on FA metabolism and distribution in obese cats. Cats (N = 12) were divided into control diet group (crude fat; 16.0 %) (n = 4) or a high fat (HF) diet group (crude fat; 23.9 %) (n = 8). The HF diet contained up to 60 % of calories from fat and was rich in stearic acid. Blood samples were collected at 0, 2, 4 and 6 weeks after the feeding. Adipose and liver tissues were collected at the 6(th) week after feeding. We performed analysis of histological findings and fatty acid composition in serum and tissues. RESULTS: Body weights of the cats significantly increased in the HF group. The increased activities of hepatic enzymes and the accumulation of lipid droplets were found in hepatocytes in the HF group at the 6(th) week after feeding. In this study, the stearic acid (C18:0)-rich HF diet contained less oleic acid (C18:1n-9) and more linoleic acid (C18:2n-6) than the control. However, the composition of oleic acid in the liver was higher, and those of stearic acid and linoleic acid were lower in the HF group at the 6(th) week after feeding. The higher oleic acid:stearic acid ratio suggests an increase in the conversion from saturated FA to mono-unsaturated FAs, which may reflect the hepatic storage of FAs as a relatively harmless form. CONCLUSION: The stearic acid-rich HF diet increased hepatic lipid accumulation accompanied by the increased of hepatic oleic acid, increased serum oleic acid and activation of hepatic enzymes. These findings could be an important sign of early stages of dyslipidemia and hepatic damage. Also, the higher oleic acid:stearic acid ratio might be related to the increased activity of SCD-1, which suggests that the stearic acid-rich HF diet evoked hepatic lipogenesis in the feline liver.

Efficacy and Complications of Palliative Irradiation in Three Scottish Fold Cats with Osteochondrodysplasia.
Fujiwara-Igarashi A, Igarashi H, Hasegawa D, Fujita M

Quantitative PCR detection of feline morbillivirus in cat urine samples.
Furuya T, Wachi A, Sassa Y et al.
Feline morbillivirus (FmoPV) is a new virus species and its detection is important, since correlation has been reported between FmoPV virus infection and tubulointerstitial nephritis in cats. Here, we report a real-time reverse transcription (RT)-PCR system that can detect the FmoPV L-gene sequence with more than 10-time higher sensitivity than a conventional PCR system, resulting in detection of less than 10 copies of the template DNA. The total FmoPV positive rate of urine samples from veterinary clinics and hospitals in Japan was 15.1% (25/166) using this system. This study demonstrates usefulness of the real-time RT-PCR system for detection of FmoPV for cat urine samples.

Man’s other best friend: domestic cats (F. silvestris catus) and their discrimination of human emotion cues.
Galvan M, Vonk J
The ability of domestic dogs (C. lupus famaliaris) to follow and attend to human emotion expressions is well documented. It is unknown whether domestic cats (F. silvestris catus) possess similar abilities. Because cats belong to the same order (Carnivora), but did not evolve to live in complex social groups, research with them enables us to tease apart the influence of social structure versus domestication processes on the capacity to recognize human communicative cues, such as emotions. Two experiments were conducted to determine the extent to which domestic cats discriminate between human emotion cues. The first experiment presented cats with facial and postural cues of happiness and anger from both an unfamiliar experimenter and their familiar owner in the absence of vocal cues. The second experiment presented cats with vocal cues of human emotion through a positively or negatively charged conversation between an experimenter and owner. Domestic cats were only modestly sensitive to emotion, particularly when displayed by their owner, suggesting that a history of human interaction alone may not be sufficient to shape such abilities in domestic cats.

COLQ variant associated with Devon Rex and Sphynx feline hereditary myopathy.


Some Devon Rex and Sphynx cats have a variably progressive myopathy characterized by appendicular and axial muscle weakness, megaesophagus, pharyngeal weakness and fatigability with exercise. Muscle biopsies from affected cats demonstrated variable pathological changes ranging from dystrophic features to minimal abnormalities. Affected cats have exacerbation of weakness following anticholinesterase dosing, a clue that there is an underlying congenital myasthenic syndrome (CMS). A genome-wide association study and whole-genome sequencing suggested a causal variant for this entity was a c.1190G>A variant causing a cysteine to tyrosine substitution (p.Cys397Tyr) within the C-terminal domain of collagen-like tail subunit (single strand of homotrimer) of asymmetric acetylcholinesterase (COLQ). Alpha-dystroglycan expression, which is associated with COLQ anchorage at the motor end-plate, has been shown to be deficient in affected cats. Eighteen affected cats were identified by genotyping, including cats from the original clinical descriptions in 1993 and subsequent publications. Eight Devon Rex and one Sphynx not associated with the study were identified as carriers, suggesting an allele frequency of ~2.0% in Devon Rex. Over 350 tested cats from other breeds did not have the variant. Characteristic clinical features and variant presence in all affected cats suggest a model for COLQ CMS. The association between the COLQ variant and this CMS affords clinicians the opportunity to confirm diagnosis via genetic testing and permits owners and breeders to identify carriers in the population. Moreover, accurate diagnosis increases available therapeutic options for affected cats based on an understanding of the pathophysiology and experience from human CMS associated with COLQ variants.

Perioperative Mortality and Long-Term Survival in 80 Dogs and 32 Cats Undergoing Excision of Thymic Epithelial Tumors.


OBJECTIVE: To examine perioperative mortality, long-term survival, causes of death, and prognostic factors for dogs and cats undergoing surgical excision of thymic epithelial tumors (TETs). STUDY DESIGN: Multi-institutional case series. ANIMALS: Eighty dogs and 32 cats. METHODS: Follow-up information was obtained for dogs and cats that underwent surgical excision of a TET between 2001 and 2012. RESULTS: Perioperative mortality was 20% in dogs and 22% in cats. No independent risk factors for perioperative mortality were identified. The estimated median survival time for all dogs was...
1.69 years (95% CI 0.56-4.32) and the 1- and 4-year survival rates were 55% (95% CI 44-67) and 44% (95% CI 32-56). The estimated median survival time for all cats was 3.71 years (95% CI 0.56-unestimatable) and the 1- and 4-year survival rates were 70% (95% CI 53-87) and 47% (95% CI 0-100). Of animals that survived to discharge, 42% of dogs and 20% of cats eventually died of TET-related causes. The presence of paraneoplastic syndromes (hazard ratio [HR] 5.78, 95% CI 1.64-20.45, P = .007) or incomplete histologic margins (HR 6.09, 95% CI 1.50-24.72, P = .01) were independently associated with decreased survival in dogs. No significant predictors of survival were identified in cats. Conclusions regarding the effect of chemotherapy or radiation therapy could not be made.

CONCLUSIONS: While there is substantial risk of perioperative death in dogs and cats undergoing surgery for TETs, many animals that survive to discharge have prolonged survival. Survival is significantly decreased in dogs with paraneoplastic syndromes or incomplete histologic margins.

Assessment of Postoperative Pain in Cats After Ovariectomy by Laparoscopy, Median Celiotomy, or Flank Laparotomy.
Gauthier O, Holopherne-Doran D, Gendarme T et al.
OBJECTIVE: To compare postoperative pain, duration of surgery, and duration of anesthesia for 3 methods of ovariectomy in cats: (1) conventional ventral median open approach (Midline), (2) right flank approach (Flank), and (3) median 2-portal laparoscopic procedure (Lap). STUDY DESIGN: Randomized, prospective clinical trial. ANIMALS: Healthy, sexually intact female cats (n = 60). METHODS: Cats were randomly assigned to 1 of 3 groups: Midline (n = 20), Flank (20), and Lap (20) were evaluated 1, 2, 4, 6, and 12 hours after endotracheal extubation. Postoperative pain was scored using the 4A-vet pain scale that combines a subjective numerical pain rating and objective scoring of physiologic and behavioral variables including the response to stimulation of the surgical site. Pain scores (PS) were compared between groups. RESULTS: There was a significant difference in the PS between groups. PS for Midline and Flank were not significantly different but were both significantly higher compared with Lap. Depending on time, 5-20% of the cats had intense postoperative pain in both Midline and Flank groups. None of the Lap cats had intense postoperative pain. CONCLUSIONS: Laparoscopic ovariectomy, although slower, appeared less painful compared with conventional ventral midline and flank ovariectomy. Postoperative pain did not differ significantly between midline and flank groups.

Relationship between Plasma Fibroblast Growth Factor-23 Concentration and Survival Time in Cats with Chronic Kidney Disease.
Geddes RF, Elliott J, Syme HM
BACKGROUND: Fibroblast growth factor-23 (FGF-23) and parathyroid hormone (PTH) are commonly increased in cats with azotemic chronic kidney disease (CKD). Both are predictors of survival time in human patients, but these relationships have not previously been examined in the cat. OBJECTIVES: To investigate the relationship between plasma FGF-23 and PTH concentrations at diagnosis of CKD in cats with survival time and with disease progression over 12 months. ANIMALS: 214 azotemic, client-owned cats (≥9 years). METHODS: Retrospective study: Biochemical and urinary variables at diagnosis of azotemic CKD, including plasma FGF-23 and PTH concentrations were assessed as predictors of survival time (all-cause mortality) using Cox regression, and as predictors of CKD progression over 12 months using logistic regression. RESULTS: In the final multivariable Cox regression model, survival was negatively associated with plasma creatinine (P =.002) and FGF-23 concentrations (P =.014), urine protein-to-creatinine ratio (P <.001) and age (P <.001). Survival was
positively associated with PCV (P = .004). In the final multivariable logistic regression model, independent predictors of CKD progression included logFGF-23 and age. Neither plasma phosphate nor PTH was found to be an independent predictor of survival time or of CKD progression. CONCLUSIONS AND CLINICAL IMPORTANCE: Plasma FGF-23 concentration is a novel prognostic indicator in cats with CKD, independent of other factors including plasma creatinine and phosphate concentrations. Further work is required to assess if FGF-23 contributes directly to CKD progression, but regardless these findings may make FGF-23 a useful biomarker for predicting poorer outcomes in cats with CKD.

**Faecal consistency and risk factors for diarrhoea and constipation in cats in UK rehoming shelters.**

German AC, Cunliffe NA, Morgan KL

OBJECTIVES: To describe faecal consistency, prevalence and risk factors for diarrhoea and constipation in a rescue cat population. METHODS: Faecal samples in litter trays from a stratified random sample of cats in pens at 25 UK rehoming centres were scored for consistency in two discrete time periods, summer and winter. A six-point scale was used, with diarrhoea =3, severe diarrhoea =2 and constipation as 6. The effect on faecal consistency of age, number of cats per pen and season were investigated using multivariable hierarchical logistic regression with centre and pen as random effects. Intraclass correlation coefficients were used to estimate the effect of pen and centre. RESULTS: Overall, 11.9% (95% confidence interval [CI]:10.4-13.7) of cats had diarrhoea, 2.4% (95% CI 1.6-3.7) severe diarrhoea and 5.6% (95% CI 4.2-7.5) were constipated. The prevalence of diarrhoea (median 11.0%, interquartile range [IQR] 5.0-14.5%) and constipation (median 4.2%, IQR 1.8-5.9) varied at the centre level. Diarrhoea was associated with being a kitten (odds ratio [OR] 2.54, 95% CI 1.45-4.46; P = 0.001) and being in a multi-cat pen (OR 1.24, 95% CI 1.04-1.48; P = 0.02) but not with season (OR 0.99, 95% CI 0.55-1.77; P = 0.96). Severe diarrhoea was associated with senior cats (OR 4.66, 95% CI 1.25-17.44; P = 0.02). Constipation was associated with increasing age (OR 1.01; 95% CI 1.00-1.01; P = 0.02) and winter (OR 0.43, 95% CI 0.21-0.89; P = 0.02). Both diarrhoea and constipation showed moderate correlation with pens within a centre. CONCLUSIONS AND RELEVANCE: From IQRs, we suggest acceptable levels for diarrhoea and constipation of 11% and 4%, respectively, targets of 5% and 2%, and intervention at 15% and 6%. Increasing age was associated with decreased risk of diarrhoea and increased risk of constipation. However, severe diarrhoea was associated with being a senior cat. Season (winter) was a risk factor for constipation; multi-cat pens were a risk factor for diarrhoea. Describing the prevalence and risk factors for diarrhoea and constipation in cats will assist their management in this population. Understanding and managing constipation may be more important than interventions to reduce severe diarrhoea.

**Iron Status of Cats with Chronic Kidney Disease.**

Gest J, Langston C, Eatroff A

BACKGROUND: Iron deficiency is a proposed mechanism for the anemia that occurs in cats with chronic kidney disease (CKD). Minimal research investigating the iron status of these cats has been performed. OBJECTIVE: To compare indicators of iron status in cats with CKD versus healthy cats and cats with nonrenal illness (NRI). To compare indicators of iron status in anemic versus nonanemic cats with CKD. ANIMALS: Thiry-nine client or employee owned healthy cats, 40 cats with CKD and 34 cats with NRI included. METHODS: Exclusion criteria included prior iron or erythropoiesis stimulating agent administration, blood transfusion, or concurrent CKD and NRI. Complete blood
counts, serum chemistries, serum iron concentrations, total iron binding capacity (TIBC), and ferritin concentrations were measured and percent transferrin saturation (TSAT) calculated on all cats. Data were analyzed using nonparametric statistical testing. RESULTS: No statistically significant differences were detected among groups for iron concentration (P =.50), ferritin concentration (P =.47), or TSAT (P =.19). TIBC was significantly lower in CKD (median 262 µg/dL; IQR 233-302; range 165-488) versus healthy cats (median 316 µg/dL; IQR 272-345, range 196-464); (P =.0030). When comparing anemic (hemoglobin <9.5 g/dL) versus nonanemic cats with CKD, TSAT was significantly lower (P =.033) in anemic (median 20.2%; IQR 17.8-34.5; range 17.6-35.9) compared to nonanemic (median 29.0%; IQR 25.5-44.1; range 11.5-94.4). No statistically significant differences found for ferritin concentration (P =.21), iron concentration (P =.94), or TIBC (P =.97). CONCLUSIONS AND CLINICAL IMPORTANCE: These results indicate that an iron deficient state exists in anemic cats with CKD and is more likely functional rather than absolute.

The effect of feeding, storage and anticoagulant on feline serum cystatin C.
Ghys LF, Paepe D, Lefebvre HP et al.
Serum cystatin C (sCysC) is a possible marker for early detection of chronic kidney disease (CKD) in cats. In contrast with serum creatinine (sCr), feline sCysC is not affected by age, breed or sex. However, further biological and clinical validation is required. The objectives of this study were: (1) to investigate if food intake and circadian rhythm affect feline sCysC; (2) to determine the stability of sCysC under different storage conditions, and (3) to investigate if plasma concentrations of CysC (pCysC) differed from sCysC. A crossover study with 10 healthy laboratory cats fed the same commercial dry food was performed to study the influence of feeding and diurnal variation. Storage effects and comparison of pCysC with sCysC were determined using healthy cats (n = 3 and n = 10, respectively) and cats with CKD (n = 4 and n = 17, respectively). A significant daily sCysC variation was seen. Pre- and postprandial sCysC and sCr concentrations did not change significantly. Serum CysC significantly increased during storage at room temperature. After freezing, sCysC significantly decreased after 5 and 12 months at both -20 °C and -72 °C. Plasma CysC was significantly lower than sCysC. These findings suggest that it is not mandatory to fast cats before evaluation of sCysC and sCr. Samples were stable during routinely used storage conditions. Based on these findings, freezing for more than 5 months is not recommended, although additional studies are required to evaluate the clinical relevance of decreased sCysC after prolonged storage. Plasma and serum CysC cannot be compared directly.

Strong spatial segregation between wildcats and domestic cats may explain low hybridization rates on the Iberian Peninsula.
Gil-Sánchez JM, Jaramillo J, Barea-Azcón JM
The European wildcat (Felis silvestris silvestris) is an endangered felid impacted by genetic introgression with the domestic cat (Felis silvestris catus). The problem of hybridization has had different effects in different areas. In non-Mediterranean regions pure forms of wildcats became almost extinct, while in Mediterranean regions genetic introgression is a rare phenomenon. The study of the potential factors that prevent the gene flow in areas of lower hybridization may be key to wildcat conservation. We studied the population size and spatial segregation of wildcats and domestic cats in a typical Mediterranean area of ancient sympathy, where no evidence of hybridization had been detected by genetic studies. Camera trapping of wild-living cats and walking surveys of stray cats in villages were used for capture-recapture estimations of abundance and spatial segregation. Results showed (i) a
low density of wildcats and no apparent presence of putative hybrids; (ii) a very low abundance of feral cats in spite of the widespread and large population sources of domestic cats inhabiting villages; (iii) strong spatial segregation between wildcats and domestic/feral cats; and (iv) no relationship between the size of the potential population sources and the abundance of feral cats. Hence, domestic cats were limited in their ability to become integrated into the local habitat of wildcats. Ecological barriers (habitat preferences, food limitations, intra-specific and intra-guild competition, predation) may explain the severe divergences of hybridization impact observed at a biogeographic level. This has a direct effect on key conservation strategies for wildcats (i.e., control of domestic cats).

**Duration of fasting but not diurnal variation affects the response to glucagon in healthy cats.**
Gilor C, Glock R, Gilor S
*Domest Anim Endocrinol* (2015) **53**:103-107
The role of glucagon disturbances in diabetes is increasingly recognized. Glucagon stimulation tests (GSTs) have been described in cats previously, but information is lacking on the response of cats to glucagon under specific conditions. The aim of this study was to assess a novel protocol for GST using human-recombinant glucagon and the effect of diurnal variation and duration of fasting using this protocol in healthy cats. All intravenous doses resulted in occasional vomiting and nausea, and eventually, a 20-µg/kg intramuscular dose was chosen. Five healthy cats were then used in a repeated-measures study. Cats were free-fed regularly at 7:30 AM and 5:30 PM for 30 min. In each cat, GST was performed at 7 PM after a 25-h fast (PM25), at 9 AM after a 25-h fast (AM25), and at 9 AM after a 15-h fast (AM15). Glucose and insulin concentrations were measured at -15, 0, 15, 25, 35, 45, and 60 min after stimulation. Baseline and peak concentrations were compared using the Friedman test. Baseline glucose and insulin did not differ significantly between treatment groups. Peak glucose concentrations occurred at 15 min and were significantly higher (P = 0.0085) at AM15 (mean ± standard deviation = 185.2 ± 43.0 mg/dL) vs AM25 (144.4 ± 10.5 mg/dL) and PM25 (128.0 ± 18.4 mg/dL). Similarly, peak insulin concentrations occurred at 15 min and were significantly higher (P = 0.04) at AM15 (1,911 ± 1,153 pg/mL) vs AM25 (739 ± 52 pg/mL) or PM25 (549 ± 366 pg/mL). In conclusion, prolonged fasting significantly blunted the glycemic response to glucagon compared with shorter fasting, but diurnal variation had no significant effect on glucose or insulin responses.

**Aglepristone: A review on its clinical use in animals.**
Gogny A, Fieni F
*Theriogenology* (2015)
Aglepristone (RU 46534) is a competitive progesterone antagonist that is indicated for the treatment of various progesterone-dependent physiological or pathologic conditions. Aglepristone has proven to be an effective means of terminating pregnancy in most species. When used to induce parturition, aglepristone was effective in all cases in the bitch, cow, and goat, with no apparent adverse effects on neonatal health or milk production. When used to schedule an elective cesarean section, aglepristone treatment was deemed safe for dams and puppies, providing that the ovulation date had been accurately assessed at the time of breeding. Irrespective of the stage of pregnancy at injection, treatment with aglepristone has no apparent negative effects on subsequent fertility. Aglepristone is also a safe and relatively effective means of treating pyometra. However, given the high level of septic risk and the likelihood of rapid deterioration, such therapy is not recommended in emergency situations. Treatment of feline fibroadenomatosis using aglepristone has given promising results, but repeat treatment may be necessary in cats previously treated with long-acting progestagens. The use of aglepristone in other progesterone-dependent diseases has yet to be fully evaluated but may prove valuable, especially in the treatment of insulin-resistant diabetes mellitus, acromegaly, and the treatment of some vaginal tumors.
in the bitch.

**Diseases Transmitted by Cats.**
Goldstein EJ, Abrahamian FM
Humans and cats have shared a close relationship since ancient times. Millions of cats are kept as household pets, and 34% of households have cats. There are numerous diseases that may be transmitted from cats to humans. General modes of transmission, with some overlapping features, can occur through inhalation (e.g., bordetellosis); vector-borne spread (e.g., ehrlichiosis); fecal-oral route (e.g., campylobacteriosis); bite, scratch, or puncture (e.g., rabies); soil-borne spread (e.g., histoplasmosis); and direct contact (e.g., scabies). It is also likely that the domestic cat can potentially act as a reservoir for many other zoonoses that are not yet recognized. The microbiology of cat bite wound infections in humans is often polymicrobial with a broad mixture of aerobic (e.g., Pasteurella, Streptococcus, Staphylococcus) and anaerobic (e.g., Fusobacterium, Porphyromonas, Bacteroides) microorganisms. Bacteria recovered from infected cat bite wounds are most often reflective of the oral flora of the cat, which can also be influenced by the microbiome of their ingested prey and other foods. Bacteria may also originate from the victim’s own skin or the physical environment at the time of injury.

**Feline discrete high-grade gastrointestinal lymphoma treated with surgical resection and adjuvant CHOP-based chemotherapy: retrospective study of 20 cases.**
Gouldin ED, Mullin C, Morges M et al.
*Vet Comp Oncol* (2015)
The aim of this retrospective study was to evaluate the outcome of cats treated with surgical intervention for a discrete intermediate-/high-grade gastrointestinal lymphoma prior to CHOP-based chemotherapy. Variables including sex, breed, haematocrit, white blood cell count, serum albumin concentration, clinical stage of disease, gastrointestinal obstruction and peritonitis were assessed for their effect on survival. Twenty cats met the inclusion criteria with three cats still alive at the time of data analysis. The overall median survival time (MST) was 417 days (range: 12-2962 days). The disease-free interval (DFI) was 357 days (range: 0-1585 days) with six cats still deemed in remission prior to death. Only clinical stage had a significant effect on both MST and DFI. Cats with discrete intermediate/high-grade gastrointestinal lymphoma that undergo surgical resection followed by adjuvant CHOP chemotherapy may achieve acceptable overall survival times.

**Effect of interactions with humans on behaviour, mucosal immunity and upper respiratory disease of shelter cats rated as contented on arrival.**
Gourkow N, Phillips CJ
Sustained positive affect may decrease vulnerability to upper respiratory infections in cats admitted to a shelter. Incidence of upper respiratory infections was examined in cats rated as Content upon admission to an animal shelter when provided with or without treatment to sustain contentment. Ninety-six cats rated as Content upon admission were provided with either human interaction, including petting, playing, and grooming, in four 10min sessions/d for 10 days or were exposed to a control treatment of a human standing in front of the cage with eyes averted for the same period. Changes in emotional state and mucosal immune responses were measured daily in treated and control groups. Infectious status was determined upon admission and on days 4 and 10 using combined conjunctival and oropharyngeal swab specimens tested by quantitative real-time PCR for feline herpes virus type 1, feline calicivirus,
Mycoplasma felis, Chlamydophila felis, and Bordetella bronchiseptica. The onset of upper respiratory disease (URD) was determined by veterinary staff based on clinical signs, including ocular or nasal discharge. Treated cats were more likely to remain Content (Incident Rate Ratio [IRR]: 1.13, Confidence Interval: 0.98-1.30, P <0.0001) and less likely to be rated as Anxious or Frustrated than Control cats over a 10 day period (IRR: 0.61, 95% CI: 0.42-0.88, P =0.007). Feline secretory IgA (S-IgA) quantified in faeces by ELISA techniques, was greater for Treated than Control cats (1451 Vs 846µg/g). Within the Treatment group, S-IgA was greater for cats that sustained Contentment throughout the study period compared to cats that became Anxious or Frustrated (1846 Vs 1394µg/g). An increasing proportion of Control than Treated cats shed pathogens over time (Control 22%, 36%, 61%; Treated 35%, 26%, 32% on d 1, 4 and 10, respectively; P =0.006). Control cats were more likely to develop URD than Treated cats (HR 2.9, CI: 1.30-6.67, P =0.01). Cats that responded positively to Treatment had a lower incidence of URD than negative responders (P =0.02). We conclude that the provision of human interaction treatments to shelter cats can facilitate sustained contentment, enhance secretion of S-IgA, and reduce incidence of URD.

Swiss Feline Cancer Registry: A Retrospective Study of the Occurrence of Tumours in Cats in Switzerland from 1965 to 2008.
Cancer is one of the leading causes of death in companion animals. Information on the epidemiology of cancer is instrumental for veterinary practitioners in patient management; however, spontaneously arising tumours in companion animals also resemble those in man and can provide useful data in combating cancer. Veterinary cancer registries for cats are few in number and have often remained short-lived. This paper presents a retrospective study of tumours in cats in Switzerland from 1965 to 2008. Tumour diagnoses were coded according to topographical and morphological keys of the International Classification of Oncology for Humans (ICD-O-3). Correlations between breed, sex and age were then examined using a multiple logistic regression model. A total of 18,375 tumours were diagnosed in 51,322 cats. Of these, 14,759 (80.3%) tumours were malignant. Several breeds had significantly lower odds ratios for developing a tumour compared with European shorthair cats. The odds of a cat developing a tumour increased with age, up to the age of 16 years, and female cats had higher risk of developing a tumour compared with male cats. Skin (4,970; 27.05%) was the most frequent location for tumours, followed by connective tissue (3,498; 19.04%), unknown location (2,532; 13.78%) and female sexual organs (1,564; 8.51%). The most common tumour types were epithelial tumours (7,913; 43.06%), mesenchymal tumours (5,142; 27.98%) and lymphoid tumours (3,911; 21.28%).

Understanding public perceptions of risk regarding outdoor pet cats to inform conservation action.
Free-ranging domestic cats (Felis catus) incur and impose risks on ecosystems and represent a complex issue of critical importance to biodiversity conservation and cat and human health globally. Prior social science research on this topic is limited and has emphasized feral cats even though owned cats often comprise a large proportion of the outdoor cat population, particularly in urban areas. To address this gap, we examined public risk perceptions and attitudes toward outdoor pet cats across varying levels of urbanization, including along the wildland-urban interface, in Colorado, USA. An analysis of 1397 completed surveys showed that residents did not view all types of risks uniformly; they viewed risks of...
cat predation on wildlife and carnivore predation on cats as more likely than risks of disease transmission to and from wildlife. Additionally, risk perceptions were related to attitudes, prior experiences with cats and cat-wildlife interactions, and cat owner behavior. Findings suggest that changes in risk perceptions may result in behavior change, and they offer insight for communication aimed at promoting risk aversive behaviors and cat management strategies that are acceptable to the public and that directly advance the conservation of native species. This article is protected by copyright. All rights reserved.

The TRPV1 receptor agonist capsaicin is an ineffective bronchoprovocant in an experimental model of feline asthma.
Grobman ME, Krumme S, Dodam JR, Reinero CR

OBJECTIVES: Airway hyper-responsiveness (AHR), a key feature of feline asthma, can be measured using bronchoprovocation testing. Limitations of both direct and indirect bronchoprovocants evaluated to date in experimental feline asthma have led to a search for a more specific indirect bronchoprovocant (ie, one which relies on existing inflammatory cells or activated neural pathways in diseased but not healthy airways). We hypothesized that capsaicin, a transient receptor potential cation channel subfamily V member 1 agonist, would lead to dose-responsive increases in airway resistance as measured by ventilator-acquired pulmonary mechanics in experimentally asthmatic cats. METHODS: Five cats induced to have asthma using Bermuda grass allergen (BGA) were studied. Twenty-four hours after aerosol challenge of BGA, cats were anesthetized and underwent neuromuscular blockade for ventilator-acquired pulmonary mechanics. Cats were monitored with pulse oximetry for hemoglobin desaturation. Parameters recorded on a breath-by-breath basis on the ventilator included airway resistance (Raw) and compliance. Saline at baseline and 10-fold increasing concentrations of capsaicin (0.4-4000.0 µM) were aerosolized for 30 s and data collected for 4 mins between doses. The intended endpoint of the study was a doubling in baseline airway resistance, halving of compliance or oxygen desaturation <75%. RESULTS: All cats completed the trial, reaching the highest dose of capsaicin without reaching any of the aforementioned endpoints. No biologically significant alteration in any other pulmonary mechanics parameter was noted. CONCLUSIONS AND RELEVANCE: Capsaicin does not appear to be an effective bronchoprovocant in a feline asthma model.

Microbiota and probiotics in canine and feline welfare.
Grześkowiak Ł, Endo A, Beasley S, Salminen S
*Anaerobe* (2015) 34:14-23

Dogs and cats have been cohabiting with us for thousands of years. They are the major human companions. Today, dogs and cats live in urban areas. Cats and most dogs are on high carbohydrate diets and face similar life-style challenges as the human beings. The health and well-being of companion animals, just as their owners, depends on the gut microbes. Providing a proper care and nutritionally balanced diet to companion animals is recognised as a part of our responsibility to maintain the health and well being of our pet. However, as microbiota differences may facilitate exposure to pathogens and harmful environmental influences, it is prudent to search for novel tools to protect dogs and cats and at the same time the human owners from pathogens. Specific probiotic strains and/or their defined combinations may be useful in the canine and feline nutrition, therapy, and care. Probiotic supplementations have been successful in the prevention and treatment of acute gastroenteritis, treatment of IBD, and prevention of allergy in companion animals. New challenges for probiotic applications include maintenance of obesity and overweight, urogenital tract infections, Helicobacter gastritis and parasitic infections. The probiotics of human origin appear to be among the
new promising tools for the maintenance of pets’ health. However, the host-derived microorganisms might be the most appropriate probiotic source. Therefore, more controlled trials are needed to characterise new and safe probiotic preparations with an impact on general health and well being as well as health maintenance in dogs and cats.

Optimization and evaluation of Flexicult® Vet for detection, identification and antimicrobial susceptibility testing of bacterial uropathogens in small animal veterinary practice.
Guardabassi L, Hedberg S, Jessen LR, Damborg P
BACKGROUND: Urinary tract infection (UTI) is a common reason for antimicrobial prescription in dogs and cats. The objective of this study was to optimize and evaluate a culture-based point-of-care test for detection, identification and antimicrobial susceptibility testing of bacterial uro-pathogens in veterinary practice. METHODS: Seventy-two urine samples from dogs and cats with suspected UTI presenting to seven veterinary facilities were used by clinical staff and an investigator to estimate sensitivity and specificity of Flexicult Vet A compared to laboratory reference standards for culture and susceptibility testing. Subsequently, the test was modified by inclusion of an oxacillin-containing compartment for detection of methicillin-resistant staphylococci. The performance of the modified product (Flexicult Vet B) for susceptibility testing was evaluated in vitro using a collection of 110 clinical isolates. RESULTS: Bacteriuria was reported by the laboratory in 25 (35 %) samples from the field study. The sensitivity and specificity of Flexicult Vet A for detection of bacteriuria were 83 and 100 %, respectively. Bacterial species were correctly identified in 53 and 100 % of the positive samples by clinical staff and the investigator, respectively. The susceptibility results were interpreted correctly by clinical staff for 70 % of the 94 drug-strain combinations. Higher percentages of correct interpretation were observed when the results were interpreted by the investigator in both the field (76 %) and the in vitro study (94 %). The most frequent errors were false resistance to β-lactams (ampicillin, amoxicillin-clavulanate and cefalotin) in Escherichia coli for Flexicult Vet A, and false amoxicillin-clavulanate resistance in E. coli and false ampicillin susceptibility in Staphylococcus pseudintermedius for Flexicult Vet B. The latter error can be prevented by categorizing staphylococcal strains growing in the oxacillin compartment as resistant to all β-lactams. CONCLUSIONS: Despite the shortcomings regarding species identification by clinical staff and β-lactam susceptibility testing of E. coli, Flexicult Vet B (commercial name Flexicult® Vet) is a time- and cost-effective point-of-care test to guide antimicrobial choice and facilitate implementation of antimicrobial use guidelines for treatment of UTIs in small animals, provided that clinical staff is adequately trained to interpret the results and that clinics meet minimum standards to operate in-house culture.

Relationship between the Presence of Bartonella Species and Bacterial Loads in Cats and Cat Fleas (Ctenocephalides felis) under Natural Conditions.
Gutiérrez R, Nachum-Biala Y, Harrus S
Cats are considered the main reservoir of three zoonotic Bartonella species: Bartonella henselae, Bartonella clarridgeiae, and Bartonella koehlerae. Cat fleas (Ctenocephalides felis) have been experimentally demonstrated to be a competent vector of B. henselae and have been proposed as the potential vector of the two other Bartonella species. Previous studies have reported a lack of association between the Bartonella species infection status (infected or uninfected) and/or bacteremia levels of cats and the infection status of the fleas they host. Nevertheless, to date, no study has compared the quantitative distributions of these bacteria in both cats and their fleas under natural conditions. Thus, the present study explored these relationships by identifying and quantifying the different Bartonella
species in both cats and their fleas. Therefore, EDTA-blood samples and fleas collected from stray cats were screened for Bartonella bacteria. Bacterial loads were quantified by high-resolution melt real-time quantitative PCR assays. The results indicated a moderate correlation between the Bartonella bacterial loads in the cats and their fleas when both were infected with the same Bartonella species. Moreover, a positive effect of the host infection status on the Bartonella bacterial loads of the fleas was observed. Conversely, the cat bacterial loads were not affected by the infection status of their fleas. Our results suggest that the Bartonella bacterial loads of fleas are positively affected by the presence of the bacteria in their feline host, probably by multiple acquisitions/accumulation and/or multiplication events.

**Risk Factors and Outcomes in Cats with Acquired Myasthenia Gravis (2001-2012).**
Hague DW, Humphries HD, Mitchell MA, Shelton GD

BACKGROUND: Acquired myasthenia gravis (MG) in cats most commonly causes generalized weakness without megaesophagus and is more often associated with a cranial mediastinal mass, compared to dogs. HYPOTHESIS/OBJECTIVES: To extend the clinical findings described in the report of 2000 on MG in cats (*J Am Vet Med Assoc* 215:55-57). ANIMALS: Two hundred and thirty-five cats with MG. METHODS: Retrospective case study to evaluate the long-term outcome and incidence of spontaneous remission in myasthenic cats. Information including signalment, clinical presentation, presence of and type of cranial mediastinal mass, treatment including surgical versus medical, survival time, and outcome including spontaneous remissions was collected and analyzed in cats diagnosed at the Comparative Neuromuscular Laboratory, University of California San Diego by detection of acetylcholine receptor antibody titers >0.3 nmol/L by immunoprecipitation radioimmunosassay. RESULTS: Acquired MG in cats is associated with a euthanasia rate of 58%. Abyssinian and Somali cats had an increased incidence of MG compared to mixed breed cats or cats of other breeds. A cranial mediastinal mass, most commonly thymoma, was observed in 52% of the cats, which is higher than in the previous report. Spontaneous remission is not a characteristic of MG in cats. CONCLUSIONS AND CLINICAL IMPORTANCE: Myasthenia gravis in cats is a chronic disease associated with a high incidence of a cranial mediastinal mass. Spontaneous remission is not common and clinicians should warn owners of the necessity for long-term treatment. The clinical outcome with a cranial mediastinal mass did not differ between surgical or medical treatment.

**Ultrasonographical, endoscopic and histological appearance of the caecum in clinically healthy cats.**
Hahn H, Freiche V, Baril A et al.

OBJECTIVES: The aim of the study was to describe the ultrasonographical and endoscopic appearance and characteristics of the caecum in asymptomatic cats, and to correlate these findings with histology. METHODS: Ex vivo ultrasonographical and histological evaluations of a fresh caecum were initially performed. Then, 20 asymptomatic cats, privately owned or originating from a reproductive colony, were included. All cats had an ultrasonographical examination of the ileoaecocolic junction, where the thickness of the caecal wall, ileocolic lymph nodes and the echogenicity of the local fat were assessed. They all underwent a colonoscopy with a macroscopic assessment of the mucosa and biopsies for histology. RESULTS: An ultrasonographical hypoechoic nodular inner layer, which corresponded to the coalescence of multiple lymphoid follicles originating from the submucosa and protruding in the mucosa on histology, was visible in all parts of the caecum. The combined mucosa and submucosa was measured ultrasonographically and defined as the follicular layer. Although all cats were asymptomatic, 3/19 cats showed mild caecal inflammation on histology. The most discriminant
ultrasonographical parameter in assessing this subclinical inflammation was the thickness of the follicular layer at the entrance of the caecum, with a cut-off value of 2.0 mm. All cats (20/20) showed some degree of macroscopic ‘dimpling’ of the caecal mucosa on endoscopy. CONCLUSIONS AND RELEVANCE: Lymphoid follicles in the caecal mucosa and submucosa constitute a unique follicular layer on ultrasound. In asymptomatic cats, a subtle non-clinically relevant inflammation may exist and this is correlated with an increased thickness of the follicular layer on ultrasound. On endoscopy, a dimpled aspect to the caecal mucosa is a normal finding in the asymptomatic cat.

Hammerle M, Horst C, Levine E et al.
*J Am Anim Hosp Assoc* (2015) **51**:205-221
The 2015 AAHA Canine and Feline Behavior Management Guidelines were developed to provide practitioners and staff with concise, evidence-based information to ensure that the basic behavioral needs of feline and canine patients are understood and met in every practice. Some facility in veterinary behavioral and veterinary behavioral medicine is essential in modern veterinary practice. More cats and dogs are affected by behavioral problems than any other condition. Behavioral problems result in patient suffering and relinquishment and adversely affect staff morale. These guidelines use a fully inclusive team approach to integrate basic behavioral management into everyday patient care using standardized behavioral assessments; create a low-fear and low-stress environment for patients, staff and owners; and create a cooperative relationship with owners and patients so that the best care can be delivered. The guidelines’ practical, systematic approach allows veterinary staff to understand normal behavior and recognize and intervene in common behavioral problems early in development. The guidelines emphasize that behavioral management is a core competency of any modern practice.

**Apparent nutrient digestibility of two raw diets in domestic kittens.**
Hamper BA, Kirk CA, Bartges JW
OBJECTIVES: The aim of the study was to evaluate overall dry matter, organic matter, crude protein, crude fat and gross energy digestibility of a feline commercial raw diet and a homemade raw diet compared with a canned heat-processed diet. METHODS: Six domestic shorthair kittens (20-28 weeks old) were fed three different diets in a Latin square crossover design. Diet A was a commercially available canned heat-processed diet. Diet B was a complete commercial prefrozen raw diet (commercial raw), and diet C was a raw diet supplement mixed with ground raw meat obtained locally (homemade raw). Both diets A and B were formulated to meet nutritional profile levels for cats at all life stages. Kittens were given specific diet amounts to maintain a 2-4% weight increase per week. Food was measured before and after feedings to determine the amount eaten, and all feces were collected, weighed and frozen prior to submission. Composite food samples and all feces were submitted to a national laboratory for proximate analysis of crude protein, crude fiber, ash, crude fat, moisture and caloric density. RESULTS: Significantly higher digestibility of dry matter (P <0.001), organic matter (P <0.001), crude protein (P <0.001) and gross energy (P <0.001) was seen in the raw diets compared with the heat-processed diets. This difference resulted in significantly less fecal matter (P <0.001) despite similar levels of intake, kcal ingested and evidence of no difference in fecal scores. CONCLUSIONS AND RELEVANCE: Higher dry matter, organic matter and protein digestibility was seen in two commercial raw diets compared with a heat-processed diet. Digestibility differences could have been due to variance in dietary protein, fat and carbohydrate concentrations between the diets, variance in dietary ingredients or quality, alterations in protein structure secondary to heat processing, as well as alterations in gastrointestinal flora. Future research examining digestibility in diets with the
same macronutrient proportions and ingredients, and mechanisms for any differences, is warranted.

**Effects of oral orbifloxacin on fecal coliforms in healthy cats: a pilot study.**
Harada K, Sasaki A, Shimizu T  
The study objective was to determine the effect of oral orbifloxacin (ORB) on antimicrobial susceptibility and composition of fecal coliforms in cats. Nine cats were randomized to two groups administered a daily oral dose of 2.5 and 5.0 mg ORB/kg for 7 days and a control group (three cats per group). Coliforms were isolated from stool samples and were tested for susceptibilities to ORB and 5 other drugs. ORB concentration in feces was measured using high-performance liquid chromatography (HPLC). The coliforms were undetectable after 2 days of ORB administration, and their number increased in most cats after termination of the administration. Furthermore, only isolates of Escherichia coli were detected in all cats before administration, and those of Citrobacter freundii were detected after termination of the administration. E. coli isolates exhibited high ORB susceptibility [Minimum inhibitory concentration (MIC), ≤0.125 µg/ml] or relatively low susceptibility (MIC, 1-2 µg/ml) with a single gyrA mutation. C. freundii isolates largely exhibited intermediate ORB susceptibility (MIC, 4 µg/ml), in addition to resistance to ampicillin and cefazolin, and harbored qnrB, but not a gyrA mutation. HPLC revealed that the peaks of mean concentration were 61.3 and 141.0 µg/g in groups receiving 2.5 and 5.0 mg/kg, respectively. Our findings suggest that oral ORB may alter the total counts and composition of fecal coliform, but is unlikely to yield highly fluoroquinolone-resistant mutants of E. coli and C. freundii in cats, possibly because of the high drug concentration in feces.

**Fibroblast Growth Factor 23: A New Dimension to Diseases of Calcium-Phosphorus Metabolism.**
Hardcastle MR, Dittmer KE  
Traditionally, control of phosphorus in the body has been considered secondary to the tighter control of calcium by parathyroid hormone and vitamin D. However, over the past decade, substantial advances have been made in understanding the control of phosphorus by the so-called phosphatonin system, the lynchpin of which is fibroblast growth factor 23 (FGF23). FGF23 binds to the klotho/FGFR1c receptor complex in renal tubular epithelial cells, leading to upregulation of Na/Pi cotransporters and subsequent excretion of phosphorus from the body. In addition, FGF23 inhibits parathyroid hormone and the renal 1α-hydroxylase enzyme, while it stimulates 24-hydroxylase, leading to decreased 1,25-dihydroxyvitamin D3. FGF23 is intimately involved in the pathogenesis of a number of diseases, particularly the hereditary hypophosphatemic rickets group and chronic kidney disease, and is a target for the development of new treatments in human medicine. Little work has been done on FGF23 or the other phosphatoninins in veterinary medicine, but increases in FGF23 are seen with chronic kidney disease in cats, and increased FGF23 expression has been found in soft tissue sarcomas in dogs.

**Feline injection-site sarcoma: ABCD guidelines on prevention and management.**
Hartmann K, Day MJ, Thiry E et al.  
OVERVIEW: In cats, the most serious of adverse effects following vaccination is the occurrence of invasive sarcomas (mostly fibrosarcomas): so-called ‘feline injection-site sarcomas’ (FISSS). These develop at sites of previous vaccination or injection. They have characteristics that are distinct from those of fibrosarcomas in other areas and behave more aggressively. The rate of metastasis ranges from 10-28%. PATHOGENESIS: The pathogenesis of these sarcomas is not yet definitively explained.
However, chronic inflammatory reactions are considered the trigger for subsequent malignant transformation. Injections of long-acting drugs (such as glucocorticoids, and others) have been associated with sarcoma formation. Adjuvanted vaccines induce intense local inflammation and seem therefore to be particularly linked to the development of FISS. The risk is lower for modified-live and recombinant vaccines, but no vaccine is risk-free. TREATMENT AND PREVENTION: Aggressive, radical excision is required to avoid tumour recurrence. The prognosis improves if additional radiotherapy and/or immunotherapy (such as recombinant feline IL-2) are used. For prevention, administration of any irritating substance should be avoided. Vaccination should be performed as often as necessary, but as infrequently as possible. Non-adjuvanted, modified-live or recombinant vaccines should be selected in preference to adjuvanted vaccines. Injections should be given at sites at which surgery would likely lead to a complete cure; the interscapular region should generally be avoided. Post-vaccination monitoring should be performed.

Abnormalities in Expression of Structural, Barrier and Differentiation Related Proteins, and Chondroitin Sulfate in Feline and Human Interstitial Cystitis.
Hauser PJ, VanGordon SB, Seavey J et al.
PURPOSE: We analyzed the urothelium of cats diagnosed with feline interstitial cystitis to determine whether abnormalities in protein expression patterns could be detected and whether the expression pattern was similar to that in patients with human interstitial cystitis/bladder pain syndrome. The proteins analyzed are involved in cell adhesion and barrier function, comprise the glycosaminoglycan layer or are differentiation markers. MATERIALS AND METHODS: Formalin fixed biopsies from 8 cats with feline interstitial cystitis and from 7 healthy control cats were labeled by immunohistochemistry and scored with a modified version of a system previously used for human samples. Cluster analysis was performed to investigate relationships between markers and samples. RESULTS: Of the feline interstitial cystitis bladders 89% showed abnormal protein expression and chondroitin sulfate patterns while only 27% of normal tissues showed slight abnormalities. Abnormalities were found in most feline interstitial cystitis samples, including biglycan in 87.5%, chondroitin sulfate, decorin, E-cadherin and keratin-20 in 100%, uroplakin in 50% and ZO-1 in 87.5%. In feline interstitial cystitis bladders about 75% of chondroitin sulfate, biglycan and decorin samples demonstrated absent luminal staining or no staining. Cluster analysis revealed that feline interstitial cystitis and normal samples could be clearly separated into 2 groups, showing that the urothelium of cats with feline interstitial cystitis is altered from normal urothelium. CONCLUSIONS: Feline interstitial cystitis produces changes in luminal glycosaminoglycan and several proteins similar to that in patients, suggesting some commonality in mechanism. Results support the use of feline interstitial cystitis as a model of human interstitial cystitis.

Potentiation of epidural lidocaine by co-administering tramadol by either intramuscular or epidural route in cats.
Hermeto LC, DeRossi R, Marques BC, Jardim PH
This study investigated the analgesic and systemic effects of intramuscular (IM) versus epidural (EP) administration of tramadol as an adjunct to EP injection of lidocaine in cats. Six healthy, domestic, shorthair female cats underwent general anesthesia. A prospective, randomized, crossover trial was then conducted with each cat receiving the following 3 treatments: EP injection of 2% lidocaine [LEP; 3.0 mg/kg body weight (BW)]; EP injection of a combination of lidocaine and 5% tramadol (LTEP; 3.0 and 2.0 mg/kg BW, respectively); or EP injection of lidocaine and IM injection of tramadol (LEPTIM;
3.0 and 2.0 mg/kg BW, respectively). Systemic effects, spread and duration of analgesia, behavior, and motor blockade were determined before treatment and at predetermined intervals afterwards. The duration of analgesia was 120 ± 31 min for LTEP, 71 ± 17 min for LEPTIM, and 53 ± 6 min for LEP (P < 0.05; mean ± SD). The cranial spread of analgesia obtained with LTEP was similar to that with LEP or LEPTIM, extending to dermatomic region T13-L1. Complete motor blockade was similar for the 3 treatments. It was concluded that tramadol produces similar side effects in cats after either EP or IM administration. Our findings indicate that EP and IM tramadol (2 mg/kg BW) with EP lidocaine produce satisfactory analgesia in cats. As an adjunct to lidocaine, EP tramadol provides a longer duration of analgesia than IM administration. The adverse effects produced by EP and IM administration of tramadol were not different. Further studies are needed to determine whether EP administration of tramadol could play a role in managing postoperative pain in cats when co-administered with lidocaine after painful surgical procedures. Abstract available from the publisher.

Dystocia in the cat evaluated using an insurance database.
Holst BS, Axnér E, Öhlund M, Möller L, Egenvall A
OBJECTIVES: The aim of this study was to describe the incidence of feline dystocia with respect to breed. METHODS: The data used were reimbursed claims for veterinary care insurance and/or life insurance claims in cats registered in a Swedish insurance database from 1999-2006. RESULTS: The incidence rates for dystocia were about 22 cats per 10,000 cat years at risk, 67 per 10,000 for purebred cats and seven per 10,000 for domestic shorthair cats. The median age was 2.5 years. A significant effect of breed was seen. An incidence rate ratio (IRR) that was significantly higher compared with other purebred cats was seen in the British Shorthair (IRR 2.5), the Oriental group (IRR 2.2), Birman (IRR 1.7), Ragdoll (IRR 1.5) and the Abyssinian group (IRR 1.5). A significantly lower IRR was seen in the Norwegian Forest Cat (IRR 0.38), the Maine Coon (IRR 0.48), the Persian/Exotic group (IRR 0.49) and the Cornish Rex (IRR 0.50). No common factor among the high-risk breeds explained their high risk for dystocia. There was no effect of location; that is, the incidence rate did not differ depending on whether the cat lived in an urban or rural area. Caesarean section was performed in 56% of the cats with dystocia, and the case fatality was 2%. CONCLUSIONS AND RELEVANCE: The incidence rate for dystocia was of a similar magnitude in purebred cats as in dogs. The IRR varied significantly among breeds, and the main cause for dystocia should be identified separately for each breed. A selection for easy parturitions in breeding programmes is suggested.

Matrix vaccination guidelines: 2015 ABCD recommendations for indoor/outdoor cats, rescue shelter cats and breeding catteries.
Hosie MJ, Addie DD, Boucraut-Baralon C et al.
OVERVIEW: In 2013, the ABCD published ‘Matrix vaccination guidelines: ABCD recommendations for indoor/outdoor cats, rescue shelter cats and breeding catteries’ in a Special Issue of the Journal of Feline Medicine and Surgery (Volume 15, Issue 7, pages 540-544). The ABCD’s vaccination recommendations were presented in tabulated form, taking into account that there is no universal vaccination protocol for all cats. To support the veterinarian’s decision making, recommendations for four lifestyles were made: for cats with outdoors access, cats kept solely indoors, rescue shelter cats and cats in breeding catteries. This update article follows the same approach, offering current and, where relevant, expanded recommendations.
Auditory feedback modulates development of kitten vocalizations.

Hubka P, Konerding W, Kral A


Effects of hearing loss on vocal behavior are species-specific. To study the impact of auditory feedback on feline vocal behavior, vocalizations of normal-hearing, hearing-impaired (white) and congenitally deaf (white) cats were analyzed at around weaning age. Eleven animals were placed in a soundproof booth for 30 min at different ages, from the first to the beginning of the fourth postnatal month, every 2 weeks of life. In total, 13,874 vocalizations were analyzed using an automated procedure. Firstly, vocalizations were detected and segmented, with voiced and unvoiced vocalizations being differentiated. The voiced isolation calls (‘meow’) were further analyzed. These vocalizations showed developmental changes affecting several parameters in hearing controls, whereas the developmental sequence was delayed in congenitally deaf cats. In hearing-impaired and deaf animals, we observed differences both in vocal behavior (loudness and duration) and in the calls’ acoustic structure (fundamental frequency and higher harmonics). The fundamental frequency decreased with age in all groups, most likely due to maturation of the vocal apparatus. In deaf cats, however, other aspects of the acoustic structure of the vocalizations did not fully mature. The harmonic ratio (i.e., frequency of first harmonic divided by fundamental frequency) was higher and more variable in deaf cats than in the other study groups. Auditory feedback thus affects the acoustic structure of vocalizations and their ontogenetic development. The study suggests that both the vocal apparatus and its neuronal motor control are subject to maturational processes, whereas the latter is additionally dependent on auditory feedback in cats.

Effect of Feeding an Iodine-Restricted Diet in Cats with Spontaneous Hyperthyroidism.

Hui TY, Bruyette DS, Moore GE, Scott-Moncrieff JC


BACKGROUND: Exclusive feeding of an iodine-restricted diet has been proposed as a method for controlling clinical manifestations of hyperthyroidism in hyperthyroid cats. OBJECTIVES: To determine the effect of feeding an iodine-restricted diet on TT4 concentrations and clinical signs in cats with spontaneous hyperthyroidism. ANIMALS: Forty-nine client-owned cats with spontaneous hyperthyroidism. METHODS: Retrospective case series. Hyperthyroid cats were exclusively fed a commercially available iodine-restricted diet. Clinical response was assessed by change in weight and heart rate and serum TT4, blood urea nitrogen (BUN), and creatinine concentrations at various times during dietary management (21-60 days, 60-180 days). RESULTS: Serum TT4 normalized in 20/48 cats (42%) and 39/47 cats (83%) at 21-60 days and 61-180 days, respectively. Cats in which the TT4 concentrations were still above reference range at 21-60 days had a significantly higher starting TT4 than those that normalized their TT4 levels during the same time period (P =.038). Body weight did not significantly increase (P =.34) nor heart rate decrease (P =.64) during the study. There was a significant decrease in serum creatinine (P =.028). Cats in the low reference range for serum TT4 concentrations did not have a significant increase in body weight (P =.41) nor creatinine (P =.54) when compared to those with high reference range. CONCLUSIONS AND CLINICAL IMPORTANCE: Restricted-iodine diets were effective at maintaining serum TT4 concentrations within reference ranges for a majority of cats with spontaneous hyperthyroidism over 1 year, although not all clinical signs of hyperthyroidism improved.

An analysis of the relative frequencies of reported adverse events associated with NSAID administration in dogs and cats in the United Kingdom.

Hunt JR, Dean RS, Davis GN, Murrell JC
This study aimed to analyse UK pharmacovigilance data to quantify adverse events (AEs) associated with the non-steroidal anti-inflammatory drug (NSAID) molecules found in veterinary medicines authorised for use in dogs and cats. It was hypothesised that the frequency of AEs would be lower when associated with cyclo-oxygenase-2 selective (coxib), compared to non-selective (non-coxib) NSAIDs. The UK Veterinary Medicines Directorate (VMD) supplied frequencies of AEs derived from Periodic Safety Update Reports subdivided by formulation and species for each NSAID molecule. Frequencies of AEs were similar between species. The five most reported AEs were emesis, death, anorexia, lethargy, and diarrhoea. Reported frequency of emesis, renal insufficiency and death was higher with injectable compared to oral NSAIDs (P = 0.043). Reported frequency of emesis, lethargy and death was higher with coxib, compared to non-coxib NSAIDs (P = 0.029). Median (range) interval since authorisation was shorter for coxibs at 5 (2.5-9) years compared to non-coxibs at 15 (12-25) years. A negative correlation between time elapsed since authorisation and the frequency of AEs was identified (rs = -0.11 to -0.94). Higher frequency of reported AEs with injectable NSAIDs may be related to perioperative administration. The AE frequency associated with coxib and non-coxib NSAIDs may be confounded by changes in reporting habits over time. This study highlights the value of interrogating passive surveillance data to identify low frequency AEs and the need to facilitate improvement in recording and collecting AEs in small animal practice.

Hutton JE, Steffey MA, Runge JJ, McClaran JK, Silverman SJ, Kass PH
OBJECTIVE: To characterize the clinical features and outcome of cats treated for patent ductus arteriosus (PDA) with attenuation (extravascular or intravascular) versus medical treatment only.
DESIGN: Retrospective case series. ANIMALS: 28 client-owned cats with congenital PDA.
PROCEDURES: Medical records for cats with PDA diagnosed by means of echocardiography were reviewed. Data retrieved included signalment; history; clinical signs; results of physical examination, ECG, echocardiography, and thoracic radiography; response to medical management if attempted; type of attenuation procedure if attempted (surgical or intravascular); procedural details; intraoperative and postoperative (≤ 2 weeks) complications; and long-term (> 2 weeks) complications. Follow-up was obtained from medical records and via telephone interviews. RESULTS: All 28 cats were referred for evaluation of a cardiac murmur, but 17 of 26 (65%) for which initial clinical signs were available did not have overt signs at initial evaluation. Multiple congenital cardiac defects were identified in 6 of 23 (26%) cats. Seventeen of 28 (65%) cats were documented as treated with 1 or more vascular attenuation procedures; vascular attenuation was not attempted in 11 cats receiving an angiotensin-converting enzyme inhibitor or loop diuretic (n = 2) or no medical treatment (9). Surgical ligation was successful in 11 of 15 cats, and coil embolization was successful in 2 cats. Procedural or postoperative complications included death (n = 2), left-sided laryngeal paralysis (2), voice change (1), fever (1), hemorrhage (4), and chylothorax (1). Long-term follow-up was available for 16 of 28 (57%) cats. Three of 4 cats that did not undergo surgical attenuation died of cardiac-related disease. CONCLUSIONS AND CLINICAL RELEVANCE: Results suggested that PDA occurs rarely in cats, and clinical signs and diagnostic findings were consistent with those previously reported for dogs. Surgical versus nonsurgical treatment did not result in a significant difference in life expectancy in this small cohort. Evaluation of laryngeal function after surgical ligation is recommended. Further study of the outcome associated with various treatment options in a larger population of patients is recommended.
Antimicrobial resistance and virulence traits in Enterococcus strains isolated from dogs and cats.
Iseppi R, Messi P, Anacarso I et al.
New Microbiol (2015) 38:369-378
We investigated presence and prevalence of antibiotic-resistances and other biological characters in enterococci isolated from faeces of healthy dogs and cats because these microorganisms represent important human and veterinary pathogens/opportunists, and a significant burden for healthcare systems. In all samples (n=115) we detected enterococci, with a predominance of Enterococcus faecium (42; 36.5%) and Enterococcus faecalis (36; 31.3%) species, endowed with virulence traits and multidrug-resistance. The two predominant resistance patterns (erythromycin, tetracycline) were examined by polymerase chain reaction for tet anderm genes. Only tetM for tetracycline, andermA andermB for erythromycin were detected. PCR for gelatinase gene (gelE) was positive in 62.6% of isolates, but only 26.1% produce gelatinase suggesting the existence of silent genes. erfAfs and erfAfms genes were found in E. faecalis and E. faecium respectively. 89.6% of isolates produced bacteriocin-like substances with a prevailing action against Listeria genus and, among these, 33.9% were positive for the bacteriocin structural genes entA, entL50 or entP. According to our study, pet animals can be considered a reservoir of potentially pathogenic enterococci and we cannot exclude that those microorganisms may be responsible for opportunistic infections in high-risk pet owners.

Prevalence of intestinal parasites in breeding cattery cats in Japan.
Ito Y, Itoh N, Kimura Y, Kanai K
OBJECTIVES: To address the lack of up-to-date published data, the present study assessed the prevalence of intestinal parasites in breeding catteries in Japan. METHODS: Fresh faecal samples were randomly collected from 342 cats (aged 1 month to 12 years) in seven breeding catteries in Japan, located in prefectures of Nagano (n = 2), Saitama (n = 1), Aichi (n = 2), Gifu (n = 1) and Miyagi (n = 1), on a single occasion. The samples were tested for the presence of Giardia species copro-antigen using a commercially available enzyme-linked immunosorbent assay kit. Other intestinal parasites were identified microscopically using the formalin-ethyl acetate sedimentation technique. RESULTS: The total prevalence of intestinal parasites was 20.8%; only two genera of protozoa (Giardia species: 18.7% andCystoisospora species: 5.0%) were detected. Co-infections of both protozoans were recorded in 2.9% of cats. In contrast, no helminths were detected. The presence of total infection, Giardia species, Cystoisospora species and multiple infections in cats <1 year old were significantly more prevalent than in cats ≥1 year old. There were no significant differences among faecal conditions with or without intestinal parasites. Giardia species infection was present in samples from all breeding catteries, except for one facility. Cystoisospora species and co-infections were shown in four and two breeding catteries, respectively. The prevalences of intestinal parasites were markedly variable among the breeding catteries. CONCLUSIONS AND RELEVANCE: The present study demonstrates the significance of Giardia species and Cystoisospora species infections in breeding cattery cats. Additionally, it is suggested that environmental contamination is the most important factor that influences the prevalence of protozoal infections among breeding catteries.

Relationship of glomerular filtration rate based on serum iodixanol clearance to IRIS staging in cats with chronic kidney disease.
Iwama R, Sato T, Katayama M et al.
We examined the correlation between the glomerular filtration rate (GFR) estimated from an equation based on the serum iodixanol clearance technique and International Renal Interest Society (IRIS) stages
of chronic kidney disease (CKD) in cats. The equation included the injection dose, sampling time, serum concentration and estimated volume of distribution (Vd) of the isotonic, nonionic, contrast medium ioxanol as a test tracer. The percent changes in the median basal GFR values calculated from the equation in CKD cats resembled those of IRIS stages 1-3. These data validate the association between the GFR derived from the simplified equation and IRIS stages based on the serum creatinine concentration in cats with CKD. They describe the GFR ranges determined using single-sample ioxanol clearance for healthy cats and cats with various IRIS stages of CKD.

Evidence for seasonal reproduction in UK domestic cats.
Jennett AL, Jennett NM, Hopping J, Yates D
OBJECTIVES: To analyse a large body of data obtained by the Royal Society for the Prevention of Cruelty to Animals (RSPCA) Greater Manchester Animal Hospital on the breeding pattern of owned domestic cats in the UK, and to provide clear statistical evidence of whether seasonal variation remains present in temperate climates. METHODS: The total number of cats spayed and the number of cats found to be pregnant were recorded on a monthly basis from December 2005 to July 2014 by the RSPCA Greater Manchester Animal Hospital. The percentage of cats found to be pregnant was calculated for each month and the 8.5 years of data were binned into calendar months. The mean and SD of the monthly pregnancy rate was calculated for each calendar month bin, as was the difference between the mean percentage of detected pregnancies and the global mean. The Z score for each month’s difference was then calculated. RESULTS: Data were available for 5414 cats neutered during the 8.5 consecutive years of this study. A global average of 8.9% of cats spayed were found to be pregnant. The mean calendar month pregnancy rate exhibited a very significant variation, with the highest positive deviation being in April (Z score +2.9) and the highest negative deviation being in November/December (Z score -4.5). When aggregated into 3 month averages, an extremely significant difference between ‘spring’ and ‘winter’ months of >7 SE (P <0.01) was found. CONCLUSIONS AND RELEVANCE: This study provides clear statistical evidence, from a large data set, that seasonal breeding patterns are still present under UK temperate conditions. We discuss the impact that this has on charity rescue shelters and propose that a campaign targeted at clients of animal welfare charities encouraging autumn neutering will be the most cost-effective method of cat population control, and aid the relief of demand on welfare charity resources.

Effect of active immunization against GnRH-I on the reproductive function in cat.
Jiang S, Hong M, Su S et al.
This study was designed to explore the effect of active immunization against maltose binding protein- gonadotropin releasing hormone I hexamer (MBP-GnRH-I6) on the reproductive function in cats. Each immunized cat was administered twice intramuscularly in the neck at 16 and 20 weeks old. The concentrations of the testosterone and estradiol and the level of anti-GnRH-I antibody in the serum were measured by radioimmunoassay and ELISA, respectively. The results showed that the weight and size of testicles and ovaries, and the concentrations of serum testosterone and estradiol in the immunized animals were lower than those of the control cats (P <0.05), but that the levels of anti-GnRH-I antibody were significant higher compared to control animals (P < 0.05). Testicular tissues from the immunized male cats showed that seminiferous tubules were depauperate with the lumen relatively empty and that the differentiation of spermatogonia was not obvious. Tissues from the immunized female cats showed that the ovaries had many primordial follicles and primary follicles, but no secondary follicle was observed. These results showed active immunization against MBP-GnRH-I6
could make the gonads atrophy and reduce the concentrations of gonadal hormones, which suggested that MBP-GnRH-I6 was a very effective immunogen in the cat.

**CLINICAL AND MAGNETIC RESONANCE IMAGING FEATURES OF INFLAMMATORY VERSUS NEOPLASTIC MEDIAL RETROPHARYNGEAL LYMPH NODE MASS LESIONS IN DOGS AND CATS.**

Johnson PJ, Elders R, Pey P, Dennis R  
Medial retropharyngeal lymph node (MRLN) mass lesions are a common cause of cranial cervical masses in dogs and cats, and are predominantly due to metastatic neoplasia, primary neoplasia, or inflammatory lymphadenitis. The purpose of this retrospective cross-sectional study was to test the hypothesis that clinical and magnetic resonance imaging (MRI) characteristics for dogs and cats with MRLN mass lesions would differ for inflammatory vs. neoplastic etiologies. Dogs and cats with MRLN mass lesions that had undergone MRI and had a confirmed cytological or histopathological diagnosis were recruited from medical record archives. Clinical findings were recorded by one observer and MRI characteristics were recorded by two other observers who were unaware of clinical findings. A total of 31 patients were sampled, with 15 in the inflammatory lymphadenitis group and 16 in the neoplasia group. Patients with inflammatory lymphadenitis were more likely to be younger and present with lethargy (P = 0.001), pyrexia (P = 0.000), and neck pain (P = 0.006). Patients with inflammatory lymphadenitis were also more likely to have a leukocytosis (P = 0.02) and segmental neutrophilia (P = 0.001). Inflammatory masses were more likely to have moderate or marked MRI perinodal contrast enhancement (P = 0.021) and local muscle contrast enhancement (P = 0.03) whereas the neoplastic masses were more likely to have greater MRI width (P = 0.002) and height (P = 0.009). In conclusion, findings indicated that some clinical and MRI characteristics differed for dogs and cats with inflammatory vs. neoplastic medial retropharyngeal lymph node masses. Although histopathological or cytological diagnosis remains necessary for confirmation, these findings may help with the ranking of differential diagnoses of future cases.

**No surgery required: the future of feline sterilization: An overview of the Michelson Prize & Grants in Reproductive Biology.**  
Johnston S, Rhodes L  
OVERVIEW: For many years, researchers have been studying reproduction of cats and dogs, including approaches to non-surgical sterilization, but scant funding has been available for this work. Recognizing the need to fund research and to attract researchers from the biomedical community to apply their expertise to this area, the Michelson Prize & Grants (MPG) in Reproductive Biology program was founded. Since 2009, it has funded 34 research projects in seven countries toward discovery of a safe single-administration lifetime non-surgical sterilant in male and female cats and dogs. GOAL: The goal of the MPG program is the reduction or elimination of the approximately 2.7 million deaths of healthy shelter cats and dogs in the US every year. The successful product is expected to be a single-dose injectable product approved by the US Food and Drug Administration as a veterinary prescription item. The most optimistic prediction is that such a product will reach the hands of practicing veterinarians within the next decade. AREAS OF RESEARCH: Active research is in progress using approaches such as immunocontraception with a single-administration vaccine against gonadotropin releasing hormone (GnRH). Long-term therapy with GnRH agonists such as deslorelin administered in controlled-release devices is also being studied. Other scientists are targeting cells in the brain or gonads with cytotoxins, such as are used in cancer chemotherapy. Gene therapy expressing
proteins that suppress reproduction and gene silencing of peptides essential to reproduction are further avenues of research. Findings are available at www.michelsonprizeandgrants.org/michelson-grants/research-findings.

**Intravenous lipid emulsion therapy in 20 cats accidentally overdosed with ivermectin.**


**OBJECTIVE:** To describe the outcome of 20 cats treated with intravenous lipid emulsion (IVLE) after an accidental parenteral ivermectin overdose. **CASE SERIES SUMMARY:** Twenty adult cats presented after receiving a 4 mg/kg accidental subcutaneous overdose of ivermectin. After admission, two IVLE treatments were initiated in asymptomatic cats: a single bolus (1.5 mL/kg; n = 16) versus a bolus followed by a 30-minute constant rate infusion (0.25 mL/kg/min; n = 4). Six out of the 16 cats that received only the single bolus developed clinical signs of ivermectin intoxication. Based on the severity of the clinical signs and their duration (approximately 48 hours), these 6 cats were retrospectively considered either moderately (n = 3) or severely (n = 3) intoxicated by ivermectin. Cats with a low body condition score (BCS) had more severe signs of ivermectin toxicity. Additional IVLE was administered until clinical resolution was complete. Median (min to max) cumulative dose of IVLE per cat was 4.5 (3.0-4.5) mL/kg for 36 (12-36) hours and 19.5 (7.5-37.5) mL/kg for 96 (72-168) hours for moderately and severely intoxicated cats, respectively. **NEW OR UNIQUE INFORMATION PROVIDED:** Our series describes the treatment of accidental ivermectin parenteral overdose in 20 cats with early initiation of IVLE therapy. An early bolus followed by a 30-minute constant rate infusion of IVLE appeared to mitigate the signs of ivermectin toxicosis in cats compared to a single treatment bolus. Our observations also suggest that cats with a low BCS given only a bolus of IVLE treatment were more likely to develop signs of ivermectin intoxication and require a greater amount of IVLE for the resolution of clinical signs. Based on our observations, BCS appears to influence the severity of ivermectin toxicity with a low BCS being associated with more severe signs of ivermectin toxicity.

**Serum cobalamin concentrations and small intestinal ultrasound changes in 75 cats with clinical signs of gastrointestinal disease: a retrospective study.**

Jugan MC, August JR  

**OBJECTIVES:** To evaluate ultrasonographic changes in the small intestine of cats with clinical signs of gastrointestinal disease and low or low-normal serum cobalamin concentrations. **METHODS:** Records for client-owned cats presenting to the small animal hospital with signs of gastrointestinal disease and in which serum cobalamin concentrations were measured from 2000 to 2013 were reviewed. Inclusion criteria were cobalamin concentrations <500 ng/l, abdominal ultrasound within 1 month of cobalamin testing and definitive diagnosis. **RESULTS:** Of 751 serum cobalamin measurements, hypocobalaminemia or low-normal cobalamin was identified in 270 cats, abdominal ultrasound was performed in 207 of those cats and a diagnosis was available for 75 of them. Small intestinal ultrasound changes were detected in 49/75 (65%) cats. Abnormalities included thickening, loss of wall layer definition, echogenicity alterations and discrete masses. Serum cobalamin concentrations <500 ng/l were observed with diagnoses of inflammatory disease, neoplasia, infectious disease and normal histopathology. Cobalamin concentration was significantly lower in cats with lymphoma or inflammatory bowel disease compared with other gastrointestinal neoplasia (P = 0.031). No difference was found between cobalamin concentration and the presence of ultrasound abnormalities, specific ultrasound changes or albumin concentration. **CONCLUSIONS AND RELEVANCE:** One-third of symptomatic cats with hypocobalaminemia or low-normal cobalamin
concentrations may have an ultrasonographically normal small intestine. For the majority of cats in this study, histopathologic abnormalities were observed in the small intestine, regardless of ultrasound changes. These findings suggest gastrointestinal disease should not be excluded based on low-normal cobalamin concentrations, even with a concurrent normal ultrasound examination. Additional studies are needed in cats with low-normal serum cobalamin concentrations, as a definitive diagnosis was not pursued consistently in those cats. However, data from this study suggest that careful monitoring, histopathologic evaluation and future cobalamin supplementation may be warranted.

Superficial keratectomy for chronic corneal ulcers refractory to medical treatment in 36 cats.

Jégou JP, Tromeur F

OBJECTIVE: To review the outcome of a case series in which superficial keratectomy was used as a treatment for chronic corneal ulceration. STUDY DESIGN: Retrospective study ANIMALS STUDIED: Thirty-six cats (41 eyes) with ulcerative keratitis. RESULTS: Forty-one superficial lamellar keratectomies were performed. Thirty-two and a half percent (32.5%) of the ulcers were resolved within 2 weeks and 85% within 4 weeks after surgery. Nonhealing surgical cases after 4 weeks (13% of the eyes) resolved with prolonged postoperative medical treatment. The mean time to healing was 22.1 days (range 7-74 days). At the end of the follow-up period (mean 8.9 months, range 1-36 months), 82.5% of eyes had regained very good to excellent corneal transparency. Nine cases relapsed (21.9% of the eyes) after surgery. Of those cases, the cornea of eight cats healed after undergoing medical treatment, and one underwent a second limited superficial lamellar keratectomy. CONCLUSION: Superficial keratectomy in cats is an effective treatment to resolve chronic ulcerative keratitis refractory to medical treatment.

Evaluation of four portable blood glucose meters in diabetic and non-diabetic dogs and cats.

Kang MH, Kim DH, Jeong IS, Choi GC, Park HM
Vet Q (2015) 1-8

BACKGROUND: Monitoring of an animal’s blood glucose concentration is critical for diagnostic and therapeutic decisions. Over the past few decades, portable blood glucose meters (PBGMs) have been used to monitor blood glucose concentrations in animals. Recently, new and improved PBGMs have been made available on the market. OBJECTIVE: The purpose of this study was to evaluate four PBGMs for use in dogs and cats. ANIMALS AND METHODS: A total of 155 venous blood samples of dogs and 85 venous blood samples of cats were tested using four PBGMs. Control solutions from manufacturers were used to determine the precision of each meter. The coefficient of variation was calculated to determine precision during a set of replicates. Pearson’s correlation analysis, Passing-Bablok regression, and Bland-Altman analysis were used to determine the accuracy of four PBGMs against the hexokinase reference method. Error grid analysis was used to evaluate clinical relevance. RESULTS: All PBGMs, except CERA-PET®, were clinically acceptable for monitoring blood glucose concentrations; AlphaTrak® and VetMate® appeared to be the most accurate ones, demonstrating that to use PBGMs for glucose monitoring, it is important to understand the strengths or limitations of each meter. The difference in results between the PBGMs and the reference method increased at high glucose concentration ranges, which were also affected by the hematocrit. CONCLUSIONS: Although readings of the PBGMs and the reference method varied across glycemic ranges (low, normal, and high glucose concentrations), most PBGMs were clinically acceptable for monitoring blood glucose concentrations in dogs and cats.
Overweight and the feline gut microbiome - a pilot study.
Kieler IN, Mølbak L, Hansen LL, Hermann-Bank ML, Bjornvad CR
*J Anim Physiol Anim Nutr (Berl)* (2015)

Compared with lean humans, the gut microbiota is altered in the obese. Whether these changes are due to an obesogenic diet, and whether the microbiota contributes to adiposity is currently discussed. In the cat population, where obesity is also prevalent, gut microbiome changes associated with obesity have not been studied. Consequently, the aim of this study was to compare the gut microbiota of lean cats, with that of overweight and obese cats. Seventy-seven rescue-shelter cats housed for ≥3 consecutive days were included in the study. Faecal samples were obtained by rectal swab and, when available, by a paired litter box sample. Body condition was assessed using a 9-point scoring system. DNA was extracted, and the 16S rRNA gene was amplified with a high-throughput quantitative real-time PCR chip. Overweight and obese cats had a significantly different gut microbiota compared to lean cats (p < 0.05), but this finding could not be linked to differences in specific bacterial groups. The rectal samples obtained higher DNA concentration than litter box samples (p < 0.0001). In conclusion, overweight and obese cats seem to have an altered gut microbiome as compared to lean cats.

Assessment of the accuracy and precision of the i-Smart 30 VET Electrolyte Analyzer in dogs, cats, cattle and pigs.
Kim HJ, Lee HR, Park YS, Kyung SG, Do SH

BACKGROUND: Performance evaluation of point-of-care (POC) electrolyte analyzers is essential for determining their precision and accuracy in clinical practice. OBJECTIVE: The purpose of this study was to validate the i-Smart 30 VET Electrolyte Analyzer for canine, feline, bovine, and porcine samples in comparison with the ion-selective electrolyte analyzer Roche 9180 electrolyte analyzer. METHODS: A total of 400 heparinized whole blood samples were collected and analyzed by both instruments for sodium, potassium, and chloride concentrations. Within-run, between-day, and total imprecision were evaluated. Statistical analyses included tests for correlation, regression, bias, and total error. RESULTS: The coefficients of variation (CV) of both within-run and between-day imprecisions in the i-Smart 30 VET ranged from 0.4-1.6%. In addition, total CV (0.3-1.7%) and total error (0.7-3.7%) of the i-Smart 30 VET were acceptable according to the ASVCP guidelines (< 5%). The correlation between the i-Smart 30 VET and the Roche 9180 was excellent (r > .98). There was no proportional error according to the regression (slope ranges 0.92-1.00, 95% CI includes 1.00), but a constant error was detected for sodium concentration in dogs (interval = 0.5), cattle (interval = 3.0), and pigs (interval = 4.0), and for chloride concentration in cats (interval = 1.0). Most of the bias was within 95% CI, and the total error range (0.8-3.5%) was acceptable according to ASVCP guidelines. CONCLUSION: The i-Smart 30 VET Electrolyte Analyzer provides precise and accurate measurements of sodium, potassium, and chloride concentrations in whole blood samples from dogs, cats, cattle, and pigs.

Rapid detection of feline morbillivirus by a reverse transcription loop-mediated isothermal amplification.
Koide R, Sakaguchi S, Ogawa M, Miyazawa T

Feline morbillivirus (FmoPV) is an emerging virus in domestic cats and considered to be one of the causes of chronic renal failure in cats. In this study, we established a reverse transcription loop-mediated isothermal amplification (RT-LAMP) assay for the detection of FmoPV. The results indicated that the detection limit of the assay was 10 50% tissue culture infective dose (TCID50)/ml in the
original sample, and sensitivity of the assay was calculated as 0.12 TCID50 per one RT-LAMP reaction. We also detected FmoPV in clinical urine samples from cats infected with FmoPV. The FmoPV RT-LAMP assay is rapid, simple and highly specific for the detection of FmoPV, and thus, it would be a reliable detection method for FmoPV.

Outcome and Prognostic Indicators in Cats Undergoing Splenectomy for Splenic Mast Cell Tumors.
Kraus KA, Clifford CA, Davis GJ, Kiefer KM, Drobatz KJ
*J Am Anim Hosp Assoc* (2015) **51**:231-238
This was a multi-institutional retrospective study evaluating the outcome and clinical parameters associated with the postoperative prognosis of 36 cats with splenic mast cell tumors treated with splenectomy. Clinical parameters reviewed included signalment, clinical history, results of staging tests, surgical variables, administration of blood products, presence of metastasis, postoperative complications, administration of chemotherapy postoperatively, chemotherapy protocol, and response to chemotherapy. Overall median survival time was 390 days (range, 2-1737 days). Administration of a blood product (P <.0001), metastasis to a regional lymph node (P =.022), and evidence of either concurrent or historical neoplasia (P =.037) were negatively associated with survival. Response to chemotherapy (P =.0008) was associated with an improved median survival time. Larger-scale prospective studies evaluating different chemotherapy protocols are required to elucidate the discrepancy between lack of survival benefit with administration of chemotherapy and improvement in survival time with positive response to chemotherapy.

Comparison of foods with differing nutritional profiles for long-term management of acute nonobstructive idiopathic cystitis in cats.
Kruger JM, Lulich JP, MacLeay J et al.
OBJECTIVE: To evaluate the effect of nutrition on recurrent clinical signs of lower urinary tract (LUT) disease in cats with idiopathic cystitis. DESIGN: Randomized, controlled, masked clinical trial. ANIMALS: 31 cats with acute nonobstructive idiopathic cystitis. PROCEDURES: Cats were assigned to receive 1 of 2 foods (a cystitis prevention or control food) that differed in mineral (calcium, phosphorus, and magnesium), antioxidant, and fatty acid profiles. Owners documented LUT signs daily for up to 1 year. The primary endpoint was the number of recurrent episodes in which a cat had multiple (≥ 2 concurrent) LUT signs within a day (defined as multiple-sign day). Consecutive days in which a cat had multiple LUT signs were considered as a single episode. RESULTS: 4 cats fed prevention food and 2 cats fed control food were excluded from analysis because of noncompliance, gastrointestinal signs, food refusal, or owner voluntary withdrawal. The proportion of cats fed prevention food that had ≥ 1 recurrent episode of multiple-sign days (4/11) was not significantly lower than that of cats fed control food (9/14). However, cats fed prevention food had significantly lower mean incidence rates for recurrent episodes of multiple-sign days (0.7 episodes/1,000 cat-days) and episodes of hematuria (0.3 episodes/1,000 cat-days), dysuria (0.2 episodes/1,000 cat-days), and stranguria (0.2 episodes/1,000 cat-days) as single LUT signs, compared with cats fed control food (5.4, 3.4, 3.1, and 3.8 episodes/1,000 cat-days, respectively). Significantly fewer cats fed prevention food required analgesics (4/11), compared with cats fed control food (12/14). CONCLUSIONS AND CLINICAL RELEVANCE: Foods with differing nutritional profiles appeared to impact mean incidence rates of recurrent feline idiopathic cystitis-associated signs.
Chemical Compatibility and Safety of Imidacloprid/Flumethrin Collar (Seresto®) Concomitantly Used with Imidacloprid/Moxidectin (Advocate®, Advantage® Multi) and Emodepside/Praziquantel (Profender®) Spot-on Formulations.

Krüdewagen EM, Remer C, Deuster K et al. 

Safety of concomitant use of veterinary products is of clinical interest. A series of studies was performed to evaluate the chemical compatibility and short term dermal and systemic safety of an imidacloprid/flumethrin collar (Seresto®/ Foresto®, Bayer) used concomitantly with spot-on or tablet formulations.Chemical compatibility was evaluated in-vitro (study reference A) on collar pieces, followed by two small, non-controlled clinical studies (study reference B) in both, cats and dogs. The studies showed, that certain solvents affected the collar in-vitro, but not in their marketed formulations.Dermal and systemic safety of different spot-on or tablet formulations was first evaluated in a small, non-controlled clinical study (study reference C) in cats and dogs, via clinical observations only, followed by controlled clinical safety studies of concomitant use with imidacloprid/ moxidectin (Advocate®/ Advantage® Multi, Bayer) in dogs and cats (study reference D) and emodepside/ praziquantel (Profender®, Bayer) in cats (study reference E), assessing safety aspects by clinical observations and statistical analyses of hematology and clinical chemistry parameters compared to baseline values and between treated and control groups.Dermal safety findings over all clinical studies (study references B to E) matched those already described for the respective products and included transient cosmetic changes (oily hair and crystal formation) at the site of spot-on application and broken hair, transient alopecia and skin alterations at the site of collar application. There were no indications of these findings aggravating under the conditions of concurrent use. There were no systemic safety findings of clinical significance in any of the clinical safety studies (study reference C to E). Assessment of blood parameters revealed some deviations from baseline levels and from the reference range in dogs as well as in cats, but no clinical relevance could be deduced. Hematology and clinical chemistry results confirmed the safety of the concomitant treatment. It is concluded that Seresto® is chemically compatible with solvents used in major spot-on formulations on the market and is dermally and systemically safe for adult dogs and cats when used concomitantly with Advocate® and Profender® spot-on formulations.

Alternative methods for feline fertility control: Use of melatonin to suppress reproduction.

Kutzler MA 

PRACTICAL RELEVANCE: Reversible contraceptives are highly desired by purebred cat breeders for managing estrous cycles and by scientists managing assisted reproduction programs. A variety of alternative medicine approaches have been explored as methods to control feline fertility. SCOPE: In the field of veterinary homeopathy, wild carrot seed and papaya have been used for centuries. Both appear to be safe, but their efficacy as feline contraceptives remains anecdotal. In contrast, the use of melatonin in cats has been investigated in a number of studies, findings from which are reviewed in this article. RATIONALE: Cats are seasonally polyestrous (they cycle several times during their breeding season) and are described as long-day breeders because endogenous melatonin negatively regulates estrous cyclicity. Exogenous melatonin administered parenterally also suppresses ovarian activity in cats, and long-term oral or subcutaneous melatonin administration is safe. CHALLENGES: The therapeutic use of melatonin is limited by its short biological half-life (15-20 mins), its poor oral bioavailability and its central effects in reducing wakefulness. Research is required to determine whether higher doses, longer-release formulations, repeated administration or combination implants might overcome these limitations.
Intratesticular and intraepididymal injections to sterilize male cats: From calcium chloride to zinc gluconate and beyond.

Kutzler MA


AIM AND RATIONALE: The aim of intratesticular and intraepididymal injections is to provide an inexpensive non-surgical method for sterilizing tom cats. Intratesticular and intraepididymal injections have been studied for decades and warrant continued investigation. While both methods result in azoospermia, intratesticular injection of sclerosing agents induces orchitis, resulting in decreased spermatogenesis, whereas intraepididymal injection blocks sperm transport but does not alter spermatogenesis. EVIDENCE BASE: Sclerosing agents that have been used effectively for intratesticular injections in cats include calcium chloride dihydrate and zinc gluconate. For sclerosis by intraepididymal injections, chlorhexidine digluconate has been used successfully in cats. The volume, formulation and concentration of sclerosing agents for intratesticular and intraepididymal injections in cats have not been standardized. CHALLENGES: Neither intratesticular nor intraepididymal injections entirely eliminate gonadal testosterone production, which may be undesirable for pet cats and therefore may restrict the application of this method of sterilization to feral cats with limited human contact. In addition, both methods may require sedation or general anesthesia, leading some to support routine castration over these non-surgical methods. Lastly, even if the technique is successful in inducing permanent sterility, normal fertility may persist in treated males for 1-2 months after treatment because of sperm present within the epididymis and vas deferens.

Urban stray cats infested by ectoparasites with zoonotic potential in Greece.

Lefkaditis MA, Sossidou AV, Panorias AH, Koukeri SE, Paștiu AI, Athanasiou LV

*Parasitol Res* (2015) **114**:3931-3934

A large population of stray cats is encountered in many urban areas sharing the same environment with people, usually being in a close direct contact with them. A variety of ectoparasites can infest such cats, causing mild dermatological abnormalities to more severe systemic disorders. In order to determine the extent of which stray cats carry ectoparasites, particularly those of zoonotic potential, 341 stray cats originating from the urban area of Thessaloniki, Greece, were examined between 2012 and 2014. The signalment of each cat such as gender, hair length, and roughly estimated age were recorded. From a total of 341 examined stray cats, 127 (37.24%; 95% confidence interval (CI) 32.14-42.64) were infested with at least one of the following ectoparasites: mites-Otodectes cynotis (15.8%), Notoedres cati (2.35%), Cheyletiella blakei (2.05%); fleas-Ctenocephalides felis (24.3%); ticks-Rhipicephalus sanguineus (0.88%); and lice-Felicola subrostratus (0.59%). A significantly higher prevalence of ectoparasites was observed in long-haired individuals (p < 0.00001). The above ectoparasites may either cause or transmit diseases not only in cats but also in humans Therefore, antiparasitic control should be included in stray cat neutering campaigns while public health education for taking preventive measures will decrease the risk of transmission to humans.

Functional Analyses of Bitter Taste Receptors in Domestic Cats (Felis catus).

Lei W, Ravoninjohary A, Li X et al.


Cats are obligate carnivores and under most circumstances eat only animal products. Owing to the pseudogenization of one of two subunits of the sweet receptor gene, they are indifferent to sweeteners, presumably having no need to detect plant-based sugars in their diet. Following this reasoning and a
recent report of a positive correlation between the proportion of dietary plants and the number of Tas2r (bitter receptor) genes in vertebrate species, we tested the hypothesis that if bitter perception exists primarily to protect animals from poisonous plant compounds, the genome of the domestic cat (Felis catus) should have lost functional bitter receptors and they should also have reduced bitter receptor function. To test functionality of cat bitter receptors, we expressed cat Tas2R receptors in cell-based assays. We found that they have at least 7 functional receptors with distinct receptive ranges, showing many similarities, along with some differences, with human bitter receptors. To provide a comparative perspective, we compared the cat repertoire of intact receptors with those of a restricted number of members of the order Carnivora, with a range of dietary habits as reported in the literature. The numbers of functional bitter receptors in the terrestrial Carnivora we examined, including omnivorous and herbivorous species, were roughly comparable to that of cats thereby providing no strong support for the hypothesis that a strict meat diet influences bitter receptor number or function. Maintenance of bitter receptor function in terrestrial obligate carnivores may be due to the presence of bitter compounds in vertebrate and invertebrate prey, to the necessary role these receptors play in non-oral perception, or to other unknown factors. We also found that the two aquatic Carnivora species examined had fewer intact bitter receptors. Further comparative studies of factors driving numbers and functions of bitter taste receptors will aid in understanding the forces shaping their repertoire.

Phylogenomic evidence for ancient hybridization in the genomes of living cats (Felidae).
Li G, Davis BW, Eizirik E, Murphy WJ
*Genome Res* (2015)
Inter-species hybridization has been recently recognized as potentially common in wild animals, but the extent to which it shapes modern genomes is still poorly understood. Distinguishing historical hybridization events from other processes leading to phylogenetic discordance among different markers requires a well-resolved species tree that considers all modes of inheritance and overcomes systematic problems due to rapid lineage diversification by sampling large genomic character sets. Here, we assessed genome-wide phylogenetic variation across a diverse mammalian family, Felidae (cats). We combined genotypes from a genome-wide SNP array with additional autosomal, X- and Y-linked variants to sample ~150 kb of nuclear sequence, in addition to complete mitochondrial genomes generated using light-coverage Illumina sequencing. We present the first robust felid time tree that accounts for unique maternal, paternal, and biparental evolutionary histories. Signatures of phylogenetic discordance were abundant in the genomes of modern cats, in many cases indicating hybridization as the most likely cause. Comparison of big cat whole-genome sequences revealed a substantial reduction of X-linked divergence times across several large recombination cold spots, which were highly enriched for signatures of selection-driven post-divergence hybridization between the ancestors of the snow leopard and lion lineages. These results highlight the mosaic origin of modern felid genomes and the influence of sex chromosomes and sex-biased hybridization in post-speciation gene flow. A complete resolution of the tree of life will require comprehensive genomic sampling of biparental and sex-limited genetic variation to identify and control for phylogenetic conflict caused by ancient admixture and sex-biased differences in genomic transmission.

Ex vivo modeling of feline herpesvirus replication in ocular and respiratory mucosae, the primary targets of infection.
Li Y, Van Cleemput J, Qiu Y, Reddy VR, Mateusen B, Nauwynck HJ
Feline herpesvirus 1 (FeHV-1) is a major cause of rhinotracheitis and ocular diseases in cats. In the present study, the viral replication at the primary infection sites was studied using feline respiratory and
ocular mucosa explants. The explants of three cats were maintained in an air-liquid culture up to 96 hours without loss of viability. After inoculation with FeHV-1 (C27), no evidence of infection was noted in corneal epithelium, while plaque-wise replication was observed in conjunctival and tracheal mucosae beginning from 24h post inoculation (hpi). The viral plaque diameters increased over time in trachea and conjunctiva and were larger in tracheal explants than in conjunctival explants at 48hpi. FeHV-1 penetrated the basement membrane in conjunctival and tracheal explants between 24 and 48hpi. At 48 and 72hpi, viral invasion was going deeper in tracheal explants than in conjunctival explants. Our study indicates that FeHV-1 has a better capacity to invade the respiratory mucosa than the conjunctival mucosa, and prefers the conjunctiva, but not the cornea as a portal of entry during ocular infection.

Simultaneous visual inspection for barometric whole-body plethysmography waveforms during pulmonary function testing in client-owned cats.
Lin CH, Wu HD, Lo PY, Lee JJ, Liu CH
OBJECTIVES: For the purpose of applying a barometric whole-body plethysmography (BWBP) device as a routine clinical tool in client-owned cats, the objective of this study was to evaluate the methodological importance of simultaneous visual inspection (SVI) of graphic tracing. METHODS: To investigate the effect of SVI on the results obtained, 50 client-owned cats were included. Breath-by-breath analysis was conducted with BWBP software, and a commonly used rejection setting was chosen for automatic elimination (AE) of non-breath artefactual waveforms, according to tidal volume (TV), inspiratory and expiratory time, and the difference between inspiratory and expiratory volumes. During 10 mins of data recording, SVI for BWBP waveforms was performed to record manually time periods that were free of any artefacts. The two datasets derived from AE alone (AEA method) and AE plus SVI (SVI-AE method) were compared. The inter-observer effect on the process of SVI was evaluated on six cats. RESULTS: There were statistically significant differences (P <0.001) between the AEA and SVI-AE datasets for most BWBP parameters. Bland-Altman analysis of the parameter-enhanced pause (Penh) showed heterogeneous variances, indicating less agreement when the Penh values were large. Intra-individual coefficients of variation of Penh were significantly higher with the AEA method than with the SVI-AE method (61.1% vs 34.7%, respectively; P <0.001). Inter-observer agreement on the SVI process was excellent, and no statistically significant differences between the two observers were found on any BWBP parameters obtained by the SVI-AE method (P >0.05). CONCLUSIONS AND RELEVANCE: Visual inspection for BWBP waveforms in real time can reliably identify stable breathing signals in client-owned cats. The obtained results were significantly different when the SVI method was used in addition to AE. In the interpretation of BWBP parameters or comparison of measurements among studies, whether a SVI methodology was applied should be considered.

Validity of aqueocentesis as a component of anterior uveitis investigation in dogs and cats.
Linn-Pearl RN, Powell RM, Newman HA, Gould DJ
OBJECTIVE: To describe aqueocentesis cytopathology results from dogs and cats presenting for uveitis investigation and to determine whether this is a useful and safe procedure. ANIMAL STUDIED: Dogs and cats presenting for investigation of anterior uveitis (April 2008-December 2013). PROCEDURES: Aqueous was collected via limbal entry under sedation/general anesthesia, for cytopathology and occasionally bacterial culture or polymerase chain reaction (PCR) testing. Further workup included blood testing (hematology, biochemistry, and serology), diagnostic imaging,
nonocular cytopathology, and available histopathology. RESULTS: Fifty-six dogs and 39 cats were included in the study. An aqueous cytopathologic diagnosis of lymphoma (or discrete cell neoplasia) was made in six dogs and seven cats, and a diagnosis of large cell carcinoma made in one dog. This diagnosis of lymphoma was confirmed by ocular histopathology in two dogs and one cat; nonocular cytopathology corroborated lymphoma in another three dogs and five cats. Lymphoma was not evident on aqueous cytopathology but confirmed on nonocular histopathology in two dogs and by cytopathology in one cat. Additionally, aqueous cytopathology in three cats suggested, but was not considered diagnostic of, lymphoma; one of these cats had a confirmatory diagnosis of lymphoma on subsequent clinical investigation. Aqueous humor cytopathology alone was not diagnostic in non-neoplastic anterior uveitis cases, but supplemented the clinical picture with other systemic diagnostic tests. No clinically important complications were reported in association with aqueocentesis.

CONCLUSIONS: Aqueocentesis is performed readily with minimal risk. The results were primarily useful in aiding a diagnosis of lymphoma in both dogs and cats.

Detection of feline upper respiratory tract disease pathogens using a commercially available real-time PCR test.

Litster A, Wu CC, Leutenegger CM

*Vet J* (2015) **206**:149-153

Feline herpesvirus (FHV-1), feline calicivirus (FCV), Bordetella bronchiseptica (Bb), Chlamydia felis (Cf) and Mycoplasma felis (Mf) are common infectious agents identified in cats with upper respiratory tract disease (URTD). Each of these agents can either act as primary pathogens or cause subclinical infections, and pathogen identification can be used to prevent disease transmission in shelters, or to manage individual cats with recurrent URTD. The aim of this study was to compare pathogen detection rates using real-time PCR testing and virus isolation (VI) or bacterial culture in conjunctival, nasal and oropharyngeal swabs from 18 shelter-housed cats with clinical URTD. Co-infections were common; FHV-1 was most prevalent and Cf and FCV were least prevalent. Agents detected by PCR were FCV 2/18 (11%), FHV-1 17/18 (94%), Bb 8/18 (44%) and Mf 15/18 (83%). Agents detected by VI and bacterial culture were FCV 1/18 (6%), FHV-1 12/18 (67%), Bb 8/18 (44%) and Mf 12/18 (67%). Agreement between PCR results and the other two methods was: FHV-1, 57.4%; FCV, 98.1%; Bb, 75.0%; Mf, 60.0%. Discordancies included PCR-positive, VI-negative (FCV, n = 1/54, 1.9%; FHV-1, n = 23/54, 42.6%), PCR-positive, culture-negative (Bb, n = 6/36, 16.7%; Mf, n = 13/36, 36.1%) or PCR-negative, culture-positive (Bb, n = 3/36, 8.3%; Mf, n = 2/36, 5.6%) results. A combination of an oropharyngeal swab and either a conjunctival or a nasal swab submitted for PCR testing was able to detect all infectious agents tested for in each cat. PCR testing was a sensitive and convenient method of detection of infectious agents in cats with clinical signs of URTD.

Cytauxzoonosis in cats: ABCD guidelines on prevention and management.

Lloret A, Addie DD, Boucraut-Baralon C et al.


OVERVIEW: Cytauxzoon species are apicomplexan haemoparasites, which may cause severe disease in domestic cats, as well as lions and tigers. For many years, cytauxzoonosis in domestic cats was only reported in North and South America, but in recent years the infection has also been seen in Europe (Spain, France and Italy). INFECTION: Cytauxzoon felis is the main species; it occurs as numerous different strains or genotypes and is transmitted via ticks. Therefore, the disease shows a seasonal incidence from spring to early autumn and affects primarily cats with outdoor access in areas where tick vectors are prevalent. Domestic cats may experience subclinical infection and may also act as reservoirs. CLINICAL SIGNS: Cytauxzoonosis caused by C felis in the USA is an acute or peracute
severe febrile disease with non-specific signs. Haemolytic anaemia occurs frequently; in some cats neurological signs may occur in late stages. The Cytauxzoon species identified in Europe differ from C felis that causes disease in the USA and are probably less virulent. The majority of infected cats have been healthy; in some cases anaemia was found, but disease as it occurs in the USA has not been reported to date. DIAGNOSIS: Diagnosis is usually obtained by Cytauxzoon detection in blood smears and/or fine-needle aspirates from the liver, spleen and lymph nodes. PCR assays are able to detect low levels of parasitaemia and may be used for confirmation. TREATMENT: Currently a combination of the antiprotozoal drugs atovaquone and azithromycin is the treatment of choice. Concurrent supportive and critical care treatment is extremely important to improve the prognosis. Cats that survive the infection may become chronic carriers for life. PREVENTION: Cats with outdoor access in endemic areas should receive effective tick treatment.

**Hepatozoonosis in cats: ABCD guidelines on prevention and management.**
Lloret A, Addie DD, Boucraut-Baralon C et al.

OVERVIEW: Hepatozoonosis of domestic cats has been reported in several countries, mainly as a subclinical infection. DISEASE AGENT: Infection has been described mostly in areas where canine infection is present and, in recent years, Hepatozoon felis has been identified as a distinct species by molecular techniques. The vector for feline hepatozoonosis remains unknown and the pathogenesis has not been elucidated. INFECTION IN CATS: Feline hepatozoonosis is mainly a subclinical infection and few cases have been reported with clinical signs. The diagnosis of hepatozoonosis in cats can be made by observation of parasite gamonts in blood smears, parasite meronts in muscles by histopathology, and detection of parasite DNA in blood and tissue by PCR. DISEASE MANAGEMENT: The treatment of choice is not known, but single cases have been treated with doxycycline or oxytetracycline and primaquine. Although the mode of transmission and the type of vector is not known, preventive treatment against blood-sucking vectors (fleas and ticks) is advised.

**Feline coronavirus quantitative reverse transcriptase polymerase chain reaction on effusion samples in cats with and without feline infectious peritonitis.**
Longstaff L, Porter E, Crossley VJ, Hayhow SE, Helps CR, Tasker S

OBJECTIVES: The aim of the study was to determine whether feline coronavirus (FCoV) RNA in effusion samples can be used as a diagnostic marker of feline infectious peritonitis (FIP); and in FCoV RNA-positive samples to examine amino acid codons in the FCoV spike protein at positions 1058 and 1060 where leucine and alanine, respectively, have been associated with systemic or virulent (FIP) FCoV infection. METHODS: Total RNA was extracted from effusion samples from 20 cats with confirmed FIP and 23 cats with other diseases. Feline coronavirus RNA was detected using a reverse transcriptase quantitative polymerase chain reaction assay (qRT-PCR), and positive samples underwent pyrosequencing of position 1058 with or without Sanger sequencing of position 1060 in the FCoV spike protein. RESULTS: Seventeen (85%) of the effusion samples from 20 cats with FIP were positive for FCoV RNA, whereas none of the 23 cats with other diseases were positive. Pyrosequencing of the 17 FCoV-positive samples showed that 11 (65%) of the cats had leucine and two (12%) had methionine at position 1058. Of the latter two samples with methionine, one had alanine at position 1060. CONCLUSIONS AND RELEVANCE: A positive FCoV qRT-PCR result on effusions appears specific for FIP and may be a useful diagnostic marker for FIP in cats with effusions. The majority of FCoVs contained amino acid changes previously associated with systemic spread or virulence (FIP) of the virus.
Failure of a single dose of medroxyprogesterone acetate to induce uterine infertility in postnataally treated domestic cats.
Lopez Merlo M, Faya M, Blanco PG, Carransa A, Barbeito C, Gobello C
*Theriogenology* (2015)

In mice and sheep, neonatal administration of progesterone or progestins inhibited development of uterine glands. The aims of the present study were (1) to describe uterine gland development on postnatal Days 6 to 8 and (2) to evaluate the effects of a single postnatal administration of a progestin on reproduction and adult uterine glands morphology and function in domestic cats. Necropsy was performed on three 1-week-old female cats which had died unrelated to this study. Ten female kittens were randomly assigned within the first 24 hours of birth to: medroxyprogesterone acetate 10 mg/animal subcutaneously (MPA; n = 6) or placebo (PLC; n = 4) and followed up until puberty when they were mated. Twenty-four days after the end of estrus, ovulation and pregnancy were diagnosed by serum progesterone measurement and ultrasonography, respectively. Then, all the cats were ovariohysterectomized. After necropsy or surgery, the excised organs were histologically evaluated. Seven queens ovulated (4 of 6 MPA and 3 of 4 PLC; P > 0.1) and were pregnant (P > 0.1). Four MPA cats presented endometrial hyperplasia and one of them developed a pyometra. The 1-week-old females presented uterine glands in the stage of budding and incipient penetration of the glandular epithelium into the underlying stroma. The MPA-treated queens revealed that the area occupied by uterine glands per square-micrometer (0.55 ± 0.2 vs. 0.49 ± 0.2; P > 0.1) and the height of the glandular epithelium (µm; 24.5 ± 6.7 vs. 24.4 ± 7.2; P > 0.1) did not differ from those of the PLC group. Neither significant gross nor microscopical differences were also found for ovaries (P > 0.1). It is concluded that 1-week-old kittens had an incipient stage of uterine gland development and that a single postnatal supraphysiological dose of MPA did not alter uterine adenogenesis in this species. Furthermore, this treatment seemed to predispose to uterine disease without prevention of fertility.

Cardiac malposition (ectopia cordis) in a cat.
Lopez MM, Kuzma AB, Margiocco ML, Cheng T, Enberg TB, Head L

OBJECTIVE: To describe a case of cardiac malposition in a cat, and the successful management of the anomaly. CASE DESCRIPTION: A 2-year-old male neutered male British Shorthair cat weighing 7.58 kg was referred for bicavitary effusion. Ultrasonography and echocardiography demonstrated displacement of the heart into the abdomen through a diaphragmatic defect. Clinical signs of rightsided congestive heart failure were attributed to mechanical restriction of diastolic function by a constrictive segment of fibrous pericardium and to impaired venous return due to a kink in the caudal vena cava. Surgical repositioning of the heart into the thoracic cavity and a subtotal pericardectomy were performed, and the diaphragmatic defect was repaired. The patient recovered well postoperatively. NEW OR UNIQUE INFORMATION PROVIDED: The diagnosis and management of cardiac malposition has not been previously described in cats. With timely diagnosis and surgical intervention, a favorable outcome is possible.

Abdominal ultrasonographic findings in acromegallic cats.
Lourenço BN, Randall E, Seiler G, Lunn KF

OBJECTIVES: Acromegaly is increasingly recognized as a cause of insulin resistance in cats with diabetes mellitus (DM). The objective of this study was to determine if ultrasonographic changes in
selected abdominal organs of acromegalic cats could be used to raise the index of suspicion for this condition. METHODS: In this retrospective case-control study, medical records of cats presenting to North Carolina State University or Colorado State University from January 2002 to October 2012 were reviewed. Cats were included in the acromegaly group if they had insulin-resistant DM with increased serum insulin-like growth factor (IGF-1) concentrations and had an abdominal ultrasound examination performed with report available. A control group included age-matched cats that had abdominal ultrasound examination performed for investigation of disease unlikely to involve the kidneys, adrenal glands, pancreas or liver. RESULTS: Twenty-four cats were included in each group. IGF-1 concentrations in the acromegaly group ranged from >148 to 638 nmol/l. When compared with age-matched controls, cats with acromegaly demonstrated significantly increased median left and right kidney length, significantly increased median left and right adrenal gland thickness, and significantly increased median pancreatic thickness. Hepatomegaly and bilateral adrenomegaly were reported in 63% and 53% of acromegalic cats, respectively, and in none of the controls. Pancreatic abnormalities were described in 88% of the acromegalic cats and 8% of the controls. CONCLUSIONS AND RELEVANCE: These findings indicate that compared with non-acromegalic cats, age-matched acromegalic patients have measurably larger kidneys, adrenal glands and pancreas. Diagnostic testing for acromegaly should be considered in poorly regulated diabetic cats exhibiting organomegaly on abdominal ultrasound examination.

Absence of bacterial DNA in culture-negative urine from cats with and without lower urinary tract disease.
Lund HS, Skogtun G, Sørøm H, Eggertsdóttir AV
A diagnosis of bacterial cystitis commonly relies on a positive microbiological culture demonstrating the presence of a significant number of colony-forming units/ml urine, as urine within the upper urinary tract, bladder and proximal urethra generally is considered sterile. Recent studies from human and veterinary medicine indicate the presence of non-culturatable bacteria in culture-negative urine samples. The aim of the present study was to determine the occurrence of bacterial DNA in culture-negative urine samples from cats with signs of feline lower urinary tract disease (FLUTD) and healthy control cats by 16S ribosomal DNA PCR and subsequent sequencing. The study sample included 38 culture-negative urine samples from cats with FLUTD and 43 culture-negative samples from control cats. Eight culture-positive urine samples from cats with FLUTD were included as external positive controls in addition to negative reaction controls. Of possible methodological limitations, degradation of DNA due to storage, the use of non-sedimented urine for DNA isolation and lack of internal positive reaction controls should be mentioned. The positive controls were recognised, but occurrence of bacterial DNA in culture-negative urine from cats with or without signs of lower urinary tract disease was not demonstrated. However, considering the possible methodological limitations, the presence of bacterial DNA in the urine of culture-negative FLUTD cats cannot be excluded based on the present results alone. Therefore, a prospective study reducing the possibility of degradation of DNA due to storage, in combination with modifications enhancing the chance of detecting even lower levels of bacterial DNA in culture-negative samples, seems warranted.

Bornavirus infection in cats: ABCD guidelines on prevention and management.
Lutz H, Addie DD, Boucraut-Baralon C et al.
OVERVIEW: Bornavirus (BDV) has a broad host range, affecting primarily horses and sheep, but also cattle, ostriches, cats and dogs. In cats, BDV may cause a non-suppurative
meningoencephalomyelitis (‘staggering disease’). INFECTION: The mode of transmission is not completely elucidated. Direct and indirect virus transmission is postulated, but BDV is not readily transmitted between cats. Vectors such as ticks may play a role and shrews have been identified as a potential reservoir host. Access to forested areas has been reported to be an important risk factor for staggering disease. DISEASE SIGNS: It is postulated that BDV may infect nerve endings in the oropharynx and spread via olfactory nerve cells to the central nervous system. A strong T-cell response may contribute to the development of clinical disease. Affected cats develop gait disturbances, ataxia, pain in the lower back and behavioural changes. DIAGNOSIS: For diagnostic purposes, detection of viral RNA by reverse transcription PCR in samples collected from cats with clinical signs of Borna disease can be considered diagnostic. Serology is of little value; cats without signs of Borna disease may be seropositive and yet not every cat with BDV infection has detectable levels of antibodies. HUMAN INFECTION: A hypothesis that BDV infection may be involved in the development of selected neurological disorders in man could not be confirmed. A research group within the German Robert Koch Institute studied the potential health threat of BDV to humans and concluded that BDV was not involved in the aetiology of human psychiatric diseases.

**Demonstration of uniformity of calcium absorption in adult dogs and cats.**
Mack JK, Alexander LG, Morris PJ, Dobenecker B, Kienzle E
_J Anim Physiol Anim Nutr (Berl)_ (2015) **99**:801-809

A meta-analysis was conducted to understand quantitative aspects of calcium (Ca) and phosphorus (P) absorption in adult dogs and cats. 34 studies in dogs and 14 studies in cats met the criteria for inclusion in the meta-analysis. Intake and faecal excretion values of Ca and P were subjected to a modified Lucas test and subsequent regression analyses. According to the current scientific consensus, Ca true digestibility (absorption) should increase at low Ca intake and decrease at high Ca intake. If true, this should result in a nonlinear relationship between the percentage of Ca excreted and dietary Ca intake. The present meta-analysis showed a highly significant linear relationship (p < 0.0001) between Ca intake and Ca excretion suggesting a lack of systematic quantitative adaptation in true Ca digestibility. This finding suggests either that the time period covered by standard digestion trials is too short to induce adaptation mechanisms or that dogs and cats at maintenance will not efficiently alter quantitative Ca absorption percentage according to the amount ingested. If the latter is true, a dietary Ca supply differing greatly from the recommended dietary intake might impair the health of cats and dogs when fed long term. The data plots for P intake and faecal excretion were less uniform suggesting other factors not just dietary intake influence faecal P excretion. In adult cats, the dietary Ca:P ratio strongly influenced the true digestibility of P, whereas this effect was less marked in adult dogs. Faecal P excretion was significantly correlated to faecal Ca excretion in both species (p < 0.0001), and surprisingly, the level of P intake did not appear to be an important determinant of true digestibility of P.

**Urinary albumin and transferrin as early diagnostic markers of chronic kidney disease.**
Maeda H, Sogawa K, Sakaguchi K et al.

Feline renal diseases are increasingly noted in veterinary practice. It is important to diagnose and identify the pathological basis of renal dysfunction accurately at an early stage, but there are only a few reports on this area in clinical veterinary medicine. We investigated the efficacy of measurement of urinary albumin (u-Alb) and urinary transferrin (u-Tf) for early diagnosis using 5-µl urine samples collected noninvasively by catheterization from normal (IRIS stage I) cats and cats with stage I chronic kidney disease (CKD). The u-Alb levels in normal and stage I CKD cats were 6.0 ± 4.5 and 11.2 ± 8.4
Feline Abstracts Jul-Oct 2015

mg/dl, respectively, and the u-Tf levels were 0.09 ± 0.42 and 0.52 ± 0.79 mg/dl, respectively. Based on ROC curve analysis, the sensitivity and specificity of u-Alb and u-Tf were higher than those of the currently used biomarker, the plasma creatinine level. The sensitivity of u-Alb was higher than that of u-Tf, whereas the specificity of u-Tf was higher than that of u-Alb. The validity of the threshold albumin level (20 mg/dl) was confirmed by measurements using SDS-PAGE. Since leakage of u-Tf in urine precedes leakage of u-Alb, inclusion of u-Tf in biochemistry tests may be appropriate for IRIS staging as a diagnostic marker of early diagnosis of renal disorder in cats.

Practical Interpretation and Application of Exocrine Pancreatic Testing in Small Animals.
Mansfield C
The pancreas remains a difficult organ to evaluate using laboratory methods alone. No single laboratory test is diagnostic of pancreatitis (chronic or acute) without other diagnostic modalities concurring with the diagnosis or ruling out other diseases. The diagnosis of pancreatitis is particularly difficult in cats, and pancreatitis often occurs with other diseases. The use of pancreatic cytology may be useful in diagnosing both inflammation and neoplasia. Exocrine pancreatic insufficiency (EPI) can be relatively easily diagnosed when clinically manifested by the measurement of trypsinlike immunoreactivity. Diagnosis is more difficult when EPI is subclinical.

Correlation Between Exposure Rate and Residual Activity in Felines Undergoing 131I Thyroid Ablation Therapy.
Martin TM, Vasudevan L, Chirayath SS
Radiiodine thyroid ablation therapy is a common method for treatment of felines exhibiting hyperthyroidism. Due to the high gamma-ray emission rate of radioiodine (I), patients following treatment must be held in isolation for several days before release to prevent unnecessary dose to owners and members of the public. Dose rate measurement on the external surface of the patient of ≤ 20 µSv h is maintained as the patient release criterion without regard to residual activity. However, the Texas Department of State Health Services regulatory guide recommends a release limit of 3.7 MBq to households with non-pregnant women and children over the age of 18 y, and a limit of 925 kBq to households of pregnant women and children who can be supervised. In this paper, Monte Carlo computational radiation transport techniques are employed to predict and standardize the patient isolation time at the clinic by correlating the thyroid burden and surface dose rates of felines. Measurements of patient dose rate as a function of time are used to determine the patient-specific effective half-life experimentally and to validate the model results. Results show that an average holding time of 8 to 9 d is sufficient to reduce the residual activity to 3.7 MBq levels. Additionally, contact dose rate measurements of 20 µSv h or less correlate to residual activity levels of approximately 925 kBq. Based on the model and measurements, a protocol was developed for clinical use at Texas A&M University Veterinary Medical Teaching Hospital to allow estimation of residual activity following injection. This in turn confirms that the surface dose rates used as the release criteria follow the release limits recommended in the regulatory guide.

Parasite control practices and public perception of parasitic diseases: A survey of dog and cat owners.
Matos M, Alho AM, Owen SP, Nunes T, Madeira de Carvalho L
Drugs used in the control of internal and external parasites in companion animals play a crucial role in Animal and Public Health. To ensure continuing protection, these drugs should be administered regularly and in intervals, as suggested by the manufacturers. To assess parasite control practices and other related factors, including the degree of public awareness on the topic, 312 dog and cat owners were surveyed while attending the Small Animal Hospital, Faculty of Veterinary Medicine, Lisbon University. Results showed that 89.7% of the dogs were currently being treated with endoparasitic drugs. Of these, 74.3% were dewormed every four months or longer and merely 11.8% with the recommended treatment regimen (minimum quarterly). In cats, 63.6% were being treated with endoparasitic drugs and 85.7% of these were irregularly dewormed every four months or longer and merely 5.5% with the recommended treatment regimen (minimum quarterly). Combinations of praziquantel, pyrantel embonate and febantel were the most commonly used drugs in dogs, whereas macrocyclic lactones were more frequently used in cats. Regarding external parasitic control, 92.2% of the dogs were being treated, 50.5% of these at monthly intervals (all-year round or seasonally). The most common ectoparasitic drug formulation used on dogs was the spot-on imidacloprid+permethrin (89%). Only 28.4% of the dogs were uninterruptedly protected throughout the year from the main canine vector borne diseases transmitted by fleas, ticks, sandflies and mosquitoes. Merely 63.6% of the cats were being controlled with ectoparasitic drugs, most at infrequent drug intervals and imidacloprid was the most frequently used drug on cats (44.4%). Additionally, 85% of the respondents had never heard of the word “zoonosis” and 37% of them did not collect their dog’s faeces in all public places. Scabies, toxoplasmosis and leishmaniasis were the most frequent parasitic diseases identified by the public in this survey. Although the majority of pet owners give antiparasitic drugs, our results show that most of them do not follow the manufacturers recommendations, deworming at irregular and consequently ineffective intervals. Therefore, it is of utmost importance for the veterinarians to educate pet owners regarding parasite cycles, methods of prevention and transmission mechanisms, as well as to follow the drug recommendations, in order, respectively, to increase their awareness and thereby improve the effectiveness of the available control measures.

Effect of topical latanoprost 0.005% on intraocular pressure and pupil diameter in normal and glaucomatous cats.
McDonald JE, Kiland JA, Kaufman PL, Bentley E, Ellinwood NM, McLellan GJ
OBJECTIVE: To determine the effects of latanoprost on intraocular pressure (IOP) and pupil diameter (PD) in cats with inherited primary congenital glaucoma (PCG) and normal cats. ANIMALS STUDIED AND PROCEDURES: IOP and PD were measured in both eyes (OU) of 12 adult cats (six normal, six PCG), three times per week for 3 weeks prior to, for 3 weeks during, and for 2 weeks following twice-daily treatment with 0.005% latanoprost to the right eye (OD) and vehicle to the left (control) eye (OS). IOP and PD were measured hourly, for 8 h, 1 day prior to, and on the first and last days of treatment. Aqueous humor flow rate (AHF) was determined at baseline and at the end of the treatment phase in six normal cats. RESULTS: Mean IOP was significantly lower in treated vs. control eyes of PCG cats, for up to 8 h following a single latanoprost treatment, and a maximal IOP reduction of 63% occurred in treated eyes at 3 h. Latanoprost acutely lowered IOP in cats with PCG, but this effect appeared to diminish over 3 weeks of treatment. AHF was modestly increased in the treated eyes of normal cats after 3 weeks of latanoprost treatment, although IOP was not significantly affected. Latanoprost caused miosis, with rebound mydriasis at 24 h posttreatment, in the treated eyes of all cats. CONCLUSIONS: Further research is needed to determine the suitability and efficacy of latanoprost treatment for long-term IOP-lowering in cats with PCG or other forms of glaucoma.
Reconciling actual and perceived rates of predation by domestic cats.

McDonald JL, Maclean M, Evans MR, Hodgson DJ

The predation of wildlife by domestic cats (*Felis catus*) is a complex problem: Cats are popular companion animals in modern society but are also acknowledged predators of birds, herpetofauna, invertebrates, and small mammals. A comprehensive understanding of this conservation issue demands an understanding of both the ecological consequence of owning a domestic cat and the attitudes of cat owners. Here, we determine whether cat owners are aware of the predatory behavior of their cats, using data collected from 86 cats in two UK villages. We examine whether the amount of prey their cat returns influences the attitudes of 45 cat owners toward the broader issue of domestic cat predation. We also contribute to the wider understanding of physiological, spatial, and behavioral drivers of prey returns among cats. We find an association between actual prey returns and owner predictions at the coarse scale of predatory/nonpredatory behavior, but no correlation between the observed and predicted prey-return rates among predatory cats. Cat owners generally disagreed with the statement that cats are harmful to wildlife, and disfavored all mitigation options apart from neutering. These attitudes were uncorrelated with the predatory behavior of their cats. Cat owners failed to perceive the magnitude of their cats’ impacts on wildlife and were not influenced by ecological information. Management options for the mitigation of cat predation appear unlikely to work if they focus on “predation awareness” campaigns or restrictions of cat freedom.

Feral Cats Are Better Killers in Open Habitats, Revealed by Animal-Borne Video.

McGregor H, Legge S, Jones ME, Johnson CN

One of the key gaps in understanding the impacts of predation by small mammalian predators on prey is how habitat structure affects the hunting success of small predators, such as feral cats. These effects are poorly understood due to the difficulty of observing actual hunting behaviours. We attached collar-mounted video cameras to feral cats living in a tropical savanna environment in northern Australia, and measured variation in hunting success among different microhabitats (open areas, dense grass and complex rocks). From 89 hours of footage, we recorded 101 hunting events, of which 32 were successful. Of these kills, 28% were not eaten. Hunting success was highly dependent on microhabitat structure surrounding prey, increasing from 17% in habitats with dense grass or complex rocks to 70% in open areas. This research shows that habitat structure has a profound influence on the impacts of small predators on their prey. This has broad implications for management of vegetation and disturbance processes (like fire and grazing) in areas where feral cats threaten native fauna. Maintaining complex vegetation cover can reduce predation rates of small prey species from feral cat predation.

Feline Glaucoma.

McLellan GJ, Teixeira LB

Feline glaucoma is often insidious in onset and slowly progressive with very subtle clinical signs. As a consequence, it is likely that the disease in cats is underdiagnosed. As cats typically present late in the course of disease, prognosis for long-term maintenance of vision is poor. Patient and owner compliance with frequent application of topical medications can be a limiting factor, and represents a serious clinical challenge. This review outlines the clinical features, classification, and pathophysiology of the feline glaucomas and provides current evidence on which to base the selection of appropriate treatment strategies for cats with glaucoma.
Circulating concentrations of glucagon-like peptide 1, glucose-dependent insulino tropic peptide, peptide YY, and insulin in client-owned lean, overweight, and diabetic cats.

McMillan CJ, Zapata RC, Chelikani PK, Snead EC, Cosford K

Our objectives were to measure plasma concentrations of glucagon-like peptide 1 (GLP-1), glucose-dependent insulino tropic peptide (GIP), and peptide YY (PYY) in client-owned newly diagnosed diabetic cats and nondiabetic lean or overweight cats and to determine whether circulating concentrations of these hormones differed between study groups and if they increased postprandially as seen in other species. A total of 31 cats were recruited and placed into 1 of 3 study groups: lean (body condition score 4-5 on a scale of 1-9; n = 10), overweight (body condition score 6-8; n = 11), or diabetic (n = 10). Diabetics were newly diagnosed and had not had prior insulin therapy. Preprandial (fasting) and postprandial (60 min after meal) plasma hormone and glucose concentrations were measured at baseline and 2 and 4 wk. All cats were exclusively fed a commercially available high-protein and low-carbohydrate diet commonly prescribed to feline diabetic patients for 2 wk before the 2-wk assessment and continued through the 4-wk assessment. Results showed that plasma concentrations of GLP-1, GIP, PYY, and insulin increased in general after a meal in all study groups. Plasma PYY concentrations did not differ (P > 0.10) between study groups. Diabetics had greater plasma concentrations of GLP-1 and GIP compared with the other study groups at baseline (P < 0.05), and greater preprandial and postprandial GLP-1 concentrations than lean cats at 2 and 4 wk (P < 0.05). Preprandial plasma GIP concentrations were greater in diabetics than obese and lean (P < 0.05) cats at week 4. Postprandial plasma GIP concentrations in diabetics were greater than lean (P < 0.05) at week 2 and obese and lean cats (P < 0.05) at week 4. Together, our findings suggest that diabetic status is an important determinant of circulating concentrations of GLP-1 and GIP, but not PYY, in cats. The role of GLP-1, GIP, and PYY in the pathophysiology of feline obesity and diabetes remains to be determined.

Adverse event surveillance in small animal anaesthesia: an intervention-based, voluntary reporting audit.

McMillan M, Darcy H
Vet Anaesth Analg (2015)

OBJECTIVE: To develop, test and refine an ‘intervention-based’ system for the surveillance of adverse events (AEs) during small animal anaesthesia. STUDY DESIGN: Prospective, voluntary reporting audit. ANIMALS: A total of 1386 consecutive small animal anaesthetics (including 972 dogs and 387 cats). METHODS: Adverse events were defined as undesirable perianaesthetic events requiring remedial intervention to prevent or limit patient morbidity. Using previous reports, 11 common AEs were selected and ‘intervention-based’ definitions were devised. A voluntary reporting audit was performed over 1 year at a university teaching hospital. Data on AEs were collected via paper checkbox forms completed after each anaesthetic and were assimilated using an electronic database. Interventions were performed entirely at the discretion of the attending anaesthetist. Comparisons between dogs and cats were made using Fisher’s exact tests. RESULTS: Forms were completed for 1114 anaesthetics (a compliance of 80.4%), with 1001 AEs reported in 572 patients. The relative frequency of AEs reported were as follows: arousal or breakthrough pain (14.9%), hypoventilation (13.5%), hypotension (10.3%), arrhythmias (5.8%), hyperthermia/hypothermia (5.0%), airway complications (4.8%), recovery excitation (4.6%), aspiration risk (4.5%), desaturation (2.8%), hypertension (1.7%) and ‘other’ (3.7%). Canine anaesthetics (57.3%) were more likely to involve AEs than were feline anaesthetics (35.5%, p < 0.01). Escalation in postanaesthetic care was required in 20%
of cases where an AE was reported (8% of anaesthetics overall). In 6% of cases (2% overall), this involved management in an intensive care unit. There were six intra-anaesthetic fatalities (0.43%) during this period. The tool was widely accepted, being considered quick and easy to complete, but several semantic, logistical and personnel factors were encountered. CONCLUSIONS AND CLINICAL RELEVANCE: Simple intervention-based surveillance tools can be easily integrated into small animal anaesthetic practice, providing a valuable evidence base for anaesthetists. A number of considerations must be addressed to ensure compliance and the quality of data collected.

**Focused assessment with sonography in nontraumatized dogs and cats in the emergency and critical care setting.**
Mcmurray J, Boysen S, Chalhoub S

OBJECTIVE: To evaluate the use of abdominal- and thoracic-focused assessment with sonography for trauma (AFAST and TFAST) in nontraumatized dogs and cats in the emergency and critical care setting and to compare prevalence of free fluid identified via these techniques between stable and unstable patients. DESIGN: Prospective observational study. SETTING: University Distributed Veterinary Learning Community. ANIMALS: One hundred client-owned dogs and cats presenting to an emergency service with no evidence of trauma. INTERVENTIONS: AFAST and TFAST performed within 12 hours of presentation. MEASUREMENT AND MAIN RESULTS: Free fluid was identified on AFAST or TFAST in 33% of dogs and cats in this study. Free fluid was identified in 27 of 36 (75%) cardiovascularly unstable or dyspneic patients, compared to 6 of 64 (9%) stable patients. A significantly greater proportion of unstable patients had free fluid compared to stable patients (P < 0.0001). CONCLUSIONS: Results of this study support the use of AFAST and TFAST to detect free fluid in nontraumatized dogs and cats in the emergency and critical care setting, particularly patients that are unstable on presentation.

**A comparative proteomic study of plasma in feline pancreatitis and pancreatic carcinoma using 2-dimensional gel electrophoresis to identify diagnostic biomarkers: A pilot study.**
Meachem MD, Snead ER, Kidney BA et al.

While pancreatitis is now recognized as a common ailment in cats, the diagnosis remains challenging due to discordant results and suboptimal sensitivity of ultrasound and specific feline pancreatic lipase (Spec fPL) assay. Pancreatitis also shares similar clinical features with pancreatic carcinoma, a rare but aggressive disease with a grave prognosis. The objective of this pilot study was to compare the plasma proteomes of normal healthy cats (n = 6), cats with pancreatitis (n = 6), and cats with pancreatic carcinoma (n = 6) in order to identify potential new biomarkers of feline pancreatic disease. After plasma protein separation by 2-dimensional gel electrophoresis, protein spots were detected by Coomassie Brilliant Blue G-250 staining and identified by mass spectrometry. Alpha-1-acid glycoprotein (AGP), apolipoprotein-A1 (Apo-A1), and apolipoprotein-A1 precursor (Pre Apo-A1) appeared to be differentially expressed, which suggests the presence of a systemic acute-phase response and alteration of lipid metabolism in cats with pancreatic disease. Future studies involving greater case numbers are needed in order to assess the utility of these proteins as potential biomarkers. More sensitive proteomic techniques may also be helpful in detecting significant but low-abundance proteins. Abstract available from the publisher.

**Management and long-term outcome of pelvic fractures: a retrospective study of 43 cats.**
OBJECTIVES: The aim of the study was to evaluate the management and long-term outcome of cats with pelvic fractures. METHODS: Cats with pelvic fractures had their records and radiographs reviewed. Radiographs were reviewed for fracture configuration, implants and pelvic canal narrowing. Owners were contacted for long-term follow-up. RESULTS: Forty-three cats met the criteria (mean follow-up 24 months [range 6-45 months]). The majority (93%) had more than one orthopaedic pelvic injury, with sacroiliac fracture luxations seen most commonly; 23% had presurgical neurological deficits. Most cats (74%) were managed surgically; 60% of sacroiliac fracture luxations, 82% of ilial fractures and 50% of acetabular fractures received surgery. The complication rate was 22%, most commonly sciatic neuropraxia (13%). Seventy-nine percent of all neurological deficits resolved and the remainder improved. Mean pelvic canal narrowing after trauma was -15% in surgical and -16% in conservatively managed cats. Canal width was improved postoperatively (-8%) but mildly narrowed further by follow-up (-12%); however, these changes were not significant. Nineteen percent of cats had constipation postsurgery; none developed megacolon. There was no clear correlation between the degree of narrowing of the pelvic canal up to -50%, or whether conservative treatment was opted for, and the development of constipation. Long-term mobility was not impaired in 86%, and 84% did not have any lameness detectable. CONCLUSIONS AND RELEVANCE: The majority were managed surgically, with a 22% complication rate; the most common being transient sciatic neuropraxia. Long-term outcome was generally excellent and most had a full recovery. Constipation/obstipation was very uncommon and no clear relationship with pelvic canal narrowing could be found when considering narrowing of up to -50% in both surgical and conservative groups. As no cats in this cohort had narrowing greater than -50%, the current recommendation of surgery to improve the canal width if narrowing is greater than -45% to -50% should remain.

GnRH-agonist implantation of prepubertal male cats affects their reproductive performance and testicular LH receptor and FSH receptor expression.
Mehl NS, Khalid M, Srisuwatanasagul S, Swangchan-Uthai T, Sirivaidyapong S
Theriogenology (2015)
This study was conducted to investigate the effect of GnRH-agonist implantation in prepubertal tomcats on sexual behavior, reproductive performance, and expression of testicular LH receptor (LHR) and FSH receptor (FSHR) and also to compare the testicular characteristics, LHR and FSHR expression between prepubertal and adult tomcats. In experiment 1, 3-month-old tomcats (n = 6/group) were either treated with or left without 4.7 mg deslorelin implants. Semen collection and evaluation were performed just before castration at 48 weeks after treatment; removed testes were analyzed for mRNA and protein expression of LHR and FSHR. We were able to collect semen from six non-implanted cats, whereas in treated cats, semen was uncollectable. The results revealed that sexual behavior was absent in the implanted cats throughout the study period. Testicular volume was found to decrease from 30 weeks after treatment onward in the implanted cats compared to the controls (P < 0.05). Semen production was found only in non-implanted cats. Testicular tissue score, seminiferous tubule diameter, and LHR protein expression were found lower in the implanted cats (P < 0.05), but no differences were observed in mRNA expression of LHR and protein expression of FSHR between groups. The mRNA expression of FSHR was higher in the implanted (P < 0.05) compared to control cats. In experiment 2, testes from prepubertal (n = 6) and adult (n = 6) male cats were collected after castration and analyzed for mRNA and protein expression of LHR and FSHR. No differences were observed in the protein expression of LHR and FSHR between the two groups, whereas mRNA expression of FSHR was higher in prepubertal cats (P < 0.05). Testicular and epididymal weight, diameter of seminiferous
Feline Abstracts Jul-Oct 2015

tubules, and the testicular grade were higher in the adult compared to prepubertal cats (P < 0.05). In conclusion, deslorelin implants suppressed protein expression of LHR and enhanced mRNA expression of FSHR along with suppression of reproductive function without any adverse effects for at least 48 weeks in male cats.

[Causes, diagnostics and course of disease in 194 cats with anemia].
Merten N, Weingart C, Kohn B
Anemia is a common hematological alteration in cats. The objective of this study was to evaluate the frequency of different types of anemia and the course of disease in cats with a hematocrit (hct) < 0.26 l/l. In a period of 18 months 194 cats were included and assigned to different anemia groups based on history, physical examination and laboratory parameters. Most cats had acute blood loss anemia (BA; 75/194; 38.7%). Frequent causes were trauma (39/75), hematuria (13/75) and hemostatic disorders (9/75). Anemia of inflammatory and neoplastic disease (AID) occurred in 22.2% (43/194) and hemolytic anemia (HA) in 18% (35/194). Half of those were presumptively immune-mediated (IHA). Four cats were diagnosed with hemotropic mycoplasma infection. Rare causes of anemia included anemia of renal disease (ARD; 18/194; 9.3%) and intramedullary non-regenerative anemia (INR; 13/194; 6.7%). The latter either had retroviral infection (6/13) or neoplasia (6/13). In cats with HA and INR anemia was often severe and very severe (Hct < 0.14 l/l) and in cats with AID and ARD usually mild (Hct 0.20-0.25 l/l). Cats with BA had significantly lower total protein concentrations than those with INR (p = 0.001), HA, AID and CNE (p < 0.001) and those with HA most often had hyperbilirubinemia (21/27). Blood transfusions were primarily given to cats with BA (37/75) and HA (19/35), especially those with IHA (13/17). 69% of the patients survived the first 14 days after the anemia was detected for the first time. Cats with HA had the highest survival rate.

Severe feline sporotrichosis associated with an increased population of CD8low cells and a decrease in CD4+ cells.
Miranda LH, Santiago MA, Schubach TM et al.
Sporotrichosis is a subcutaneous mycosis with worldwide distribution, especially in tropical and subtropical areas. Zoonotic transmission is described with cats being the main animal species involved. The occurrence of severe feline sporotrichosis with high fungal levels demonstrates the susceptibility of cats to this disease and the importance of studying its pathogenesis. This study describes the leukocytes profile in blood of cats with sporotrichosis by flow cytometry and its correlation with histopathology and fungal load. The cats with sporotrichosis were separated into groups L1, L2, and L3 (lesions at one, two, and three or more noncontiguous skin locations, respectively) and were classified as good, fair, or poor general conditions. The highest percentage of CD4+ cells was associated to L1 (P =.04) and to good general condition (P =.03). The percentage of CD8+ cells was greater in L2 and L3 (P =.01). CD8(low) expression occurred in 20 animals with sporotrichosis, mainly in L3 (P =.01) and was not observed in healthy controls. This expression was related to macrophage granulomas (P =.01) and predominated in cases with high fungal load. Altogether, the results indicated that control over feline sporotrichosis, with maintenance of a good general condition, fixed lesions, well-organized response and lower fungal load, is associated with increased CD4+ cells percentages. In contrast, a poor general condition, disseminated lesions and high fungal load were related to increased CD8+ cell percentages and increased expression of CD8(low). As conclusion these results point to an important role of the CD4:CD8 balance in determining the clinical outcome in feline sporotrichosis.
Cystoscopy in dogs and cats.
Morgan M, Forman M
Cystoscopy has become an important and widely available component of the diagnostic evaluation of diseases of the lower urinary tract in dogs and cats. In addition, a large number of cystoscopic guided procedures have been described that can be used to treat disease processes that were previously treatable only with invasive surgical procedures. This article reviews the indications and contraindications for cystoscopy, cystoscopy equipment and techniques for male and female dogs and cats, potential complications associated with cystoscopy, and management options for these complications.

Preliminary Analysis of Modified Low-Density Lipoproteins in the Serum of Healthy and Obese Dogs and Cats.
Mori N, Okada Y, Tsuchida N et al.
Front Vet Sci (2015) 2:34
Oxidized low-density lipoprotein (LDL) is thought to play an important role in the inflammatory response associated with human obesity. The purpose of this preliminary study was to determine oxidized LDL concentrations in healthy dogs and cats, and to evaluate whether obesity affects oxidized LDL concentration, using 39 cats and 19 dogs that had visited two different veterinary clinics in Japan. We hypothesized that oxidized LDL concentrations measured against body condition score (BCS) may have a potential value in evaluating the qualities of accumulated or circulating lipids in obese dogs and cats that do not show signs of metabolic diseases. The mean oxidized LDL value in BCS3 dogs (2.4 ± 0.9 µg/dl) was very similar to that of BCS5 dogs (2.2 ± 0.3 µg/dl). The mean oxidized LDL value of BCS4 dogs was 7.2 ± 10.3 µg/dl and the highest among three groups. BCS4 dogs included two dogs whose oxidized LDL values were higher than the mean oxidized LDL value of healthy humans (11.2 ± 0.3 µg/dl). On the other hand, the mean oxidized LDL value of BCS3 cats was 2.5 ± 0.9 µg/dl, and those of BCS4 and 5 cats were higher than that of BCS3, but there was no significant difference. The BCS4 cat group included one cat with a higher oxidized LDL value, and the BCS5 group also included two cats with oxidized LDL values higher than the mean oxidized LDL value of healthy humans. Interestingly, the oxidized LDL values in two obese dogs and three obese cats were indeed higher than the mean oxidized LDL value of humans with coronary artery disease (20.1 ± 1.1 µg/dl). In conclusion, this preliminary study showed reference ranges of oxidized dogs and cats against BCS. Obesity alone does not appear to have any direct effect on serum oxidized LDL values in healthy dogs and cats.

Assessing changes in the UK pet cat and dog populations: numbers and household ownership.
Murray JK, Gruffydd-Jones TJ, Roberts MA, Browne WJ
Vet Rec (2015) 177:259
The main aim of this study was to replicate methodology used to estimate the size of the UK pet cat and dog populations in 2006 and the proportion of households owning cats/dogs in 2007, to produce updated data to compare trends in ownership and population sizes. A cross-sectional study design was used to collect telephone interview data from 3155 households in the UK. 2011 UK human census data were used to predict the size of the cat and dog populations owned by households in the UK in 2011. Of the households, 23 per cent (714/3155) owned one or more cats and 30 per cent (940/3155) owned one or more dogs. There was some overlap in pet ownership with 7 per cent (210/3155) of households...
owning both one or more cats and one or more dogs. There was a small but significant decrease in the proportion of households that owned one or more cats in 2011 compared with 2007, with no change in the proportion owning dogs. However, overall, the total number of cats and dogs that were estimated to be owned by UK households did not change significantly between 2006 and 2011. The estimated size (and 95% CIs) of the pet cat and dog populations in the UK in 2011 was 10,114,764 cats (9,138,603-11,090,924) and 11,599,824 dogs (10,708,070-12,491,578).

**Methods of fertility control in cats: Owner, breeder and veterinarian behavior and attitudes.**
Murray JK, Mosteller JR, Loberg JM, Andersson M, Benka VA

OVERVIEW: Fertility control is important for population management of owned and unowned cats, provides health benefits at the individual level and can reduce unwanted sexually dimorphic behaviors such as roaming, aggression, spraying and calling. This article reviews the available evidence regarding European and American veterinarian, owner and pedigree cat breeder attitudes toward both surgical sterilization and non-surgical fertility control. It additionally presents new data on veterinarians’ and pedigree cat breeders’ use of, and attitudes toward, alternative modalities of fertility control.

PROPORTION OF CATS THAT ARE NEUTERED: Within the United States and Europe, the proportion of cats reported to be sterilized varies widely. Published estimates range from 27-93% for owned cats and 2-5% for cats trapped as part of a trap-neuter-return (TNR) program. In some regions and populations of cats, non-surgical fertility control is also used. Social context, cultural norms, individual preferences, economic considerations, legislation and professional organizations may all influence fertility control decisions for cats. NON-SURGICAL METHODS OF FERTILITY CONTROL: Particularly in Europe, a limited number of non-surgical temporary contraceptives are available for cats; these include products with regulatory approval for cats as well as some used ‘off label’. Non-surgical methods remove the risk of complications related to surgery and offer potential to treat more animals in less time and at lower cost; they may also appeal to pedigree cat breeders seeking temporary contraception. However, concerns over efficacy, delivery methods, target species safety, duration and side effects exist with current non-surgical options. Research is under way to develop new methods to control fertility in cats without surgery. US and European veterinarians place high value on three perceived benefits of surgical sterilization: permanence, behavioral benefits and health benefits. Non-surgical options will likely need to share these benefits to be widely accepted by the veterinary community.

**Seroprevalence of and Risk Factors for Toxoplasma gondii Infection in Cats in Estonia.**
Must K, Lassen B, Jokelainen P

In Estonia, northeastern Europe, Toxoplasma gondii seroprevalence in humans has not declined, in contrast to many other countries. The reasons for this are unknown. Domestic cats are important hosts in the epidemiology of the parasite, but information on local feline *T. gondii* infections has been lacking. An epidemiological cross-sectional study was conducted to estimate the seroprevalence of *T. gondii* and the risk factors associated with seropositivity in cats in Estonia. Surplus from blood samples that had been collected for unrelated diagnostic purposes from 306 pet cats and 184 shelter cats were analyzed for anti-*T. gondii* immunoglobulin G antibodies by using a direct agglutination test. Two questionnaires were designed to reveal relevant risk factors for seropositivity. The overall seroprevalence of *T. gondii* in cats in Estonia was 60.8%. Older age, outdoor access, hunting, living outside the city in the countryside, and not being a purebred cat were among the risk factors associated with seropositivity. *T. gondii* is highly prevalent in domestic cats in Estonia. This suggests that the
environment has been contaminated with *T. gondii*. Seropositivity indicates previous oocyst shedding, and most of the cats had outdoor access. The increase in *T. gondii* seroprevalence with age indicates acquired infections, and most of the risk factors were lifestyle-related. Cat owners could diminish the risk of *T. gondii* infection and also limit the spread of the parasite by not allowing their cats to roam free.

**Pharmacokinetics and pharmacodynamics of the factor Xa inhibitor apixaban after oral and intravenous administration to cats.**  
Myers JA, Wittenburg LA, Olver CS, Martinez CM, Bright JM  
OBJECTIVE: To determine pharmacokinetic and pharmacodynamic properties of the novel factor Xa inhibitor apixaban in clinically normal cats. ANIMALS: 5 purpose-bred domestic shorthair cats. PROCEDURES: A single dose of apixaban (0.2 mg/kg, PO) was administered to each cat (time 0), and blood samples were obtained at 0, 15, 30, 45, 60, 120, 240, 360, 480, and 1,440 minutes. After a 1-week washout period, another dose of apixaban (0.2 mg/kg, IV) was administered to each cat, and blood samples were obtained at 0, 5, 10, 15, 30, 45, 60, 120, 240, 360, 480, and 1,440 minutes. Apixaban concentrations in plasma were measured via liquid chromatography-tandem mass spectrometry. Pharmacodynamic effects of apixaban were determined with a commercial assay for factor X activity, which measures endogenous factor X activity chromogenically. RESULTS: Factor Xa was inhibited as a function of time after a single dose of apixaban administered orally or IV, and a direct inverse correlation with the plasma apixaban concentration was detected. Pharmacokinetic analysis revealed moderate clearance, short half-life, and high bioavailability for apixaban. A 2-compartment model was fit to the IV pharmacokinetic data; compartmental modeling could not be used to adequately describe the oral data because of substantial interindividual variability. CONCLUSIONS AND CLINICAL RELEVANCE: Results indicated that apixaban was an effective inhibitor of factor Xa in cats. Further studies will be needed to determine pharmacokinetics and pharmacodynamics after multidose administration, effects of cardiac disease on pharmacokinetics and pharmacodynamics, dosing recommendations, and efficacy of apixaban for use in the treatment and prevention of thromboembolic disease in cats.

**Familial cardiomyopathy in Norwegian Forest cats.**  
März I, Wilkie LJ, Harrington N et al.  
Norwegian Forest cats (NFCs) are often listed as a breed predisposed to cardiomyopathy, but the characteristics of cardiomyopathy in this breed have not been described. The aim of this preliminary study was to report the features of NFC cardiomyopathy based on prospective echocardiographic screening of affected family groups; necropsy findings; and open-source breed screening databases. Prospective examination of 53 NFCs revealed no murmur or left ventricular (LV) outflow tract obstruction in any screened cat, though mild LV hypertrophy (defined as diastolic LV wall thickness ≥5.5mm) was present in 13/53 cats (25%). Gross pathology results and histopathological sections were analysed in eight NFCs, six of which had died of a cardiac cause. Myocyte hypertrophy, myofibre disarray and interstitial fibrosis typical of hypertrophic cardiomyopathy were present in 7/8 cats, but endomyocardial fibrosis suggestive of restrictive cardiomyopathy was also present in the same cats. Pedigree data analysis from 871 NFCs was supportive of a familial cardiomyopathy in this breed.

**ASSOCIATIONS BETWEEN ULTRASOUND AND CLINICAL FINDINGS IN 87 CATS WITH**
URETHRAL OBSTRUCTION.
Nevins JR, Mai W, Thomas E

Urethral obstruction is a life-threatening form of feline lower urinary tract disease. Ultrasonographic risk factors for reobstruction have not been previously reported. Purposes of this retrospective cross-sectional study were to describe urinary tract ultrasound findings in cats following acute urethral obstruction and determine whether ultrasound findings were associated with reobstruction. Inclusion criteria were a physical examination and history consistent with urethral obstruction, an abdominal ultrasound including a full evaluation of the urinary system within 24 h of hospitalization, and no cystocentesis prior to ultrasound examination. Medical records for included cats were reviewed and presence of azotemia, hyperkalemia, positive urine culture, and duration of hospitalization were recorded. For medically treated cats with available outcome data, presence of reobstruction was also recorded. Ultrasound images were reviewed and urinary tract characteristics were recorded. A total of 87 cats met inclusion criteria. Common ultrasound findings for the bladder included echogenic urine sediment, bladder wall thickening, pericystic effusion, hyperechoic pericystic fat, and increased urinary echoes; and for the kidneys/ureters included pyelectasia, renomegaly, perirenal effusion, hyperechoic perirenal fat, and ureteral dilation. Six-month postdischarge outcomes were available for 61 medically treated cats and 21 of these cats had reobstruction. No findings were associated with an increased risk of reobstruction. Ultrasonographic perirenal effusion was associated with severe hyperkalemia (P = 0.009, relative risk 5.75, 95% confidence interval [1.54-21.51]). Findings supported the use of ultrasound as an adjunct for treatment planning in cats presented with urethral obstruction but not as a method for predicting risk of reobstruction.

Environmental contamination with *Toxocara* eggs: a quantitative approach to estimate the relative contributions of dogs, cats and foxes, and to assess the efficacy of advised interventions in dogs.
Nijsse R, Mughini-Gras L, Wagenaar JA, Franssen F, Ploeger HW
*Parasit Vectors* (2015) 8:397

BACKGROUND: Environmental contamination with *Toxocara* eggs is considered the main source of human toxocariasis. The contribution of different groups of hosts to this contamination is largely unknown. Current deworming advices focus mainly on dogs. However, controversy exists about blind deworming regimens for >6-month-old dogs, as most of them do not actually shed *Toxocara* eggs. We aim to estimate the contribution of different non-juvenile hosts to the environmental *Toxocara* egg contamination and to assess the effects of different *Toxocara*-reducing interventions for dogs.

METHODS: A stochastic model was developed to quantify the relative contribution to the environmental contamination with *Toxocara* eggs of household dogs, household cats, stray cats, and foxes, all older than 6 months in areas with varying urbanization degrees. The model was built upon an existing model developed by Morgan et al. (2013). We used both original and published data on host density, prevalence and intensity of infection, coprophagic behaviour, faeces disposal by owners, and cats’ outdoor access. Scenario analyses were performed to assess the expected reduction in dogs’ egg output according to different deworming regimens and faeces clean-up compliances. Estimates referred to the Netherlands, a country free of stray dogs. RESULTS: Household dogs accounted for 39% of the overall egg output of >6-month-old hosts in the Netherlands, followed by stray cats (27%), household cats (19%), and foxes (15%). In urban areas, egg output was dominated by stray cats (81%). Intervention scenarios revealed that only with a high compliance (90%) to the four times a year deworming advice, dogs’ contribution would drop from 39 to 28%. Alternatively, when 50% of owners would always remove their dogs’ faeces, dogs’ contribution would drop to 20%. CONCLUSION:
Among final hosts of Toxocara older than 6 months, dogs are the main contributors to the environmental egg contamination, though cats in total (i.e. both owned and stray) transcend this contribution. A higher than expected compliance to deworming advice is necessary to reduce dogs’ egg output meaningfully. Actions focusing solely on household dogs and cats are unlikely to sufficiently reduce environmental contamination with eggs, as stray cats and foxes are also important contributors.

**Polycystic kidney disease in four British shorthair cats with successful treatment of bacterial cyst infection.**

Nivy R, Lyons LA, Aroch I, Segev G  
*J Small Anim Pract* (2015) **56**:585-589

Polycystic kidney disease is the most common inherited disorder in cats. Renal cysts progressively increase in size and number, resulting in a gradual decrease in kidney function. An autosomal dominant mutation in exon 29 of the polycystin-1 gene has been identified, mostly in Persian and Persian-related breeds. This case study describes polycystic kidney disease in four British shorthair cats, of which two had the same genetic mutation reported in Persian and Persian-related cats. This likely reflects introduction of this mutation into the British shorthair breeding line because of previous outcrossing with Persian cats. An infected renal cyst was diagnosed and successfully treated in one of the cats. This is a commonly reported complication in human polycystic kidney disease, and to the authors’ knowledge has not previously been reported in cats with polycystic kidney disease.

**Comparison of FEDESI and SCORFAD scoring systems for the evaluation of skin lesions in allergic cats.**

Noli C, Cena T  
*Vet Dermatol* (2015) **26**:481-e113

BACKGROUND: Feline Dermatitis Extent and Severity Index (FeDESI) and Scoring Feline Allergic Dermatitis (SCORFAD) are two different scoring systems for the evaluation of feline allergic dermatitis. OBJECTIVES: To evaluate the correlation between FeDESI and SCORFAD and pruritus. ANIMALS AND METHODS: The dermatological lesions of 32 cats affected by feline allergic dermatitis were evaluated with both FeDESI and SCORFAD before treatment and once monthly during treatment where ciclosporin was administered at 7 mg/kg orally once daily for 1 month then tapered, when possible, in the subsequent 2 months. Pruritus was scored by pet owners with a Visual Analog Scale (VAS). Correlation between scores at Visit 1, and between absolute and percentage score improvements at visits 1, 2 and 3, were analysed statistically using a nonparametric Spearman’s rank correlation test. RESULTS: Correlation between FeDESI, SCORFAD and VAS pruritus scores at baseline was low and nonsignificant for all combinations. The correlation of absolute score improvement was moderate and significant only between FeDESI and VAS pruritus at Visit 3. Correlation of improvement percentage was moderate and significant between FeDESI and SCORFAD and between FeDESI and VAS pruritus at Visit 2, whereas at visits 3 and 4 it was high and significant for each combination. CONCLUSION: Only improvement percentage of FeDESI and SCORFAD scores seem to correlate well. SCORFAD is the only scoring system to have been validated, although it seems to correlate less with pruritus and may be more difficult to use than FeDESI. The latter could thus be more appropriate for use, but further studies are needed especially in regard to its validation.

**Prevalence and underlying causes of histologic abnormalities in cats suspected to have chronic small bowel disease: 300 cases (2008-2013).**

Norsworthy GD, Estep JS, Hollinger C et al.
OBJECTIVE: To determine prevalence of histologic abnormalities in cats suspected, on the basis of compatible clinical signs and ultrasonographic findings, to have chronic small bowel disease; identify the most common underlying causes in affected cats; and compare methods for differentiating among the various causes of chronic small bowel disease. DESIGN: Retrospective case series. ANIMALS: 300 client-owned domestic cats suspected to have chronic small bowel disease. PROCEDURES: Medical records were reviewed to identify cats evaluated because of chronic vomiting, chronic small bowel diarrhea, or weight loss that also had ultrasonographic evidence of thickening of the small intestine. Cats were included in the study if full-thickness biopsy specimens had been obtained from ≥ 3 locations of the small intestine by means of laparotomy and biopsy specimens had been examined by means of histologic evaluation and, when necessary to obtain a diagnosis, immunohistochemical analysis and a PCR assay for antigen receptor rearrangement. RESULTS: Chronic small bowel disease was diagnosed in 288 of the 300 (96%) cats. The most common diagnoses were chronic enteritis (n = 150) and intestinal lymphoma (124). CONCLUSIONS AND CLINICAL RELEVANCE: Results indicated that a high percentage of cats with clinical signs of chronic small bowel disease and ultrasonographic evidence of thickening of the small intestine had histologic abnormalities. Furthermore, full-thickness biopsy specimens were useful in differentiating between intestinal lymphoma and chronic enteritis, but such differentiation was not possible with ultrasonography or clinicopathologic testing alone.

Primary pulmonary neoplasia in cats: assessment of computed tomography findings and survival.
Nunley J, Sutton J, Culp W et al. 
OBJECTIVE: To identify variables with a preoperative computed tomography scan that influence survival of cats undergoing surgical removal of a primary lung tumour. A secondary objective was to determine whether histologic type and or grade of feline pulmonary tumours affects long term survival. METHODS: Medical records were retrospectively reviewed for cats with preoperative computed tomography scans and surgical resection of primary lung tumours. Pulmonary carcinomas were reviewed for histologic diagnosis using two different approaches, histologic grade as well as major histologic pattern. RESULTS: Median survival time of all (n = 28) cats was 156 days. Median survival time for cats with lymph node enlargement was 65 days versus 498 days for cats without lymph node enlargement on preoperative computed tomography scan. Median survival time for cats with preoperative pleural effusion was 2 - 5 days versus 467 days for cats without pleural effusion. Cats with low or intermediate grade tumours had a median survival time of 730 days versus 105 days for cats with high grade tumours. CLINICAL SIGNIFICANCE: Cats with preoperative lymph node enlargement and pleural effusion have shorter survival times than cats without.

Abdominal Ultrasound Examination Findings in 534 Hyperthyroid Cats Referred for Radiiodine Treatment Between 2007-2010.
Nussbaum LK, Scavelli TD, Scavelli DM et al. 
BACKGROUND: The prevalence of concurrent disease in hyperthyroid cats is unknown. OBJECTIVES: To identify the prevalence of concurrent intra-abdominal disease using abdominal ultrasound examination (AUS) in hyperthyroid cats referred for radioactive iodine treatment (RIT) and to determine whether the requirement for pretreatment AUS is justified. ANIMALS: Five hundred and thirty-four client-owned cats diagnosed with hyperthyroidism and referred for RIT. METHODS:
Retrospective study. Age, breed, sex, body weight, clinical signs, total serum T4 concentration, blood urea nitrogen (BUN) concentration, serum creatinine concentration, urine specific gravity (USG), AUS results, and biopsy or cytology results, or both (if obtained) were collected from the medical records. RESULTS: The prevalence of concurrent disease identified using AUS in hyperthyroid cats referred for RIT was 36.1%; 22.8% of the cats in the study had renal disease and 2.4% had confirmed neoplasia. Significant differences in median USG (P value 0.032) and median BUN (P value 0.028) were found between cats that had abnormal kidneys on AUS compared to those with normal-appearing kidneys. Only 2.2% of the cats were not treated with RIT as a result of changes identified on AUS and subsequently obtained cytology or biopsy results. CONCLUSIONS AND CLINICAL IMPORTANCE: The results indicate that pretreatment AUS in hyperthyroid cats referred for RIT is unnecessary in most patients.

OBJECTIVES: Body temperature is commonly used for assessing health and identifying infectious diseases in cats. Rectal thermometry, the most commonly used method, is stressful, invasive and time consuming. Non-contact infrared thermometry (NIRT) has been used with mixed success to measure temperature in humans and other species. The purpose of this study was to determine if NIRT measurements were comparable to rectal temperature measurements or, if not highly correlated, could at least identify cats in the hypothermic or hyperthermic range in need of further evaluation.
METHODS: From a total of six NIRT devices and 15 anatomic sites, three devices and three sites (pinna, gingiva and perineum) with the highest correlation to rectal temperature were selected for further study. Measurements were made in 188 adult cats housed indoors at animal shelters, veterinary clinics and private homes across a wide range of body temperatures and compared with rectal temperatures. RESULTS: Bland-Altman analysis revealed poor agreement between NIRT and rectal thermometry. The mean NIRT measurements ranged from 0.7-1.3°C below the mean rectal measurements, but the effect was not consistent; NIRT measurements tended to exceed rectal measurements in hypothermic cats and fall below rectal measurements in normothermic and hyperthermic cats. CONCLUSIONS AND RELEVANCE: The accuracy of temperature measurements using NIRT devices is not reliable for clinical use in cats.

Characterization of an Early-Onset, Autosomal Recessive, Progressive Retinal Degeneration in Bengal Cats.
PURPOSE: A form of retinal degeneration suspected to be hereditary was discovered in a family of Bengal cats. A breeding colony was established to characterize disease progression clinically, electrophysiologically, and morphologically, and to investigate the mode of inheritance. METHODS: Affected and related cats were donated by owners for breeding trials and pedigree analysis. Kittens from test and complementation breedings underwent ophthalmic and neuro-ophthalmic examinations and ERG, and globes were evaluated using light microscopy. RESULTS: Pedigree analysis, along with test and complementation breedings, indicated autosomal recessive inheritance and suggested that this disease is nonallelic to a retinal degeneration found in Persian cats. Mutation analysis confirmed the disease is not caused by CEP290 or CRX variants found predominantly in Abyssinian and Siamese cats. Ophthalmoscopic signs of retinal degeneration were noted at 9 weeks of age and became more noticeable over the next 4 months. Visual deficits were behaviorally evident by 1 year of age.
Electroretinogram demonstrated reduced rod and cone function at 7 and 9 weeks of age, respectively. Rod responses were mostly extinguished at 14 weeks of age; cone responses were minimal by 26 weeks. Histologic degeneration was first observed at 8 weeks, evidenced by reduced photoreceptor numbers, then rapid deterioration of the photoreceptor layer and, subsequently, severe outer retinal degeneration. CONCLUSIONS: A recessively inherited primary photoreceptor degeneration was characterized in the Bengal cat. The disease is characterized by early onset, with histologic, ophthalmoscopic, and electrophysiological signs evident by 2 months of age, and rapid progression to blindness.

**Comparison of Toxoplasma gondii Seroprevalence in Shelter Cats and Dogs during 1999-2001 and 2009-2011 in Tokyo, Japan.**

Oi M, Yoshikawa S, Maruyama S, Nogami S  

Toxoplasma gondii is an important human health concern with respect to abortion, congenital hydrocephalus, and encephalitis in immunocompromised people. Cats and dogs both are potential sources of T. gondii because they have close contact with humans. However, no epidemiological surveys have been conducted in Tokyo over the past decade. Therefore, the present study investigated and compared the seroprevalence of T. gondii infection in shelter cats and dogs during 1999-2001 and 2009-2011 in Tokyo, Japan. Serum samples were collected from 337 shelter cats and 325 shelter dogs in urban and suburban areas of Tokyo, during 1999-2001 (233 cats and 219 dogs) and 2009-2011 (104 cats and 106 dogs). T. gondii antibodies were measured in the serum samples using a commercial latex agglutination test. Data were compared using the Fisher’s exact test, and significance was indicated at P < 0.05. The overall seroprevalence of T. gondii infection in cats was 5.6% (13 of 233) in 1999-2001 and 6.7% (7 of 104) in 2009-2011, and that in dogs was 1.8% (4 of 219) and 1.9% (2 of 106), respectively. Significantly higher seroprevalence was observed in cats from suburban areas compared with cats in urban areas during both periods (P < 0.05). These results reveal that there has been little change in the feline and canine seroprevalence over the past decade, indicating that the risk of T. gondii exposure for cats and dogs in Tokyo is considerably low as the seroprevalence has reached a steady state.

**Toward a genome-wide approach for detecting hybrids: informative SNPs to detect introgression between domestic cats and European wildcats (Felis silvestris).**

Oliveira R, Randi E, Mattucci F, Kurushima JD, Lyons LA, Alves PC  

Endemic gene pools have been severely endangered by human-mediated hybridization, which is posing new challenges in the conservation of several vertebrate species. The endangered European wildcat is an example of this problem, as several natural populations are suffering introgression of genes from the domestic cat. The implementation of molecular methods for detecting hybridization is crucial for supporting appropriate conservation programs on the wildcat. In this study, genetic variation at 158 single-nucleotide polymorphisms (SNPs) was analyzed in 139 domestic cats, 130 putative European wildcats and 5 captive-bred hybrids (N=274). These SNPs were variable both in wild (HE=0.107) and domestic cats (HE=0.340). Although we did not find any SNP that was private in any population, 22 SNPs were monomorphic in wildcats and pairwise FCT values revealed marked differences between domestic and wildcats, with the most divergent 35 loci providing an average FCT>0.74. The power of all the loci to accurately identify admixture events and discriminate the different hybrid categories was evaluated. Results from simulated and real genotypes show that the 158 SNPs provide successful estimates of admixture, with 100% hybrid individuals (two to three generations in the past) being
correctly identified in STRUCTURE and over 92% using the NEWHYBRIDS’ algorithm. None of the unclassified cats were wrongly allocated to another hybrid class. Thirty-five SNPs, showing the highest FCT values, provided the most parsimonious panel for robust inferences of parental and first generations of admixed ancestries. This approach may be used to further reconstruct the evolution of wildcat populations and, hopefully, to develop sound conservation guidelines for its legal protection in Europe.

Critically appraised topic on adverse food reactions of companion animals (1): duration of elimination diets.
Olivry T, Mueller RS, Prélaud P
BACKGROUND: Restrictive (i.e. elimination)-provocation dietary trials remain the standard of care to diagnose cutaneous adverse food reactions (CAFRs) in dogs and cats. There is currently no consensus on the duration of elimination diet trials that would permit the highest sensitivity of diagnosis of CAFR in companion animals. RESULTS: The search for, and review and analysis of the best evidence available as of December 14, 2014 suggests that, by 5 weeks in dogs and 6 weeks in cats after starting an elimination diet, more than 80 % of patients had achieved a remission of clinical signs of CAFR. Increasing the diet trial duration to 8 weeks leads to a complete remission in more than 90 % of dogs and cats with CAFR. CONCLUSIONS: For diagnosing CAFRs in more than 90 % of dogs and cats, elimination diet trials should last at least 8 weeks.

Ortalda C, Noli C, Colombo S, Borio S
BACKGROUND: Oclacitinib is a Janus kinase inhibitor that decreases pruritus and lesions in allergic dogs. In cats, it is able to inhibit interleukin-31-induced pruritus; no information is available on its clinical effectiveness. HYPOTHESIS/OBJECTIVES: To evaluate the efficacy, ease of administration and tolerability of oclacitinib in feline nonflea-, nonfood-induced hypersensitivity dermatitis. METHODS: Cats >12 months of age and >3 kg body weight with a diagnosis of nonflea-, nonfood-induced hypersensitivity dermatitis were treated with oclacitinib, 0.4-0.6 mg/kg orally (p.o.) twice daily for 2 weeks, then once daily for an additional 14 days. Clinical lesions were evaluated with the Scoring Feline Allergic Dermatitis (SCORFAD) system and pruritus was evaluated with a 10-cm-long visual analog scale (VAS) before and at the end of the study. Owners assessed global efficacy, ease of administration and tolerability with a four-point scale. RESULTS: Twelve cats were treated with a mean initial oclacitinib dose of 0.47 mg/kg p.o. twice daily. There was good improvement in SCORFAD and VAS pruritus scores in five of 12 cases, while the other cats were unchanged, deteriorated or dropped out due to treatment failure. Owners scored global efficacy as good/excellent in four of 12 cases and ease of administration and tolerability as good/excellent in 10 of 12. CONCLUSIONS AND CLINICAL IMPORTANCE: Oclacitinib at 0.4-0.6 mg/kg p.o. may be an effective and safe drug for some cats with nonflea-, nonfood-induced hypersensitivity dermatitis. Further studies are needed to identify the most effective dose range for this species.

Routine kidney variables, glomerular filtration rate and urinary cystatin C in cats with diabetes mellitus, cats with chronic kidney disease and healthy cats.
Paepe D, Ghys LF, Smets P, Lefebvre HP, Croubels S, Daminet S
OBJECTIVES: Diabetic kidney disease (DKD) is a frequent and serious complication in human diabetic patients, but data are limited in cats. This study was undertaken to assess whether diabetic cats are susceptible to DKD. METHODS: Kidney function was compared between 36 cats with diabetes mellitus (DM), 10 cats with chronic kidney disease (CKD) and 10 age-matched healthy cats by measuring routine kidney variables (serum creatinine [sCreat], serum urea [sUrea], urine specific gravity [USG], urinary protein:creatinine ratio [UPC]), urinary cystatin C:creatinine ratio and glomerular filtration rate (GFR). Urinary cystatin C (uCysC) was measured with a human particle-enhanced nephelometric immunoassay, validated to measure feline cystatin C, in all but two diabetic cats. GFR was evaluated by exo-iohexol clearance in 17 diabetic cats, all cats with CKD and all healthy cats. RESULTS: Diabetic cats had significantly (mean ± SD) lower sCreat (123 ± 38 vs 243 ± 80 µmol/l), sUrea (11 ± 3 vs 18 ± 7 mmol/l) and urinary cystatin C:creatinine ratio (6 ± 3 vs 17 ± 3 ± 242 mg/mol), and a significantly higher USG (1.033 ± 0.012 vs 1.018 ± 0.006) and GFR (2.0 ± 0.7 vs 0.8 ± 0.3 ml/min/kg) compared with cats with CKD. Compared with healthy cats, diabetic cats only had significantly lower USG (1.033 ± 0.012 vs 1.046 ± 0.008). Proteinuria (UPC >0.4) was present in 39% of diabetic cats, in 30% of cats with CKD and in none of the healthy cats. However, the UPC did not differ statistically between the three groups. CONCLUSIONS AND RELEVANCE: Based on evaluation of routine kidney variables, GFR and uCysC as a tubular marker at a single time point, a major impact of feline DM on kidney function could not be demonstrated.

Simplified methods for estimating glomerular filtration rate in cats and for detection of cats with low or borderline glomerular filtration rate.
Paepe D, Lefebvre HP, Concordet D, van Hoek I, Croubels S, Daminet S
OBJECTIVES: Diagnosis of early feline chronic kidney disease (CKD) is challenging. Glomerular filtration rate (GFR) is the best overall indicator of kidney function, but multisample plasma clearance methods to determine GFR are labour intensive, time consuming and stressful for feline patients. This study aimed to develop simplified methods to detect decreased GFR in cats. METHODS: Data from a nine-sample combined plasma exogenous creatinine-iohexol clearance test of 73 cats were used. Limited sampling strategies were developed by comparing all sampling time combinations with the complete nine sampling times set and selecting the best sampling time combinations based on maximum relative error. By regression analysis, the ability of routine blood (serum creatinine, serum urea) and urine (urine specific gravity, urinary protein:creatinine ratio) variables to predict GFR or identify cats with low or borderline GFR was examined. Cut-off clearance marker concentrations to predict low or borderline GFR was determined at three time points after marker injection. All procedures were analysed for three clearance markers (exo-iohexol, creatinine, endo-iohexol). RESULTS: For reliable estimation of GFR, at least three blood samples for clinical purposes and five blood samples for research purposes are required. Regression formulae based on routine variables did not reliably predict GFR, but accurately identified cats with low (sensitivity 96.5–98.2%; specificity 60–91.3%) or borderline (sensitivity 91.1–96%; specificity 76.5–81.8%) GFR. Clearance marker concentrations exceeding given marker cut-off concentrations also identified cats with low or borderline GFR with high sensitivities and specificities. CONCLUSIONS AND RELEVANCE: These simplified methods will facilitate the detection of early kidney dysfunction in cats. Early diagnosis allows timely therapeutic intervention, and future studies must reveal whether this improves the long-term outcome of cats with CKD.

Comparative Efficacy of Feline Leukemia Virus (FeLV) Inactivated Whole-Virus Vaccine and
Canarypox Virus-Vectored Vaccine during Virulent FeLV Challenge and Immunosuppression.
Patel M, Carritt K, Lane J, Jayappa H, Stahl M, Bourgeois M
Four vaccines for feline leukemia virus (FeLV) are available in the United States. This study’s purpose was to compare the efficacy of Nobivac feline 2-FeLV (an inactivated, adjuvanted whole-virus vaccine) and PureVax recombinant FeLV (a live, canarypox virus-vectorized vaccine) following FeLV challenge. Cats were vaccinated at 9 and 12 weeks with Nobivac feline 2-FeLV (group A, n = 11) or PureVax recombinant FeLV (group B, n = 10). Group C (n = 11) comprised unvaccinated controls. At 3 months postvaccination, cats were immunosuppressed and challenged with FeLV-A/61E. The outcomes measured were persistent antigenemia at 12 weeks postchallenge (PC) and proviral DNA and viral RNA at 3 to 9 weeks PC. Persistent antigenemia was observed in 0 of 11 cats in group A, 5 of 10 cats in group B, and 10 of 11 cats in group C. Group A was significantly protected compared to those in groups B (P < 0.013) and C (P < 0.0001). No difference was found between groups B and C (P > 0.063). The preventable fraction was 100% for group A and 45% for group B. At 9 weeks PC, proviral DNA and viral RNA were detected in 11 cats in group A, 6 of 10 cats in group B, and 9 of 11 cats in group C. Nucleic acid loads were significantly lower in group A than in group C (P < 0.01). Group A had significantly lower proviral DNA loads than group B at weeks 6 to 9 (P < 0.02). The viral RNA loads were significantly lower in group A than in group B at weeks 7 to 9 (P < 0.01). The results demonstrate that Nobivac feline 2-FeLV-vaccinated cats were fully protected against persistent antigenemia and had significantly smaller amounts of proviral DNA and plasma viral RNA loads than PureVax recombinant FeLV-vaccinated cats and unvaccinated controls.

Detection of Leishmania major and Leishmania tropica in domestic cats in the Ege Region of Turkey.
Paşa S, Tetik Vardarlı A, Erol N et al.
Leishmaniosis is a group of diseases caused by different species of Leishmania parasites in mammalian species. The aim of the present study was to investigate the presence of Leishmania spp. DNA in cats using real time polymerase chain reaction (RT-PCR) assays targeting internal transcribed spacer (ITS1) and heat-shock protein 70 gene (Hsp70) regions with Leishmania species-specific primers and probes. Blood samples were collected from 147 cats (73 female; 74 male) in the endemic regions for zoonotic visceral leishmaniasis in the western provinces of Turkey and analyzed using two RT-PCR assays. Additionally, Hsp70 RT-PCR products were sequenced. ELISA assays for feline immunodeficiency virus (FIV) and feline leukemia virus (FeLV) were also carried out for 145 of the 147 samples. Overall, 13/147 (8.84%) cats were positive for Leishmania by RT-PCR (4 L. major and 9 L. tropica). FIV and FeLV antibody and/or antigen was detected in 4 and 5 cats among Leishmania DNA positives, respectively. To the best of our knowledge, this study is the first to investigate and report the presence of L. major and L. tropica infections in a large group of domestic cats in Turkey. The results obtained indicate that species identification of Leishmania is essential for epidemiological understanding and that clinical signs alone are not indicative for leishmaniosis in cats, as it is in dogs. This study suggests that extensive research should be carried out in cat populations in order to fully understand the role of cats in the epidemiology of the disease.

A randomized, controlled clinical trial of intravenous lipid emulsion as an adjunctive treatment for permethrin toxicosis in cats.
Peacock RE, Hosgood G, Swindells KL, Smart L
OBJECTIVE: To assess for any clinical benefit of intravenous lipid emulsion (ILE) for permethrin toxicosis in cats by comparing the progression of clinical signs of cats before and after treatment with ILE to cats treated with a saline control. To accomplish this objective, a clinical staging system for cats with permethrin toxicosis was developed and validated. DESIGN: Prospective, multicenter, randomized, controlled clinical trial. SETTING: University veterinary teaching hospital and 12 private veterinary emergency hospitals. ANIMALS: Thirty-four client-owned cats with permethrin toxicosis. INTERVENTIONS: A clinical staging system was designed based on abnormalities found on physical examination of cats with permethrin toxicosis. The clinical staging system had 6 stages, ranging from Stage A for cats with no abnormalities to Stage F for cats with grand mal seizures. The system was validated for intraviewer and interviewer variability. Cats in the clinical trial were randomized to receive 15 mL/kg of either intravenous 0.9% saline (control) or 20% ILE over 60 minutes. For each cat, a clinical stage was recorded at set time points before and after the randomized treatment was administered. The distribution of clinical stage stratified over time was compared across treatment groups. MEASUREMENTS AND MAIN RESULTS: The clinical staging system showed excellent repeatability (P = 1.0) and reliability (P = 1.0). In the clinical trial, there was a significant difference in the distribution of clinical stages over time (P < 0.001) and from presentation stage to Stage B (P = 0.006), with ILE-treated cats (n = 20) having lower clinical stages earlier than control cats (n = 14). There was no significant difference in signalment, body weight, or supportive treatment between the groups. CONCLUSIONS: The clinical staging system was repeatable and reliable. Clinical stages of permethrin toxicosis in ILE-treated cats improved earlier compared to control cats, suggesting ILE may be a useful adjunctive therapy in the treatment of permethrin toxicosis in cats.

Pennisi MG, Hartmann K, Addie DD et al. 
OVERVIEW: The availability of blood components has increased the number of indications for transfusing cats, and fresh whole blood is readily accessible to clinicians because it can be taken from in-house donor cats or ‘volunteer’ feline blood donors. A certain amount of risk remains to the recipient cat, as immediate or delayed adverse reactions can occur during or after transfusion, related to immunemediated mechanisms. This article, however, focuses on adverse events caused by infectious agents, which may originate either from contamination of blood following incorrect collection, storage or transfusion, or from transfusion of contaminated blood obtained from an infected donor. PREVENTION OF BLOOD CONTAMINATION: In cats, blood cannot be collected through a closed system and, therefore, collection of donor blood requires a multi-step manipulation of syringes and other devices. It is crucial that each step of the procedure is performed under the strictest aseptic conditions and that bacterial contamination of blood bags is prevented, as bacterial endotoxins can cause an immediate febrile reaction or even fatal shock in the recipient cat. PREVENTION OF DISEASE TRANSMISSION: With a view to preventing transmission of blood-borne infectious diseases, the American College of Veterinary Internal Medicine has adopted basic criteria for selecting pathogens to be tested for in donor pets. The worldwide core screening panel for donor cats includes feline leukaemia virus, feline immunodeficiency virus, Bartonella species and feline haemoplasma. The list should be adapted to the local epidemiological situation concerning other vector-borne feline infections. The most practical, rapid and inexpensive measure to reduce transfusion risk is to check the risk profile of donor cats on the basis of a written questionnaire. Blood transfusion can never, however, be considered entirely safe.
Lungworm disease in cats: ABCD guidelines on prevention and management.
Pennisi MG, Hartmann K, Addie DD et al.

OVERVIEW: Cardiopulmonary nematodes are emerging parasites of cats in Europe. A number of helminth parasites may be involved. The most prevalent lungworm in domestic cats is *Aelurostrongylus abstrusus*. *Oslerus rostratus* and *Troglostrongylus* species are found mainly in wild cats. The trichurid *Capillaria aerophila* has a low host specificity and is not uncommon in cats. Additionally the lung flukes *Paragonimus* species are reported in many species outside of Europe, including cats. CLINICAL SIGNS: Lungworm infections may be asymptomatic, or cause mild to severe respiratory signs, dependent on the worm species and burden; mixed infections are observed. Kittens can be vertically infected and may develop a more severe disease. Affected cats show a productive cough, mucopurulent nasal discharge, tachypnoea, dyspnoea and, in severe cases, respiratory failure and death. MANAGEMENT: Early diagnosis and treatment greatly improves the prognosis. First-stage larvae can be easily detected in fresh faecal samples; the Baermann migration method is the enrichment technique of choice, but takes 24 h. Lungworm larvae can be found in tracheal swabs and bronchoalveolar lavage fluid, but with less sensitivity than in faeces. Molecular methods have been developed that exhibit high specificity and sensitivity, and allow diagnosis in the prepatent phase. Treatment options include fenbendazole paste, milbemycin oxime/praziquantel and various spot-on formulations. Severe cases should receive prompt medical care in an intensive care unit. PREVENTION: Avoiding predation is at present the only preventive measure for pulmonary worms with indirect life cycles. ZOONOTIC RISK: *C aerophila* has zoonotic potential, causing severe pulmonary disease in humans. Some *Paragonimus* species are also of zoonotic concern.

Ticks and associated pathogens collected from cats in Sicily and Calabria (Italy).
Pennisi MG, Persichetti MF, Serrano L et al.
*Parasit Vectors* (2015) 8:512

BACKGROUND: Limited information is available about the species of ticks infesting the cat and the pathogens that they harbor. The aims of the present study were to identify the species of ticks removed from cats living in Sicily and Calabria (Italy) and to detect DNA of vector-borne pathogens in the same ticks. FINDINGS: Morphological identification of 132 adult ticks collected throughout the year from cats was carried out. Real-time PCRs for *Hepatozoon felis*, *Piroplasmid*, *Ehrlichia/Anaplasma* spp., *Rickettsia* spp., *Bartonella* spp., *Mycoplasma* spp. and *Leishmania* infantum were performed from each individual tick.Ticks belonging to *Rhipicephalus* (*R. sanguineus sensu lato*, *R. pusillus*) and *Ixodes* (*I. ricinus*, *I. ventalloi*) genera were identified. *Ixodes ventalloi* was the most frequently found tick species (47%). The positivity rate to at least one pathogen was 14.4 % (19/132 ticks). *Leishmania* infantum, *Rickettsia* spp. (*R. monacensis* and *R. helvetica*), *Bartonella* spp. (*B. clarridgeiae*), *Piroplasmid* (*Babesia vogeli*), and *Ehrlichia/Anaplasma* spp. (*E. canis*) DNAs were amplified in 8.3, 5.3, 1.5, 0.75 and 0.75 % of ticks, respectively. *Hepatozoon felis*, *Anaplasma* spp. and *hemotropic Mycoplasma* spp. DNAs were not detected. Four (21.1 %) out of nineteen positive ticks were co-infected. CONCLUSIONS: This study provides novel data about ticks infesting cats and the DNA of pathogens that they harbor. In Southern Italy, anti-tick prophylaxis should be implemented throughout the year in cats without neglecting winter time.

Improving the feline veterinary consultation: the usefulness of Feliway spray in reducing cats’ stress.
OBJECTIVES: Going to the veterinary clinic is a stressful experience for most cats as they feel threatened when entering a new and confined environment. The aim of this research was to investigate if Feliway spray, when used on the table in the consultation room, can decrease cats’ stress and ease their handling. METHODS: A randomised, double-blind, placebo-controlled clinical trial was developed, using a total sample of 87 cats of both sexes, castrated or intact, of any breed, aged >26 weeks. A Feliway spray and a placebo solution spray were tested in two different consultation rooms. During the first phase, Feliway spray was applied to the examination table of one room and the placebo spray in the other. After a washout period of 15 days the spray allocation was switched. After the first 15 mins of general questioning and physical examination carried out by the veterinarian, the observer assessed the stress levels of the cats based on a seven-level ‘cat stress score’, and the ease of handling based on a five-point ‘scale of handling’ developed by the authors. RESULTS: The study demonstrated that the use of Feliway spray leads to significant (P = 0.01) differences in cats’ usual behaviour, according to their owners. With regard to stress, animals exposed to Feliway spray showed significantly lower stress levels than those treated with placebo (P = 0.02). Regarding the scale of handling, the scoring did not differ significantly between cats under the effect of Feliway spray and cats receiving placebo (P = 0.01). CONCLUSIONS AND RELEVANCE: This research shows that the use of Feliway spray on the examination table improves the welfare of cats by reducing their stress during veterinary consultations. Feliway spray significantly changed the behaviour of the cats in this study, and offers a simple and effective way to help decrease stress in cats during the consultation.

Evaluation of Serum Thyroid-Stimulating Hormone Concentration as a Diagnostic Test for Hyperthyroidism in Cats.
Peterson ME, Guterl JN, Nichols R, Rishniw M
BACKGROUND: In humans, measurement of serum thyroid-stimulating hormone (TSH) concentration is commonly used as a first-line discriminatory test of thyroid function. Recent reports indicate that canine TSH (cTSH) assays can be used to measure feline TSH and results can help diagnose or exclude hyperthyroidism. OBJECTIVES: To investigate the usefulness of cTSH measurements as a diagnostic test for cats with hyperthyroidism. ANIMALS: Nine hundred and seventeen cats with untreated hyperthyroidism, 32 euthyroid cats suspected of having hyperthyroidism, and 131 clinically normal cats. METHODS: Prospective study. Cats referred to the Animal Endocrine Clinic for suspected hyperthyroidism were evaluated with serum T4, T3, free T4 (fT4), and TSH concentrations. Thyroid scintigraphy was used as the gold standard to confirm or exclude hyperthyroidism. RESULTS: Median serum TSH concentration in the hyperthyroid cats (<0.03 ng/mL) was significantly (P <.001) lower than concentrations in clinically normal cats (0.05 ng/mL) or euthyroid cats with suspected thyroid disease (0.06 ng/mL). Only 18 (2.0%) hyperthyroid cats had measurable TSH concentrations (≥0.03 ng/mL), whereas 114 (69.9%) of the 163 euthyroid cats had detectable concentrations. Combining serum TSH with T4 or fT4 concentrations lowered the test sensitivity of TSH from 98.0 to 97.0%, but markedly increased overall test specificity (from 69.9 to 98.8%). CONCLUSIONS AND CLINICAL IMPORTANCE: Serum TSH concentrations are suppressed in 98% of hyperthyroid cats, but concentrations are measurable in a few cats with mild-to-moderate hyperthyroidism. Measurement of serum TSH represents a highly sensitive but poorly specific test for diagnosis of hyperthyroidism and is best measured in combination with T4 and fT4.

Effects of two calculolytic diets on parameters of feline mineral metabolism.
Pineda C, Aguilera-Tejero E, Raya AI, Montes de Oca A, Rodriguez M, Lopez I
OBJECTIVES: To evaluate the influence of two feline calculolytic diets on selected parameters of mineral metabolism. MATERIALS AND METHODS: Two dry commercial diets designed for struvite urolith dissolution were evaluated in 14 cats. The study was designed as a two-sequence, four-period crossover protocol with a baseline period, two 60-day “run-in” periods in which calculolytic diets (Diet 1 and Diet 2) were fed and one 30-day “wash-out” period. Data are expressed as median (range).

RESULTS: Feeding the calculolytic diets for two months did not alter plasma concentrations of calcium, phosphorus, magnesium and parathyroid hormone. A significant (P < 0.05 in each case) decline in calcitriol was observed after administering both diets from 236.4 (122.4-429.6) to 170.4 (108.0-394.3) pmol/L (Diet 1) and from 278.4 (153.6-492.0) to 177.1 (87.6-392.4) pmol/L (Diet 2). Cats fed Diet 1 showed a significant increase in urine calcium concentration (from 0.3 (0.2-0.5) to 0.4 (0.3-0.7) mmol/L). Magnesium concentration in urine was significantly increased with both diets, from 1.4 (0.1-1.7) to 1.5 (1.3-2.4) mmol/L (Diet 1) and from 1.1 (0.4-1.9) to 2.0 (0.1-3.1) mmol/L (Diet 2).

CLINICAL SIGNIFICANCE: Both diets resulted in an increased urinary concentration of magnesium, through different mechanisms: urine acidification (Diet 1) and increased sodium load (Diet 2).

Use of indocyanine green and sodium fluorescein for anterior segment angiography in ophthalmologically normal cats.

Pirie CG, Alario A

OBJECTIVE: To assess and compare results of anterior segment angiography of ophthalmologically normal cats following IV injection with indocyanine green and sodium fluorescein dyes. ANIMALS: 10 client-owned cats. PROCEDURES: Anterior segment angiography was performed in anesthetized cats following administration of 0.25% indocyanine green (1.0 mg/kg, IV) or 10% sodium fluorescein (20 mg/kg, IV) solution. All cats received both treatments. Imaging (1 eye/cat) was performed with a full-spectrum digital single-lens reflex camera equipped with an adaptor (1 image/s for 30 seconds) immediately following IV dye injection and 1, 2, 3, 4, and 5 minutes after injection. Onset and duration of arterial, capillary, and venous phases of iris vasculature were identified and compared statistically between treatments. Degree of iridal pigmentation, leakage of dye from iris vasculature, and image quality were subjectively assessed. RESULTS: No differences were found in onset or duration of vascular phases between treatments. Visibility of the iris vasculature was not impaired by poor or moderate iridal pigmentation with either method. Indocyanine green provided subjectively better vascular detail and image contrast than sodium fluorescein. No vascular dye leakage was observed following indocyanine green administration. Leakage of dye from blood vessels in the stroma (in 10 cats) and presence of dye in the anterior chamber (in 5 cats) were detected after sodium fluorescein administration. CONCLUSIONS AND CLINICAL RELEVANCE: Images obtained with either fluorescent dye were considered to be of diagnostic quality. Lack of leakage following indocyanine green administration suggested this treatment may have better diagnostic utility for anterior segment angiography. The photographic equipment used provided a cost-effective alternative to existing imaging systems.

Sleeping and resting respiratory rates in dogs and cats with medically-controlled left-sided congestive heart failure.

Porciello F, Rishniw M, Ljungvall I, Ferasin L, Haggstrom J, Ohad DG
Vet J (2015)

Sleeping and resting respiratory rates (SRR and RRR, respectively) are commonly used to monitor dogs and cats with left-sided cardiac disease and to identify animals with left-sided congestive heart failure (L-CHF). Dogs and cats with subclinical heart disease have SRRmean values <30 breaths/min.
However, little is known about SRR and RRR in dogs and cats with CHF that is well controlled with medical therapy. In this study, SRR and RRR were measured by the owners of 51 dogs and 22 cats with stable, well-controlled CHF. Median canine SRRmean was 20 breaths/min (7-39 breaths/min); eight dogs were ≥25 breaths/min and one dog only was ≥30 breaths/min. Canine SRRmean was unrelated to pulmonary hypertension or diuretic dose. Median feline SRRmean was 20 breaths/min (13-31 breaths/min); four cats were ≥25 breaths/min and only one cat was ≥30 breaths/min. Feline SRRmean was unrelated to diuretic dose. SRR remained stable during collection in both species with little day-to-day variability. The median canine RRRmean was 24 breaths/min (12-44 breaths/min), 17 were ≥25 breaths/min, seven were ≥30 breaths/min, two were >40 breaths/min. Median feline RRRmean was 24 breaths/min (15-45 breaths/min); five cats had RRRmean ≥25 breaths/min; one had ≥30 breaths/min, and two had ≥40 breaths/min. These data suggest that most dogs and cats with CHF that is medically well-controlled and stable have SRRmean and RRRmean <30 breaths/min at home. Clinicians can use these data to help determine how best to control CHF in dogs and cats.

A cell wall protein-based vaccine candidate induce protective immune response against Sporothrix schenckii infection.
Sporotrichosis is a subcutaneous mycosis caused by several closely related thermo-dimorphic fungi of the Sporothrix schenckii species complex, affecting humans and other mammals. In the last few years, new strategies have been proposed for controlling sporotrichosis owing to concerns about its growing incidence in humans, cats, and dogs in Brazil, as well as the toxicity and limited efficacy of conventional antifungal drugs. In this study, we assessed the immunogenicity and protective properties of two aluminum hydroxide (AH)-adsorbed S. schenckii cell wall protein (ssCWP)-based vaccine formulations in a mouse model of systemic S. schenckii infection. Fractioning by SDS-PAGE revealed nine protein bands, two of which were functionally characterized: a 44kDa peptide hydrolase and a 47kDa enolase, which was predicted to be an adhesin. Sera from immunized mice recognized the 47kDa enolase and another unidentified 71kDa protein, whereas serum from S. schenckii-infected mice recognized both these proteins plus another unidentified 9.4kDa protein. Furthermore, opsonization with the anti-ssCWP sera led to markedly increased phagocytosis and was able to strongly inhibit the fungus’ adhesion to fibroblasts. Immunization with the higher-dose AH-adjuvanted formulation led to increased ex vivo release of IL-12, IFN-γ, IL-4, and IL-17, whereas only IL-12 and IFN-γ were induced by the higher-dose non-adjuvanted formulation. Lastly, passive transference of the higher-dose AH-adjuvanted formulation’s anti-ssCWP serum was able to afford in vivo protection in a subsequent challenge with S. schenckii, becoming a viable vaccine candidate for further testing.

Domestic Cats (Felis silvestris catus) Do Not Show Signs of Secure Attachment to Their Owners.
The Ainsworth Strange Situation Test (SST) has been widely used to demonstrate that the bond between both children and dogs to their primary carer typically meets the requirements of a secure attachment (i.e. the carer being perceived as a focus of safety and security in otherwise threatening environments), and has been adapted for cats with a similar claim made. However methodological problems in this latter research make the claim that the cat-owner bond is typically a secure attachment, operationally definable by its behaviour in the SST, questionable. We therefore developed an adapted version of the SST with the necessary methodological controls which include a full counterbalance of the procedure. A cross-over design experiment with 20 cat-owner pairs (10 each undertaking one of the
two versions of the SST first) and continuous focal sampling was used to record the duration of a range of behavioural states expressed by the cats that might be useful for assessing secure attachment. Since data were not normally distributed, non-parametric analyses were used on those behaviours shown to be reliable across the two versions of the test (which excluded much cat behaviour). Although cats vocalised more when the owner rather than the stranger left the cat with the other individual, there was no other evidence consistent with the interpretation of the bond between a cat and its owner meeting the requirements of a secure attachment. These results are consistent with the view that adult cats are typically quite autonomous, even in their social relationships, and not necessarily dependent on others to provide a sense of security and safety. It is concluded that alternative methods need to be developed to characterise the normal psychological features of the cat-owner bond.

Cardiovascular-renal axis disorders in the domestic dog and cat: a veterinary consensus statement.
Pouchelon JL, Atkins CE, Bussadori C et al. 
OBJECTIVES: There is a growing understanding of the complexity of interplay between renal and cardiovascular systems in both health and disease. The medical profession has adopted the term “cardiorenal syndrome” (CRS) to describe the pathophysiological relationship between the kidney and heart in disease. CRS has yet to be formally defined and described by the veterinary profession and its existence and importance in dogs and cats warrant investigation. The CRS Consensus Group, comprising nine veterinary cardiologists and seven nephrologists from Europe and North America, sought to achieve consensus around the definition, pathophysiology, diagnosis and management of dogs and cats with “cardiovascular-renal disorders” (CvRD). To this end, the Delphi formal methodology for defining/building consensus and defining guidelines was utilised. METHODS: Following a literature review, 13 candidate statements regarding CvRD in dogs and cats were tested for consensus, using a modified Delphi method. As a new area of interest, well-designed studies, specific to CRS/CvRD, are lacking, particularly in dogs and cats. Hence, while scientific justification of all the recommendations was sought and used when available, recommendations were largely reliant on theory, expert opinion, small clinical studies and extrapolation from data derived from other species. RESULTS: Of the 13 statements, 11 achieved consensus and 2 did not. The modified Delphi approach worked well to achieve consensus in an objective manner and to develop initial guidelines for CvRD. DISCUSSION: The resultant manuscript describes consensus statements for the definition, classification, diagnosis and management strategies for veterinary patients with CvRD, with an emphasis on the pathological interplay between the two organ systems. By formulating consensus statements regarding CvRD in veterinary medicine, the authors hope to stimulate interest in and advancement of the understanding and management of CvRD in dogs and cats. The use of a formalised method for consensus and guideline development should be considered for other topics in veterinary medicine.

Nutritional analysis and microbiological evaluation of commercially available enteral diets for cats.
OBJECTIVE: To determine the prevalence of nutrients less than or greater than accepted standards in commercially available enteral diets for cats, and to identify contamination incidence in enteral diets for cats. DESIGN: Prospective cross-sectional study. SETTING: University teaching hospital. SAMPLES: Seven commercial enteral diets for cats. INTERVENTIONS: Labels were evaluated to
determine if diets were intended to be nutritionally complete and balanced. One diet under storage techniques partially representative of clinical conditions was sampled on days 0, 1, 3, 5, and 7 of storage for aerobic bacterial culture. MEASUREMENTS AND MAIN RESULTS: All 7 diets were analyzed for key nutrients and results were compared to Association of American Feed Control Officials (AAFCO) Nutrient Profiles for Adult Cats for maintenance and National Research Council recommended allowance (NRC-RA). From label information, 4 diets were classified as complete and balanced and 3 diets were classified as not complete and balanced. All 7 diets had at least 1 nutrient less than the AAFCO minimums and the NRC-RA. The total number of nutrients less than AAFCO minimums ranged from 3 to 9 (median = 4), with iron, potassium, and manganese being the most common. Concentrations of some nutrients were undetectable. None of the samples tested had a positive aerobic culture at baseline (day 0) or on subsequent samples from days 1, 3, 5, and 7 under any storage condition. CONCLUSIONS: None of the diets analyzed met all of the minimum nutrient concentrations. While short-term feeding may not be of concern for an individual patient, clinicians should be aware of potential nutritional limitations when feeding enteral diets to ill or injured cats.

Clinical Approach to Advanced Renal Function Testing in Dogs and Cats.
Pressler BM
Serum creatinine concentration is insensitive for detecting kidney injury and does not assist in differentiation between glomerular versus tubular damage. Advanced renal function tests, including glomerular filtration rate testing, determining fractional excretion of electrolytes, and assay of urine biomarkers, may allow earlier detection of reduced renal function mass, differentiation of renal from non-renal causes of azotemia, and assist with localization of damage. This article reviews the principles, indications, and limitations of these tests and describes their use in sample clinical scenarios.

Characteristics of urethral and epididymal semen collected from domestic cats-A retrospective study of 214 cases.
Prochowska S, Niżański W, Ochota M, Partyka A
Theriogenology (2015) 84:1565-1571
This study was designed to describe and compare basic semen characteristics and sperm motility parameters obtained via computer-assisted sperm analysis (CASA) in feline semen collected from the urethra and epididymis, on the basis of large, unselected population of domestic cats. The semen collected from 214 males was subjected for routine semen assessment and CASA evaluation. semen collected by urethral catheterization (CT) and by epididymal slicing (EP) has comparable characteristics according to total sperm count (47.7 ± 42.1 and 52.9 ± 45.0), subjective motility (71.1 ± 17.0 and 69.3 ± 13.9), viability (74.9 ± 13.4 and 76.7 ± 10.6), and morphology (52.6 ± 19.0 and 47.2 ± 17.4). The study of a large feline population confirmed a high incidence of teratospermy in cats, which negatively affects sperm motility parameters assessed by CASA. A lack of a correlation between CT and EP semen for total sperm count and viability, as well as occasional gross differences between the morphology of CT and EP semen of the same cat suggests that many factors may affect sperm cells, and the fertility and/or infertility of patients should not be assessed after examining only one sample. Additionally, technical problems with assessment of EP samples (understated results) suggest that CT semen is more appropriate for an analysis by CASA than EP.

Chronic use of maropitant for the management of vomiting and inappetence in cats with chronic
kidney disease: a blinded, placebo-controlled clinical trial.
Quimby JM, Brock WT, Moses K, Bolotin D, Patricelli K

**OBJECTIVES:** Maropitant is commonly used for acute vomiting. A pharmacokinetic and toxicity study in cats indicated that longer term usage appears safe. The aim of this study was to assess the efficacy of maropitant for management of chronic vomiting and inappetence associated with feline chronic kidney disease (CKD).

**METHODS:** Forty-one cats with stable International Renal Interest Society Stage II or III CKD, no known concurrent illness, and a complaint of chronic vomiting and inappetence attributed to CKD were enrolled in a randomized, placebo-controlled, blinded clinical study. A complete blood count, serum biochemistry, urinalysis, urine culture, T4 and blood pressure were required for entry. Maropitant was administered at a dose of 4 mg orally (median 1.1 mg/kg, range 0.6-2.9 mg/kg) daily for 2 weeks. Owners kept daily logs of vomiting incidence, appetite and activity scores. Physical examination, weight, body condition score and serum biochemistry were performed before and after the trial period. Mann-Whitney statistics were used to compare treatment groups.

**RESULTS:** Thirty-three cats successfully completed the trial: 21 cats received the drug (nine Stage II cats, 12 Stage III cats) and 12 cats received placebo (seven Stage II cats, five Stage III cats). There was a statistically significant decrease in vomiting in cats with CKD that received maropitant (P <0.01). Cats that received maropitant did not have statistically significant differences in appetite scores, activity scores, weight or serum creatinine compared with placebo.

**CONCLUSIONS AND RELEVANCE:** Maropitant was demonstrated to palliate vomiting associated with CKD, and may be helpful in the nutritional management of cats with CKD.

**Acquired Fanconi syndrome in four cats treated with chlorambucil.**
Reinert NC, Feldman DG

**CASE SERIES SUMMARY:** Fanconi syndrome (FS) is well described in humans and dogs, but has not been reported in cats. This case series describes four cats with acquired FS. On the basis of clinical signs and intestinal biopsies, all cats were initially diagnosed with alimentary lymphoma or inflammatory bowel disease. Treatment with chlorambucil and corticosteroids was started at standard doses, based on published protocols. Within 2-26 months of the start of treatment, glucosuria, despite normoglycemia, was identified incidentally on routine biochemical screening; FS was diagnosed with urine metabolic assays confirming aminoaciduria and glucosuria in all four cases. Neither polyuria nor polydypsia were noted in any case, and only 1/4 cats had any clinical signs at the time of diagnosis. Partial or complete resolution of FS was seen in 3/4 cases within 3 months of discontinuing chlorambucil therapy.

**RELEVANCE AND NOVEL INFORMATION:** This is the first case series to document acquired FS in the cat, and the first to suggest a possible association between chlorambucil and acquired FS. Cats treated with chlorambucil should be monitored for the development of glucosuria, and discontinuation of chlorambucil should be considered if FS is identified. Further study into the association between chlorambucil and acquired FS in cats is warranted.

**Put a label (claim) on it: Getting non-surgical contraceptives approved for use in cats and dogs.**
Rhodes L

**RELEVANCE:** Non-surgical contraceptives or sterilants need regulatory approval to be sold for that use. This approval process gives veterinarians the information required to assess the benefits and risks of each product, and to provide comprehensive information on the required dose, method and duration of use, safety and effectiveness.

**AIM:** This article reviews the information that must be developed and
provided to regulatory agencies worldwide, with a focus on the European Union and the United States, in order to achieve regulatory approval. PROCESSES: The main components of developing a drug include developing extensive information on the safety and effectiveness of the product, and also the safety to the environment and to humans handling and administering the drug. Most importantly, a robust method of manufacturing both the drug itself and the formulated drug product (pill, liquid implant or injection) must be developed to assure quality and consistency in each batch. This information is then compiled and submitted to regulatory agencies; in the United States, this includes the Food and Drug Administration, the United States Department of Agriculture and the Environmental Protection Agency, and, in Europe, the European Medicines Agency. CHALLENGES: Because of the unique nature of non-surgical contraceptives for use in cats and dogs, particularly the desire to have these products last over multiple years, there are special challenges to their regulatory approval that are discussed in this review.

Clinical and laboratory features of cats with feline infectious peritonitis - a retrospective study of 231 confirmed cases (2000-2010).
Riemer F, Kuehner KA, Ritz S, Sauter-Louis C, Hartmann K
OBJECTIVES: The objectives of this study were to review signalment, clinical signs and laboratory features in a large number of naturally occurring cases of feline infectious peritonitis (FIP), and to evaluate potential changes in diagnostic criteria for FIP and compare findings in cats with and without effusion. METHODS: The medical records of 231 cats with confirmed FIP that presented to the Clinic of Small Animal Medicine of the Ludwig-Maximilian University of Munich, Germany, were reviewed for signalment, history, and clinical and laboratory parameters. Age, sex and breed distribution of the cats were compared with the clinic population. RESULTS: Male sex and young age were significantly correlated with FIP. Neutering status was not associated with FIP. No breed predisposition was observed and the majority of cats presented were domestic shorthair and mixed breed. Microcytosis of peripheral erythrocytes was found in 35.1% of cats, of which 42.4% did not have concurrent anaemia. Band neutrophilia was documented in 44.3% (81/183), of which 35.8% did not have mature neutrophilia. Lymphopenia, observed significantly more often with effusion, was documented in only 26.8% of cats without effusion. Hyperbilirubinaemia also occurred significantly more often in cats with vs without effusion. While serum total protein was increased in only 17.5% of cats, hyperglobulinaemia was documented in 89.1%. Nearly 85.0% of cats had an albumin-to-globulin (A:G) ratio <0.8, while 67.8% had an A:G ratio <0.6. CONCLUSIONS AND RELEVANCE: Microcytosis was common and can increase suspicion of FIP in the presence of other typical clinical and laboratory abnormalities. The low prevalence of lymphopenia in cats without effusion suggests that this is not a useful parameter in non--effusive FIP. The frequent occurrence of a left shift in the absence of a mature neutrophilia complicates the differentiation of effusive FIP and septic peritonitis. Globulins and A:G ratio were of higher diagnostic value than hyperproteinaemia.

Effective prevention of pseudothrombocytopenia in feline blood samples with the prostaglandin I2 analogue Iloprost.
BACKGROUND: In vitro platelet aggregation in feline blood samples is a well-known phenomenon in veterinary clinical laboratories resulting in high numbers of pseudothrombocytopenia. Several attempts have been made to prevent or dissolve platelet aggregates in feline blood samples and to increase the reliability of feline platelet counts. Prostaglandin I2 (PGI2) is the most powerful endogenous inhibitor
of platelet aggregation but unstable. Iloprost is a stable PGI2 analogue. The aims of the present study were (1) to evaluate the anti-aggregatory effect of Iloprost on feline platelet counts and to determine a useful concentration to inhibit platelet aggregation in EDTA samples from clinically healthy cats, (2) to investigate the effect of Iloprost on hematological blood parameters, and (3) to determine stability of Iloprost in K3-EDTA tubes for up to 16 weeks. From 20 clinically healthy cats blood was drawn from the jugular vein and immediately distributed in a 1.3 ml K3-EDTA tube, and two 1.3 ml K3-EDTA tubes containing 20 ng and 200 ng Iloprost, respectively. A complete blood cell count was performed on the Sysmex XT-2000iV and the Mythic 18 on eight consecutive time points after collection. Blood smears were evaluated for the presence of PLT aggregates. RESULTS: In the absence of Iloprost, pseudothrombocytopenia was observed in 50% of the investigated samples that led to significantly decreased optical PLT counts by a mean of 105 x10(3)/µl, which could be prevented by the addition of 1 µL (20 ng) Iloprost leading to an increase in PLT counts by a mean of 108 x10(3)/µl. CONCLUSION: This is the first study showing an anti-aggregatory effect of the PGI2-analogue Iloprost in feline EDTA blood. In all clinically healthy cats investigated, pseudothrombocytopenia was prevented by adding Iloprost to EDTA tubes prior to blood collection. Furthermore, Iloprost was very useful in preventing falsely increased WBC counts in samples with platelet aggregates analyzed on impedance-based hematological instruments. Iloprost is preferable to PGI2 or PGE1 due to its stability and easy and safe handling properties. Cytological evaluations of blood smears as well as other hematological parameters were not influenced to a clinically significant degree by the presence of Iloprost.

Fleas and Flea-Associated Bartonella Species in Dogs and Cats from Peru.
Rizzo MF, Biller SA, Osikowicz L, Luna-Caipo DV, Cáceres AG, Kosoy M
In the present study, we investigated 238 fleas collected from cats and dogs in three regions of Peru (Ancash, Cajamarca, and Lima) for the presence of Bartonella DNA. Bartonella spp. were detected by amplification of the citrate synthase gene (16.4%) and the 16S-23S intergenic spacer region (20.6%). Bartonella rochalimae was the most common species detected followed by Bartonella clarridgeiae and Bartonella henselae. Our results demonstrate that dogs and cats in Peru are infested with fleas harboring zoonotic Bartonella spp. and these infected fleas could pose a disease risk for humans.

Roberts E, Gray JM, Gunn E, Ramsey IK
Vet Rec (2015) 177:14
A continuous monitoring system (MGP DM2000X) was assessed for monitoring γ radiation emissions and determining appropriate isolation times for hyperthyroid cats treated with radioactive iodine (I(131)). Daily radiation emitted by 12 cats who had received a range of doses of I(131) (80-200 MBq) was measured and average background radiation readings deducted. The effective half-lives of the I(131) in the cats were found to have a median of 2.54 days (range 1.40-3.24 days). Cats treated with 200 MBq emitted 5 µGy/day more exposure than cats treated with lower doses throughout the study period (P=0.032). All cats were found to emit a total radiation dose exposure less than 100 µGy (range 0-43 µGy) during days 18-21 of isolation. The potential additional dose exposure to owners was calculated at various days that might be considered for the cats to be returned to their owners. Using this provisional data, maximum isolation periods at this institution could be safely reduced to 17 days as long as certain precautions are followed. This preliminary study demonstrated that this novel cage-side monitoring system can be used to calculate the effective half-life of I(131) and to measure γ
radiation exposure from treated cats, which may assist other institutions in determining appropriate isolation times for individual cats.

Clinical efficacy and safety following dose tapering of ciclosporin in cats with hypersensitivity dermatitis.
Roberts ES, Tapp T, Trimmer A, Roycroft L, King S

**OBJECTIVES:** This study was designed to evaluate the efficacy and safety of reducing ciclosporin (CsA) dosing frequency from daily to every other day (EOD) or twice a week (TW) according to clinical response in cats with hypersensitivity dermatitis (HD) and treated with CsA. **METHODS:** One hundred and ninety-one cats with HD were given 7 mg/kg CsA daily for at least 4 weeks. Depending on clinical response, the dosing frequency was tapered from daily to EOD over the next 4 weeks and further to TW for an additional 4 weeks. Safety was evaluated through physical examinations, clinical pathology and the monitoring of adverse events (AEs). **RESULTS:** The majority of cats were able to have their dose of CsA tapered to either EOD (15.5%) or TW (62.9%) according to the clinical response. Observed AEs were most frequently mild and self-limiting vomiting and diarrhea. A higher percentage of AEs occurred with daily administration (73%) compared with other dosing regimens (27%). **CONCLUSIONS AND RELEVANCE:** Following 4 weeks of daily dosing at 7 mg/kg, CsA may be tapered to EOD or TW while maintaining the desired therapeutic response in cats with HD. Additionally, CSA appears to be well tolerated with fewer AEs at EOD or TW dosing. Establishing the lowest effective dosing frequency of CSA improves the drug’s safety profile.

The effects of diazepam or midazolam on the dose of propofol required to induce anaesthesia in cats.
Robinson R, Borer-Weir K

**OBJECTIVES:** Assess effects of benzodiazepine administration on the propofol dose required to induce anaesthesia in healthy cats, investigate differences between midazolam and diazepam, and determine an optimal benzodiazepine dose for co-induction. **STUDY DESIGN:** Prospective, randomised, blinded, placebo-controlled clinical trial. **ANIMALS:** Ninety client-owned cats (ASA I and II) with a median (interquartile range) body mass of 4.0 (3.4-4.9) kg. **METHODS:** All cats received 0.01 mg kg(-1) acepromazine and 0.2 mg kg(-1) methadone intravenously (IV). Fifteen minutes later, sedation was scored on a scale of 1-5, with 5 indicating greatest sedation. Propofol, 2 mg kg(-1), administered IV, was followed by either midazolam or diazepam at 0.2, 0.3, 0.4 or 0.5 mg kg(-1) or saline 0.1 mL kg(-1). Further propofol was administered until endotracheal intubation was possible. Patient signalment, sedation score, propofol dosage and adverse reactions were recorded. **RESULTS:** Midazolam and diazepam (all doses) significantly reduced the propofol dose required compared with saline (p < 0.001). There was no difference between midazolam and diazepam in propofol dose reduction (p = 0.488). All individual doses of midazolam reduced propofol requirement compared with saline (0.2 mg kg(-1), p = 0.028; 0.3 mg kg(-1), p = 0.006; 0.4 mg kg(-1), p < 0.001; 0.5 mg kg(-1), p = 0.009). Diazepam 0.2 mg kg(-1) did not reduce the propofol dose compared with saline (p = 0.087), but the remaining doses did (0.3 mg kg(-1), p = 0.001; 0.4 mg kg(-1), p = 0.032; 0.5 mg kg(-1), p = 0.041). Cats with sedation scores of 3 required less propofol than cats with scores of 2 (p = 0.008). There was no difference between groups in adverse events. **CONCLUSIONS AND CLINICAL RELEVANCE:** Midazolam (0.2-0.5 mg kg(-1)) and diazepam (0.3-0.5 mg kg(-1)) administered IV after 2 mg kg(-1) propofol significantly reduced the propofol dose required for tracheal intubation.
**Clinical efficacy and cardiorespiratory effects of intramuscular administration of alfaxalone alone or in combination with dexmedetomidine in cats.**

Rodrigo-Mocholi D, Belda E, Bosmans T, Laredo FG  

**OBJECTIVE:** To investigate the sedative, anaesthetic and cardiorespiratory effects of intramuscular (IM) administration of alfaxalone alone or in combination with dexmedetomidine in cats.  
**STUDY DESIGN:** Blinded, randomized crossover study with a washout period of 15 days.  
**ANIMALS:** Seven adult cats, weighing 3.5 ± 0.7 kg.  
**METHODS:** Cats were assigned randomly to each of three treatments: A5 (alfaxalone 5 mg kg(-1)), D20 A5 (dexmedetomidine 20 µg kg(-1) and alfaxalone 5 mg kg(-1)) and D40 A5 (dexmedetomidine 40 µg kg(-1) and alfaxalone 5 mg kg(-1)). Drugs were administered IM into the epaxial muscles. Sedation or anaesthesia scores were evaluated by a modified numerical rating scale. Times to extubation, head-lift, sternal recumbency and standing were recorded. Heart and respiratory rates, systolic arterial pressure, arterial oxygen saturation of haemoglobin, end-tidal carbon dioxide tension and rectal temperature were measured at 5, 10, 15, 20, 30, 45, 60, 90, 120 and 150 minutes after drug administration. Adverse events were recorded. Data were analysed by one-way anova with Tukey’s post-hoc test for parametric values and, for non-normally distributed parameters, a Kruskal-Wallis test and Mann-Whitney U-test for two independent samples (p < 0.05).  
**RESULTS:** Sedation scores were significantly different among the treatments. Cats in A5 were deeply sedated, whereas cats administered dexmedetomidine were anaesthetized. The onset of action and the duration of anaesthesia were related to the dose of dexmedetomidine. Cardiorespiratory parameters remained stable in the A5 group. Lower heart rates, higher systolic blood pressures and occasional low pulse oximetry readings were observed in the dexmedetomidine groups. A limited number of adverse events (hyperkinesia, emesis) occurred during recovery.  
**CONCLUSIONS AND CLINICAL RELEVANCE:** Alfaxalone administered IM induced sedation in cats. The addition of dexmedetomidine to alfaxalone induced general anaesthesia with a mild decrease in the heart rate and arterial oxygen saturation of haemoglobin.

**Molecular Detection of Bartonella Species in Fleas Collected from Dogs and Cats from Costa Rica.**

Rojas N, Troyo A, Castillo D, Gutierrez R, Harrus S  
*Vector Borne Zoonotic Dis* (2015) **15**:630-632

The bacterial genus Bartonella includes several species with zoonotic potential, some of which are common in domestic dogs and cats, as well as in their fleas. Because there is no previous information about the presence of Bartonella species in fleas from Central America, this study aimed at evaluating the presence of Bartonella spp. in fleas collected from dogs and cats in Costa Rica. A total 72 pools of Ctenocephalides felis and 21 pools of Pulex simulans were screened by conventional PCR to detect Bartonella DNA fragments of the citrate synthase (gltA) and the β subunit RNA polymerase (rpoB) genes. Three (4.2%) pools of C. felis and five pools (22.7%) of P. simulans were found positive for Bartonella DNA. Sequences corresponding to Bartonella vinsonii subsp. berkhoffii strain Winnie, B. rochalimae, and an undescribed Bartonella sp. (clone BR10) were detected in flea pools from dogs, whereas Bartonella henselae and B. clarridgeiae sequences were identified in flea pools from cats. The detection of zoonotic Bartonella spp. in this study should increase the awareness to these flea-borne diseases among physicians and public health workers and highlight the importance of flea control in the region.
An ethicist’s commentary on feral cats.
Rollin BE

Progestins to control feline reproduction: Historical abuse of high doses and potentially safe use of low doses.
Romagnoli S

RELEVANCE: The high fertility rate of cats means that methods to control feline reproduction are a requirement for cat breeders and pet owners, as well as for those involved in the management of feral cat populations. Progestins continue to be used to prevent queens from cycling, and also as an adjunct or alternative to surgical sterilization within trap-neuter-return (TNR) programs. EVIDENCE BASE: A considerable body of information exists on megestrol acetate (MA) and medroxyprogesterone acetate (MPA), thanks to the many studies and case reports published in the scientific literature over the past 50 years documenting their clinical use in cats. Comparatively less is known about the use in cats of more recent progestins such as levonorgestrel, progilstone, delmadinone, chlormadinone and altrenogest. DOSING, SAFETY AND EFFICACY: Based on a combination of dose, frequency and duration of treatment, MA can be categorized into low (0.625 mg/kg/week for up to 30 weeks), medium (0.625 mg/kg q24h for 1 week or q48h for up to 2 weeks) and high (0.625 mg/kg q24h or q48h for several weeks, or weekly for months or years) dosages. Studies suggest that low dosages can be used relatively safely in cats, while higher dosages increase the risk and severity of adverse reactions. Early work showing that an oral MPA dosage of 0.01 mg/kg administered q24h for 12 months suppresses oestrus in queens effectively and safely has not been considered, and much higher MPA dosages (>6.25 mg/kg q24h) have been used in cats over the past 40 years. RECOMMENDATIONS: Progestins should always be used with caution. Using the lowest possible dosages, MA and MPA may, however, continue to be used safely in pet queens as well as (in conjunction with TNR programs) for the control of feral cat colonies. More recent progestins appear to be effective and safe, albeit their efficacy and safety need to be further investigated.

Risk factors identified for owner-reported feline obesity at around one year of age: Dry diet and indoor lifestyle.
Rowe E, Browne W, Casey R, Gruffydd-Jones T, Murray J

Obesity is considered the second most common health problem in pet cats in developed countries. Previous studies investigating risk factors for feline obesity have been cross-sectional, where reverse causality cannot be ruled out. This study is the first to use prospective data from a large scale longitudinal study of pet cats (‘Bristol Cats’) to identify early-life risk factors for feline overweight/obesity at around one year of age. Data analysed were collected via three owner-completed questionnaires (for cats aged 2-4 months, 6.5-7 months and 12.5-13 months) completed between May 2010 and August 2013. Owner-reported body condition scores (BCS) of cats at age 12.5-13 months, using the 5-point system, were categorised into a dichotomous variable: overweight/obese (BCS 4-5) and not overweight (BCS 1-3) and used as the dependent variable. Cat breed, neuter status, outdoor access, type of diet, frequency of wet and dry food fed and frequency of treats fed were analysed as potential risk factors. Of the 966 cats for which data were available, 7.0% were reported by their owners to be overweight/obese at 12.5-13 months of age. Descriptive data on type of diet fed at
different cat ages suggest that a dry diet is the most popular choice for UK domestic cats. Significant potential explanatory variables from univariable logistic regression models were included in multivariable logistic regression models built using stepwise forward-selection. To account for potential hierarchical clustering of data due to multi-cat households these were extended to two-level random intercept models. Models were compared using Wald test p-values. Clustering had no impact on the analysis. The final multivariable logistic regression model identified two risk factors that were independently associated with an increased risk of feline obesity developing at 12.5-13 months of age: restricted or no outdoor access and feeding dry food as the only or major (>50%) type of food in the diet at age 12.5-13 months. The same relationship was revealed when only variables containing prospective data were included in the multivariable model. The study highlights the importance of a cat’s early environment in the risk of obesity developing in early adulthood. The amount of food fed, opportunities for exercise and BCS of cats with no or restricted outdoor access and cats fed a dry diet should be monitored, especially whilst cats are aged below one year, to reduce the risk of overweight/obesity developing.

**Adrenal insufficiency secondary to lymphocytic panhypophysitis in a cat.**
Rudinsky AJ, Clark ES, Russell DS, Gilor C
*Aust Vet J* (2015) **93**:327-331
CASE REPORT: A 13-year-old male castrated Domestic Shorthair cat was presented for investigation of lethargy, vomiting, polydipsia and polyuria. Glucocorticoid-deficient hypoadrenocorticism was suspected based on hypocholesterolaemia, hypoglycaemia and lack of a stress leucogram, and confirmed with an ACTH stimulation test. Pituitary disease was suspected based on the clinical signs and the combination of hyposthenuria and hypernatraemia. Necropsy revealed bilaterally symmetric adrenocortical atrophy and the changes in the pituitary gland were suggestive of a T-cell-rich immune-mediated panhypophysitis. CLINICAL SIGNIFICANCE: Secondary adrenal insufficiency and panhypophysitis have not been previously reported in the cat. This report should raise awareness of this rare but potentially treatable disease process.

**Dynamic sound localization in cats.**
Ruhland JL, Jones AE, Yin TC
*J Neurophysiol* (2015) **114**:958-968
Sound localization in cats and humans relies on head-centered acoustic cues. Studies have shown that humans are able to localize sounds during rapid head movements that are directed toward the target or other objects of interest. We studied whether cats are able to utilize similar dynamic acoustic cues to localize acoustic targets delivered during rapid eye-head gaze shifts. We trained cats with visual-auditory two-step tasks in which we presented a brief sound burst during saccadic eye-head gaze shifts toward a prior visual target. No consistent or significant differences in accuracy or precision were found between this dynamic task (2-step saccade) and the comparable static task (single saccade when the head is stable) in either horizontal or vertical direction. Cats appear to be able to process dynamic auditory cues and execute complex motor adjustments to accurately localize auditory targets during rapid eye-head gaze shifts.

**The detection of toxigenic Corynebacterium ulcerans from cats with nasal inflammation in Japan.**
Saeki J, Katsukawa C, Matsubayashi M et al.
*Epidemiol Infect* (2015) **143**:2660-2665
Corynebacterium ulcerans (toxigenic C. ulcerans) produces the diphtheria toxin, which causes pharyngeal and cutaneous diphtheria-like disease in people, and this bacterium is commonly detected in dogs and cats that are reared at home. It is considered dangerous when a carrier animal becomes the source of infection in people. To investigate the carrier situation of toxigenic C. ulcerans of cats bred in Japan, bacteria were isolated from 37 cats with a primary complaint of rhinitis in 16 veterinary hospitals in Osaka. Toxigenic C. ulcerans was detected in two of the cats. By drug sensitivity testing, the detected bacterium was sensitive to all investigated drugs, except clindamycin. It appears necessary to create awareness regarding toxigenic C. ulcerans infection in pet owners because this bacterium is believed to be the causative organism for rhinitis in cats.

**Preliminary results of a prospective study of inter- and intra-user variability of the Royal Veterinary College corneal clarity score (RVC-CCS) for use in veterinary practice.**
Sanchez RF, Dawson C, Matas Riera M, Escanilla N

**OBJECTIVE:** To introduce a new corneal clarity score for use in small animals and describe its inter- and intra-user variability. **ANIMALS STUDIED:** Twelve dogs and two cats with corneal abnormalities and five dogs with healthy corneas. **MATERIALS AND METHODS:** Four examiners scored every patient twice and never consecutively, focusing on the central cornea. The peripheral cornea was scored separately. The following scoring system was used to describe corneal clarity: G0: no fundus reflection is visible on retroillumination (RI) using a head-mounted indirect ophthalmoscope. G1: a fundus reflection is visible with RI. G2: a 0.1-mm diameter light beam is visible on the anterior surface of the iris and/or lens. G3: gross fundic features are visible when viewed with indirect ophthalmoscopy (IO) using a head-mounted indirect ophthalmoscope and a hand-held 30D lens, although fine details are not clear. G4: fine details of the fundic features are clearly visible with IO. The minimum grades given were analyzed for inter- and intra-user variability with kappa analysis. **RESULTS:** Intra- and interuser variability of the central corneal clarity ranged from 0.78 to 0.96, showing substantial to almost perfect reproducibility, and from 0.66 to 0.91, showing substantial to almost perfect reliability, respectively. Intra- and interuser variability of the peripheral cornea ranged from 0.83 to 0.95, showing almost perfect agreement, and from 0.53 to 0.91, showing moderate to almost perfect agreement. **CONCLUSIONS:** The RVC-CCS is well suited to assess and monitor central corneal clarity in small animals and to compare outcomes between studies and different surgeons.

**Sporothrix brasiliensis outbreaks and the rapid emergence of feline sporotrichosis.**
Sanctotene KO, Madrid IM, Klafke GB et al.

Sporotrichosis is the main subcutaneous mycosis in Brazil, and is caused by Sporothrix schenckii and allied species. Sporothrix propagules present on soil and plant debris may be traumatically inoculated into the cutaneous/ subcutaneous tissues of the warm-blooded host. An alternative route involves direct animal-animal and animal-human transmissions through deep scratches and bites of diseased cats. Sporotrichosis is much more common than previously appreciated with several cases emerging over the years especially in South and Southeast Brazil. We conducted an epidemiological surveillance in endemic areas of feline sporotrichosis in the southern region of Rio Grande do Sul state, Brazil. Over the last 5-year period the number of feline sporotrichosis in Rio Grande increased from 0.75 new cases per month in 2010 to 3.33 cases per month in 2014. The wide geographic distribution of diagnosed cases highlights the dynamics of Sporothrix transmission across urban areas with high population density. Molecular identification down to species level by PCR-RFLP of cat-transmitted Sporothrix revealed the emergence of the clonal offshoot S. brasiliensis during feline outbreaks; this scenario is
similar to the epidemics taking place in the metropolitan areas of Rio de Janeiro and São Paulo. Controlling and preventing sporotrichosis outbreaks are essential steps to managing the disease among humans and animals.

**Dermoscopic features in 12 cats with dermatophytosis and in 12 cats with self-induced alopecia due to other causes: an observational descriptive study.**

Scarampella F, Zanna G, Peano A, Fabbri E, Tosti A

_Vet Dermatol_ (2015) **26**:282-e63

**BACKGROUND:** Dermoscopy is a noninvasive technique allowing rapid magnified in vivo observation of the skin and structures that lie beneath the skin surface. Various congenital and acquired hair shaft abnormalities may also be evaluated by dermoscopy. Additionally, characteristic features of _Microsporum canis_-induced tinea capitis and trichotillomania in humans have been reported.

**OBJECTIVES:** To describe the dermoscopic findings observed in cats with patchy alopecia due to _M. canis_ infection and in cats with self-inflicted hair loss.

**ANIMALS:** Twenty-four client-owned cats presented at a veterinary referral practice.

**METHODS:** Dermoscopy was performed with a hand-held nonpolarized light dermoscope at 10-fold magnification. The glass plate of the dermoscope was applied gently to the lesions and no sedation was required.

**RESULTS:** Twelve cats were diagnosed with dermatophytosis and 12 with self-induced alopecia due to other causes. At 10-fold magnification, the most characteristic findings observed in circumscribed lesions of cats with dermatophytosis were opaque, slightly curved, broken hairs of a homogeneous thickness (comma-like structures) and a variable amount of brown-to-yellow greasy scales. In cats with self-induced alopecia, multiple hairs with a normal shaft cleanly broken at different lengths, short tufts of hairs broken at an equal level and hook-like and coiled hairs were observed.

**CONCLUSIONS AND CLINICAL IMPORTANCE:** This observational descriptive study suggests that dermoscopy may represent a helpful noninvasive in vivo technique in the differential diagnosis of patchy alopecia in cats.

**Screw Loosening and Pelvic Canal Narrowing After Lateral Plating of Feline Iliac Fractures With Locking and Nonlocking Plates.**

Schmierer PA, Kircher PR, Hartnack S, Knell SC

_Vet Surg_ (2015) **44**:900-904

**OBJECTIVE:** To compare the frequency of complications, including screw loosening and pelvic canal narrowing, associated with dynamic compression plating, locking plating, and double locking plating of iliac fractures in cats.

**STUDY DESIGN:** Historical cohort study.

**METHODS:** The radiographs and medical records of cats with pelvic fractures that were presented between 2004 and 2013 were reviewed. The cases were categorized based on the plate type and number as dynamic compression plate (DCP), single locking plate (LPS) and double locking plates (dLPS). The frequency of screw loosening was compared across categories using a Fisher’s exact test. The change in pelvic alignment, described by the change in sacral index (postoperative sacral index-followup sacral index), was compared across plate categories using ANOVA.

**RESULTS:** The frequency of screw loosening for DCP (5/10) was significantly higher than LPS (1/13) and dLPS (0/11) (P = .05, P = .012, respectively). There was no significant difference in the SI change across plate categories. The mean change in sacral index for DCP was -0.11 (95%CI -0.25 to 0.03), for LPS was 0.0007 (95%CI -0.07 to 0.08), and for dLPS was -0.01 (95%CI -0.04 to 0.02). None of the cats showed constipation postoperatively.

**CONCLUSION:** Screw loosening occurred less often but the change in pelvic canal alignment was not significantly different in iliac fractures repaired with LPS or dLPS compared to iliac fractures repaired with DCP. Locking plating of iliac fractures in cats may offer advantages compared to nonlocking plating.
Systematic review of ground reaction force measurements in cats.
Schnabl E, Bockstahler B
*Vet J* (2015) **206**:83-90
Although orthopaedic abnormalities in cats are frequently observed radiographically, they remain clinically underdiagnosed, and kinetic motion analysis, a fundamental aspect of orthopaedic research in dogs and horses, is not commonly performed. More information obtained with non-invasive measurement techniques to assess normal and abnormal gait in cats would provide a greater insight into their locomotion and biomechanics and improve the objective measurement of disease alterations and treatment modalities. In this systematic review, 12 previously performed studies that investigated ground reaction force measurements in cats during locomotion were evaluated. The aims of these studies, the measurement methods and equipment used, and the outcomes of parameters used to assess both sound and diseased cats are summarised and discussed. All reviewed studies used pressure sensitive walkways to gain data and all provided an acclimatisation period as a prerequisite for measurements. In sound cats during walking, the forelimb peak vertical force was greater than in the hindlimb and the peak vertical force in the hindlimb was greater in cats than in dogs. This review confirms that ground reaction forces can be used to evaluate lameness and treatment effects in the cat.

Prevalence of congenital heart disease in 76,301 mixed-breed dogs and 57,025 mixed-breed cats.
Schrope DP
OBJECTIVE: Assess the prevalence of congenital heart disease (CHD) in a large population of mixed-breed dogs and cats. ANIMALS: 76,301 mixed-breed dogs and 57,025 mixed-breed cats. METHODS: Retrospective review of records and examinations based on specified diagnostic criteria. RESULTS: Among mixed-breed dogs, the prevalence of CHD was 0.13% (51.4% female) and of innocent murmurs was 0.10% (53.0% male). Pulmonic stenosis was the most common defect followed by patent ductus arteriosus, aortic stenosis, and ventricular septal defect. Among mixed-breed cats, prevalence of CHD was 0.14% (55.2% male) and of innocent murmurs was 0.16% (54.4% male). When the 25 cats with dynamic left or right ventricular outflow obstruction were counted with cases of innocent murmurs, the overall prevalence was 0.2%. Ventricular septal defects were the most common feline CHD followed closely by aortic stenosis and hypertrophic obstructive cardiomyopathy. There was no overall sex predilection for CHD in mixed-breed cats or dogs, and no significant difference in CHD prevalence between cats or dogs. Among dogs, subvalvular aortic stenosis and mitral valve dysplasia had a male predisposition while patent ductus arteriosus had a female predisposition. Among cats, valvular pulmonic stenosis, subvalvular and valvular aortic stenosis, and ventricular septal defects had a male predisposition while pulmonary artery stenosis had a female predisposition. CONCLUSIONS: The prevalence of CHD in a mixed-breed dogs and cats is lower than for prior studies, perhaps due to the lack of purebreds in the study population or actual changes in disease prevalence.

Parasite control in Canadian companion animal shelters and a cost-comparison of anthelmintics.
Schurer JM, McKenzie C, Dowling PM, Bouchard E, Jenkins EJ
*Can Vet J* (2015) **56**:964-970
Animal shelters have limited resources and must accommodate large numbers of animals at unpredictable intake rates. These dogs and cats are often parasitized, which can adversely affect the health of animals and expose shelter workers and adoptive owners to zoonoses. We analyzed survey responses from rural (n = 32) and urban (n = 50) companion animal shelters across Canada, and
compared the wholesale cost of commercially available anthelmintics to identify cost-effective methods of managing parasites within shelters. Almost all shelters employed nematocides (98% to 99%), but cestocides and ectoparasiticide were used less frequently. Shelters identified cost as an important consideration in choosing to perform fecal diagnostic testing and administer anthelmintics, and this motivated many shelters to selectively perform testing (66%) or never to test (32%), and to use drugs extralabel (80%). Abstract available from the publisher.

**Effect of melatonin on the reproductive cycle in female cats: a review of clinical experiences and previous studies.**
Schäfer-Somi S
PRACTICAL RELEVANCE: Cat breeders aim to suppress the sexual cycle for a defined period. This is a challenge as most preparations available for this intention are orally administered progestins; however, these drugs may have side effects, especially when used over a long period of time. Long-acting gonadotropin-releasing hormone agonist implants have been used successfully to suppress the oestrous cycle in cats for a longer period. After removal of the implant, the duration of action was shortened; however, the re-occurrence of normal cyclicity cannot be foreseen. The search for alternatives is therefore ongoing. CLINICAL CHALLENGES: Another possibility for oestrus control is orally administered melatonin preparations; however, previous studies have shown that the effect was not satisfactory. After subcutaneous application of a melatonin implant developed for induction of oestrus in sheep (Melovine; Ceva Sante Animale), duration of oestrus suppression was shown to differ highly in individuals and in some cases no effect was observed. Nevertheless, it is used for short-term oestrus suppression in female cats. The present review shall therefore provide an overview of recent studies and clinical experiences. AIMS: This article discusses the use of melatonin as a contraceptive in cats. It shall explain the function of melatonin in cats, discuss previous studies, provide clinical experience with Melovine (27 cases) and elucidate advantages and disadvantages. EVIDENCE BASE: Information provided in this article is drawn from the published literature and the author’s own clinical experience.

**Effect of a Limited Iodine Diet on Iodine Uptake by Thyroid Glands in Hyperthyroid Cats.**
Scott-Moncrieff JC, Heng HG, Weng HY, Dimeo D, Jones MD
BACKGROUND: The effect of feeding a limited iodine diet on radioactive iodine uptake in the thyroid glands of hyperthyroid cats is unknown. OBJECTIVES: To determine how feeding limited dietary iodine affects radioactive iodine uptake by the thyroid glands of hyperthyroid cats. ANIMALS: Eight geriatric cats with spontaneous hyperthyroidism. METHODS: Prospective study of eight client owned hyperthyroid cats fed a commercially available iodine limited diet for 6 months. Clinical signs were evaluated and TT4 and fT4 were measured during consumption of the diet. Uptake of (123)I was determined before and 8-16 weeks after exclusive consumption of the diet. RESULTS: Clinical signs of hyperthyroidism resolved in all cats, but there was no significant increase in body weight. TT4 and fT4 decreased into the reference range by 8-16 weeks in all cats. Mean TT4 before consumption of the diet was 9.7 µg/dL (SD 5.2) and after consumption of the diet was 3.1 µg/dL (SD 0.9). Scintigraphy revealed unilateral uptake of isotope in 5 cats and bilateral uptake in 3 cats. Mean percentage uptake of (123)I by the thyroid gland at 8 hours after isotope administration was 16.2 (SD 11.8) before diet consumption and 34.6 (SD 11.7) 8-16 weeks after exclusive consumption of the diet. The percentage increase was variable between cats (38-639%). CONCLUSIONS AND CLINICAL IMPORTANCE: Limited iodine diets increase iodine uptake in the autonomous thyroid glands of hyperthyroid cats.
Further studies are necessary to determine if consumption of a limited iodine diet changes sensitivity of the thyroid gland to (131)I treatment.

**Pasireotide for the Medical Management of Feline Hypersomatotropism.**
Scudder CJ, Gostelow R, Forcada Y, Schmid HA, Church D, Niessen SJ

**BACKGROUND:** Feline hypersomatotropism (HST) is a cause of diabetes mellitus in cats. Pasireotide is a novel multireceptor ligand somatostatin analog that improves biochemical control of humans with HST. **HYPOTHESIS/OBJECTIVES:** Pasireotide improves biochemical control of HST and diabetes mellitus in cats. **ANIMALS:** Hypersomatotropism was diagnosed in diabetic cats with serum insulin-like growth factor-1 (IGF-1) concentration >1,000 ng/mL by radioimmunoassay and pituitary enlargement. **METHODS:** Insulin-like growth factor 1 was measured and glycemic control assessed using a 12-hour blood glucose curve on days 1 and 5. On days 2, 3, and 4, cats received 0.03 mg/kg pasireotide SC q12h. IGF-1, insulin dose, and estimated insulin sensitivity (product of the area under the blood glucose curve [BGC] and insulin dose) were compared pre- and post treatment. Paired t-tests or Wilcoxon signed rank tests were employed for comparison where appropriate; a linear mixed model was created to compare BGC results. **RESULTS:** Insulin-like growth factor 1 decreased in all 12 cats that completed the study (median [range] day 1: 2,000 ng/mL [1,051-2,000] and day 5: 1,105 ng/mL [380-1,727], P = .002, Wilcoxon signed rank test). Insulin dose was lower on day 5 than on day 1 (mean reduction 1.3 [0-2.7] units/kg/injection, P = .003, paired t-test). The product of insulin dose and area under the BGC was lower on day 5 than day 1 (difference of means: 1,912; SD, 1523; u × mg/dL × hours, P = .001; paired t-test). No clinically relevant adverse effects were encountered. **CONCLUSIONS:** Short-acting pasireotide rapidly decreased IGF-1 in cats with HST and insulin-dependent diabetes. The decrease in IGF-1 was associated with increased insulin sensitivity.

**Effects of two concentrations of topical tropicamide on the Schirmer tear test in clinically normal cats.**
Selk Ghaffari M, Javadzadeh R, Rajaei SM

**OBJECTIVES:** The aim of this study was to evaluate the effect of topical tropicamide at two concentrations (0.5% and 1.0%) on the Schirmer tear test (STT) results in clinically normal cats. **METHODS:** Twenty-four adult domestic shorthair cats were randomly assigned to three groups. In all three groups, ophthalmic solutions were instilled in a randomly selected eye and the opposite eye served as the control. In groups 1, 2 and 3 one drop of 0.5% tropicamide, 1.0% tropicamide and distilled water were used, respectively. Tear production in both eyes was tested 30 and 60 mins after instillation administration in all three groups. **RESULTS:** Baseline mean ± SEM STT values for the treated eyes in groups 1, 2 and 3 were 13.37 ± 2.91 mm/min, 10.87 ± 1.39 mm/min and 11.37 ± 1.65 mm/min, respectively. Thirty minutes after the drug instillation in the treated eye, mean ± SEM STT values in groups 1, 2 and 3 were 4.87 ± 3.05 mm/min, 2.00 ± 0.84 mm/min and 11.25 ± 1.81 mm/min, respectively. The mean ± SEM STT levels of the treated eye after 60 mins were 3.75 ± 1.87 mm/min, 0.5 ± 0.37 mm/min and 11.42 ± 1.78 mm/min in groups 1, 2 and 3, respectively. **CONCLUSIONS AND RELEVANCE:** Use of 0.5% topical tropicamide, instead of 1.0% tropicamide, as a mydriatic agent, can be recommended in cats. Tear production measurement should be performed prior to the administration of tropicamide, regardless of the concentration of this drug.

**Postpartum uterus involution observed by real-time ultrasound scanning and vaginal cytology in**
Van cats.
Sendag S, Alan M, Eski F, Uslu S, Uslu BA, Wehrend A
OBJECTIVES: The objective was to investigate postpartum uterus involution by real-time ultrasonography and vaginal cytology in Van cats. METHODS: This study included 15 healthy Van cats belonging to the Van Cat Research Centre (Yuzuncu Yil University, Van, Turkey). Starting 24 h postpartum, ultrasonographic measurements were performed on the placental and interplacental uterine horn regions every day. Decreases in the diameters and uterine content were considered as criteria for uterine involution. Vaginal discharge samples were collected every day for 4 weeks postpartum. The smears were stained with Papanicolaou stain. RESULTS: The average diameters of placental and interplacental regions (IPRs) in the uterine horns were 3.12 ± 0.29 cm and 2.36 ± 0.43 cm, respectively, at 24 h postpartum. Placental regions (PRs) shrank faster than IPRs. At 48 h postpartum, it became difficult to distinguish PRs from IPRs in the uterine horns. The uterine horns could be seen in the abdominal cavity up to 5.60 ± 0.99 days postpartum. The mean of the last assessable diameter of the uterine horns from days 4 to 7 in all cats was 0.49 ± 0.07 cm. The vaginal epithelial cells appeared to be under the effect of oestrogen for 4 weeks postpartum. CONCLUSIONS AND RELEVANCE: The morphological involution of the uterus completes, to a large extent, within the first 48 h postpartum in Van cats. A more detailed hormonal analysis would contribute greatly to the understanding of the physiological processes involved in this period. Although postpartum involution appeared complete by the 5.60 ± 0.99 day after parturition in Van cats, histological verification of this finding is needed.

Comparison of Efficacy of Long-term Oral Treatment with Telmisartan and Benazepril in Cats with Chronic Kidney Disease.
Sent U, Gössl R, Elliott J, Syme HM, Zimmering T
BACKGROUND: The efficacy and benefits of telmisartan in cats with chronic kidney disease (CKD) have not previously been reported. HYPOTHESIS: Long-term treatment of cats with CKD using telmisartan decreases urine protein-to-creatinine ratio (UP/C) similar to benazepril. ANIMALS: Two-hundred and twenty-four client-owned adult cats with CKD. METHODS: Prospective, multicenter, controlled, randomized, parallel group, blinded clinical trial with noninferiority design. Cats were allocated in a 1 : 1 ratio to either telmisartan (1 mg/kg; n = 112) or benazepril (0.5-1.0 mg/kg; n = 112) PO q24 h. The primary endpoint was prospectively defined as the change in proteinuria (benazepril:telmisartan) based on a log transformed weighted average of UP/C change from baseline (AUC 0→t/t) as a percentage compared using a confidence interval (CI) approach. Changes of UP/C from baseline were assessed on all study days and corrected for multiple comparisons. RESULTS: Telmisartan proved noninferior to benazepril in controlling proteinuria (CI, -0.035 to 0.268). At Day 180, UP/C compared to baseline in the telmisartan group was significantly lower (-0.05 ± 0.31; P =.016), whereas in the benazepril group the change (-0.02 ± 0.48) was not statistically significant (P =.136). Similar results were obtained at all assessment points with significant decrease in UP/C occurring with telmisartan but not benazepril. CONCLUSION AND CLINICAL IMPORTANCE: Both telmisartan and benazepril were well tolerated and safe. Telmisartan proved to be noninferior to benazepril and significantly decreased proteinuria relative to baseline at all assessment points whereas benazepril did not.

Discovery of new feline paramyxoviruses in domestic cats with chronic kidney disease.
Sieg M, Heenemann K, Rückner A, Burgener I, Oechtering G, Vahlenkamp TW
Paramyxoviruses constitute a large family of enveloped RNA viruses including important pathogens in veterinary and human medicine. Recently, feline paramyxoviruses, genus morbillivirus, were detected in cats from Hong Kong and Japan. Here we describe the discovery of several new feline paramyxoviruses. Infections with these diverse viruses were detected in urine samples from cats suffering from chronic kidney disease (CKD). No viral RNA was found in cats without clinical signs of uropathy highlighting an association between feline paramyxovirus (FPaV) infections and CKD. Phylogenetic analyses of the detected viruses showed that they represent at least two different species, one of them representing the feline morbilliviruses detected previously in Hong Kong and Japan. In addition, a new FPaV was detected sharing only 73 % homology on the nucleotide level of the viral L-gene to currently known paramyxoviral species.

**Effect of acarbose on postprandial blood glucose concentrations in healthy cats fed low and high carbohydrate diets.**
Singh R, Rand JS, Coradini M, Morton JM

OBJECTIVES: Feeding a low carbohydrate diet is recommended for diabetic cats; however, some cats may require diets containing moderate-to-high carbohydrate and may benefit from the use of therapeutic agents to improve glycemic control. The aim of the study was to determine the effect of the α-glucosidase inhibitor acarbose on postprandial plasma glucose concentration when combined with commercially available feline diets high and low in carbohydrate. METHODS: Twelve healthy, adult, non-obese, neutered cats were enrolled. Plasma glucose concentrations were assessed over 24 h after feeding high and low carbohydrate diets, with and without acarbose, during single and multiple meal tests, in a crossover study. Commercially available feline diets were used, which were high and low in carbohydrate (providing 51% and 7% of metabolizable energy, respectively). RESULTS: In cats fed the high carbohydrate diet as a single meal, mean 24 h glucose concentrations were lower when acarbose was administered. Mean glucose concentrations were lower in the first 12 h when acarbose was given once daily, whereas no significant difference was observed in mean results from 12-24 h. Acarbose had little effect in cats eating multiple meals. Compared with consumption of the high carbohydrate diet with acarbose, lower mean 24 h and peak glucose concentrations were achieved by feeding the low carbohydrate diet alone. CONCLUSIONS AND RELEVANCE: In healthy cats meal-fed diets of similar composition to the diets used in this study, acarbose has minimal effect when a low carbohydrate diet is fed but reduces postprandial glucose concentrations over 24 h when a high carbohydrate diet is fed. However, mean glucose concentrations over 24 h are still higher when a high carbohydrate diet with acarbose is fed relative to the low carbohydrate diet without acarbose. Future studies in diabetic cats are warranted to confirm these findings.

**Effect of intramuscular methadone on pharmacokinetic data and thermal and mechanical nociceptive thresholds in the cat.**
Slingsby LS, Sear JW, Taylor PM, Murrell JC

OBJECTIVES: The aim of the study was to assess simultaneous pharmacokinetics and thermal and mechanical antinociception after intramuscular methadone (0.6 mg/kg) in 10 cats. METHODS: Thermal and mechanical threshold (TT and MT, respectively) testing and blood collection were conducted at baseline and up to 24 h after administration. Methadone plasma concentrations were determined by liquid chromatography-tandem mass spectrometry and pharmacokinetic parameters were estimated by a non-compartmental method. TT and MT were analysed using ANOVA (P <0.05). Time of maximum plasma concentration (Tmax), time of onset of antinociception and time of reaching
cut out threshold (TT 55°C; MT 30 Newtons [N]) were determined. RESULTS: TT and MT increased above baseline from 20-240 mins and 5-40 mins, respectively, after intramuscular (IM) administration (P <0.005). Mean maximum delta T (measured as TT minus baseline threshold) was 7.9°C (95% confidence interval [CI] 4.3-11.6) at 60 mins and mean maximum delta F (measured as MT minus baseline threshold) was 4.2 (95% CI 1.6-6.7) N at 45 mins. IM methadone concentration-time data decreased curvilinearly, and gave a clearance estimate of mean 9.1 ml/kg/min (range 5.2-15.7) with median Tmax at 20 mins (range 5-360 mins). CONCLUSIONS AND RELEVANCE: IM data followed classical disposition and elimination in all cats. Plasma concentrations after IM administration were associated with an antinociceptive effect, including negative hysteresis. These data can be used for devising dosing schedules for methadone in clinical feline practice.

**Methadone in combination with medetomidine as premedication prior to ovariohysterectomy and castration in the cat.**

Slingsby LS, Bortolami E, Murrell JC  

OBJECTIVES: The aim of the study was to evaluate the tolerability, sedative and analgesic effects of methadone in combination with medetomidine for premedication prior to neutering in healthy cats. METHODS: This was an assessor-blinded, randomised, clinical research study. Forty-five cats were recruited and divided into three treatment groups of 15. Following premedication with medetomidine (20 µg/kg) and one of the three test drugs - methadone 0.5 mg/kg, buprenorphine 20 µg/kg or butorphanol 0.4 mg/kg intramuscularly - anaesthesia was induced with propofol and maintained with isoflurane, and neutering was carried out. Sedation and physiological parameters were assessed before premedication, after premedication before induction of anaesthesia, and at 90 mins and 2, 3, 4, 6, 7, 8 and 24 h after premedication. Pain and mechanical nociceptive threshold were assessed at similar time points. RESULTS: There were no differences between groups with respect to age, sex, duration of anaesthesia or surgery. Most cats had low pain scores in the postoperative period, with small differences in pain scores between groups at individual time points only. Five, two and no cats required additional rescue analgesia in the postoperative period in the butorphanol, methadone and buprenorphine groups, respectively, representing no significant difference between groups. CONCLUSIONS AND RELEVANCE: Medetomidine combined with methadone for premedication prior to neutering in healthy cats provided adequate analgesia for the first 6 h after administration with no adverse effects; effects overall were comparable with medetomidine combined with buprenorphine or butorphanol. Administration of further analgesia with methadone at 6 h and a non-steroidal anti-inflammatory drug at 8 h provided adequate analgesia for the first 24 h after surgery.

**Influence of anesthetic variables on short-term and overall survival rates in cats undergoing renal transplantation surgery.**


OBJECTIVE: To identify factors associated with short-term (30-day) and overall survival rates in cats that underwent renal transplantation surgery (RTS). DESIGN: Retrospective cohort study. ANIMALS: 94 cats that underwent RTS from 1998 through 2010. PROCEDURES: Data obtained from the medical records pertinent to RTS included cat signalment; anesthetic agents, techniques, and timings; supportive treatment; perioperative physiologic findings; and surgery and warm ischemia times. Associations with short-term and overall survival rates were investigated. RESULTS: Median survival time was 653 days (range, 2 to 4,580 days). Prolonged anesthesia (median, 300 minutes; range, 225 to 445 minutes) reduced overall survival rate but did not influence short-term survival rate. No
associations were identified between survival rates and anesthetic agent used, amount and type of fluid administered IV, physiologic abnormalities, and blood product administration. All cats that received µ-opioid receptor antagonists at anesthetic recovery to reverse the effects of µ-opioid receptor agonists survived for at least 30 days. High Hct at the end of anesthesia was also associated with an increase in short-term survival rate. Two cats had an intraoperative hemoglobin oxygen saturation < 90%, and both died within 7 days after surgery. Cats > 12 years old had a lower overall survival rate than did younger cats. CONCLUSIONS AND CLINICAL RELEVANCE: Minimization of total anesthesia time, reversal of µ-opioid receptor agonists at the end of anesthesia, and prevention of intraoperative decreases in blood oxygen saturation and postoperative decreases in Hct appeared to help maximize postsurgical survival time in cats undergoing RTS.

Detection by ELISA of C-terminal proBNP in plasma from cats with cardiomyopathy.
Solter PF, Oyama MA, Machen MC, Trafny DJ, Sisson DD
The B-type natriuretic peptide prohormone (proBNP) is enzymatically cleaved into an inactive N-terminal peptide and a biologically active C-terminal peptide with many beneficial cardiorenal effects. The purpose of this study was to develop and test in cats with cardiomyopathy an immunoassay to quantify the concentrations of C-terminal proBNP in feline plasma. An anti-canine proBNP monoclonal antibody (UI-1021) was shown to have adequate binding affinity to proBNP 80-106 for use in a solid-phase immunoassay, and by epitope mapping to bind within positions 84-87 of feline proBNP. UI-1021 was paired with an affinity-purified rabbit polyclonal detection antibody to feline proBNP 100-106, in a sandwich ELISA with feline proBNP 80-106 standard. The linearity and analytical range and sensitivity of the assay were confirmed from 1.4 to 85 pmol/L. Spike recovery averaged 106.5% (95% confidence interval 78-135%). Within run and intra-assay coefficients of variation were <12%. A protease inhibitor mixture preserved proBNP 80-106 immunoreactivity for at least 5 days in plasma. Clinical verification of the ELISA was done using plasma from 13 cats with cardiomyopathy, whose C-terminal proBNP concentrations ranged from 1.7 to 78.8 pmol/L vs. <1.4-1.8 pmol/L in plasma from 18 healthy cats. Concentrations were found to be substantially lower than reported N-terminal proBNP concentrations, and similar to those of human heart failure patients where relative C-terminal BNP deficiencies have been proposed as contributory to the progression of the disease.

The safety of high-dose buprenorphine administered subcutaneously in cats.
Sramek MK, Haas MC, Coleman GD, Atterson PR, Hamlin RL
The safety of a proprietary formulation of buprenorphine hydrochloride administered subcutaneously (SC) to young cats was investigated in a blinded, randomized study. Four cohorts of eight cats aged approximately 4 months were administered saline, 0.24, 0.72 or 1.20 mg/kg/day buprenorphine SC for nine consecutive days, representing 0×, 1×, 3× and 5× of the intended dose. Cats were monitored daily for evidence of clinical reactions, food and water intake and adverse events (AEs). Physical examinations, clinical pathology, vital signs and electrocardiograms (ECGs) were evaluated at protocol-specified time points. Complete necropsy and histopathologic examinations were performed following humane euthanasia. Four buprenorphine-treated cats experienced AEs during the study, two unrelated and two related to study drug administration. The two cats with AEs considered related to drug administration had clinical signs of hyperactivity, difficulty in handling, disorientation, agitation and dilated pupils in one 0.24 mg/kg/day cat and one 0.72 mg/kg/day cat. All of these clinical signs were observed simultaneously. There were no drug-related effects on survival, injection response,
injection site inspections, body weight, food or water consumption, bleeding time, urinalysis, respiration rate, heart rate, ECGs, blood pressures, body temperatures, macroscopic examinations or organ weights. Once daily buprenorphine s.c. injections at doses of 0.24, 0.72 and 1.20 mg/kg/day for 9 consecutive days were well tolerated in young domestic cats.

The Relationship Between Coat Color and Aggressive Behaviors in the Domestic Cat.
Stelow EA, Bain MJ, Kass PH
*J Appl Anim Welf Sci* (2015) 1-15
The authors explored a possible relationship between coat color and aggressive behaviors in the domestic cat. This study used an Internet-based survey to collect information on coat color, affiliative behaviors toward cats/humans, agonistic behaviors toward cats/humans, other “problem” behaviors, and cat and guardian demographic data. A total of 1,432 cat guardians completed the online survey; after exclusions based on study protocol, data analysis included 1,274 completed surveys. Guardians reported sex-linked orange female (tortoiseshells, calicos, and “torbies”), black-and-white, and gray-and-white cats to be more frequently aggressive toward humans in 3 settings: during everyday interactions, during handling, and during veterinary visits. Kruskal-Wallis 1-way analysis of variance was used to compare possible differences between the 2 sexes and among different coat colors. Analyses of aggression due to handling, as well as aggression displayed during veterinarian visits, showed little difference among coat colors in these settings.

Insulin-like growth factor I in cats: validation of an enzyme-linked immunosorbent assay and determination of biologic variation.
Strage EM, Theodorsson E, Ström Holst B, Lilliehöök I, Lewitt MS
BACKGROUND: Insulin-like growth factor I (IGF-I) measurements are used in veterinary medicine for diagnosing growth hormone disorders. IGF-I assays are subject to interference by IGF-binding proteins (IGFBP) which may not be efficiently removed by standard extraction methods. Adding excess IGF-II during analysis may improve accuracy. OBJECTIVES: The purpose of the study was to validate a commercial human IGF-I ELISA which uses excess IGF-II for feline samples and to evaluate biologic variation. METHODS: Precision was determined by calculating the coefficient of variation (CV). Accuracy was determined by recovery after removal of IGFBP, addition of IGF-I, and linear dilution after the addition of IGFBP. Biologic variation was determined by repeated sampling in 7 cats. RESULTS: There was interference by IGFBP in the high measuring range, resulting in falsely low IGF-I concentrations. This was overcome by the addition of high concentrations of IGF-II. Untreated serum had a measured/expected ratio of 98-115% compared to serum where IGFBP had been removed. Recovery after the addition of IGF-I was 83-112%. Inter- and intra-assay CVs ranged from 2.4% to 5.0% which is within the minimum acceptance criteria based on biologic variation. The reference interval of IGF-I was wide (90-1207 ng/mL) and there was a significant association between body weight and ln IGF-I (P < .000001). CONCLUSIONS: This human ELISA is suitable for feline samples, but interfering IGFBP can cause falsely low concentrations. It is recommended to dilute samples such that IGF-I is < 28 ng/mL on the standard curve to grant for sufficient IGF-II for binding of interferent IGFBP.

Medial humeral epicondylitis in clinically affected cats.
Streubel R, Bilzer T, Grest P, Damur D, Montavon PM
OBJECTIVE: To describe the clinical signs and histologic changes in cats clinically affected with medial humeral epicondylitis (MHE) and evaluate long-term outcome after either conservative or surgical treatment. STUDY DESIGN: Prospective cohort study. ANIMALS: Client-owned cats (n = 17) with MHE. METHODS: Cats diagnosed with MHE, based on clinical signs, radiographs and computed tomography (CT), were prospectively recruited. Cats were treated conservatively for an initial 4 weeks, followed by either surgery or continued conservative treatment. Followup examinations were performed at 6 and 12 weeks and at 6-49 months. RESULTS: Cats had a mean age of 10.3 years and presented for chronic lameness. Examination revealed pain on palpation caudodistal to the medial epicondyle and by exerting antebrachial supination/pronation with elbow and carpal flexion. Lameness was restricted to 1 limb although CT revealed bilateral disease in 11/17 cats. Free mineralized joint bodies were identified in 9/17 cats. Nine cats were treated surgically and 8 cats were treated conservatively. Intraoperative findings included new bone formation at the origin of the humeral head of the flexor carpi ulnaris muscle with displacement and adhesions of the ulnar nerve. Microscopic examination revealed neurogenic myopathy in 4/9 cats treated surgically. Seven of 9 cats treated surgically were free from lameness by 12 weeks. Seven of 8 cats treated conservatively were chronically lame throughout the study. CONCLUSIONS: Cats with forelimb lameness should be evaluated for MHE. This condition is associated with free joint bodies and neurogenic myopathy. Surgical treatment is associated with excellent outcome in the majority of cats.

Assessment of left ventricular longitudinal function in cats with subclinical hypertrophic cardiomyopathy using tissue Doppler imaging and speckle tracking echocardiography.
Sugimoto K, Fujii Y, Sunahara H, Aoki T
Hypertrophic cardiomyopathy (HCM) in cats is characterized by concentric left ventricular (LV) hypertrophy and both diastolic and systolic dysfunction. Although impaired cardiac function detected by tissue Doppler imaging (TDI) in cats with HCM was previously reported, reference ranges of TDI in normal cats and cats with HCM have been reported as widely variable. Two-dimensional speckle tracking echocardiography (STE) was useful for assessment of cardiac function in human patients with HCM, but clinical utility was not known in cats. The aim of this study was to assess global and segmental LV myocardial function using STE in cats with HCM whose TDI variables were within the reference range. A total of 35 cats of different breeds were enrolled in this study. The HCM group (n=22) was cats diagnosed as HCM without left atrial enlargement and with normal TDI measurements. HCM cats were further divided into a segmental hypertrophy (S-HCM) group and a diffuse hypertrophy (D-HCM) group. The control group consisted of 13 clinically healthy cats. No cats in any group showed any clinical symptoms. Conventional echocardiography, TDI, and global and segmental STE indices were evaluated and compared between groups. Only the longitudinal strain rate during early diastole was significantly decreased in both HCM groups, even in all segments including those without hypertrophy in S-HCM group. This study suggests that STE parameters are the more sensitive variables compared with conventional TDI parameters to detect early myocardial diastolic dysfunction in cats with HCM.

Evaluation of a modified Karnofsky score to assess physical and psychological wellbeing of cats in a hospital setting.
Taffin ER, Paepe D, Campos M et al.
OBJECTIVES: The Karnofsky score (KS) modified for cats, a scoring system to rate health and quality of life (QOL) in cats, is used in clinical trials, but its reliability and validity are yet to be determined.
The present study aims to evaluate the scientific robustness of the KS when adapted for use in a hospital setting. METHODS: A list of variables to consider during the physical examination, which informs the clinician’s score (CS) part of the KS, was added and clinicians were allowed to choose a score anywhere between 0 and 50. The Karnofsky QOL questionnaire was adapted for use in a hospital setting. F-tests with Bonferroni correction and Spearman rank correlation coefficients were used to evaluate reliability and validity of the KS to assess the health and wellbeing of cats in a hospital setting. The records of 54 feline immunodeficiency virus-positive cats, which were recruited for a clinical trial and hospitalised for 6 weeks, were reviewed. Four veterinarians scored the CS, and one veterinarian and a veterinary nurse assessed the QOL score. RESULTS: Mean absolute difference between observers was significantly larger for the CS than for the QOL score (P <0.001) and two veterinarians scored significantly higher than the remaining two veterinarians (P <0.001). Inter-observer correlation ranged from 0.45-0.75 for the CS. For the QOL score, the absolute difference between observers was small, no significant difference was found between observers and a high degree of inter-observer correlation was noted (r = 0.91). CONCLUSIONS AND RELEVANCE: The results indicate low inter-observer reliability for the CS, requiring additional modifications to this part of the KS. The QOL score seems more reliable, and the questionnaire may serve as a reliable tool in the assessment of QOL in cats in a hospital setting. Consequently, further adaptation of the KS is mandatory when simultaneous assessment of both the cat’s clinical health and perceived wellbeing is required.

Molecular characterization and pathogenicity of a genogroup GVI feline norovirus.  
Takano T, Kusuhara H, Kuroishi A et al.  
Norovirus (NoV) has been classified into 6 genogroups, GI-GVI. In the present study, we identified novel feline NoV (FNoV) M49-1 strain. The C-terminal of RNA-dependent RNA polymerase of the FNoV M49-1 strain was highly homologous with GIV FNoV and GIV lion norovirus, whereas VP1 was highly homologous with GVI canine NoV (CNoV). Based on the results of the Simplot analysis, the FNoV M49-1 strain may have been produced by recombination between GIV.2 FNoV and GVI.1 CNoV. In addition, specific pathogen-free cats inoculated with FNoV gene-positive-fecal samples developed diarrhea symptoms, and the viral gene was detected in their feces and blood.

Molecular cloning of feline resistin and the expression of resistin, leptin, and adiponectin in the adipose tissue of normal and obese cats.  
Takashima S, Nishii N, Kato A, Matsubara T, Shibata S, Kitagawa H  
Resistin, one of the adipokines that has a cysteine-rich C-terminus, is considered to relate to the development of insulin resistance in rats. However, in cats, there is little knowledge regarding resistin. In this study, we cloned the feline resistin cDNA from adipose tissue by RT-PCR. The feline resistin clone contained an entire open reading frame encoding 107 amino acids that had 72.8%, 75.4%, 50.9% and 51.8% homology with bovine, human, mouse, and rat homologues, respectively. In both subcutaneous and visceral adipose tissues, the transcription levels of feline resistin mRNA were significantly higher in obese cats than normal cats, and those of feline adiponectin mRNA were significantly lower in obese cats than normal cats. However, there was no difference in the expression of feline leptin between normal and obese cats. On the other hand, in both normal and obese cats, there were no significant differences in resistin, leptin and adiponectin mRNA levels between subcutaneous and visceral adipose tissues. In cats, the altered expression of resistin and adiponectin mRNA with obesity may contribute to the pathogenesis of insulin resistance and subsequent diabetes mellitus. In addition to feline adiponectin, the feline resistin cDNA clone obtained in this study will be useful for
further investigation of the pathogenesis of obesity in cats.

**Gastrointestinal parasites of cats in Denmark assessed by necropsy and concentration McMaster technique.**
Takeuchi-Storm N, Mejer H, Al-Sabi MN, Olsen CS, Thamsborg SM, Enemark HL

The large population of feral cats in Denmark may potentially transmit pathogens to household cats and zoonotic parasites to humans. A total of 99 euthanized cats; feral cats (n=92) and household cats with outdoor access (n=7), were collected from March to May 2014 from the Zealand region, Denmark. The sedimentation and counting technique (SCT) was used to isolate helminths and coproscopy was done by concentration McMaster technique (c-McMaster). Overall, 90.1% of the cats were infected and a total of 10 species were recorded by SCT: 5 nematode species: Toxocara cati (84.8%), Ollulanus tricuspis (13.1%), Aonchotheca putorii (7.1%), Paersonema spp. (3.0%), Strongyloides spp. (1.0%); 3 cestodes: Hydatigera taeniaeformis (36.4%), Mesocestoides sp. (3.0%), Dipylidium caninum (1.0%); and 2 trematodes: Cryptocotyle spp. (5.1%) and Pseudamphistomum truncatum (1.0%). O. tricuspis was the second most common gastrointestinal nematode of cats but had the highest intensity of infection. For T. cati, prevalence and worm burden were significantly higher in feral than household cats. No juvenile cats were infected with H. taeniaeformis, and age thus had a significant effect on prevalence and worm burdens of this species. Rural cats had a higher prevalence and worm burden of A. putorii than urban cats. By c-McMaster, ascarid, capillarid, strongylid or taeniid type eggs were found in 77.9% of the cats while Cystoisospora felis was found in 2.1%. The sensitivity of the c-McMaster was 82.5% for T. cati but 26.5% for taeniid eggs, using the SCT as gold standard. A positive correlation between faecal egg counts and worm burdens was seen for T. cati, but not for taeniid eggs (assumed to be H. taeniaeformis). Coprological examination also detected the eggs of extraintestinal Capillariidae species including Eucoleus aerophilus and Eucoleus boehmi, but further necropsy studies are needed to confirm these findings.

**Central venous blood gas and acid-base status in conscious dogs and cats.**
Tamura J, Itami T, Ishizuka T et al.

To determine the reference level of central venous oxygen saturation (ScvO2) and clinical efficacy of central venous blood gas analysis, partial pressures of oxygen and carbon dioxide, pH, oxygen saturation, base excess (B.E.) and HCO3 concentration were compared between simultaneously obtained central venous and arterial blood samples from conscious healthy 6 dogs and 5 cats. Comparisons between arteriovenous samples were performed by a paired t-test and Bland-Altman analysis. Between arteriovenous samples, B.E. showed good agreement, but there were significant differences in other parameters in the dogs, and no good agreement was detected in cats. The ScvO2 in dogs and cats were 82.3 ± 3.5 and 62.4 ± 13.5%, respectively. Central venous blood gas analysis is indispensable, especially in cats.

**Sedative effects of intramuscular alfaxalone administered to cats.**
Tamura J, Ishizuka T, Fukui S et al.

The sedative effects of intramuscular (IM) alfaxalone in 2-hydroxypropyl-beta-cyclodextrin (alfaxalone-HPCD) were evaluated in cats. The cats were treated with alfaxalone-HPCD in five occasions with a minimum 14-day interval between treatments: an IM injection of 1.0 mg/kg (IM1), 2.5
mg/kg (IM2.5), 5 mg/kg (IM5) or 10 mg/kg (IM10), or an intravenous injection of 5 mg/kg (IV5). The sedative effects were evaluated subjectively using a composite measurement scoring system (a maximum score of 16). Cardio-respiratory variables were measured non-invasively. The median sedation scores peaked at 10 min (score 9), 15 min (score 14), 10 min (score 16), 10 to 20 min (score 16) and 2 to 5 min (score 16) after the IM1, IM2.5, IM5, IM10 and IV5 treatments, respectively. The IM5 treatment produced longer lasting sedation, compared to the IV5 treatment. Durations of maintenance of lateral recumbency after the IM10 treatment (115 ± 22 min) were longer than those after the IM2.5 (40 ± 15 min), IM5 (76 ± 21 min) and IV5 treatments (50 ± 5 min). Cardio-respiratory variables remained within clinically acceptable ranges, except for each one cat that showed hypotension (<60 mmHg) after the IM10 and IV5 treatments. Tremors, ataxia and opisthotonus-like posture were observed during the early recovery period after the IM2.5, IM5, IM10 and IV5 treatments. In conclusion, IM alfaxalone-HPCD produced dose-dependent and clinically relevant sedative effect at 2.5 to 10 mg/kg in healthy cats. Hypotension may occur at higher IM doses of alfaxalone-HPCD.

Presumptive acute non-compressive nucleus pulposus extrusion in 11 cats: clinical features, diagnostic imaging findings, treatment and outcome.
Taylor-Brown FE, De Decker S
OBJECTIVES: The aim of the study was to describe the clinical features, diagnostic imaging findings, treatment and outcome in cats diagnosed with presumptive acute non-compressive nucleus pulposus extrusion. METHODS: Medical records and imaging studies of cats diagnosed with presumptive acute non-compressive nucleus pulposus extrusion were retrospectively reviewed. Information on long-term outcome was acquired from patient records and from either owners or referring veterinary surgeons via a telephone questionnaire. RESULTS: Eleven cats met the inclusion criteria. All cats had a peracute onset of clinical signs, with eight cats experiencing witnessed (n = 6) or suspected (n = 2) external trauma based on imaging findings. Neuroanatomical localisation included C1-C5 (n = 1), T3-L3 (n = 7) and L4-S3 (n = 3) spinal cord segments. Magnetic resonance imaging revealed acute non-compressive nucleus pulposus extrusions located at C3-C4 (n = 1), T12-T13 (n = 1), T13-L1 (n = 1), L1-L2 (n = 1), L3-L4 (n = 3), L4-L5 (n = 1) and L5-L6 intervertebral disc spaces (n = 3). Treatment included supportive care and 10 cats were discharged with a median hospitalisation time of 10 days (range 3-26 days). One cat was euthanased during hospitalisation owing to complications unrelated to neurological disease. All cats that presented non-ambulatory regained an ambulatory status with the median time to ambulation of 17 days (range 6-21 days). Overall, the outcome for cats diagnosed with acute non-compressive nucleus pulposus extrusion was successful, with almost 90% returning to ambulation with urinary and faecal continence. CONCLUSIONS AND RELEVANCE: The majority of cats diagnosed with acute non-compressive nucleus pulposus extrusion had good outcomes. Acute non-compressive nucleus pulposus extrusion should be considered as a differential diagnosis for cats presenting with peracute onset of spinal cord dysfunction, particularly if there is a clinical history or evidence of trauma.

Metabolizable energy intake of client-owned adult cats.
Thes M, Koeber N, Fritz J, Wendel F, Dobenecker B, Kienzle E
*J Anim Physiol Anim Nutr (Berl)* (2015) **99**:1025-1030
A retrospective analysis of the metabolizable energy (ME) intake of privately owned pet cats from the authors’ nutrition consultation practice (years 2007-2011) was carried out to test whether current recommendations are suitable for pet cats. Data of 80 adult cats (median age: 9.0 years, median deviation from ideal weight: +22.5%, majority neutered) at maintenance were available. Six percentage
of the cats were healthy and the others were affected by various chronic diseases. A standardized questionnaire was used, cat owners weighed cat and food. For ration calculation, the software Diet Check Munich™ was used (ME prediction according to National Research Council, 2006: Nutrient Requirements of Dogs and Cats. National Academy Press, Washington, DC). Data were analysed for the factors deviation from ideal weight, breed, age, gender, disease and type of feeding [prepared food (dry, wet) vs. home-made]. Over- or underweight were defined as ≥15% deviation from ideal body weight (BW) according to Kienzle and Moik (British Journal of Nutrition 2011, 106, Suppl 1: S113). Cat owner’s estimation of ideal BW was higher than literature data from Kienzle and Moik (2011). Based on literature data, 26.3% of the pet cats were normal weight, 63.7% overweight and 10% underweight. The mean ME intake of all adult cats amounted to 0.40 ± 0.14 MJ/kg actual BW(0.67) (n = 80). When the data were analysed according to normal, over- and underweight, there was a significant effect with normal weight cats eating 0.46 MJ/kg BW(0.67). Underweight cats ate even more (0.49 MJ/kg BW(0.67)), whereas overweight cats ate considerably less (0.36 MJ/kg BW(0.67)). The other factors had no influence on ME intake of adult cats.

Thungrat K, Price SB, Carpenter DM, Boothe DM
Escherichia coli is one of the most common bacterial pathogens in dogs and cats. The lack of a national monitoring program limits evidence-based empirical antimicrobial choices in the United States. This study describes antimicrobial susceptibility patterns for presumed clinical E. coli isolates from dogs (n=2392) or cats (n=780) collected from six geographic regions in the United States between May 2008 and January 2013. Minimum inhibitory concentrations (MIC) were determined for 17 drugs representing 6 drug classes. Urinary tract isolates were most common (71%). Population MIC distributions were generally bimodal with the second mode above the resistant breakpoint for all drugs except gentamicin, amikacin, and meropenem. The MIC90 exceeded the susceptible breakpoint for ampicillin, amoxicillin-clavulanic acid, cephalothin (surrogate drug for cephalexin), and doxycycline but was below the susceptible breakpoint for all others. None of isolates was susceptible or resistant to all drug tested; 46% were resistant to 1 or 2 antimicrobial categories, and 52% to more than three categories. The resistance percentages were as follows: doxycycline (100%), cephalexin (98%)>ampicillin (48%)>amoxicillin-clavulanic acid (40%)>ticarcillin-clavulanic acid (18%)>cefdodoxime (13%), cefotaxime (12%), cefoxitin (11%), cefazolin (11%), enrofloxacin (10%), chloramphenicol (9.6%)>ciprofloxacin (9.2%), ceftazidime (8.7%), trimethoprim-sulfamethoxazole (7.9%), gentamicin (7.9%)>meropenem (1.5%), amikacin (0.7%) (P<0.05). Resistance to ampicillin and amoxicillin-clavulanic acid was greatest in the South-Central region (P<0.05). E. coli resistance may preclude empirical treatment with doxycycline, cephalexin, ampicillin, or amoxicillin-clavulanic acid. Based on susceptibility patterns, trimethoprim-sulfonamides may be the preferred empirical oral treatment.

Assessment of the IFN-β response to four feline caliciviruses: Infection in CRFK cells.
Tian J, Zhang X, Wu H et al.
Feline calicivirus (FCV) is a highly contagious pathogen with a widespread distribution. Although the cat genome has been sequenced, little is known about innate immunity in cats, which limits the understanding of FCV pathogenesis. To investigate the IFN-β response during FCV infection in CRFK cells, we first cloned and identified the feline IFN-β promoter sequence and the positive regulatory
Feline Abstracts Jul-Oct 2015

domain (PRD) motifs, which shared a high similarity with human and porcine IFN-β promoters. Next, we found that infections with FCV strains F9, Bolin and HRB-SS at the 100 or 1000 TCID50 doses could not activate the IFN-β promoter at 12 and 24h post-infection. Only strain 2280 infection at a 1000 TCID50 dose could induce the IFN-β promoter mainly through IRF3 and partially through NF-κB, at 24h post-infection. However, the IFN response occurred much later and was smaller in magnitude compared with that following Sendai virus (SeV) infection. Further, we found that induction of the IFN-β promoter by FCV 2280 infection depended on dsRNA and not on viral proteins. Finally, we examined whether the IFN-β response had an antiviral effect against FCV replication. The over-expression of IFN-β before exposure to the virus reduced viral yields by a range of 2.2-3.2 log10TCID50, but its over-expression at 12h post-infection did not inhibit FCV replication. Our results indicate that some FCV strains cannot induce IFN-β expression in vitro, which may be a potential factor for FCV survival in cats. Whether this is important in evading the host interferon response in vivo must be investigated.

A descriptive review of cardiac tumours in dogs and cats.
Treggiari E, Pedro B, Dukes-McEwan J, Gelzer AR, Blackwood L
Vet Comp Oncol (2015)
Cardiac tumours are uncommon in the canine and feline population and often an incidental finding. Common types include haemangiosarcoma (HSA), aortic body tumours (chemodectoma and paraganglioma) and lymphoma. These neoplasms can cause mild to severe, life-threatening clinical signs that are independent of the histological type and may be related to altered cardiovascular function or local haemorrhage/effusion into the pericardial space. Cardiac tumours may require symptomatic treatment aimed at controlling tumour bleeding and potential arrhythmias, and other signs caused by the mass effect. Additional treatment options include surgery, chemotheraphy and radiotherapy. For all medical therapies, complete remission is unlikely and medical management, beyond adjunctive chemotherapy in HSA, requires further investigation but combination chemotherapy is recommended for lymphoma. The aim of this report is to summarize and critically appraise the current literature in a descriptive review. However, interpretation is limited by the lack of definitive diagnosis and retrospective nature of most studies.

Comparison of specific gravity analysis of feline and canine urine, using five refractometers, to pycnometric analysis and total solids by drying.
Tvedten HW, Ouchterlony H, Lilliehöök IE
AIMS: To compare the performance of five refractometers for determination of urine specific gravity in cats and dogs, with reference to weight of total solids and pycnometer analysis. METHODS: Urine samples from 27 cats and 31 dogs submitted for routine urinalysis were included. Urine specific gravity was determined with five refractometers. Four were optical, hand-held refractometers with a temperature compensation method and one was a digital model. Urine was dried to determine the precise weight of total solids. The total solids (g/L) were converted to an estimated specific gravity by division with 2.33. Urine specific gravity of four feline and seven canine samples were analysed with a pycnometer. Limits of agreement analysis was used to evaluate the agreement between specific gravity (analysed as specific gravity minus 1) measured by the refractometers and estimated from dried total solids, or pycnometer results. RESULTS: The five refractometers reported clearly different results from each other. Proportional negative bias was noted for refractometer results compared to estimated specific gravity from total solids and a constant negative bias compared to pycnometer results. The two refractometers designed for cat urine reported similar and lowest specific gravity results with a mean
negative bias of 0.007 and 0.008 units compared to estimated specific gravity from total solids, and a mean negative bias of 0.006 units compared to pycnometer results. CONCLUSIONS: Refractometer results did not increase consistently with increasing urine specific gravity compared to reference methods or to other refractometers. Two feline refractometers reported consistently lower specific gravity results than reference methods and other refractometers. CLINICAL RELEVANCE: Because of this imprecision, veterinarians should not use precise cut off values such as 1.030 or 1.035 for evaluation of renal concentrating ability in dogs and cats. Veterinarians should consider the variability of refractometric specific gravity results in their clinical assessment. Two feline refractometers appeared to report falsely low specific gravity results.

Plasma lactate concentrations and comparison of two point-of-care lactate analyzers to a laboratory analyzer in a population of healthy cats.

Tynan B, Kerl ME, Jackson ML, Mann FA


OBJECTIVE: To establish a reference interval for plasma lactate in a population of healthy adult cats on a laboratory analyzer (Nova Biomedical Critical Care Xpress [CCX]) and 2 commercially available point-of-care (POC) analyzers (Abbott i-STAT [i-STAT] and Nova Biomedical Lactate Plus [LP]), and to compare the level of agreement of lactate measurement between the laboratory analyzer and POC analyzers. DESIGN: Prospective observational study. SETTING: University veterinary teaching hospital. ANIMALS: Forty-seven healthy adult cats. INTERVENTIONS: Jugular phlebotomy. MEASUREMENTS AND MAIN RESULTS: In this population, plasma lactate reference interval was 0.67-5.44 mmol/L for the CCX, 0.65-5.16 mmol/L for the i-STAT, and 0.68-4.39 mmol/L for the LP. Comparisons were made between lactate measurements on 2 point-of-care analyzers and the laboratory analyzer using the Bland-Altman method. For the comparison of CCX and i-STAT, the bias was -0.10 mmol/L; for the CCX and LP, the bias was -0.24 mmol/L. CONCLUSIONS: Measurements of plasma lactate in cats using the i-STAT showed acceptable agreement with the CCX. The LP showed weaker agreement. However, both POC analyzers are suitable for measurement of lactate in cats, provided results from different POC analyzers are not directly compared. This study identified a larger reference interval for plasma lactate concentration in cats than what has been previously reported.

Effects in cats of atipamezole, flumazenil and 4-aminopyridine on stress-related neurohormonal and metabolic responses induced by medetomidine, midazolam and ketamine.

Ueoka N, Hikasa Y


This study aimed to investigate the antagonistic effects of a fixed dose of atipamezole (ATI), flumazenil (FLU) and 4-aminopyridine (4AP), both alone and in various combinations, on key stress-related neurohormonal and metabolic changes induced by medetomidine (MED), midazolam (MID) and ketamine (KET) in healthy cats. Seven cats were used consistently in eight investigation groups. Cats were administered a mixture of 0.05 mg/kg MED and 0.5 mg/kg MID followed 10 mins later by 10 mg/kg KET intramuscularly. Twenty minutes after KET injection, the cats were intravenously injected with either a physiological saline solution at 0.1 ml/kg (control) or one of the seven variations of experimental drugs, alone or in combination: ATI, FLU, 4AP, ATI + FLU, FLU + 4AP, ATI + 4AP and ATI + FLU + 4AP. Blood samples were collected 10 times during the 24 h test period. Plasma glucose, insulin, cortisol, epinephrine, norepinephrine and non-esterified fatty acid levels were measured. The administration of MED + MID + KET resulted in hyperglycaemia and decreases in epinephrine, norepinephrine, cortisol and non-esterified fatty acid levels. FLU or 4AP alone or FLU + 4AP did not effectively antagonise the effects induced by MED + MID + KET but enhanced the
hyperglycaemia. ATI alone was effective in antagonising these effects. Compared with non-ATI regimens, combinations with ATI were more effective in antagonising the effects induced by MED + MID + KET; however, ATI + FLU + 4AP caused large increases in cortisol, epinephrine and norepinephrine concentrations. ATI, both alone and in combination, is effective in antagonising the neurohormonal and metabolic effects of MED + MID + KET in cats. However, ATI + FLU + 4AP is not suitable because of large stress-related hormonal responses.

Osteoporotic risk and physeal closure in prepubertal ovariohysterectomized cats.
Uçmak M, Yılmaz ÖT, Gündüz MC et al.
We aimed to examine the early effects of prepubertal ovariohysterectomy (P-OHE) on bone loss and proximal physeal closure in cats. Fourteen kittens randomly underwent P-OHE or sham operations (S-OP) at three months (mo) of age and were allocated to group I and group II. Each mo between four and nine mo of age, dual-energy X-ray absorptiometry (DEXA) scans were performed to determine the total body bone mineral density (BMD) and bone mineral content (BMC). Proximal radial physeal closure and radial length were determined by radiography. Bone-specific alkaline phosphatase (BAP), carboxy-terminal collagen teleopeptide (CTX), 17-β estradiol, progesterone, calcium (Ca) and phosphorus (P) were measured in the serum samples. No significant differences were observed between the groups in terms of BMD, BMC, BAP, BAP/CTX, P, progesterone and body weight (BW) (between 4 and 9mo) and for Ca (between 5 and 9mo) and for CTX levels (between 4 and 8mo). The 17-β estradiol was significantly higher at 6, 8 and 9mo of age in the S-OP group due to puberty (P=0.02, P=0.03 and P=0.02 respectively). Although there was a significant difference (P=0.0002) between the P-OHE and S-OP groups in terms of the proximal radial physeal closure times (7.43±0.20mo and 6.14±0.14mo, respectively), no significant difference was observed for the mean radius length (10.59±0.10cm and 10.06±0.27cm, respectively) at the last evaluation time. In conclusion, prepubertal ovariohysterectomized cats do not have any osteoporotic risks until nine mo of age and exhibit a delayed physeal closure time without a change in radius length.

Complications of appendicular fracture repair in cats and small dogs using locking compression plates.
Vallefuoco R, Le Pommellet H, Savin A et al.
Vet Comp Orthop Traumatol (2015) 29
OBJECTIVE: Our objectives were: 1) to review the complications associated with stabilization of appendicular fractures in cats and small dogs using locking compression plates (LCP), and 2) to identify factors that could influence fixation construct stability. STUDY DESIGN: Retrospective clinical study. MATERIALS AND METHODS: Medical and radiographic records of cats and small dogs with appendicular fractures treated with LCP were reviewed. Only cases with adequate follow-up to document clinical union and cases for which complications appeared before the clinical union were included. Complications were classified as implant-related complications or other complications. Cases with implant-related complications were compared to cases with non-implant-related complications for differences in signalment (species, age, body weight, multiple fractures), fracture location and type (fractured bone, fracture localization, closed or open fracture), reduction method (open reduction and internal fixation [ORIF] or minimally invasive plate osteosynthesis [MIPO]) and fixation evaluations (implant size, plate-bridging ratio, plate span ratio, working length, plate screw density, number of screws and cortices engaged per plate and per main fragment, ratio between screw and bone diameter at the narrowest aspect of the bone, and presence of ancillary fixation). RESULTS: Seventy-five fractures from 63 cats (64 fractures) and 10 dogs (11 fractures) met the inclusion criteria. Eight humeral, 13
radio-ulnar, 26 femoral, and 28 tibio-fibular fractures were treated. Primary repair of the fracture was performed using 2.0 mm and 2.4 mm LCP in 22 and 53 fractures, respectively. Overall and implant-related complications were encountered in 13 and seven of 75 fractures, respectively. Fixation failure was not significantly associated with any aforementioned factor considered in this study, and in particular, there was no significant difference in the occurrence of fixation failure between fractures stabilized with two, or more than two, bicortical locking screws per main fragment. CLINICAL SIGNIFICANCE: 2.0 mm and 2.4 mm LCP were used to manage appendicular fractures in cats and small dogs. The overall complication and fixation failure rate were comparable to those reported in previous studies in which various locking plate systems were used.

**Suspected adverse reactions to vaccination in Canadian dogs and cats.**

Valli JL  
*Can Vet J* (2015) **56**:1090-1092

**Feline hepatic biotransformation of diazepam: Differences between cats and dogs.**

van Beusekom CD, van den Heuvel JJ, Koenderink JB, Russel FG, Schrickx JA  

In contrast to humans and dogs, diazepam has been reported to induce severe hepatic side effects in cats, particularly after repeated dosing. With the aim to elucidate the mechanisms underlying this apparent sensitivity of cats to drug-induced liver injury, in a series of in vitro experiments, the feline-specific biotransformation of diazepam was studied with liver microsomes obtained from cats and dogs and the possible inhibition of the bile salt export pump (Bsep) was measured in isolated membrane vesicles overexpressing feline and canine Bsep. In line with previous in vivo studies, the phase I metabolites nordiazepam, temazepam and oxazepam were measurable in microsomal incubations, although enzyme velocity of demethylases and hydroxylases differed significantly between cats and dogs. In cats, the main metabolite was temazepam, which also could be glucuronidated. In contrast to dogs, no other glucuronidated metabolites could be observed. In addition, in the membrane vesicles an inhibition of the transport of the Bsep substrate taurocholic acid could be observed in the presence of diazepam and its metabolites. It was concluded that both mechanisms, the slow biotransformation of diazepam as well the inhibition of the bile acid efflux that results in an accumulation of bile acids in the hepatocytes, seem to contribute to the liver injury observed in cats following repetitive treatment with diazepam.

**Retrospective assessment of peripheral nerve block techniques used in cats undergoing hindlimb orthopaedic surgery.**

Vettorato E, Corletto F  

OBJECTIVES: To assess retrospectively the efficacy and complication rate of hindlimb peripheral nerve blocks (PNBs) in cats. METHODS: Clinical records of cats that received PNBs and underwent hindlimb orthopaedic surgery from February 2010 to October 2014 were examined. Type of PNB, type and dose of local anaesthetic used, end expiratory fraction of isoflurane (FE1%o) administered, additional intraoperative analgesia, incidence of hypotension, postoperative opioid requirement, postoperative contralateral limb paralysis and neurological complications at the 6 week re-examination were investigated. RESULTS: Eighty-nine records were retrieved but only 69 were analysed. Four combinations of PNBs were used: 34 lateral preiliac (LPI) approach to lumbar plexus (LP) associated
with lumbar paravertebral approach to sciatic nerve (SN); 20 LPI-LP associated with the lateral approach to SN; three LPI-LP associated with gluteal approach to SN; 12 dorsal-paravertebral (DPV) approach to LP associated with lateral SN. Levobupivacaine was used for the majority of PNBs. The mean intraoperative FE’Iso was 1.15%; hypotension was documented in 55.1% of anaesthetics, while 31.8% of cats received fentanyl and/or ketamine intraoperatively. Postoperatively, 72.7% of cats received at least one dose of opioid, while five cats required further postoperative analgesia (ketamine constant rate infusion and/or gabapentin). No cats showed contralateral limb paralysis and neurological complications at the 6 week re-examination. No differences were found comparing the different PNBs used. CONCLUSIONS AND RELEVANCE: PNBs contributed to perioperative anaesthesia/analgesia in cats undergoing hindlimb orthopaedic surgery; however, the clinical relevance of intraoperative hypotension needs further investigation.

Seroprevalence of heartworm (Dirofilaria immitis) in feline and canine hosts from central and northern Portugal.
Vieira L, Silvestre-Ferreira AC, Fontes-Sousa AP et al.
J Helminthol (2015) 89:625-629
Dirofilaria immitis is endemic in Portugal. Several studies have reported the presence of canine heartworm disease, although no previous studies on feline infections have been published. The aim of this study was to determine the prevalence of D. immitis in cats and dogs from central and northern Portugal. Blood samples from 434 cats were tested for circulating anti-D. immitis and anti-Wolbachia antibodies. Furthermore, 386 dogs were tested for circulating D. immitis antigens. Overall feline seroprevalence was 15%, while canine prevalence was 2.1%. The highest feline seroprevalences of 18.7% and 17.6% were found in Aveiro and Viseu, respectively, while the highest canine prevalences of 8.8% and 6.8% were found in Coimbra and Aveiro, respectively. Cats and dogs showing respiratory signs presented higher prevalences of 24.4% and 17%, respectively, while 50% of cats with gastrointestinal signs were seropositive. The present study confirms the seropositivity of D. immitis in the feline population in central and northern Portugal, and suggests the importance of including heartworm disease in the list of differential diagnoses of cats and dogs showing clinical signs compatible with the disease.

What’s inside your cat’s head? A review of cat (Felis silvestris catus) cognition research past, present and future.
Vitale Shreve KR, Udell MA
The domestic cat (Felis silvestris catus) has shared an intertwined existence with humans for thousands of years, living on our city streets and in our homes. Yet, little scientific research has focused on the cognition of the domestic cat, especially in comparison with human’s other companion, the domestic dog (Canis lupus familiaris). This review surveys the current status of several areas of cat cognition research including perception, object permanence, memory, physical causality, quantity and time discrimination, cats’ sensitivity to human cues, vocal recognition and communication, attachment bonds, personality, and cognitive health. Although interest in cat cognition is growing, we still have a long way to go until we have an inclusive body of research on the subject. Therefore, this review also identifies areas where future research must be conducted. In addition to the scientific value of future work in this area, future research on cat cognition could have an important influence on the management and welfare of pet and free-roaming cats, leading to improved human-cat interactions.
Association of mineralisations in the stifle joint of domestic cats with degenerative joint disease and cranial cruciate ligament pathology.

Voss K, Karli P, Montavon PM, Geyer H


**OBJECTIVES:** The aim of the study was to evaluate the prevalence, size, location and appearance of mineralisations in feline stifle joints, and to evaluate their relationship with osteoarthritis and cranial cruciate ligament (CrCL) status. **METHODS:** Presence or absence, and size of mineralisations were determined from lateral stifle radiographs of 25 cats with CrCL rupture, and 44 cat cadavers without CrCL rupture. Mineralisations were classified as small, medium or large. Prevalence was compared between the clinically affected cats and the cadavers; the cadaver group was subdivided into an age-matched and an older group. Ten stifles with varying sizes of mineralisations were prepared as whole-knee specimens for histopathology. Location and appearance of the mineralisations, and degenerative changes in the cruciate ligaments, menisci, articular cartilage and joint capsule are described.

**RESULTS:** Prevalence of articular mineralisations was 0.76 in stifles of cats with CrCL rupture (mean ± SD age 8.6 ± 4.5 years), 0.64 in stifles of age-matched cat cadavers and 0.74 in older cat cadavers (mean ± SD age 17.0 ± 2.4 years). Cats with CrCL rupture had a higher percentage of medium and large mineralisations than cats without CrCL rupture. Microscopically, small mineralisations were calcifications usually located in the cranial horn of the medial meniscus. Larger mineralisations were found to be ossifications, commonly located in the joint capsule and fat pad. Cats with larger mineralisations showed more signs of osteoarthritis, including degenerative changes in the CrCL.

**CONCLUSIONS AND RELEVANCE:** Mineralisations in feline stifle joints were found to differ in size, appearance and location. Small mineralisations were usually confined to the medial meniscus as described previously; larger mineralisations tended to be located in the tissues cranial to the menisci and seemed to be associated with osteoarthritis and CrCL pathology. Large mineralisations in feline stifles are ossifications in periarticular tissue and are associated with degenerative joint disease.

**Stem cell therapy in cats with chronic enteropathy: a proof-of-concept study.**

Webb TL, Webb CB


**OBJECTIVES:** The current treatment of cats with chronic enteropathy frequently includes use of a prescription diet and daily medication administration, with the potential for side effects or problems with owner compliance, and may still result in treatment failure in some cases. The objective of this study was to determine if stem cell therapy was a safe and viable treatment in cases of feline chronic enteropathy. **METHODS:** Allogeneic adipose-derived feline mesenchymal stem cells (fMSC) were used to treat seven cats with diarrhea of no less than 3 months’ duration, while four cats with a similar clinical condition received placebo, in a blinded manner. Three additional cats were treated with an identical fMSC protocol, but owners were not blinded to the treatment. Owners completed a questionnaire characterizing clinical signs both before entering the study and 2 weeks following the second of two fMSC or placebo treatments. Owners were also surveyed for similar input by email 1-2 months later before being unblinded to their cat’s study group. Besides the fMSC or placebo treatment, no other changes were made in diet, supplement or medication administration during the study. **RESULTS:** No adverse reactions or side effects were attributed to the fMSC therapy in any of the cats. Owners of 5/7 fMSC-treated cats reported significant improvement or complete resolution of clinical signs, while the owner of the remaining two cats reported modest but persistent improvement. Owners of placebo-treated cats reported no change or worsening of clinical signs. Of the owners not blinded to the treatment, one reported marked improvement, one reported no change and one was lost to follow-up. **CONCLUSIONS AND RELEVANCE:** Although allogeneic adipose-derived fMSC therapy...
appears to be a safe and potentially effective treatment for cats suffering from chronic enteropathy, these preliminary results require significant follow-up study.

**The rectal microbiota of cats infected with feline immunodeficiency virus infection and uninfected controls.**

Weese JS, Nichols J, Jalali M, Litster A


Rectal swabs were collected from 31 cats, 16 with FIV infection and 15 uninfected controls, to evaluate and compare the rectal bacterial microbiota in cats with feline immunodeficiency virus (FIV) infection and uninfected controls. The rectal microbiota was characterized via next generation sequencing of 16S rRNA gene (V4 region) polymerase chain reaction products. Eighteen different phyla were identified. Firmicutes dominated in both groups, followed by Proteobacteria and Actinobacteria, but there were no significant differences between groups. When predominant orders are compared, FIV-infected cats had significant higher median relative abundances of Bifidobacteriales (P=0.022), Lactobacillales (P=0.022) and Aeromonadales (P=0.043). No differences were identified in the 50 most common genera when adjusted for false discovery rate. There were significant differences in community membership (Jaccard index, unifrac P=0.008, AMOVA P<0.001) and community structure (Yue&Clayton index, unifrac P=0.03, AMOVA P=0.005) between groups. However, only one metacommunity (enterotype) was identified. The rectal microbiota differed between cats with FIV infection and uninfected controls. Some of the changes that were noted have been associated with ‘dysbiosis’ and proinflammatory states in other species, so it is possible that subclinical alteration in the intestinal microbiota could influence the health of FIV-infected cats. Evaluation of the reasons for microbiota alteration and the potential impact on cat health is required.

**Acute liver failure in dogs and cats.**

Weingarten MA, Sande AA


**OBJECTIVE:** To define acute liver failure (ALF), review the human and veterinary literature, and discuss the etiologies and current concepts in diagnostic and treatment options for ALF in veterinary and human medicine.

**ETIOLOGY:** In veterinary medicine ALF is most commonly caused by hepatotoxin exposure, infectious agents, inflammatory diseases, trauma, and hypoxic injury.

**DIAGNOSIS:** A patient may be deemed to be in ALF when there is a progression of acute liver injury with no known previous hepatic disease, the development of hepatic encephalopathy of any grade that occurs within 8 weeks after the onset of hyperbilirubinemia (defined as plasma bilirubin >50 µM/L [=2.9 mg/dL]), and the presence of a coagulopathy. Diagnostic testing to more specifically characterize liver dysfunction or pathology is usually required.

**THERAPY:** Supportive care to aid the failing liver and compensate for the lost functions of the liver remains the cornerstone of care of patients with ALF. Advanced therapeutic options such as extracorporeal liver assist devices and transplantation are currently available in human medicine.

**PROGNOSIS:** The prognosis for ALF depends upon the etiology, the degree of liver damage, and the response to therapy. In veterinary medicine, the prognosis is generally poor.

**Determining the feline immunodeficiency virus (FIV) status of FIV-vaccinated cats using point-of-care antibody kits.**

Westman ME, Malik R, Hall E, Sheehy PA, Norris JM

This study challenges the commonly held view that the feline immunodeficiency virus (FIV) infection status of FIV-vaccinated cats cannot be determined using point-of-care antibody test kits due to indistinguishable antibody production in FIV-vaccinated and naturally FIV-infected cats. The performance of three commercially available point-of-care antibody test kits was compared in a mixed population of FIV-vaccinated (n=119) and FIV-unvaccinated (n=239) cats in Australia. FIV infection status was assigned by considering the results of all antibody kits in concert with results from a commercially available PCR assay (FIV RealPCR™). Two lateral flow immunochromatography test kits (Witness FeLV/FIV; Anigen Rapid FIV/FeLV) had excellent overall sensitivity (100%; 100%) and specificity (98%; 100%) and could discern the true FIV infection status of cats, irrespective of FIV vaccination history. The lateral flow ELISA test kit (SNAP FIV/FeLV Combo) could not determine if antibodies detected were due to previous FIV vaccination, natural FIV infection, or both. The sensitivity and specificity of FIV RealPCR™ for detection of viral and proviral nucleic acid was 92% and 99%, respectively. These results will potentially change the way veterinary practitioners screen for FIV in jurisdictions where FIV vaccination is practiced, especially in shelter scenarios where the feasibility of mass screening is impacted by the cost of testing.

Rapid and sensitive detection of Feline immunodeficiency virus using an insulated isothermal PCR-based assay with a point-of-need PCR detection platform.
Wilkes RP, Kania SA, Tsai YL et al.
Feline immunodeficiency virus (FIV) is an important infectious agent of cats. Clinical syndromes resulting from FIV infection include immunodeficiency, opportunistic infections, and neoplasia. In our study, a 5' long terminal repeat/gag region-based reverse transcription insulated isothermal polymerase chain reaction (RT-iiPCR) was developed to amplify all known FIV strains to facilitate point-of-need FIV diagnosis. The RT-iiPCR method was applied in a point-of-need PCR detection platform--a field-deployable device capable of generating automatically interpreted RT-iiPCR results from nucleic acids within 1 hr. Limit of detection 95% of FIV RT-iiPCR was calculated to be 95 copies standard in vitro transcription RNA per reaction. Endpoint dilution studies with serial dilutions of an ATCC FIV type strain showed that the sensitivity of lyophilized FIV RT-iiPCR reagent was comparable to that of a reference nested PCR. The established reaction did not amplify any nontargeted feline pathogens, including Felid herpesvirus 1, feline coronavirus, Feline calicivirus, Feline leukemia virus, Mycoplasma haemofelis, and Chlamydomphila felis. Based on analysis of 76 clinical samples (including blood and bone marrow) with the FIV RT-iiPCR, test sensitivity was 97.78% (44/45), specificity was 100.00% (31/31), and agreement was 98.65% (75/76), determined against a reference nested-PCR assay. A kappa value of 0.97 indicated excellent correlation between these 2 methods. The lyophilized FIV RT-iiPCR reagent, deployed on a user-friendly portable device, has potential utility for rapid and easy point-of-need detection of FIV in cats.

Development and validation of a feline abdominal palpation model and scoring rubric.
Williamson JA, Hecker K, Yvorchuk K, Artemiou E, French H, Fuentealba C
Vet Rec (2015) 177:151
Simulation in veterinary education enables clinical skills practice without animal use. A feline abdominal palpation model was created that allows practice in this fractious species. This study assessed the model and rubric using a validation framework of content evidence, internal structure and relationship with level of training. Content Evidence: Veterinarians accepted this model as a helpful training tool for students (median=4 on five-point Likert scale). Internal Structure Evidence: G-coefficients were low for first- and second-year students (0.28 and 0.23), but were acceptable for
veterinarians (0.61). Internal consistency values (0.24, 0.42 and 0.67) followed a similar pattern. Thus, scores were more reliable for veterinarians than for the students. Evidence of Relationship with Level of Training: Although level of training impacted reliability, its effect on performance scores was inconsistent. Analysis of variance (ANOVA) identified no differences among the groups of students and veterinarians. However, effect size between first- and third-year students was medium to large (0.62). Effect sizes between the veterinarians and student groups were small. Although the model and rubric appeared valid for experts, modifications would be necessary to generate reliable scores for students. These results allow greater understanding of the needs of students utilising a low-fidelity model.

Owner observations regarding cat scratching behavior: an internet-based survey.
OBJECTIVES: To examine aspects of the cat, environment and scratching post that might influence scratching behavior, in an effort to determine how inappropriate scratching behavior might be refocused on acceptable targets. METHODS: An internet survey, posted on several public websites, gathered details about scratching behavior, as described by owners in their home environments, from 4331 respondents over a 4 month period. Responses from 39 different countries were analyzed, mostly from the USA, Canada and the UK. RESULTS: Owners offered traditionally recommended scratching substrates including rope, cardboard, carpet and wood. Rope was most frequently used when offered, although carpet was offered most frequently. Most owners provided at least one scratching post; cats scratched the preferred substrate more often when the post was a simple upright type or a cat tree with two or more levels and at least 3 ft high. Narrower posts (base width \(<=3\) ft) were used more often than wider posts (base width \(>=5\) ft). Intact or neutered cats (males and females) were as likely to scratch inappropriately, and inappropriate scratching decreased with age. Geriatric cats between the ages of 10 and 14 years preferred carpet substrate most frequently; all other ages preferred rope first. Inappropriate scratching decreased as the different types/styles of posts increased in the home. Inappropriate scratching did not increase if the number of cats or dogs increased in the household. Declawed cats were preventatively declawed most often to prevent household item destruction. CONCLUSIONS AND RELEVANCE: Although cats can have individual preferences, our data provide a starting point for veterinarians recommending scratching posts to clients.

Pain and analgesia following onychectomy in cats: a systematic review.
Wilson DV, Pascoe PJ
_Vet Anaesth Analg_ (2015)
OBJECTIVES: To systematically review published studies evaluating pain associated with onychectomy in cats, and to assess the efficacy of the analgesic therapies applied. DATABASES USED: Four sources were used to identify manuscripts for review. Databases searched were those of the National Library of Medicine, EMBASE and CAB International. In addition, pertinent references in the bibliographies of included articles were retrieved. RESULTS: Twenty manuscripts published in refereed journals were reviewed. These included papers reporting 18 clinical trials and two studies conducted in conditioned research cats. Twelve analgesics were evaluated, including seven opioids, four non-steroidal anti-inflammatory drugs and one local anesthetic. Nine studies involved a direct comparison of analgesic agents. Limb use was abnormal when measured at 2 and 12 days following onychectomy, and neither fentanyl patch nor butorphanol administration resulted in normal use of the surgical limb. In another study, cats evaluated at 6 months after this surgery were not lame. Differing
surgical techniques were compared in six studies; the results indicated that pain scores were lower after laser surgery than after scalpel surgery. The difficulties associated with assessing pain in cats and the lack of sensitivity of the evaluation systems utilized were highlighted in many of the studies. Huge variations in dose and dosing strategies had significant impacts on drug efficacy. Statistically significant differences among treatments were found in most studies; however, no clearly superior analgesic treatment was identified. A combination of meloxicam or robenacoxib with an opioid may provide more effective analgesia and should be evaluated.


Adiponectin is an important anti-inflammatory hormone secreted from adipose tissue. The high-molecular-weight form of adiponectin (HMW) closely correlates with insulin sensitivity in human beings. This study uses a novel method of size-exclusion gel chromatography combined with enzyme-linked immunosorbent assay to measure HMW feline adiponectin and determine its relationship to leptin, cholesterol, and insulin sensitivity as cats gain and lose weight. In addition, total adiponectin and its messenger RNA expression in subcutaneous adipose tissue were measured. No correlations were found between total serum adiponectin and subcutaneous adipose messenger RNA expression, fat mass, or measures of insulin sensitivity. This study demonstrates that cats have high percentages of HMW adiponectin. Although weak correlations between HMW adiponectin and fat mass were detected, additional cats are needed to determine if the correlations are significant.


Abdominal radiography and ultrasonography are commonly used as part of the initial diagnostic plan for cats with nonspecific signs of abdominal disease. This retrospective study compared the clinical usefulness of abdominal radiography and ultrasonography in 105 feline patients with signs of abdominal disease. The final diagnosis was determined more commonly with ultrasonography (59%) compared to radiography (25.7%). Ultrasonography was also able to provide additional clinically relevant information in 76% of cases, and changed or refined the diagnosis in 47% of cases. Based on these findings, ultrasonography may be sufficient as an initial diagnostic test for the investigation of feline abdominal disease. Abstract available from the publisher.


Feline calicivirus (FCV) is a highly contagious pathogen that causes oral and upper respiratory tract disease in cats. Despite widespread vaccination, the prevalence of FCV remains high. Furthermore, a high gene mutation rate has led to the emergence of variants, and some infections are lethal. To date, there is no effective antiviral drug available for treating FCV infection. Here, we show that lithium chloride (LiCl) effectively suppresses the replication of FCV strain F9 in Crandell-Reese feline kidney (CRFK) cells. The antiviral activity of LiCl occurred primarily during the early stage of infection and in a dose-dependent manner. LiCl treatment also inhibited the cytopathic effect. LiCl treatment exhibited a strong inhibitory effect against a panel of other two reference strains and two recent FCV
isolates from China. These results demonstrate that LiCl might be an effective anti-FCV drug for controlling FCV disease. Further studies are required to explore the antiviral activity of LiCl against FCV replication in vivo.

Pilot study of oral metformin in cancer-bearing cats.
Wypij JM
*Vet Comp Oncol* (2015)
A prospective dose escalation pilot study was performed in cancer-bearing cats to assess toxicity and surrogate biomarkers of pharmacologic activity of oral metformin hydrochloride. Nine cats with measurable spontaneous cancer were treated with oral metformin for 14 days. Monitoring included complete blood count (CBC), serum biochemistry, lactate, pH, insulin-like growth factor-1, and vascular endothelial growth factor serially until study completion. At the maximum tolerated dose of 10 mg kg\(^{-1}\) q12 h side effects were primarily mild to moderate gastrointestinal upset (anorexia, vomiting, and/or weight loss). All cats developed a reduction in haematocrit. Six of nine cats developed new or progressive hyperlactatemia and one cat developed asymptomatic lactic acidosis. There were no clinical responders and two cats had modest measurable reduction in tumour size. In conclusion, we demonstrate potential pharmacologic activity of metformin at a clinically relevant dose and identify parameters for clinical monitoring and supportive care. Further investigation of metformin in cancer-bearing cats is warranted.

Molecular characterisation of Cryptosporidium and Giardia in cats (Felis catus) in Western Australia.
Yang R, Ying JL, Monis P, Ryan U
Little is known of the prevalence of Cryptosporidium and Giardia in domestic cats in Western Australia and their potential role as zoonotic reservoirs for human infection. In the present study, a total of 345 faecal samples from four different sources were screened for the presence of Cryptosporidium and Giardia by PCR and genotyped by sequence analysis. Oocyst numbers and cyst numbers for Cryptosporidium and Giardia respectively were also determined using quantitative PCR assays. Cryptosporidium and Giardia were detected in 9.9% (95% CI 6.7-13.0) and 10.1% (95% CI 7.0-13.3) of cats in Western Australia respectively. Sequence analysis at the 18S rRNA locus identified five Cryptosporidium species/genotypes; C. felis (n = 8), C. muris (n = 1), C. ryanae (n = 1), Cryptosporidium rat genotype III (n = 5) and a novel genotype most closely related to Cryptosporidium rat genotype III in one isolate. This is the first report of C. ryanae and Cryptosporidium rat genotype III in cats. For Giardia, assemblage F the most commonly identified species, while only 1 assemblage sequence was detected. Since most human cases of cryptosporidiosis are caused by C. parvum and C. hominis and human cases of giardiasis are caused by G. duodenalis assemblage A and B, the domestic cats in the present study are likely to be of low zoonotic risk to pet owners in Perth. Risk analyses identified that elderly cats (more than 6 years) were more prone to Cryptosporidium and Giardia infections than kittens (less than 6 months) (P = 0.009). Clinical symptoms were not associated with the prevalence of Cryptosporidium and Giardia infections in cats.

Isolation and genetic characterization of viable Toxoplasma gondii from tissues and feces of cats from the central region of China.
Yang Y, Ying Y, Verma SK et al.
Cats are important in the epidemiology of toxoplasmosis because they are the only definitive hosts that excrete environmentally resistant Toxoplasma gondii oocysts. Little is known of feline toxoplasmosis in China and most of the literature is in Chinese. Here we summarized all published reports on feline toxoplasmosis in English and report first identification of oocyst excretion by naturally infected cats in China. Unfrozen tissues of 42 cats and feces of 360 cats from China were bioassayed in mice for isolation of T. gondii. Antibodies to T. gondii were found in 21 of 42 (50%) of cats by the modified agglutination test (cut-off 1:25). Viable T. gondii was isolated from tissues of eight of 21 seropositive but not from 21 seronegative (<1:25) cats. Viable T. gondii was isolated from feces of one cat. DNA derived from cell cultured tachyzoites of all nine T. gondii isolates was characterized by PCR-RFLP at 10 loci (SAG1, SAG2, SAG3, BTUB, GRA6, c22-8, c29-2, L358, PK1, and Apico). Four genotypes were found; the genotypes of tissue isolates were ToxoDB #9 in six, ToxoDB #2 in one, and ToxoDB #17 in one. The fecal isolate was ToxoDB #1. To our knowledge, the present study is the first isolation of T. gondii from cat feces from China.

Femoral head and neck excision in cats: medium- to long-term functional outcome in 18 cats.
Yap FW, Dunn AL, Garcia-Fernandez PM, Brown G, Allan RM, Calvo I

OBJECTIVE: To assess the medium- to long-term functional outcome of cats after femoral head and neck excision (FHNE) using an owner-completed questionnaire. METHODS: Cats that had FHNE and were free of other orthopaedic or medical conditions that could affect their mobility, other than the studied coxofemoral joint(s), were included. A specific owner-completed questionnaire was used at a minimum of 4 months postoperatively. The questionnaire assessed the ability of the cats to perform normal feline activities, change of demeanour or behaviour, the necessity for long-term analgesia and the time taken to resume normal activities. RESULTS: Eighteen cats had undergone uni- or bilateral FHNE and met the inclusion criteria. All but one cat could perform normal feline activities without or with slight difficulty at follow-up. The aforementioned cat had notable, persistent difficulty in climbing. The majority of the cats took between 1 and 2 months to resume normal activity. No change in demeanour or behaviour was noted in any of the cats and none of the cats required long-term analgesia. CONCLUSIONS AND RELEVANCE: Based on the owner-completed questionnaire, cats have good-to-excellent medium- to long-term functional outcome after adequately performed FHNE.

Recurrent and non-recurrent feline injection site sarcoma: computed tomographic and ultrasonographic findings.
Zardo KM, Damiani LP, Matera JM, Fonseca-Pinto AC

OBJECTIVES: This study describes the sonographic and computed tomographic (CT) characteristics of primary and recurrent feline injection site sarcomas (FISSs). METHODS: Between 2005 and 2013, 32 cats were selected for prospective and retrospective studies. Tumor shape and margins, presence of thickening of the adipose tissue, muscular and bone involvement, pre- and postcontrast attenuation, blurring of fat planes, calcification and liquefactive necrosis, intratumoral areas and skip metastasis were analyzed in CT scans. Echogenicity, echotexture, tumor margins and peritumoral tissue characteristics were analyzed by ultrasound (US). RESULTS: Irregular shape (62.5%) with digitiform projections (100.0%), mixed (peripheral and intratumoral) contrast enhancement (67.7%), blurring of fat planes (68.8%) and signs of liquefactive intratumoral necrosis (68.8%) were the prevailing CT findings. Ultrasonography revealed irregular tumor margins, peripheral hyperechoic capsule-like rim, heterogeneous echotexture, and hyperechoic tissue contiguous with the formations and thickening of adjacent subcutaneous tissues in all cases. Mixed echogenicity with areas suggestive of tumor
liquefactive necrosis was documented in 83.3% of cases. Skip metastases were highly correlated with tumor recurrence (P = 0.001). The incidence of muscular involvement tended to be higher (P = 0.003) in tumors presenting with thickening of adjacent adipose tissue. CONCLUSIONS AND RELEVANCE: CT and US features common to FISS lesions were highlighted in this study. The imaging modalities employed allowed assessment of peritumoral inflammation, particularly adipose tissue inflammation. Imaging data may contribute to FISS diagnosis, therapeutic planning and patient follow-up.

Detection prevalence of H5N1 avian influenza virus among stray cats in eastern China.
Since 1997, more and more cases of the infectious H5N1 avian influenza virus (AIV) in humans have been reported all over the world but the transmission of H5N1 avian influenza virus to stray cats has been little demonstrated. The objective of this pilot investigation was to determine the prevalence of H5N1 AIV antibodies in stray cats in eastern China where is the dominant enzootic H5N1 highly pathogenic avian influenza virus (HP AIV). A total of 1,020 nasal swab and 1,020 serum samples were collected and tested. Evidence of HPAI H5N1 virus antibodies was present in two of the 1,020 serum samples that were positive by HI assay and NT assay, respectively. The results imply little transmission and that the Clade 2.3.2 HPAIV H5N1 infections in poultry did not significantly affect the rural animal shelters or suburban environment in eastern China. In future studies, these results can be used as baseline seroepidemiological levels for H5N1 AIV among cats in China.

Exocrine Pancreas in Cats with Diabetes Mellitus.
Pancreatitis has been described in cats with diabetes mellitus, although the number of studies currently available is very limited. In addition, ketoacidosis has been hypothesized to be associated with pancreatitis in diabetic cats. The aims of the present study were to investigate whether diabetic cats have pancreatitis and to determine if pancreatitis is more frequent with ketoacidosis. Samples of pancreas were collected postmortem from 37 diabetic cats, including 15 with ketoacidosis, and 20 control cats matched for age, sex, breed, and body weight. Sections were stained with hematoxylin and eosin, double-labeled for insulin/CD3, insulin/CD20, insulin/myeloperoxidase, insulin/PCNA, and glucagon/Ki67, and single-labeled for Iba1. A previously proposed semiquantitative score was used to characterize pancreatitis, along with counts of inflammatory cells. Scores of pancreatitis and the number of neutrophils, macrophages, and lymphocytes in the exocrine pancreas did not differ between diabetic and control cats or between diabetic cats with and without ketoacidosis. Of note, PCNA-positive acinar cells were increased (P = .002) in diabetic cats, particularly near islets (P <.001). Ki67-positive acinar cells were increased only near islets (P =.038). Ketoacidosis was not linked to proliferation. The results suggest that histopathologic evidence of pancreatitis may not be more frequent in diabetic cats and that ketoacidosis may not be associated with it at the time of death. Augmented PCNA-positive acinar cells might indicate increased proliferation due to chronic pancreatitis. The reason behind the prevalent proliferation of acinar cells surrounding pancreatic islets deserves further investigation.

Cat Ownership Perception and Caretaking Explored in an Internet Survey of People Associated with Cats.
Zito S, Vankan D, Bennett P, Paterson M, Phillips CJ
*PLoS One* (2015) **10:**e0133293

People who feed cats that they do not perceive they own (sometimes called semi-owners) are thought to make a considerable contribution to unwanted cat numbers because the cats they support are generally not sterilized. Understanding people’s perception of cat ownership and the psychology underlying cat semi-ownership could inform approaches to mitigate the negative effects of cat semi-ownership. The primary aims of this study were to investigate cat ownership perception and to examine its association with human-cat interactions and caretaking behaviours. A secondary aim was to evaluate a definition of cat semi-ownership (including an association time of $\geq 1$ month and frequent feeding), revised from a previous definition proposed in the literature to distinguish cat semi-ownership from casual interactions with unowned cats. Cat owners and semi-owners displayed similar types of interactions and caretaking behaviours. Nevertheless, caretaking behaviours were more commonly displayed towards owned cats than semi-owned cats, and semi-owned cats were more likely to have produced kittens ($p<0.01$). All interactions and caretaking behaviours were more likely to be displayed towards cats in semi-ownership relationships compared to casual interaction relationships. Determinants of cat ownership perception were identified ($p<0.05$) and included association time, attachment, perceived cat friendliness and health, and feelings about unowned cats, including the acceptability of feeding unowned cats. Encouraging semi-owners to have the cats they care for sterilized may assist in reducing the number of unwanted kittens and could be a valuable alternative to trying to prevent semi-ownership entirely. Highly accessible semi-owner “gatekeepers” could help to deliver education messages and facilitate the provision of cat sterilization services to semi-owners. This research enabled semi-ownership to be distinguished from casual interaction relationships and can assist welfare and government agencies to identify cat semi-owners in order to develop strategies to address this source of unwanted cats.

**Incidence of Diabetes Mellitus in Insured Swedish Cats in Relation to Age, Breed and Sex.**
Öhlund M, Fall T, Ström Holst B, Hansson-Hamlin H, Bonnett B, Enevall A

BACKGROUND: Diabetes mellitus (DM) is a common endocrinopathy in cats. Most affected cats suffer from a type of diabetes similar to type 2 diabetes in humans. An increasing prevalence has been described in cats, as in humans, related to obesity and other lifestyle factors. OBJECTIVES: To describe the incidence of DM in insured Swedish cats and the association of DM with demographic risk factors, such as age, breed and sex. ANIMALS: A cohort of 504,688 individual cats accounting for 1,229,699 cat-years at risk (CYAR) insured by a Swedish insurance company from 2009 to 2013. METHODS: We used reimbursed insurance claims for the diagnosis of DM. Overall incidence rates and incidence rates stratified on year, age, breed, and sex were estimated. RESULTS: The overall incidence rate of DM in the cohort was 11.6 cases (95% confidence interval [CI], 11.0-12.2) per 10,000 CYAR. Male cats had twice as high incidence rate (15.4; 95% CI, 14.4-16.4) as females (7.6; 95% CI, 6.9-8.3). Domestic cats were at higher risk compared to purebred cats. A significant association with breed was seen, with the Burmese, Russian Blue, Norwegian Forest cat, and Abyssinian breeds at a higher risk compared to other cats. No sex predisposition was found among Burmese cats. Several breeds with a lower risk of DM were identified. CONCLUSIONS AND CLINICAL IMPORTANCE: Our results verify that the Burmese breed is at increased risk of developing DM. We also identified several previously unreported breeds with increased or decreased risk of DM.
Differences in the faecal microbiome of non-diarrhoeic clinically healthy dogs and cats associated with Giardia duodenalis infection: impact of hookworms and coccidia.

Šlapeta J, Dowd SE, Alanazi AD, Westman ME, Brown GK


The protozoan parasite Giardia duodenalis causes a waterborne diarrhoeal disease in animals and humans, yet many Giardia-infected hosts remain asymptomatic. Mixed parasite infections are common in both animals and humans with unknown consequences for Giardia or other parasites. We compared the composition and diversity of bacterial communities from 40 dogs, including free-roaming dogs, and 21 surrendered cats from Australia. The dog cohort included 17 (42.5%) dogs positive for Giardia and 13 (32.5%) dogs positive for dog hookworm (*Ancylostoma caninum*). The cat samples included eight positive for Giardia and eight positive for *Cystoisospora*. The V4 region of 16S rRNA was sequenced at an average of 36,383 high quality sequences (>200 bp) per sample using the Ion Torrent PGM platform. In dogs we found significant (*P*<0.05, AnoSim) difference between the Giardia-positive and -negative groups when evaluating bacterial genera. No such difference was demonstrated between *Ancylostoma*-positive and -negative dogs. However, there was a modest but not significant separation of the Giardia-negative and -positive dogs (*P*=0.09, UniFrac) using principal coordinate analysis. Removal of dogs with hookworms further separated Giardia-positive and -negative groupings (*P*=0.06, UniFrac). In cats, the presence of Giardia was not associated with a significant difference based on bacterial genera (*P*>0.05, AnoSim). *Cystoisospora*-positive cats, however, exhibited significantly different profiles from *Cystoisospora*-negative cats (*P*=0.02, AnoSim) and UniFrac showed significant separation of *Cystoisospora*-positive and -negative samples (*P*<0.01). The results suggest that in clinically heathy dogs and cats, helminths and protozoa are associated with different microbiomes and possibly variable gut microbiota functions. Understanding the association of parasites and microbiomes has important consequences for the administration of antiparasitic drugs in animals and humans.