The occurrence of feline neoplasia; a comparison between Danish and NorthAmerican cats

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ORAL RESEARCH COMMUNICATIONS

ESVIM – European Society of Veterinary Internal Medicine

Thursday 14 September

09.00–09.15	ESVIM-O-1	Cuq	Calibrated automated thrombography to evaluate thrombin generation in dogs with immune-mediated hemolytic anaemia
09.15–09.30	ESVIM-O-2	Dandrieux	Effect of immune-suppressive treatment on cytokine production in healthy dogs
09.30–09.45	ESVIM-O-3	Hansson-Hamlin	Identification of antinuclear antibodies in dogs using immunodiffusion

Friday 15 September

14.40–14.55	ESVIM-O-4	Brown	Short- and long-term morbidity and mortality in dogs and cats following cardiopulmonary arrest
14.55–15.10	ESVIM-O-6	Darcy	Feline primary erythrocytosis: a multicentre retrospective case series (18 cases)
15.10–15.25	ESVIM-O-7	Roels	Investigation of a fungal aetiology in canine idiopathic pulmonary fibrosis
15.25–15.40	ESVIM-O-8	Keegan	Clinical features of 70 cases of canine idiopathic eosinophilic lung disease
15.40–15.55	ESVIM-O-9	Keegan	Therapy and long-term follow-up of 70 cases of canine idiopathic eosinophilic lung disease
16.30–16.45	ESVIM-O-10	Vientos-Plotts	Development of respiratory dysbiosis as cats transition from healthy to asthmatic airways
16.45–17.00	ESVIM-O-11	Grobman	Documenting silent reflux and microaspiration events using nuclear scintigraphy in healthy dogs
17.00–17.15	ESVIM-O-12	Canonne	Diagnosis of pulmonary angiostrongylosis in dogs with negative non-invasive tests (Baermann analysis and AngioDetectTM©)
17.15–17.30	ESVIM-O-13	Grobman	Discrimination between cough and non-cough behaviours using acoustic wave recordings
17.30–17.45	ESVIM-O-14	Robin	Tracheal stent in dogs: outcome prediction and owner satisfaction assessment
17.45–18.00	ESVIM-O-15	Stengel	Meticulous debridement as sole management for successful outcome in 6 dogs with sinonasal aspergillosis (SNA)

ESVC – European Society of Veterinary Cardiology

Thursday 14 September

14.25–14.40	ESVC-O-1	Vitt	Utility of VHS to predict echocardiographic EPIC Trial inclusion criteria in dogs with myxomatous mitral valve disease: A retrospective multicentre study
14.40–14.55	ESVC-O-2	Rocchi	Evaluation of continuous positive airway pressure in dogs with cardiogenic pulmonary oedema secondary to severe mitral valve disease
14.55–15.10	ESVC-O-3	Rishniw	Development of a simple algorithm for diagnosis of left-sided congestive heart failure in dogs with mitral valve disease
15.10–15.25	ESVC-O-4	Lee	Effects of treatment with thromboxane A2 synthase inhibitor on pulmonary hypertension: a pilot study

15.25–15.40	ESVC-O-5	Vezzosi	Echocardiographic evaluation of right ventricular dimension and systolic function in dogs with pulmonary hypertension
15.40–15.55	ESVC-O-6	Merveille	Caudal vena cava assessment in dogs with right-sided congestive heart failure: a pilot study
15.55–16.10	ESVC-O-7	Blake	Heart rate variability in dogs with intracranial disease
16.10–16.25	ESVC-O-8	Kiss	Genetic background of focal junctional tachycardia with isorhythmic atrioventricular dissociation in Labrador retrievers
16.25–16.40	ESVC-O-9	Oxford	Immunofluorescent localization of plakoglobin in endomyocardial biopsy samples to diagnose arrhythmogenic right ventricular cardiomyopathy (ARVC) in the dog
Friday 15 September			
08.00–08.15	ESVC-O-10	LeBlanc	Right ventricular volume quantification measured by real-time 3D echocardiography and ECG-gated 64 slice MDCT in healthy dogs
08.15–08.30	ESVC-O-11	Damoiseaux	Feasibility of intracardiac echocardiography in dogs: a pilot study
08.30–08.45	ESVC-O-12	Corda	Use of two-dimensional speckle tracking echocardiography to assess left ventricular systolic function in dogs with systemic inflammatory response syndrome
08.45–09.00	ESVC-O-13	Bree	Major histocompatibility complex class II haplotypes associated with remodelling in Cavalier King Charles spaniels with chronic valvular heart disease
11.20–11.35	ESVC-O-14	Traub	MiRNAs in progressing canine myxomatous mitral valve disease
11.35–11.50	ESVC-O-15	Tims	White coat effect in client-owned dogs, as assessed by high definition oscillometry (HDO)
11.50-12.05	ESVC-O-16	Mckeever	Prevalence and murmur characteristics of incidentally detected heart murmurs and heart disease in 12,958 young healthy shelter cats
12.05–12.20	ESVC-O-17	Szatmári	When should we talk about tachypnoea in cats at the veterinarian's consultation room?
12.20–12.35	ESVC-O-18	Szatmári	How often do primary care practitioners recognise innocent cardiac murmurs in puppies during the first veterinary health check?
12.35–12.50	ESVC-O-19	Connolly	Towards cardiac stem cell therapy: characterisation and cryopreservation of canine cardiosphere-derived cells
16.45–17.00	ESVC-O-20	Dutton	Assessing the feasibility of allogeneic stem cell therapy for canine dilated cardiomyopathy
17.00–17.15	ESVC-O-21	Ohad	The association of clinical, laboratory and echocardiographic findings with survival in 108 dogs undergoing pericardiocentesis; a retrospective study
17.15–17.30	ESVC-O-22	Neves	Usefulness of colour TDI at the level of lateral atrial tissue as a predictor of future development of atrial fibrillation in dogs
17.30–17.45	ESVC-O-23	Beijerink	ECG-gated computed tomography angiography of patent ductus arteriosus in 25 dogs
17.45–18.00	ESVC-O-24	Szatmári	Is prophylactic antibiotic therapy necessary to prevent infectious endocarditis in dogs that undergo transcatheter embolisation of a patent ductus arteriosus?
Saturday 16 September			
16.30–16.45	ESVC-O-25	Gomart	Biological variability of N-terminal pro-B-type natriuretic peptide in fifty-three healthy Labrador retrievers over an 8 month period
16.45–17.00	ESVC-O-26	Glen	Clinical use of a patient-side feline NT-proBNP ELISA test in 281 cats in general practice
17.00–17.15	ESVC-O-27	Romito	Diagnostic and prognostic utility of surface ECG in cats with left ventricular hypertrophy
17.15–17.30	ESVC-O-28	Winter	Notched QRS complexes in dogs with and without structural cardiac disease: 85 cases

ESVNU – European Society of Veterinary Nephrology and Urology

Thursday 14 September

14.25–14.40	ESVNU-O-1	Sargent	Fibroblast growth factor 23 and symmetric dimethylarginine in feline chronic kidney disease
14.40–14.55	ESVNU-O-2	van den Broek	Immunohistochemical staining of a-klotho protein in feline kidney tissue
14.55–15.10	ESVNU-O-3	Pelander	Symmetric dimethylarginine (SDMA) compared to creatinine for detection of decreased GFR in 97 dogs with stable kidney function
15.10–15.25	ESVNU-O-4	Buresova	SDMA in hyperthyroid cats before and after treatment with radioiodine
15.25–15.40	ESVNU-O-5	Chen	Interleukin 6 and Interleukin 18 as markers of kidney injury in dogs
15.40–15.55	ESVNU-O-6	Segev	Application of novel kidney-specific biomarkers for canine kidney diseases
15.55–16.10	ESVNU-O-7	Lamoureux	Prevalence of urinary tract infection in dogs with chronic kidney disease: a retrospective study of 201 cases
16.10–16.25	ESVNU-O-8	Johnstone	Whole genome sequencing of Escherichia coli isolated from the urinary tract of individual dogs over time
16.25–16.40	ESVNU-O-9	Pomba	Virulence and antimicrobial resistance of Escherichia coli Sequence Type 131 H30 and other human pandemic clones spreading in companion animals

Saturday 16 September

14.25–14.40	ESVNU-O-10	Russak	Urinary biomarker concentrations in canine urinary tract infections
14.40–14.55	ESVNU-O-11	Garcia	Evolution of ionised calcium concentration over time in cats with ureteral obstruction: 39 cases
14.55–15.10	ESVNU-O-12	Crisi	Urinary findings suggesting early renal involvement in cats with Feline Morbillivirus infection
15.10–15.25	ESVNU-O-13	Reynolds	Effects of a non-absorbent litter on urinalysis results in cats
15.25–15.40	ESVNU-O-14	Garcia	Determining the pH in canine urine: comparing visual and automated reading variability of urine dipstick analysis within a small animal teaching hospital
15.40–15.55	ESVNU-O-15	van den Berg	Assessment of kidney injury in canine parvoviral infection by comparing novel urinary kidney injury biomarkers with routine renal functional parameters

ESVONC – European Society of Veterinary Oncology

Friday 15 September

09.30–09.45	ESVONC-O-1	Zandvliet	Are protein kinase inhibitors of use in the treatment of canine lymphoma? A screening in vitro study with multiple protein kinase inhibitors in canine lymphoid cell lines
09.45–10.00	ESVONC-O-2	Giuliano	Masitinib treatment for advanced stage III and IV canine melanoma
10.00–10.15	ESVONC-O-3	Elliott	Toceranib phosphate in fifteen dogs with stage 4 anal sac apocrine gland adenocarcinoma
10.15–10.30	ESVONC-O-4	Lyons	Effect of toceranib phosphate (Palladia®) on outcome in dogs with anal sac carcinoma
11.20–11.35	ESVONC-O-5	Børresen	The occurrence of feline neoplasia; a comparison between Danish and North American cats
11.35–11.50	ESVONC-O-6	Aghazadeh	Expression of Felis catus gammaherpesvirus-1 ORF73, F7 and ORF50 in FIV-associated lymphoma biopsies
11.50–12.05	ESVONC-O-7	Boye	High pretreatment D-dimer concentraion is associated with poor prognosis in 48 dogs with high-grade lymphoma
12.05–12.20	ESVONC-O-8	Treggiari	Efficacy of chemotherapy and clinical outcome in primary, metastatic feline pulmonary carcinomas: an observational study
12.20–12.35	ESVONC-O-9	Aupperle-Lellbach	Ovarian tumours in the bitch – Pathological findings and AMH values
12.35–12.50	ESVONC-O-10	Bechtel	Initial evaluation of gum arabic coated radioactive gold nanoparticles in canine prostatic cancer

SCH – Society of Comparative Hepatology

Friday 15 September

08.00–08.15	SCH-O-1	Bayton	Prednisolone therapy for chronic hepatitis in the English Springer Spaniel: A prospective study of 14 cases
08.15–08.30	SCH-O-2	Ullal	Ciclosporin in the treatment of canine chronic hepatitis
08.30–08.45	SCH-O-3	Kortum	Investigation into hepatocyte expression and prognostic significance of senescence marker p21 in canine chronic hepatitis
08.45–09.00	SCH-O-4	Sato	Chronic portal vein thrombosis in eleven dogs
09.00–09.15	SCH-O-5	Allerton	Breed predisposition to gall bladder mucocoeles in Border Terriers
09.15–09.30	SCH-O-6	Valiente	Outcome of cats undergoing surgical attenuation of congenital extrahepatic portosystemic shunts through cellophane banding: 23 cases
09.30–09.45	SCH-O-7	Neiger	Transcutaneous fluorometric measurement of indocyanine green clearance as dynamic liver function test in dogs with congenital portosystemic shunt

ESCG – European Society of Comparative Gastroenterology

Friday 15 September

09.45–10.00	ESCG-O-1	Heilmann	Serum S100/calgranulin concentrations in Miniature Schnauzers with idiopathic hyperlipidemia
10.00–10.15	ESCG-O-2	Williams	Serum tocopherol and retinol concentrations in dogs with exocrine pancreatic insufficiency
10.15–10.30	ESCG-O-3	Schleifenbaum	Effect of mirtazapine on canine gastric emptying assessed by 13C-sodium acetate breath test (13C-SABT)
11.20–11.35	ESCG-O-4	Botha	Prevalence of Clostridium difficile and Salmonella spp. in Juvenile Dogs Affected with Parvoviral Enteritis
11.35–11.50	ESCG-O-5	Albuquerque	Risk factors for C. difficile carriage in dogs and associations with clinical disease
11.50–12.05	ESCG-O-6	Manchester	Long-term impact of tylosin on the faecal microbiota of healthy dogs
12.05–12.20	ESCG-O-7	Cartwright	Vitamin D receptor expression in the dog and the effect of intestinal inflammation
12.20–12.35	ESCG-O-8	Konstantinidis	Serum circulating microRNAs as a marker for canine lymphocytic- plasmacytic inflammatory bowel disease
12.35–12.50	ESCG-O-9	Allenspach	Specific virulence factors in mucosa-associated E. coli of dogs with inflammatory bowel disease (IBD) are associated with survival

Saturday 16 September

16.30–16.45	ESCG-O-10	Coddou	Identification of IgG4-related disease in the English Cocker Spaniel and dogs of other breeds
16.45–17.00	ESCG-O-11	Allenspach	Correlating gastrointestinal histopathologic findings to clinical disease activity in dogs with inflammatory bowel disease
17.00–17.15	ESCG-O-12	Freiche	Acquired oesophageal strictures: balloon dilatation or stenting? Outcome and complications in 24 dogs and cats (2002–2017)
17.15–17.30	ESCG-O-13	Dominguez Ruiz	Prevalence of gastric lymphoid follicular hyperplasia in French Bulldogs
17.30–17.45	ESCG-O-14	Woolhead	A retrospective evaluation of ileocecocolic perforations associated with routine diagnostic lower gastrointestinal endoscopy in dogs and cats
17.45–18.00	ESCG-O-15	Da Riz	Acquired pyloric stenosis in cats: a prospective study of 15 cats (2015–2017)

ESVE – European Society of Veterinary Endocrinology

Saturday 16 September

08.15–08.30	ESVE-O-1	Sieber-Ruckstuhl	Agreement of two prepill cortisol measurements in dogs with hypercortisolism treated with trilostane

08.30–08.45	ESVE-O-2	van Staalduinen	Sterol-O-acyl transferase 1 (SOAT1) expression in canine cortisol-secreting adrenocortical tumours: providing the basis for a future treatment option
08.45–09.00	ESVE-O-3	de Wit	CYP17 inhibitor abiraterone acetate as a promising future treatment for canine hyperadenocorticism: in vitro investigations
14.25–14.40	ESVE-O-4	Sanders	Molecular prognostic markers in canine cortisol-secreting adrenocortical tumours
14.40–14.55	ESVE-O-5	Hanson	The use of chromogranin A epitopes vasostatin and catestatin as biomarkers for catecholamine-producing tumours in dogs
14.55–15.10	ESVE-O-6	Scudder	Pilot study assessing the use of cabergoline in the management of diabetic acromegalic cats
15.10–15.25	ESVE-O-7	Woolhead	Serial changes in insulin-like growth factor 1 and impact on hypersomatotropism-screening in feline diabetes mellitus
15.25–15.40	ESVE-O-8	Zini	Ultrastructural characterisation of pancreatic beta-cells in cats with diabetes mellitus
15.40–15.55	ESVE-O-9	Niessen	The diabetic clinical score (DCS): evaluation of a simple standardised quantification tool to allow rapid description of clinical signs in diabetic dogs
16.30–16.45	ESVE-O-10	Finch	Thyroid and renal function in cats post low-dose radioiodine therapy
16.45–17.00	ESVE-O-11	Casado Diaz	Evaluation of symmetric dimethylarginine (SDMA) in dogs with primary hypoadrenocorticism under long-term mineralocorticoid replacement therapy
17.00–17.15	ESVE-O-12	Spence	A comparison of the ACTH concentrations in dogs with stable hypoadrenocorticism being treated with either fludrocortisone or desoxycortone pivalate and prednisolone
17.15–17.30	ESVE-O-13	Hagblom	Prevalence of hyperaldosteronism and hypertension in cats with chronic azotaemia
17.30–17.45	ESVE-O-14	Pijnacker	The use of a TRH stimulation test, with measurement of plasma concentrations of growth hormone and thyroid stimulating hormone, to differentiate between primary hypothyroidism and non-thyroidal illness in dogs
17.45–18.00	ESVE-O-15	Scarpa	Interrelation between thyroid function and sex hormones in female German Shepherd Dogs

ESVCN – European Society of Veterinary Comparative Nutrition

Saturday 16 September

08.15–08.30	ESVCN-O-1	Söder	Plasma metabolomics reveals lowered carnitine concentrations in overweight Labrador retriever dogs
08.30–08.45	ESVCN-O-2	Kiefer-Hecker	Silica urolithiasis in a dog - a case report
08.45–09.00	ESVCN-O-3	Dobenecker	Knowing the total amount of phosphorus in a diet is not enough – different sources have different effects

ESVCP – European Society of Veterinary Clinical Pathology

Saturday 16 September

09.15–09.30	ESVCP-O-1	Aroch	Pre- and post-operative D-dimer concentration in dogs changes in D-dimer concentration in dogs following soft tissue and orthopaedic surgery
09.30–09.45	ESVCP-O-2	Whitehead	Evaluation of haemostatic changes in dogs with parvoviral enteritis before and after fluid resuscitation using thromboelastography
09.45–10.00	ESVCP-O-3	König	Analytical and clinical validation of a human enzyme-linked immunosorbent assay (ELISA) for measurement of canine angiopoietin-2
10.00–10.15	ESVCP-O-4	König	Plasma angiopoietin-2 (Ang-2) is elevated in dogs with sepsis and/or systemic inflammatory disease syndrome (SIRS) and is associated with severity of disease and outcome
10.15–10.30	ESVCP-O-5	Neumann	Investigation of Interleukin-6 (IL-6) as prognostic marker
11.20–11.35	ESVCP-O-6	Leynaud	Comparison of serum amyloid A and fibrinogen to other inflammatory biomarkers in cats
11.35–11.50	ESVCP-O-7	Bremer	Identification of ILF2 autoantibodies as a promising biomarker for autoimmune disease in dogs

11.50–12.05	ESVCP-O-8	Aroch	Serum histones as biomarkers of the severity of heatstroke in dogs
12.05–12.20	ESVCP-O-9	Zoia	Pleural effusion lactate dehydrogenase (LDHp) concentration and serum total protein (TPs) concentration versus traditional veterinary classification method in the discrimination between transudates and exudates: a cross-sectional study in 100 dogs with pleural effusion
12.20–12.35	ESVCP-O-10	Burchell	The site of bone marrow acquisition affects the myeloid to erythroid ratio in apparently healthy dogs
12.35–12.50	ESVCP-O-11	Cuq	Acute myeloid leukemia in retrovirus-negative cats: a case series of 16 patients

ISCAID - International Society for Companion Animal Infectious Diseases

Saturday 16 September

11.20–11.35	ISCAID-O-1	Barrs	Re-emergence of feline panleukopenia in Australia
11.35–11.50	ISCAID-O-2	Byrne	Investigation of faecal parvovirus shedding in asymptomatic shelter housed cats in Australia
11.50–12.05	ISCAID-O-3	Ferri	Class A CpG oligonucleotides in cats with naturally occurring feline panleukopenia infection: a prospective case-control study
12.05–12.20	ISCAID-O-4	Barrs	Feral carnivores are reservoirs of Carnivore protoparvovirus 1 in Australia
12.20–12.35	ISCAID-O-5	de Luca	Feline morbillivirus infection in domestic cats in Italy: epidemiological and pathological aspects
12.35–12.50	ISCAID-O-6	Felten	Evaluation of a discriminative realtime RT-PCR in cerebrospinal fluid for the diagnosis of feline infectious peritonitis
14.25–14.40	ISCAID-O-7	Duplan	Screening for selected pathogens in ticks infecting cats in the United Kingdom: a large-scale surveillance programme
14.40–14.55	ISCAID-O-8	Dvir	The role of hypovitaminosis d in complicated canine babesiosis
14.55–15.10	ISCAID-O-9	Barash	Is urine culture the poor man's blood culture? Concordance between parallel canine blood and urine cultures
15.10–15.25	ISCAID-O-10	Pomba	Companion animals and humans with UTI share common uropathogenic Klebsiella pneumoniae
15.25–15.40	ISCAID-O-11	Leutenegger	Validation of a qPCR panel to aid in the diagnosis of dermatophytosis

VBPS - Veterinary Blood Pressure Society

16.30–16.45	VBPS-O-1	Glaus	Efficacy of telmisartan in hypertensive cats: results of a large European clinical trial

POSTER RESEARCH COMMUNICATIONS

ESVIM – European Society of Veterinary Internal Medicine

ESVIM_P_1	Paul	Bronchoalveolar lavage analysis using urea dilution standardisation in diagnosis of respiratory diseases in dogs
ESVIM_P_2	Huang	Prevalence of degenerative joint disease in mature indoor cats
ESVIM_P_3	Rengaswamy Baranidharan	Oral Carica papaya in the supportive care of infectious thrombocytopenia in bleeding dogs
ESVIM_P_4	Jaffey	Methaemoglobinemia caused by cytochrome b5 reductase deficiency: genetic studies and long-term treatment with oral methylene blue
ESVIM_P_5	Rohdin	Prevalence of gait abnormalities in Pugs: a questionnaire based survey
ESVIM_P_6	Aromaa	Comparing the submaximal exercise test results and severity of brachycephalic obstructive airway syndrome in Pugs and French Bulldogs
ESVIM_P_7	Viitanen	Bronchiectasis in Irish Wolfhounds with recurrent bacterial pneumonia
ESVIM_P_8	Roels	Investigation of the nasal microbiota in healthy dolichocephalic dogs and dogs with sinonasal aspergillosis (SNA)

ESVIM_P_9	Clarke	Retrospective study of clinical findings, treatment and outcome in dogs and cats diagnosed with dysautonomia
ESVIM_P_10	Marchetti	Retrospective study on 33 cases of canine primary IMHA: clinico-pathological features, follow-up and prognostic factors
ESVIM_P_11	Benvenuti	Diagnostic accuracy of the macro-endoscopic bronchial aspect for the diagnosis of eosinophilic bronchitis
ESVIM_P_12	Määttä	Reflux aspiration can be detected in lungs of dogs with respiratory disease
ESVIM_P_13	Greci	Clinical and laboratory alterations in 37 dogs diagnosed with lungworm infection: a retrospective study (July 2010- April 2017)
ESVIM_P_15	Miglio	Comparison of three different guidelines for blood transfusion applied in a population of Italian feline donors to reduce the risk of transfusion transmissible infections

ESVC – European Society of Veterinary Cardiology

ESVC_P_1	Caro-Vadillo	Reliability of vena contracta for staging degenerative chronic mitral valve disease in dogs
ESVC_P_2	Vezzosi	Retrospective analysis of pulmonary hypertension in cats with left-sided congestive heart failure
ESVC_P_3	Larsson	Frequency of mitral valve prolapse in adult healthy Dachshund dogs
ESVC_P_4	Darnis	Prevalence of pulmonary hypertension in dogs naturally infected with Angiostrongylus vasorum
ESVC_P_5	Berlanda	Symmetric dimetyl-arginine in dogs with myxomatous mitral valve disease with and without pulmonary hypertension
ESVC_P_6	Locatelli	Left ventricular hypertrophy in dog: an echocardiographic study
ESVC_P_7	Patata	Pulmonary vein to pulmonary artery ratio in healthy and cardiomyopathic cats
ESVC_P_8	Savarese	Comparative analysis of a portable smartphone-based electrocardiograph (D-Heart®) versus standard 6-leads electrocardiograph in the canine patient
ESVC_P_9	Ward	Use of graphic organisers in an elective veterinary cardiology course
ESVC_P_10	Itikawa	Frequency of heart murmur in 69 healthy adult Dachshunds
ESVC_P_11	Levent	Choline concentration as a new potential biomarker to distinguish pleural effusions from heart base tumours and cardiomyopathy in dogs
ESVC_P_12	Poissonnier	Epidemiological, clinical, and echocardiographic features, and survival times of dogs with Ebstein anomaly: 40 cases (2002-2017)
ESVC_P_13	Damoiseaux	Utility of the SNAP feline n-terminal pro-b-type natriuretic peptide test in detecting asymptomatic hypertrophic cardiomyopathy: a prospective study in 61 cats

ESVNU – European Society of Veterinary Nephrology and Urology

ESVNU_P_1	Maurey Guenec	Efficacy and safety of two new high protein-low carbohydrate dry diets in sterile, feline struvite urolithiasis
ESVNU_P_2	Soerensen	The effect of storage temperature and boric acid preservation on quantitative bacterial culture for diagnosing canine urinary tract infection
ESVNU_P_3	Falus	Microalbuminuria in dogs infected with Dirofilaria repens
ESVNU_P_5	Zambarbieri	Symmetric dimethylarginine (SDMA) and nephropathy in dog: diagnostic utility in clinical practice
ESVNU_P_6	Codea	Ultrasound-guided renal biopsy significantly increases urinary n-acetyl-beta-d-glucosaminase index activity in dogs with diffuse parenchimal nephropaties

ESVONC – European Society of Veterinary Oncology

ESVONC_P_2	Béguin	Evaluation of infective and replicative properties of a replication-selective oncolytic Vaccinia virus (VVTG17990) on canine, feline, porcine and human cell lines
ESVONC_P_3	Ruiz	Multiple colorectal granular cell tumours in a dog
ESVONC_P_4	Pazzi	Spirocerca lupi induced oesophageal neoplasia: predictors of surgical outcome

ESVONC_P_5	Clares Moral	Survival of dogs diagnosed with inflamatory mammary cancer treated with a multimodal therapy
ESVONC_P_6	Magalhães	Effect of radiation therapy on the treatment of intracranial tumours in dogs: meningioma and glioma
ESVONC_P_7	Thiemeyer	Ultrasound-guided fine-needle aspiration of the canine prostate - a useful sampling method for molecular biological analysis?
ESVONC_P_8	Elliott	Histiocytic sarcoma is over-represented in Miniature Schnauzers in the United Kingdom

SCH – Society of Comparative Hepatology

SCH_P_1	Menard	Validation of a blood score for non-invasive diagnosis of liver fibrosis in dogs
SCH_P_2	Tabar	Diagnostic value of paired serum bile acids in clinical practice in 484 samples

ESCG – European Society of Comparative Gastroenterology

ESCG_P_1	Hill	Factors affecting gastric mucosal barrier function in dogs
ESCG_P_2	Slovak	Evaluation of the Hemoccult faecal occult blood test kit in cats
ESCG_P_3	Slovak	Fecal occult blood testing in a presumed healthy population of cats
ESCG_P_4	Xenoulis	Specificity of SNAP fPLTM for the diagnosis of pancreatitis in healthy cats and sick cats without clinical suspicion of pancreatitis
ESCG_P_6	Hugonnard	Metabolic and clinical follow-up of seven inappetent cats during enteral refeeding
ESCG_P_7	Hanifeh	S100A12 and myeloperoxidase as possible biomarkers for intestinal inflammation in dogs
ESCG_P_8	Jolivet	Fasting and postprandial variations of plasma TLI, cobalamin and folate concentration in healthy beagle dogs
ESCG_P_9	Ioannidi	Total serum magnesium and cobalamin concentration in 20 cats with inflammatory small bowel disease or small intestinal neoplasia
ESCG_P_10	Fabres	Megaesophagus associated with gastro-œsophageal junction neoplasia in dogs: 7 cases (2004-2016)
ESCG_P_11	Heilmann	Feasibility of measuring fecal calprotectin concentrations in dogs and cats by the fCAL® turbo immunoassay
ESCG_P_12	Watson	Clinical features of English Cocker Spaniels with chronic pancreatitis mimic human IgG4RD
ESCG_P_13	Caivano	Contrast-enhanced ultrasonography of the duodenum in dogs with inflammatory bowel disease: preliminary findings
ESCG_P_14	Hill	Utility of capsule endoscopy as a complement to traditional endoscopy
ESCG_P_15	Benvenuti	Serum protein profiling of 100 cats with inflammatory bowel disease and lymphoma

ESVE – European Society of Veterinary Endocrinology

ESVE_P_1	Burchell	Safety and efficacy of dapagliflozin, a novel antidiabetic drug, in healthy cats
ESVE_P_2	Langner	Evidence for regional variation of patient characteristics in dogs with hyperadrenocorticism
ESVE_P_3	Corsini	Symmetric dimethylarginine (SDMA) in hyperthyroid cats
ESVE_P_4	Schmicke	Low thyroxine concentrations after controlled feeding of bovine thyroid gland to dogs
ESVE_P_6	Lyngby	C-reactive protein in dogs diagnosed with hypoadrenocorticism
ESVE_P_7	García San José	Systemic hypertension in diabetic cats: does it really matters?
ESVE_P_8	Pérez Alenza	Systemic hypertension in dogs with diabetes mellitus
ESVE_P_9	Fowlie	Canine electrolyte analysis in dogs with hypoadrenocorticism: a comparison of two in-house analysers with a reference laboratory
ESVE_P_10	van Bokhorst	Concurrent pituitary and adrenocortical tumors in dogs with spontaneous hypercortisolism
ESVE_P_11	González Sanz	Prevalence of neurological signs in hypothiroid dogs at diagnosis
ESVE_P_12	del Baldo	Evaluation of one portable blood glucose meter and one portable glucose-ketones meter in dogs

ESVE_P_13	Carotenuto	Serum Symmetric Dimethylarginine (SDMA) in dogs with hypothyroidism
ESVE_P_14	Malerba	Evaluation of one portable blood glucose meter and one portable glucose-ketones meter in cats

ESVCN – European Society of Veterinary Comparative Nutrition

ESVCN_P_1	Allaert	A randomised double-blind, placebo controlled study evaluating the effects of short-chain fructo-oligosaccharides (scFOS) on cat stools odors
ESVCN_P_2	Jewell	Increased dietary long-chain polyunsaturated fatty acids alter plasma fatty acid concentrations and lower risk of urine stone formation in cats
ESVCN_P_3	Jewell	Foods enriched with bioactive ingredients including fish oil increase circulating (n-3) fatty acid concentrations, decrease PGE2, and increase lean body mass in cats
ESVCN_P_4	Koizumi	Studies in a new body condition scoring by morphometric method in dogs
ESVCN_P_5	German	Validation of a modified 9-integer-unit body condition score system and a computer-based modelling tool to estimate body condition in pet dogs

ISCAID _ International Society for Companion Animal Infectious Diseases

ISCAID_P_1	Breu	Seroprevalences to Anaplasma phagocytophilum, Borrelia burgdorferi and Babesia canis in 2948 dogs from Germany
ISCAID_P_2	Planellas	A prospective study of urinary adverse effects of allopurinol treatment for canine leishmaniosis
ISCAID_P_3	Solano-Gallego	Detection of Leishmania in archived canine colonic inflammatory biopsies in an endemic area for canine leishmaniosis
ISCAID_P_4	Duque	Comparison of the severity of myocardial damage with the quantitative estimation of the myocardial parasitic load by real-time PCR in dogs with canine visceral leishmaniosis
ISCAID_P_5	Kalogianni	Investigation of the presence of bacteraemia in puppies with canine parvoviral enteritis
ISCAID_P_6	Yilmaz	Identification of serum biomarkers in dogs naturally infected with Anaplasma phagocytophilum and Borrelia burgdorferi
ISCAID_P_7	Fontaine	At least three years of proven protection against distemper, infectious canine hepatitis and parvovirosis in dogs vaccinated with the multivalent CanigenTM DHPPi/L vaccine
ISCAID_P_8	Blondeau	Comparative killing of canine urinary pathogens by cephalexin (CP), marbofloxacin (MR), pradofloxacin (PR) and trimethoprim/sulfamethoxazole (TMP/SMX)
ISCAID_P_9	Liu	SNAP 4Dx Plus correlates well with IFA for detection of E. canis antibodies
ISCAID_P_10	Palerme	Seroprevalence of infectious diseases in feral cats in the American Midwest
ISCAID_P_11	Fontaine	Seroneutralisation of canine parvovirus by sera of cats vaccinated with either LeucofeligenTM FeLV/RCP or FeligenTM CRP vaccines
ISCAID_P_12	Veneziano	Serologic and molecular diagnostic survey of Babesia spp. infections in hunting dogs from Southern Italy
ISCAID_P_13	Bergmann	Antibody production as reaction to feline panleukopenia virus vaccination in cats with feline immunodeficiency virus and feline leukaemia virus infection
ISCAID_P_14	Rodon Vernet	Evaluation of rapid diagnostic test kits for canine vector-borne diseases
ISCAID_P_15	Hopman	Antimicrobial use in 44 Dutch companion animal clinics
ISCAID_P_16	Jessen	Prevalence and risk factor for harbouring Campylobacter jejuni in young dogs in Copenhagen
ISCAID_P_17	Sebastian	Surveillance of bacterial contamination in stethoscopes and effectiveness of different disinfecting protocols
ISCAID_P_18	Rubin	Identification of attaching and effacing enteropathogenic Escherichia coli in dogs with parvoviral enteritis
ISCAID_P_19	Sarpataki	Combined therapy with clindamycin, doxycycline and metronidazole induces complete sterilisation of Babesia gibsoni infection in dogs - A case report
ISCAID_P_20	Hartley	First documentation of cytochrome B gene mutations associated with atovaquone and azithromycin treatment in Cytauxzoon felis
ISCAID_P_21	Decaro	Lethal pox disease in a cat: classical cowpox or novel Orthopoxvirus infection?

ISCAID_P_22	Pomba	Evidence of sharing of MDR K. pneumoniae between infected and non-infected cats from same household

ESVCP – European Society of Veterinary Clinical Pathology

ESVCP_P_1	Weiss	Blood reference ranges for rabbits from routine diagnostic samples
ESVCP_P_2	Navarro Martínez	Urine protein analysis by capillary electrophoresis in healthy dogs
ESVCP_P_3	Nielsen	Detection and stability of microRNAs in urine from healthy cats
ESVCP_P_4	Ruggerone	Preliminary evaluation of protein carbonyl group in canine serum using a Western blotting technique
ESVCP_P_5	Weiss	Age dependent correlation of mutation c.118G>A in the SOD1 gene to clinical signs of degenerative myelopathy in Hovawart dogs
ESVCP_P_6	Giraldi	Reproducibility of urinary sediment examination: stain versus bright field and phase contrast

ORAL ABSTRACTS

ESCG – O – 1

SERUM S100/CALGRANULIN CONCENTRATIONS IN MINIATURE SCHNAUZERS WITH IDIOPATHIC HYPERLIPIDEMIA. R.M. Heilmann[1], P.G. Xenoulis[2], K. Müller[1], E. Stavroulaki[2], J. Suchodolski[3], J. Steiner[3]. [1]College of Veterinary Medicine, University of Leipzig, Leipzig, Germany, [2]Small Animal Clinic, University of Thessaly, Karditsa, Greece, [3]Gastrointestinal Laboratory, Texas A&M University, College Station, USA

Idiopathic hyperlipidemia (IH) is a common condition in Miniature Schnauzers (MS), with more than 75% of dogs = 9 years old being affected and >45% of these dogs having moderate to severe fasting hypertriglyceridemia (HTG) with or without combined hypercholesterolemia (HCHOL). Severe HTG poses an increased risk for the development of several conditions (e.g., pancreatitis, insulin resistance). Recent studies in humans suggest IH to be associated with low-grade inflammation involved in the pathogenesis of diseases associated with IH. The risk of such complications decreases with medical control of IH. Given that biomarkers of inflammation have not been investigated in MS with IH, the aims of the study were to evaluate serum calprotectin and S100A12 concentrations (i) in healthy MS and in MS with IH, and (ii) in MS with IH in response to dietary intervention for the management of IH.

Serum samples were collected from 152 clinically healthy MS, and a study questionnaire was completed for each dog to confirm the health status and medication history. Serum triglyceride, cholesterol, calprotectin, and S100A12 concentrations were measured in all samples. Paired serum samples were obtained from 17 of the IH dogs after being placed on a commercial ultra-low fat diet without any additional lipid-lowering medications. Statistical analyses were performed using non-parametric (paired or unpaired) group comparisons and Fisher's exact or likelihood ratio tests, with statistical significance set at $P < 0.05$.

A total of 34%, 5%, and 11% of dogs had isolated HTG, hypercholesterolemia (HCHOL), and combined hyperlipidemia, respectively. Compared to MS without IH, both HTG and HCHOL were associated with increased serum calprotectin ($P = 0.0007$, odds ratio [OR] = 4.2 and $P = 0.0051$, OR = 4.1, respectively) but not S100A12 concentrations (both $P > 0.05$). There was no significant difference in serum calprotectin or S100A12 concentrations among MS with isolated HTG, HCHOL, or combined hyperlipidemia. Presence and severity of HTG decreased in MS with IH within 14–26 weeks after being placed on an ultra-low fat diet ($P = 0.0052$ and $P = 0.0032$). Dietary intervention also yielded a significant decrease in serum cholesterol ($P = 0.0356$) but neither serum calprotectin nor S100A12 concentrations changed significantly during that time (both $P > 0.05$).

These results suggest that subclinical inflammation is present in MS with HTG due to IH and that an ultra-low fat diet does not reduce the concentrations of the inflammatory S100 proteins in MS with HTG. Whether this presumable inflammatory phenotype in MS with IH contributes to the development of pancreatitis, insulin resistance, or other conditions warrants further research.

Disclosures: No disclosures to report.

ESCG – O – 2

SERUM TOCOPHEROL AND RETINOL CONCENTRATIONS IN DOGS WITH EXOCRINE PANCREATIC INSUFFICIENCY. P.C. Barko, D.A. Williams. University of Illinois, Urbana, USA

Exocrine pancreatic insufficiency (EPI) in dogs is diagnosed by observing serum canine trypsin-like immunoreactivity (cTLI) to be <2.5 μg/L; affected dogs have severe fat malabsorption. Some dogs with signs of EPI have marginally subnormal serum cTLI (3–6 μg/L) and do not respond to enzyme replacement therapy (subclinical EPI, SEPI), but given their clinical signs, abnormal serum cobalamin or folate, and absence of other detectable non-enteric disease presumably have an idiopathic chronic enteropathy (ICE). Unpublished preliminary data indicate decreased serum tocopherol concentrations in dogs with EPI that do not resolve after pancreatic enzyme supplementation. The objectives of this study were to measure serum tocopherol and retinol in dogs with EPI and those with subclinical EPI and ICE (SEPI/ICE).

Inclusion criteria for the EPI group ($n = 8$) were clinical signs of EPI and serum cTLI concentrations <2.5 μg/L. Dogs in the SEPI/ICE group ($n = 9$) had clinical signs of ICE and serum cTLI concentrations in the 3.0–6.0 μg/L range. Diets of dogs in both groups were supplemented with oral pancreatic enzyme extract. Control samples were collected from 10 healthy dogs before and after 10 days of pancreatic enzyme supplementation. All samples were surplus from another study approved by our institutional ethics committee, and stored at −80°C prior to assay of tocopherol and retinol by high-performance liquid chromatography.

Dogs with EPI and SEPI/ICE had significantly lower serum concentrations of tocopherol (means 14.02 and 16.66 μg/mL; $P = 0.015$ and $P = 0.0002$ respectively) and retinol (means 509 and 673.78 ng/mL; $P = 0.0003$ and 0.004 respectively) than enzyme-supplemented control dogs (means 41.6 μg/mL and 1124.86 ng/mL respectively). Neither tocopherol nor retinol concentrations were significantly different between the EPI and SEPI/ICE groups, nor were there differences between the control dogs before and after enzyme supplementation.

These findings indicate that dogs with EPI and SEPI/ICE have relative deficiencies in tocopherol and retinol, likely reflecting fat malabsorption, and may share a similar enteropathy that may precede the onset of EPI. The clinical significance of these decreased fat soluble vitamin concentrations is unknown though retinol has been shown to influence enteric mucosal immune responses though its effects on T-cell differentiation, IgA secretion in GALT, and homing of innate lymphoid cells to the gut. Tocopherol is an important antioxidant and studies have revealed increased reactive oxygen species in intestinal biopsies from humans with IBD.

Clinical trials to assess the value of tocopherol and retinol supplementation in dogs with EPI and ICE are warranted.

Disclosures: Disclosures to report.

David Williams is a consultant with Idexx Laboratories and the GI Laboratory at Texas A&M University, and is involved in a collaborative research study with Nestle-Purina. He is a member of the Nestle-Purina Advisory Board.

ESCG – O – 3

EFFECT OF MIRTAZAPINE ON CANINE GASTRIC EMPTYING ASSESSED BY 13C-SODIUM ACETATE BREATH TEST (13C-SABT). N. Schleifenbaum[1], S. Salavati[2], R. Neiger[1]. [1]Small Animal Clinic - Justus-Liebig-University Giessen, Giessen, Germany, [2]The Royal (Dick) School of Veterinary Studies and The R, University of Edinburgh, Edinburgh, UK

Delayed gastric emptying is suspected to occur in several common conditions in dogs, for example metabolic/ -endocrine disorders or inflammatory bowel disease. It can also be a sequela in critical care patients suffering from sepsis, peritonitis or pancreatitis. Treating the underlying cause is indicated, but additional supportive treatment in the form of prokinetic drugs is scarce, especially as 5-HT4 receptor agonists are not widely available. The antidepressant mirtazapine, routinely used at low dosages for its appetite stimulating properties in small animals, has been reported to accelerate gastric emptying both in people and (at high dosages) in experimental healthy dogs. The effects of mirtazapine on gastric emptying times using a non-invasive test have not been assessed. Hence, assessing the effect of different dosages of this drug on gastric half emptying times (G50%) in healthy dogs using the ^{13}C-SABT was sought.

Six healthy Beagle dogs (3–5 years, 9.7–11.6 kg body weight) were included. Mirtazapine was used at increasing dosages (0.6 mg/kg = MLo, 2 mg/kg = MMe, 20 mg/kg = MHi). Initially, MLo, placebo and prucalopride (1 mg/kg as a positive control) were administered orally in a cross-over design. Subsequently, MMe and MHi were administered and compared to a second and third placebo treatment. This approach was chosen to enable interim analysis of data, as ethical approval only allowed to progress to a higher mirtazapine dose if no effect was seen with the lower one. On day 4 of each treatment, a test meal consisting of each dog's half daily calorie requirement and 150 mg ^{13}C-sodium

acetate was fed after an overnight fast and a ^{13}C-SABT was performed. Breath samples were obtained with a facial mask before (0 min) and 30, 60, 120, 180, 240, 300, and 360 min after test meal ingestion. $^{12}CO_2/^{13}CO_2$ ratio in the breath was measured by non-dispersive infrared spectroscopy and delta-over baseline (DOB) values plotted against time. G50% was calculated for each treatment based on cumulative non-linear curve fitting of the DOB values. Median G50% was 78.3 min (range 48.4–93.3) with MLo, 84.4 min (69.2–109.6) with MMed and 106.4 min (range 83.1–144.2) with MHi. Median G50% for Prucalopride and for placebo was 61.9 min (43.1–159.0) and 67.1 min (38.1–146.1) respectively.

MLo ($P = 0.75$) and MMed ($P = 0.12$) had no effect on G50% compared to placebo. Unexpectedly, MHi prolonged gastric emptying ($P = 0.046$). G50% was not significantly different between Prucalopride and placebo ($P = 0.75$). In conclusion, mirtazapine does not accelerate G50% in healthy dogs. In high dosages, it might prolong gastric emptying, even though with borderline significance.

Disclosures: No disclosures to report.

ESCG – O – 4
PREVALENCE OF CLOSTRIDIUM DIFFICILE AND SALMONELLA SPP. IN JUVENILE DOGS AFFECTED WITH PARVOVIRAL ENTERITIS.

W.J. Botha[1], J.P. Schoeman[1], S.L. Marks[2], P.S. Morley[3], Z. Whitehead[1], C.H. Annandale[1]. [1]University of Pretoria, Onderstepoort, South Africa, [2]University of California, Davis, Davis, USA, [3]Colorado State University, Fort Collins, USA

Clostridium difficile (CD) is a common cause of hospital-acquired diarrhea in humans and has been associated with diarrhea in dogs. Salmonellosis is a major zoonotic disease but the transmission pathway is unclear. It is thus important to evaluate the risk factors that increase the likelihood of infection. Canine parvovirus (CPV) is a prevalent and fatal cause of canine enteritis often exacerbated by concurrent infection with other enteropathogens. Persistent isolation of *Salmonella* spp. during hospital environmental surveys of the isolation ward prompted further investigation. This study was designed to determine the comparative prevalence of CD and *Salmonella* spp. in dogs with CPV and healthy dogs.

The study was approved by the ethics committee of the University of Pretoria and conducted from October 2015 to March 2017. Fresh fecal samples were collected from dogs aged 6 weeks to 9 months diagnosed and admitted with CPV infection, and healthy dogs presented for vaccination or routine hospital procedures. CPV shedding was confirmed using negative staining electron microscopy. CD was detected via commercial fecal antigen enzyme immunoassay for glutamate dehydrogenase (GDH), TcdA and TcdB. In addition, feces was submitted for the isolation, antimicrobial susceptibility and serotyping of *Salmonella* spp.

Seventy-five dogs with CPV and 41 healthy dogs comprised the study. The prevalence of CD was 2.7% and 5% in CPV and healthy dogs, respectively, whereas the prevalence of *Salmonella* spp. was 21.3% and 32.5% in CPV and healthy dogs, respectively. No statistically significant associations between *Salmonella* infection status and possible risk factors or continuous variables such as age, weight and length of hospitalization were identified. Statistical analysis was not performed on CD positive animals, because only two animals in either groups tested positive. Moreover, all the *Salmonella* spp. isolates ($n = 32$) were resistant to penicillin G, lincomycin and tylosin. Nine of the isolates were resistant to lincospectin and 21 showed intermediate ($n = 20$) or complete resistance ($n = 1$) to doxycycline/oxytetracycline. Nine different serotypes of *Salmonella* spp. were identified.

In conclusion, the prevalence of *Salmonella* spp. in dogs with CPV infection was not statistically different from that in a healthy cohort. However, the prevalence in both groups was considerably higher than those previously reported (0–3.6%), yet similar to that reported for shelter dogs or dogs fed a raw diet (30–69%). This is the first report of the prevalence of CD and *Salmonella* spp. in dogs in South Africa.

Disclosures: No disclosures to report.

ESCG – O – 5
RISK FACTORS FOR C. DIFFICILE CARRIAGE IN DOGS AND ASSOCIATIONS WITH CLINICAL DISEASE.

C. Albuquerque, C. Millins, G. Douce, A. Ridyard, G. Mclaughlan. SAH - University of Glasgow, Glasgow, UK

Clostridium difficile is the most common cause of antimicrobial and hospital-associated diarrhea in humans. Several risk factors have been identified for development of community-associated *C. difficile* infection in humans. Information about prevalence, strain types and risk factors for *C. difficile* carriage in dogs is scarce.

This prospective study aimed at quantifying the prevalence and strain types of *C. difficile* in dogs with and without diarrhea presented to a small animal teaching hospital; and identifying risk factors for C. difficile carriage through retrospective analysis of the clinical histories.

Stool samples were collected from 199 dogs within 48 h of admission to the hospital. These included 52 dogs presented for investigation of diarrhea and 147 dogs presented for reasons other than diarrhea. At the time of sampling 24 of the dogs presenting for reasons unrelated to diarrhea were found to have acute diarrhea and were moved to the diarrheal cohort. The prevalence of *C. difficile* carriage in dogs in the diarrheal cohort was 25% (95% CI: 16.6–35.8%, 19/76 samples culture positive) and in the non-diarrheal cohort was 13.8% (95% CI: 8.8–21%; 17/123 samples culture positive). Dogs presented with chronic diarrhea had a prevalence of *C. difficile* carriage of 34.8% (95% CI: 18.8–55.3%, 8/23 samples culture positive) while dogs with acute diarrhea had a prevalence of 17.2% (95% CI: 7.7–34.7%, 5/29 samples culture positive). A number of ribotypes were detected and the predominate types identified. PCR testing of all ribotypes was carried out to detect alpha and beta toxins which are associated with clinical disease.

Epidemiological risk factors which were assessed included those associated with the dog's household environment including the number of pets and presence of elderly people or infants, individual animal information including age, gender, neutering status and clinical information on medical treatment including antibiotic administration and visits to a veterinary practice in the previous three months. This type of study has the power to provide evidence-based data to support clinical decision making in evaluating the significance of detecting *C. difficile* in a fecal sample in dogs with acute and chronic diarrhea. It can also inform whether dogs carry similar or different ribotypes of *C. difficile* to humans, and their potential significance as a reservoir for human infection.

Disclosures: No disclosures to report.

ESCG – O – 6
LONG-TERM IMPACT OF TYLOSIN ON THE FECAL MICROBIOTA OF HEALTHY DOGS.

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The intestinal microbiota is thought to play a major role in the pathogenesis of intestinal disease. Antibiotics are commonly employed in the treatment of acute and chronic enteropathy, in some cases with the goal of eradicating specific pathogens. The aim of this study was to prospectively evaluate the impact of tylosin administration on specific bacterial components of the fecal microbiota.

Sixteen healthy pet dogs were randomly assigned to one of two groups in a double-blinded fashion: 8 dogs were given oral tylosin at 20 mg/kg while the other 8 dogs were administered a placebo capsule, each given q12 hr for 7 days. All dogs were maintained on their usual diet and a standardized fecal score (range: 1–7) was noted daily during drug administration. Fecal samples were collected on day 0 prior to drug administration as well as on days 7, 10, 21, and 63. Fecal samples were assessed using quantitative PCR for 7 bacterial taxa, belonging to the Firmicutes, Proteobacteria and Fusobacteria phyla. Relative abundance of *Clostridium perfringens* was also assessed pre & post-treatment via qPCR. Parameters were compared using a Friedman's test, followed by Dunn's post-test. A P-value <0.05 was considered statistically significant.

None of the dogs in either group developed diarrhea, though significant changes were seen in the abundance of various bacterial taxa. Significantly decreased *Faecalibacterium*, *Clostridium hiranonis*, *Turicibacter* and Fusobacterium were observed in the fecal microbiota of dogs treated with tylosin at day 7. At 2 months post-tylosin cessation, 5 and 4 of 6 dogs failed to have regained their pre-treatment *Faecalibacterium* and *C. hiranonis* levels, respectively. Tylosin administration was not associated with a significant decrease of *C. perfringens* ($P = 0.38$), but dogs in the placebo group had a significant decrease in *C. perfringens* ($P = 0.02$). There was no significant change in relative abundance of *E. coli* in dogs treated with tylosin ($P = 0.64$) or placebo ($P = 0.38$).

Tylosin leads to alterations in the fecal microbiota without predictable effects of potential enteric pathobionts. Further studies are warranted to determine the long-term effects of antimicrobial-induced changes as well as the efficacy of recommended therapies for bacterial enteritis.

Disclosures: Disclosures to report.

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ESCG – O – 7

VITAMIN D RECEPTOR EXPRESSION IN THE DOG AND THE EFFECT OF INTESTINAL INFLAMMATION.

J.A. Cartwright, A.G. Gow, E. Milne, N. Macintyre, S. Smith, I. Handel, R.J. Mellanby. University of Edinburgh, Edinburgh, UK

Vitamin D plays an important role in skeletal health in dogs. Due to the inability to cutaneously produce vitamin D, dogs are heavily reliant on dietary sources of vitamin D. We have previously shown that dogs with a protein losing enteropathy have significantly lower concentrations of the major vitamin D metabolite, 25 hydroxyvitamin D (25(OH)D). Furthermore, we have shown that serum 25(OH)D concentrations negatively correlate with extent of inflammation in dogs with a chronic enteropathy (CE). In addition, low vitamin D status has been found to be a negative prognostic marker in dogs with a CE.

Vitamin D influences cellular function by signaling through the vitamin D receptor (VDR). Despite the growing awareness of the potential impact gastrointestinal diseases have on vitamin D metabolism in dogs, little is known about the sites of VDR expression and whether intestinal inflammation influences VDR expression. The aim of this study was to define the non-skeletal tissues which express VDR in the dog and to investigate how extent of inflammation correlated with VDR expression in the small intestine.

Twelve non-skeletal tissues were collected prospectively from 6 dogs, euthanized for non-health related problems. These included stomach, duodenum, ileum, colon, skin, kidney, spleen, liver, mesenteric lymph node, heart and lung. VDR expression was assessed with immunohistochemistry using a Rat IgG VDR monoclonal antibody.

Thirty five dogs diagnosed with a chronic enteropathy were prospectively enrolled and biopsies taken at endoscopy from the duodenum were evaluated for VDR expression with both immunohistochemistry and quantitative polymerase chain reaction (qPCR). Twenty three control dogs were also prospectively enrolled without clinical signs of gastrointestinal disease.

The VDR was found to be highly expressed in the duodenum of all 6 control dogs. It was also found in the skin of these 6 dogs and in the majority of the kidney samples, and occasionally in spleen and ileum.

There was no statistical difference in the relative expression, by qPCR, of the VDR between dogs with chronic enteropathy and dogs not clinically affected. VDR expression was also not different between healthy and CE dogs when assessed by protein expression via immunohistochemistry scoring.

Our study has defined the tissues which express VDR in healthy dogs. The lack of down regulation of VDR expression in intestinal inflammation contrasts with humans and provides support for future studies which aim to investigate whether vitamin D and its analogues can be used to modulate intestinal inflammation in the dog.

Disclosures: No disclosures to report.

ESCG – O – 8

SERUM CIRCULATING MICRORNAS AS A MARKER FOR CANINE LYMPHOCYTIC- PLASMACYTIC INFLAMMATORY BOWEL DISEASE.

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MicroRNAs (miRs) are small, non-coding RNA molecules with gene regulatory function. MiRs appear to play a critical role in the pathogenesis of a variety of diseases in humans, including inflammatory bowel disease (IBD). Furthermore, recent studies suggest that miRs have altered expression profiles in the serum of humans with IBD, suggesting they could be promising non-invasive serum biomarkers.

The aim of the current study was to evaluate the expression of a selection of serum circulating miR-16, miR-21, miR-122, miR146a, miR-147, miR-185, miR-192 and miR-223 in canine lymphocytic- plasmacytic (LP) IBD based on published data on human IBD.

Serum samples were collected from 21 dogs diagnosed with active LP IBD. All dogs had undergone upper and/or lower GI endoscopy according to clinical signs, were diagnosed histopathologically according to the guidelines of the WSAVA International Gastrointestinal Standardization Group (Washabau et al. 2010) and by clinical exclusion diagnosis. In addition, serum samples were available from 14 clinically healthy control dogs for comparison. Total RNA from serum was isolated using Trizol, and reverse transcribed into cDNA. The expression of serum miRs genes was measured using real-time quantitative reverse transcriptase polymerase chain reaction (real-time qRT-PCR). Clinical disease activity was recorded for all dogs using the Canine Chronic Enteropathy Clinical Activity Index (CCECAI; Allenspach et al. 2008). Endoscopies were performed and graded according to the canine IBD endoscopic index (Slovak et al. 2014).

Compared to healthy controls, there was a significantly increased expression of the following miR in the serum of dogs: miR-16 (IBD: median 1.56, range 1.24–1.89, $P < 0.0005$; controls: median 1.4, range 0.89–1.64), miR-21 (IBD: median 1.85, range 0.87–6.89; controls: median 1.54, range 0.37–2.18; $P = 0.009$), miR-122 (IBD: median 1.85, range 1.08–6.28; controls: median 1.49, range 1.02–2.21; $P = 0.012$), miR146a (IBD: median 1.86, range 0.93–5.92; controls: median 1.575, range 1.33–2.33; $P = 0.016$) and miR-147 (IBD: median 3.63, range 2.73–5.46, $P < 0.005$; Controls: median 1.85, range 1.27–2.53, $P < 0.0005$), as well as a significantly decreased expression of miR-185 (IBD: median 0.86, range 0.44–1.53, $P < 0.0005$; Controls: median 1.68, range 0.89–1.64, $P < 0.0005$), miR-192 (IBD: median 1.56, range 1.24–1.89, $P < 0.0005$; Controls: median 1.4, range 1.19–2.3, $P < 0.0005$) and miR-223 (IBD: median 0.54, range 0.32–0.96, $P < 0.0005$; Controls: median 0.9, range 0.62–1.68, $P < 0.0005$).

This study shows that some circulating miRs are differentially expressed in the serum of dogs with LP IBD versus healthy dogs. Further studies are needed to evaluate the usefulness of these markers in the diagnosis and treatment of canine IBD.

Disclosures: No disclosures to report.

ESCG – O – 9

SPECIFIC VIRULENCE FACTORS IN MUCOSA-ASSOCIATED E. COLI OF DOGS WITH INFLAMMATORY BOWEL DISEASE (IBD) ARE ASSOCIATED WITH SURVIVAL.

K. Allenspach[1], F. Vessieres[2], Y. Du[1], D.D. Kingsbury[1], F. Procoli[2], C.M. Logue[1], L.K. Nolan[1], G. Li[1], K.W. Simpson[3], J.P. Mochel[1], A.E. Jergens[1]. [1]Iowa State University, Ames, USA, [2]Anderson Moores Speciality Practice, Winchester, UK, [3]Department of Veterinary Clinical Sciences, Cornell University, Ithaca, USA

Growing evidence suggests that resident *E.coli* play an important role in the pathogenesis of inflammatory bowel disease (IBD) across species. Among the genes that may contribute to *E. coli*'s role in the development of IBD are those typical of Extraintestinal Pathogenic *E. coli* (ExPEC). Here, we tested the hypothesis that

mucosal *E. coli* harboring ExPEC virulence genes may drive inflammation in the small intestine of dogs with lymphoplasmacytic IBD and contribute to a more severe clinical presentation.

A comprehensive investigation of virulence genes in *E.coli* strains from dogs diagnosed with IBD was performed using a 17-panel multiplex PCR, targeting for 8 genes typical for human IBD-associated adherent and invasive *E. coli* [Group 1 genes: eaeH, irp2, fimH, ratA, fepC, usp, colV, dsbA] and 9 genes more typically associated with ExPEC [Group 2 genes: cvaC, ompTp, hlyF, etaB, iss, aerJ, ereA, papC] (Johnson, TJ, JMicrobiol 2008). A cohort of 12 German Shepherd Dogs (GSDs) and 20 non-GSDs diagnosed with lympho-plasmacytic IBD on the basis of clinical signs, intestinal histopathology, and exclusion of other known causes of chronic gastro-intestinal signs was enrolled. *E. coli* was cultured from endoscopically collected biopsies using MacConkey and Sheep Blood agar, and identified using API20E (BioMérieux). Statistical analysis was performed using univariate linear mixed effect models and Fisher's exact tests for continuous and categorical variables, respectively. The following dependent variables were considered: (i) clinical activity of disease (CCECAI; Allenspach K 2007), (ii) histological severity score (WSAVA index; Day M 2008)), (iii) use of immunosuppressive agents, and (iv) euthanasia due to intractable IBD or survival within 1 year after diagnosis. Results revealed that none of the tested virulence factors were significantly associated with the CCECAI index. However, one virulence factor from group 1 [colV:colicin V, antimicrobial peptide; $P = 0.03$) had a significant effect on the WSAVA index. Two of the virulence genes typically associated with ExPEC (Group 2: ompTP: inactivates antimicrobials, and cvaC: secreted toxin resulting in cytolysis) were significantly associated with euthanasia due to intractable IBD (ompTP: OR: 19, cvaC: OR: 30, $P = 0.05$), as well as an increased likelihood of having been treated with immunosuppressives ($P = 0.03$). These data are reminiscent of reports on human ulcerative colitis cases harboring mucosal *E. coli* with multiple ExPEC virulence factors that were associated with clinical severity. Similarly, our data indicate that specific microbial factors may be important determinants and predictors of disease progression and survival in a sub-group of dogs with IBD.

Disclosures: No disclosures to report.

ESCG – O – 10
IDENTIFICATION OF IGG4-RELATED DISEASE IN THE ENGLISH COCKER SPANIEL AND DOGS OF OTHER BREEDS.

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Chronic pancreatitis (CP) is common in the English Cocker Spaniel (ECS), and is characterized histologically by duct destruction, interlobular fibrosis and dense periductular and perivenous lymphocytic aggregates. These changes are characteristic of human autoimmune pancreatitis type 1, part of a steroid-responsive, multi-organ syndrome, newly recognized as IgG4-Related Disease (IgG4-RD). Human IgG4-RD affects one or several organs, often showing a predominance of IgG4+ plasma cells histologically, with an IgG4+/total IgG+ plasma cell ratio >40%.

This study investigated whether ECSs with CP and inflammatory disease in several organs show an increase in IgG4+ plasma cells within affected tissues. Histological sections of pancreas ($n = 12$), liver ($n = 10$), kidney ($n = 12$), salivary gland ($n = 4$), anal sacs ($n = 9$), and conjunctiva ($n = 2$) were obtained from 37 ECSs with idiopathic chronic inflammatory disease affecting those tissues. Control samples were identified from 18 age-matched dogs of other breeds with chronic pancreatitis ($n = 6$), chronic idiopathic hepatitis ($n = 2$), chronic nephritis ($n = 6$), anal sacculitis ($n = 5$), chronic sialadenitis ($n = 2$) or chronic conjunctivitis ($n = 1$). Eleven ECSs and 6 control dogs presented with disease in more than one organ. Immunohistochemistry was performed for canine total IgG and IgG subclasses (IgG2, IgG3, and IgG4). Normal tissue sections were labeled as controls. The number of plasma cells was counted in three high power fields ($\times 400$). The number of IgG4+ cells and the percentage of total IgG+ plasma cells were compared between groups using Mann-Whitney U tests.

Nineteen sections from 17 ECSs and 11 sections from 10 controls showed elevated numbers of IgG4+ plasma cells and IgG4+/IgG+ ratios >40%. Individual dogs (ECSs and other breeds) showed marked increases in IgG4+ cells. There were no significant differences in numbers of IgG4+ plasma cells between ECSs and controls for affected pancreas, liver, anal sacs, salivary glands and conjunctiva. Anal sacs showed high numbers of total IgG and IgG4+ plasma cells. Kidney sections had more IgG4+ cells in both cases and controls than other organs. Dogs of other breeds had significantly more IgG4+ plasma cells in affected kidneys.

In conclusion, several ECSs and dogs of other breeds fulfilled the histological criteria for diagnosis of IgG4-RD, supporting the existence of a multi-organ immune-mediated disease in ECS and some other dogs. Strict inclusion criteria for controls with multi-organ inflammatory disease likely selected for dogs of other breeds with IgG4-RD. Anal sacculitis showed histological changes suggesting an immune-mediated etiology. Future studies will focus on the immunology and treatment of the disease.

Disclosures: Disclosures to report.

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ESCG – O – 11
CORRELATING GASTROINTESTINAL HISTOPATHOLOGIC FINDINGS TO CLINICAL DISEASE ACTIVITY IN DOGS WITH INFLAMMATORY BOWEL DISEASE.

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Diagnosis of canine inflammatory bowel disease (IBD) requires confirmation of histopathologic inflammation in intestinal biopsies. Different studies have found it difficult to correlate histopathologic findings with clinical disease severity due to a lack of consistency between pathologists when describing histopathologic changes and the questionable quality of specimens submitted for diagnostic evaluation. The WSAVA* GI standardization grading scheme (Day, 2008) was an attempt to rectify some of these problems but even it is associated with poor agreement among pathologists. The aim of the present study was to utilize a new grading scheme for improved consistency of evaluation of GI histopathologic findings and to correlate these features to clinical disease activity in dogs with IBD.

Paraffin-embedded tissues from the stomach, duodenum, ileum, and colon of 70 healthy dogs and 163 IBD dogs were evaluated for histopathologic lesions using a simplified model for defining GI inflammation (Jergens, 2013). Morphologic/inflammatory features were independently scored by 8 pathologists for total lesion scores for each GI organ and sub-scores within each organ. Clinical disease activity was calculated using CCECAI/CIBDAI scores. Pearson's correlation coefficients were used to evaluate the association between clinical and histopathologic scores.

The estimated correlation between CCECAI/CIBDAI and total histology score was found to be significant ($P < 0.05$) for duodenum ($r = 0.42$, 95% CI = [0.08–0.65]) and colon ($r = 0.33$, 95% CI = [0.04–0.57]). The correlation was borderline significant for ileum (P: 0.06, $r = 0.29$, 95% CI = [−0.02 to 0.55]) but non-significant for stomach (P: 0.7, $r = 0.05$, 95% CI = [−0.24 to 0.34]). In evaluating the relationship between histopathologic sub-scores and disease activity, the correlation was significant for: (i) crypt dilation ($P < 0.001$, $r = 0.52$), (ii) LP macrophages ($P < 0.01$, $r = 0.34$), (iii) LP neutrophils (P: 0.03, $r = 0.28$), iv) mucosal fibrosis ($P < 0.001$, $r = 0.53$), v) surface epithelium (P: 0.01, $r = 0.34$), and (vi) villus stunting (P: 0.002, $r = 0.43$). The correlation to CCECAI/CIBDAI for colonic goblet cells, intraepithelial lymphocytes, LP eosinophils, LP lymphocytes, and lacteal dilation was non-significant. There was agreement between pathologists for total histology scores, while sub-scores for mucosal fibrosis and villus stunting differed significantly ($P < 0.05$).

In conclusion, a simplified model for GI inflammation shows utility in correlating histologic features to clinical disease activity. Gastric biopsies would appear to be less clinically useful versus duodenal and colonic biopsies for defining intestinal inflammation in canine IBD.

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ESCG – O – 12

ACQUIRED ESOPHAGEAL STRICTURES: BALLOON DILATATION OR STENTING? OUTCOME AND COMPLICATIONS IN 24 DOGS AND CATS (2002–2017). J.S. Béguin[1], M. Manassero[1], M. Faucher[2], V. Freiche[1]. [1]Ecole nationale vétérinaire d'Alfort, Université Paris Est, Maisons-Alfort, France, [2]Clinique Vétérinaire Alliance, Bordeaux, France

Balloon dilatation is the most commonly used therapy for esophageal strictures. The objective of this study was to assess outcome and complications of balloon dilatation and/or stenting for treatment of acquired esophageal strictures in dogs and cats.

Medical records were reviewed from animals presented with esophageal strictures that underwent endoscopic balloon dilatation or stenting. All cases were managed by the same clinician (VF). Values are expressed as percentage and median [interquartile range].

Twenty-four cases (19 dogs and 5 cats) were included. The median age was 6 years [2.7; 10.7] for dogs and 1 year [0.4; 4] for cats. Strictures resulted from recent anesthesia in 11 cases (45.8%). Other causes included foreign body (29%), toxic ingestion (10.4%), acute vomiting (6.2%) and one benign neoplasia (4.2%). Clinical signs reported by owners were regurgitation (24/24), vomiting (11/24), dysphagia (13/23), dysorexia or anorexia (10/22), ptyalism (6/23) and cough (6/24). Median duration of clinical signs prior to endoscopy was 15 days [10; 26]. Thirty-two strictures were identified at initial esophagoscopy. Seventeen animals had one stricture, six had two strictures and one had three strictures. Seven strictures (29.2%) were located within the cervical esophagus, 10 of 32 (41.6%) were in the mid-esophagus, and 15 of 32 (62.5%) were in the distal esophagus. The median stricture diameter was 4 mm [3; 8]. Annular strictures were observed in 21 of 32 stenosis (65.6%).

Balloon dilatation procedures were performed for 19/24 animals using a dilatator (Olympus®) with an inflated diameter of 10 to 12 mm. Median numbers of dilatation were 2 [1; 3]. Clinical improvement was noted for 15 cases. Perforation of the esophagus was the only complication (1/19). Stenting was considered for 6 animals (Boston Scientific® "Ultraflex" half covered stent in 2 cases and "Symphony" nitinol uncovered stent in 4 cases). Stent placement was considered for the last 4 refractory cases and as first-line treatment for 2 cases. Clinical improvement was observed in 5 of 6 cases. Complications included discomfort (1/6) and stent migration (1/6). Long-term follow up was available for 17 animals, median survival time was 730 days [100.7; 1368.7].

The limited number of cases precluded statistical analysis to determine the best treatment option. To the author's opinion, balloon dilatation remains a good first-line therapeutic modality. Esophageal stenting appears safe and effective for refractory cases or ductal strictures but needs to be compared to balloon dilatation in a prospective study on a more substantial number of cases.

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ESCG – O – 13

PREVALENCE OF GASTRIC LYMPHOID FOLLICULAR HYPERPLASIA IN FRENCH BULLDOGS. T. Bienes, R. Oliveira Leal, M. Dominguez Ruiz, R. Elvas de Carvalho, N. Fernandes Rodrigues, K. Le Boedec, J.L. Hernandez. CHV Frégis, Arcueil, France

Gastric lymphoid follicular hyperplasia (GLFH) has been reported as higher prevalent in French Bulldogs (FB). However, screening for confounders was never performed. In humans and cats, an association between Helicobacter/Helicobacter-like organism (HLO) infection and GLFH is recognized.

This study aimed to (i) confirm the association between GLFH and FB and (ii) screen for confounders, especially regarding HLO presence.

A total of 288 client-owned dogs were included.

Medical records of dogs that underwent gastroscopy between January 2013 and December 2015 were retrospectively reviewed. Two univariate analyses were performed in order to identify the association between signalment, clinical signs, endoscopic and histopathologic variables with GLFH and FB respectively. Significant variables of both analyses were included in a multivariate analysis. Backward elimination was used to select the final model.

Variables associated with GLFH on univariate analysis included: FB ($P = 0.04$), intact male ($P = 0.03$), age ($P < 0.001$), vomiting ($P = 0.03$), discoloration ($P = 0.02$), hemorrhage ($P < 0.001$), ulcerations ($P = 0.004$) on gastric endoscopy, and epithelial and lamina propria lymphocyte invasion ($P < 0.001$) and HLO presence ($P < 0.001$) on histopathology. Variables associated with FB on univariate analysis included intact male ($P = 0.005$), age ($P < 0.001$), vomiting ($P < 0.001$), discoloration ($P = 0.001$) and hemorrhage ($P = 0.01$) on gastric endoscopy, and HLO presence ($P = 0.001$) on histopathology. Final model included FB, age, vomiting, gastric hemorrhage and HLO presence. FB ($P = 0.87$) and age ($P = 0.18$) were no longer associated with GLFH on multivariate analysis. HLO colonization was associated with young age ($P < 0.001$) but not with FB ($P = 0.1$).

Although an association between HLO colonization and young age was identified, this study shows that GLFH is not more frequent in FB as it would be expected.

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ESCG – O – 14

A RETROSPECTIVE EVALUATION OF ILEOCECOCOLIC PERFORATIONS ASSOCIATED WITH ROUTINE DIAGNOSTIC LOWER GASTROINTESTINAL ENDOSCOPY IN DOGS AND CATS. V.L. Woolhead[1], J.C. Whittemore[2], R. Geddes[1], S.A. Stewart[1]. [1]Royal Veterinary College, North Mymms, UK, [2]University of Tennessee, Knoxville, USA

Colonic perforation is a known complication of ileocolonoscopy in human medicine. Most perforations are immediately detected during endoscopy; however, up to 40% are diagnosed 24 h post-procedure. Recent veterinary studies documented that obtaining ileal biopsies can increase the diagnostic yield of gastrointestinal [GI] endoscopy for workup of diffuse intestinal diseases; therefore, this procedure is being conducted more frequently. Currently, there are no published cases in the veterinary literature documenting iatrogenic ileocecocolic [ICC] perforations or delayed diagnosis of endoscopic perforations. The purpose of the study was to identify iatrogenic ICC perforations in dogs and cats associated with lower gastrointestinal [LGI] endoscopy, including anatomical location of perforation, timing of diagnosis, risk factors and outcome. Canine and feline medical records from two university veterinary hospitals between 2012 and 2017 were retrospectively evaluated for cases with iatrogenic ICC perforation associated with diagnostic LGI endoscopy. Cases were included if full medical records, including histopathological reports, were available. Five ICC perforations associated with canine LGI endoscopy were identified; no feline endoscopic perforations were documented. All perforations occurred adjacent to the ICC valve; two were ileal and three colonic. Three perforations were immediately identified by visualization of abdominal contents during endoscopy, and one perforation was suspected intra-procedure due to excessive abdominal distension and confirmed with demonstration of pneumoperitoneum on plain radiographs. Pneumoperitoneum was detected on abdominal ultrasound and radiographs in one dog 5 days post-endoscopy, following evaluation for lethargy and anorexia post procedure. All dogs underwent immediate surgical correction following diagnosis of perforation, with four patients surviving beyond discharge. Histopathology from the area of perforation revealed no significant underlying pathology. The patient with delayed diagnosis of perforation died as a consequence of complications from septic peritonitis following two surgical procedures. Patient signalment, adequacy of colonic preparation and visualization, method of ileal intubation (direct intubation vs. scope advancement over biopsy forceps) and underlying GI pathology did not appear to contribute to risk of iatrogenic perforation. Recent publications suggest that ileal biopsies should be obtained in all patients undergoing diagnostic LGI endoscopy; however, clinicians should be aware that

iatrogenic ICC perforation can occur in canine patients with minimal underlying GI pathology. Delayed diagnosis of ICC perforation was associated with a negative outcome; if patients become unwell within the days immediately following endoscopy, perforation should be rapidly excluded with abdominal radiography to screen for pneumoperitoneum.

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ESCG – O – 15

ACQUIRED PYLORIC STENOSIS IN CATS: A PROSPECTIVE STUDY OF 15 CATS (2015–2017).

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Pyloric stenosis (PSt) is a rare condition in cats and can be a diagnostic challenge as ultrasonography lacks specificity in this context. Few reports describe congenital PSt in young cats presented for chronic alimentary vomiting. A retrospective study conducted on 34 cases (Ecvim 2016) suggested that acquired PSt in cats, associated with Inflammatory Bowel Disease (IBD) is probably an underdiagnosed feature. For the first time, a prospective study conducted on 22 cats (Ecvim 2016) measured the pyloric diameter (PD) by per-endoscopic assessment, using biocompatible graduated olives: PD was reported to be between 9 to 10 mm in 22 healthy cats.

The aim of this prospective study was to describe a cohort of cats with acquired PSt confirmed by per-endoscopic measurement. All procedures were performed by the same operator (VF), using a GIF, Olympus 180 8.8 mm diameter video-gastroscope. Group A included 15 cats with acquired PSt. Cats were included in group A if PD was less than 9 mm. The control group (group B) included 12 cats presented during the same period with a normal PD. Gastrointestinal biopsies were submitted for histologic analysis in all cats (including stomach, pylorus and duodenum, $n = 14$). Signalment, clinical signs, endoscopic and histopathological findings were compared between both groups.

Age, sex and weight were similar between groups. Chronic vomiting was the most frequent clinical complaint in both groups (100% in group A, 67% in group B). Food vomiting occurred more frequently in group A (12/15) than in group B (6/12) but this was not statistically different. Endoscopic findings were consistent with mild gastritis in both groups. Edema and hyperemia were frequently noted around the pylorus in group A (8/15), less in group B (2/12). Median value of the PD in group A was 7 mm, which was statistically different from group B (9 mm; $P < 0.05$; Wilcoxon/Mann-Whitney test). Histologic changes were non-specific (lymphocytic-plasmacytic infiltration of the gastric mucosa in 6 cats in group A, in 3 cats in group B). Pyloric fibrosis was found in 11/15 cats from group A and in 4/9 cats from group B.

Our results confirm that acquired pyloric stenosis can occur in cats suffering from IBD. Pathogenic mechanisms are not clearly understood but could imply mucosal scar pyloric fibrosis. This study should be pursued with inclusion of additional cases in each group in order to increase statistical power.

Disclosures: No disclosures to report.

ESVC – O – 1

UTILITY OF VHS TO PREDICT ECHOCARDIOGRAPHIC EPIC TRIAL INCLUSION CRITERIA IN DOGS WITH MYXOMATOUS MITRAL VALVE DISEASE: A RETROSPECTIVE MULTICENTRE STUDY.

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The EPIC Trial reported three cardiac size inclusion criteria including radiographic vertebral heart size (VHS) >10.5, and echocardiographically derived normalized left ventricular internal dimension in diastole (LVIDDN) ≥1.7 and left atrial to aortic ratio (LA:Ao) ≥1.6 as measured by the Swedish method. However, echocardiography may not always be available and, therefore, there is interest in identification of a VHS cutoff that predicts EPIC echocardiography inclusion criteria (EPIC-ECHO+) in dogs with preclinical myxomatous mitral valve disease (MMVD). Medical records from 8 sites were searched for MMVD cases that had contemporaneous thoracic radiographic and echocardiographic studies. A total of 247 cases were identified and descriptive statistics are reported as mean, median, and interquartile range for VHS (11.4, 11.2, 10.8–11.9), LVIDDN (1.80, 1.79, 1.58–2.05), and LA:Ao (1.78, 1.69, 1.42–2.06). Dogs that were EPIC-ECHO+ ($N = 126$) were identified and compared to the remaining population ($N = 121$). Receiver operator curves were constructed for VHS and performance was explored for optimal cutoffs. The percent correct, sensitivity, specificity, false positive and negative rates for a VHS of 11.1(72%, 0.730, 0.707, 12%, 16%), 11.7(60%, 0.439, 0.85, 6%, 34%) and 11.9(58%, 0.365, 0.90, 4%, 38%) were determined. Based on these data, dogs with MMVD and a VHS >11.7 have a high likelihood of meeting EPIC-ECHO+ (85% specificity) and an acceptable false positive rate (6%), however approximately 34% dogs with a VHS between 10.6–11.7 may meet EPIC-ECHO+ and warrant further echocardiographic evaluation. These results may help veterinarians apply the results of the EPIC Trial to dogs with preclinical MMVD when an echocardiogram is not readily available.

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ESVC – O – 2

EVALUATION OF CONTINUOUS POSITIVE AIRWAY PRESSURE IN DOGS WITH CARDIOGENIC PULMONARY EDEMA SECONDARY TO SEVERE MITRAL VALVE DISEASE.

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The aim of this study was to evaluate the application, tolerability and outcome of continuous positive airway pressure (CPAP) compared to another non-invasive oxygen therapy (flow-by), in dogs diagnosed with cardiogenic pulmonary edema secondary to severe mitral valve disease (MVD).

Records of dogs diagnosed with cardiogenic pulmonary edema based on clinical findings, thoracic radiographs and echocardiography were retrospectively evaluated. Newly diagnosed dogs with MVD and dogs already in treatment for MVD were included in the study.

Thirty dogs were included in the study between February 2016 and 2017. All dogs received medical treatment based on clinical status and echocardiography results and were divided into 2 groups: group 1 (14 dogs) received oxygen administration by CPAP-helmet at a positive expiratory pressure (PEP) of 5 cm H_2O and group 2 (16 dogs) received oxygen flow-by (2–15 L/min).

Oxygen administration was discontinued based on clinical improvement, decreased respiratory labor and RR (respiratory rate), emogas-analysis parameters ($PaCO_2$, or PaO_2 and PaO_2/FiO_2) and improvement of radiographic signs of pulmonary edema.

In group 1 the mean age was 12.5 years (2–16) and mean body weight was 6 kg (3–39). Eleven dogs (78%, 11/14) showed improvement of RR, respiratory labor, blood gas parameters within 30 min after CPAP treatment initiation; radiographic signs of pulmonary edema improved within 8 h. Treatment with CPAP was intermittent, mean wearing time of the CPAP-helmet was 13.4 h/day (3–12) for 50 h (3–23 h). Butorphanol was administered only at the time of application of the CPAP-helmet. The mortality rate was 35% (5/14).

In group 2, the mean age was 11.3 years (8–15) and mean body weight 8 kg (2–22). In seven dogs (43%, 7/16), RR, respiratory labor and blood gas parameters improved within 30 min after oxygen flow-by administration. Radiographic signs of pulmonary edema improved after a median of 19 h (12–26 h). Oxygen delivery was continuous. Butorphanol administration was necessary more than three times per day. The mortality rate was 62% (10/16).

Respiratory failure due to cardiogenic pulmonary edema secondary to MVD is a very common disease in dogs; in this study, CPAP-helmet interface was a valid alternative to oxygen flow-by therapy. Though clinical improvement was similar in the first 30 min, CPAP-helmet reduced the need for butorphanol administration, quickened both clinical and radiographic signs of pulmonary edema improvement and showed a decrease of the mortality rate compared to oxygen flow-by. CPAP-helmet was well tolerated by all dogs.

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ESVC – O – 3

DEVELOPMENT OF A SIMPLE ALGORITHM FOR DIAGNOSIS OF LEFT-SIDED CONGESTIVE HEART FAILURE IN DOGS WITH MITRAL VALVE DISEASE.

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Clinicians in first-opinion practice commonly diagnose congestive heart failure (CHF) in small breed dogs with myxomatous mitral valve disease (MMVD) that do not have CHF. To improve the accuracy of CHF diagnosis, we developed an initial algorithm based on historical, physical and radiographic findings that might help a clinician in first opinion practice to more accurately diagnose CHF in these dogs. We then sought to refine and validate the algorithm by determining which of these historical, physical and radiographic findings help discriminate dogs with MMVD into CHF and "not CHF" groups.

We collected the following historical and physical examination information on 52 small-breed dogs presenting for evaluation of a cough, murmur, or suspicion of CHF to the referral clinician: presence or absence of coughing, duration of coughing, recent worsening of cough, presence of loud crackles, murmur intensity, presence of sinus arrhythmia, heart rate, in-clinic respiratory rate, presence or absence of dyspnea, sleeping respiratory rate, response to a diuretic trial (if considered necessary by the referral clinician) and radiographic evaluation of left atrial size. Additionally, all dogs underwent echocardiographic evaluation. The diagnosis of "CHF" or "not CHF" was made by each investigator on their own cases, using all required diagnostic tests and treatment, and not validated by other investigators.

Historical and physical variables that excluded a diagnosis of CHF included presence of a sinus arrhythmia (never identified in CHF dogs), a murmur that was "less than loud", a heart rate <120 bpm, an in-clinic RR <35 breaths/min, less-than-moderate left atrial enlargement on radiographs. A positive diuretic trial which alleviated dyspnea confirmed a diagnosis of CHF. 20/21 coughing dogs with CHF showed a recently worsening cough.

Based on these findings, we refined our algorithm so that detection of either a sinus arrhythmia, a soft murmur, a sinus rate <100 bpm, or an in-clinic RR < 30 breaths/min excludes a diagnosis of CHF. Presence of a cough or crackles does not help, but a recently worsening cough warrants increases the suspicion of CHF. In cases where CHF is suspected, a resolution of dyspnea with appropriate diuresis strongly supports the diagnosis of CHF. How well the refined algorithm performs with first opinion clinicians remains to be determined.

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ESVC – O – 4

EFFECTS OF TREATMENT WITH THROMBOXANE A2 SYNTHASE INHIBITOR ON PULMONARY HYPERTENSION: A PILOT STUDY.

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Thromboxane A_2 (TXA_2) is an important multifactorial mediator in the pathogenesis of pulmonary hypertension. Although endothelium-derived TXA_2 causes excessive pulmonary vascular resistance by acting as a potent vasoconstrictor, mitogen of vascular smooth muscle cells and promoter of platelet aggregation, there is no current therapeutic strategy for pulmonary hypertension, targeting TXA_2 formation. The aim of this study is to assess possible beneficial effects of inhibiting TXA_2 synthesis in patients with pulmonary hypertension.

Sixteen client-owned dogs with proven moderate-to-severe pulmonary hypertension were randomly assigned to the treatment ($n = 8$; ozagrel hydrochloride, 5 mg/kg bid PO) or control group ($n = 8$; sildenafil citrate, 1 mg/kg bid PO). All patients have already been treated with standard protocol including sildenafil (1.8 ± 0.6 mg/kg, bid). Pulmonary hypertension associated with left-side heart failure (LA/Ao >1.6 and LVIDDn >1.7) was excluded in the population. Several clinical indices, which relate to hypoxia (lactate, SpO_2, base excess), thrombosis (d-dimer), azotemia (BUN, creatinine), congestion (NT-proBNP) and echocardiographic indices (peak velocity of tricuspid regurgitation, Ao/MPA), were tracked down for four weeks.

The treatment led to significant and gradual decreases in lactate and d-dimer ($P < 0.01$; from 5.6 ± 1.9 mmol/L to 1.8 ± 1.0 and from 7.4 ± 6.8 to 1.2 ± 1.1 μg/mL, respectively) but significantly increased SpO_2 and base excess ($P < 0.01$; from 87 ± 5.3 to 95 ± 1.8 % and from -8.4 ± 3.2 to -3.1 ± 1.9 mmol/L, respectively) in the patients. Compared to controls, the treatment group exhibited statistically significant changes in only lactate level ($P = 0.02$) and SpO_2 ($P = 0.016$). However, treatment of TXA_2 synthase inhibitor showed the tendency to improve the other variables, such as NT-proBNP and tricuspid regurgitant flow, implicating the potential role of TXA_2 synthase inhibitor in pulmonary vascular impedance. Abnormal behavior such as licking footpads and joints has been reported to be a putative side effect of the treatment in one case.

These results suggest that TXA_2 synthase inhibitor may contribute to the improvement of pulmonary hemodynamics in pulmonary hypertension by alleviating pulmonary vasoconstriction and preventing thrombosis.

Disclosures: No disclosures to report.

ESVC – O – 5

ECHOCARDIOGRAPHIC EVALUATION OF RIGHT VENTRICULAR DIMENSION AND SYSTOLIC FUNCTION IN DOGS WITH PULMONARY HYPERTENSION.

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Pulmonary hypertension (PH) may lead to right ventricular (RV) remodeling, dysfunction and right-sided congestive heart failure (R-CHF). RV enlargement and dysfunction are strongly associated with prognosis in humans with PH. Reference intervals for RV size and systolic function have been described in healthy dogs. The aims of this study were to assess RV size and systolic function in dogs with PH and to verify if they are associated with severity of PH.

This was a prospective, multicenter, observational study. We included 138 client-owned dogs: 64 with PH and 74 healthy. PH was classified according to tricuspid regurgitation pressure gradient (TRPG) in mild (TRPG: 36–50 mmHg; $n = 18$ dogs), moderate (TRPG: 51–75 mmHg; $n = 14$ dogs) and severe (TRPG

>75 mmHg; $n = 32$ dogs). Fourteen dogs with PH had R-CHF. Echocardiographic evaluation of the RV was obtained from the left apical 4-chamber view optimized for the right heart. RV dimension was evaluated through the RV end-diastolic area (RVEDA) index, calculated as RVEDA divided by body surface area. Echocardiographic indices of RV systolic function were tricuspid annular plane systolic excursion (TAPSE) and RV fractional area change (FAC) normalized for body weight (TAPSEn and FACn, respectively).

RVEDA index was significantly higher in dogs with mild, moderate and severe PH than in healthy dogs ($P < 0.05$ for each contrast). No differences in RVEDA index were found between dogs with moderate and severe PH. RVEDA index was significantly higher in dogs with R-CHF in comparison to dogs without R-CHF ($P < 0.0001$). TAPSEn below the reference interval was found in 1/14 dogs with moderate PH and in 4/32 with severe PH, but did not significantly differ among dogs with mild, moderate and severe PH in comparison to healthy. FACn below the reference interval was found in 4/14 dogs with moderate PH and 6/32 with severe PH, and did not significantly differ between dogs with and without PH, irrespective of the severity. No differences in TAPSEn and FACn were found between dogs with and without R-CHF.

In conclusion, the RVEDA index was increased in dogs with PH and in those with R-CHF, suggesting that it may represent a useful parameter to assess PH severity. Because TAPSEn and FACn were abnormal in only a few dogs with moderate-to-severe PH, these parameters of RV dysfunction do not seem to be linked to R-CHF in this species. Further studies are therefore needed to identify additional factors associated with R-CHF in dogs with PH.

Disclosures: No disclosures to report.

ESVC – O – 6
CAUDAL VENA CAVA ASSESSMENT IN DOGS WITH RIGHT-SIDED CONGESTIVE HEART FAILURE: A PILOT STUDY.

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Right-sided congestive heart failure (R-CHF) secondary to right-sided heart or pericardial diseases is characterized by increased right atrial, systemic venous and capillary pressures. Direct right atrial pressure measurements are considered the gold standard for identifying R-CHF, but are invasive. In human medicine, sonographically identifying a distended, non-compliant caudal vena cava (CVC) is a non-invasive means of detecting R-CHF and/or estimating intravascular volume. Sonographic CVC dimensions in healthy dogs have been reported. However, the effect of R-CHF on CVC dimensions is not well described. The objective of this study was to determine if CVC measurements, obtained via three different sonographic views, from dogs with R-CHF are outside reference intervals (RI).

Dogs presenting with right-sided heart disease and ascites were prospectively evaluated. Via longitudinal subxiphoid views (SV), maximal and minimal CVC diameter (SV-CVCMax, expiration, SV-CVCMin, inspiration) and collapsibility index (CI) were measured. Transverse 11–13th right hepatic intercostal views (HV) were used to measure maximal and minimal CVC (HV-CVCMax, HV-CVCMin) and aortic diameter. A single CVC and aortic diameter (PV-CVC, PV-Ao) were measured via longitudinal right paralumbar views (PV). CVC dimensions were adjusted for the three views using allometric scaling as well as indexed to aortic diameter for HV and PV. Data were compared to a RI previously established by the authors using 126 healthy dogs of various breeds. Data were expressed as median and range.

Six dogs weighing 19.2 kg (7.2–33.9), were included. Diagnosis included pulmonary hypertension ($n = 3$), congenital heart disease ($n = 2$) and pericardial effusion ($n = 1$). 6/6 and 5/6 dogs had SV-CVCMax and SV-CVCMin above RI, respectively. All dogs had CI (19% (7–24)) within RI. HV-CVCMax and HV-CVCMin were above RI in 5/6 and 4/6 dogs, respectively. 2/6 HV-CVCMax/Ao and HV-CVCMin/Ao ratios were above RI. The PV-CVC/Ao ratio was 1.28 (1.13–1.47), and above RI in 4 dogs. The PV-CVC diameter, using allometric scaling, was above RI in one dog.

This pilot study suggests that an enlarged CVC is observed in dogs with evidence of R-CHF. CVC distension may be easiest to identify at the SV. This could be due to the proximity CVC in relation to the right atrium and/or the influence of the respiratory cycle on the CVC diameter between healthy dogs and dogs with R-CHF when measured at the SV. In contrast to human medicine, there was no difference in CI between dogs with R-CHF and healthy dogs. A larger study is needed to confirm these findings.

Disclosures: No disclosures to report.

ESVC – O – 7
HEART RATE VARIABILITY IN DOGS WITH INTRACRANIAL DISEASE.

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In humans, alterations in heart rate variability (HRV) have been associated with various forms of intracranial disease due to disturbances in the autonomic nervous system. HRV has been shown to hold prognostic value in these patients.

The aims of this study were to evaluate alterations in HRV in dogs with clinical signs of intracranial disease and the relationship of HRV with the results of brain imaging and outcome.

Ambulatory electrocardiographic recordings were prospectively obtained from 12 client-owned dogs with a history and/or neurological examination consistent with intracranial disease. Data was collected for a minimum of 12 h the night before brain imaging (MRI or CT), while the dogs were hospitalized. Control data was gathered from 25 healthy dogs used in a parallel study on HRV. The data was analyzed using Novacor Holtersoft Ultima Version 2.5.5. Time and frequency-domain measurements of HRV, Poincaré plots and their descriptors were generated from the data.

Two dogs from the diseased group were excluded, one due to the presence of persistent arrhythmia and another due to a recording time of less than 12 h. The mean heart rate of the diseased group was higher than that of the control group when HRV parameters were calculated from 6 h of resting data for each group. All of the measured parameters of HRV (SDNN, SDNNIDX, PNN50%, RMSSD, SD1, SD2, SD1/SD2, HFmsec2, LFmsec2), apart from SDANN, were lower in the diseased group than the control group ($P < 0.03$). There was no distinct Poincaré plot pattern evident for the diseased group when compared to the healthy controls. There was no significant difference in any of the HRV measurements over 12 h of recording between dogs with intracranial lesions present on imaging ($n = 7$) and those with no imaging abnormalities ($n = 3$). Neither was there a significant difference between those who were alive 3 months following data collection ($n = 5$) and those who were not ($n = 5$).

This pilot study suggests that the presence of intracranial disease may be associated with a reduction in HRV in dogs, regardless of the underlying etiology. HRV does not appear to be predictive of brain imaging findings in a small cohort of dogs with clinical signs of intracranial disease, and there does not appear to be a relationship between HRV and survival.

Disclosures: No disclosures to report.

ESVC – O – 8
GENETIC BACKGROUND OF FOCAL JUNCTIONAL TACHYCARDIA WITH ISORHYTHMIC ATRIOVENTRICULAR DISSOCIATION IN LABRADOR RETRIEVERS.

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Focal junctional tachycardia with isorhythmic atrioventricular dissociation is a known arrhythmia in Labrador retrievers. Because of breed predisposition of this type of arrhythmia, genetic background is strongly suspected in the dog. Recently, we diagnosed

the disease in several Labradors including a family with three consecutive generations. The aim of our study was to describe the inheritance pattern and to identify potentially causative gene mutations in our population. Study population consisted of 12 Labradors. Eight dog was diagnosed with different severity of the disease, one was a 13 years old healthy littermate in an affected family, three dogs (>10 years old) from different breed lines served as controls. Clinical diagnosis was made by electrocardiography and echocardiography. Inheritance pattern was studied by pedigree analysis. Genomic DNA was isolated from EDTA-anticoagulated blood samples using a commercial kit. Whole exome sequencing (WES) of healthy and diseased littermates was used to identify candidate mutations (Illumina HiSeq2500 next generation sequencing system, Agilent Sure Select Canine All Exon 54 Mb library-kit, 50x-coverage, CanFam3.1 annotation). Selection of target mutations in genes related to calcium transport was based on clinical experience with calcium channel blocker diltiazem, that could effectively control the disease. Sanger-sequencing was used to validate WES results in the study population and in controls (ABI3500 capillary-sequencing system, BigDye3.1 chemistry). The disease was present in all generations (affecting both genders) of the affected Labrador family, although the symptoms varied among the individuals. Sudden death at young age occurred in the offsprings of parents that were both clinically affected. Development of congestive heart failure between 5 and 8 years of age due to tachycardiomyopathy was another observed phenotype, while there were also some clinically asymptomatic dogs with or without the arrhythmia. Comparison of the WES data of the healthy and diseased littermates resulted in 1629 differences in coding regions. After filtering for calcium turnover related targets a homozygous single nucleotide variant (c.[3019C>A]; [Gln1007Lys]) in Ryanodine receptor-2 (RyR2) gene and a heterozygous insertion (c.246_247insCAG; p.Gln92_Ser93insGln) in the calcium activated potassium channel gene (KCNN2) were identified. Both were confirmed to be present in all of the clinically affected (related and unrelated) dogs and absent in healthy controls by Sanger-sequencing. Pedigree analysis suggests an autosomal dominant inheritance pattern with strong but incomplete penetrance and variable expression in the affected Labrador family. The identified RyR2 and KCNN2 mutations may have a causative role in the disease development in Labrador retrievers.

Disclosures: No disclosures to report.

ESVC – O – 9
IMMUNOFLUORESCENT LOCALIZATION OF PLAKOGLOBIN IN ENDOMYOCARDIAL BIOPSY SAMPLES TO DIAGNOSE ARRHYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY (ARVC) IN THE DOG.

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In early stages of ARVC, diagnosis is difficult due to the absence of echocardiographic changes and day-to-day arrhythmia variability. A definitive diagnosis requires histopathologic identification of transmural fibrofatty replacement of the right ventricle. Reduction of immunofluorescent signal for the desmosomal protein plakoglobin has been reported in ARVC-affected humans and boxers. Reduction in plakoglobin signal within endomyocardial biopsy samples (EMBs) may help diagnose ARVC.

EMBs were obtained with owner consent from 48 dogs: 42 with advanced cardiac disease and six asymptomatic boxers (>5 years) with mild to moderate ventricular arrhythmia (VA) burden. Investigators were blinded to breed and clinical signs of the dogs. ARVC was diagnosed from EMBs by histopathology (MT) in 5 dogs. Of these, 3 had clinical signs consistent with ARVC (2 boxers, 1 English bulldog). Two were asymptomatic boxers with a moderate VA burden. Confocal microscopy was performed (EMO) to detect immunoreactive signal for plakoglobin in EMBs. Samples were prepared with antibodies recognizing cadherin (intercalated disc marker) and plakoglobin.

Forty-two samples were positive for cadherin signal and 6 were non-diagnostic. Plakoglobin signal was reduced in 4 samples: 2 boxers and 1 English bulldog with clinical signs and histopathologic diagnoses of ARVC. The fourth sample was from a mongrel diagnosed with myocarditis. Plakoglobin signal was present in all 6 asymptomatic boxers, including those with a histopathologic diagnosis of ARVC.

These results suggest that reduced plakoglobin signal in EMBs may help to differentiate ARVC from other myocardial diseases in dogs, specifically when clinical signs of disease are present.

Disclosures: No disclosures to report.

ESVC – O – 10
RIGHT VENTRICULAR VOLUME QUANTIFICATION MEASURED BY REAL-TIME 3D ECHOCARDIOGRAPHY AND ECG-GATED 64 SLICE MDCT IN HEALTHY DOGS.

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Accurate assessment of right ventricular (RV) structure and function is an integral component of a complete cardiology evaluation in veterinary patients. Assessment of RV performance is particularly important in patients with pulmonary hypertension, congenital heart disease, and acquired myocardial disease affecting the RV. There is evidence in human medicine suggesting RV function is strongly associated with outcomes in many conditions. The aim of this study was to evaluate the accuracy of right ventricular volume (RVV) and function quantification using three-dimensional echocardiography (3DE) compared to electrocardiogram-gated multidetector computed tomography (ECG-gated MDCT).

Six intact hound cross dogs weighing between 19.5–23.8 kg were anesthetized using a standardized protocol and spontaneous ventilation. Each dog underwent an ECG-gated MDCT and complete 3DE examination. Right ventricular end-diastolic volumes (EDV), end-systolic volumes (ESV), stroke volume (SV), and ejection fraction (EF) were measured using software specific for RVV quantification from 3DE and MDCT data sets. Correlation and levels of agreement between methods were determined, and intra- and inter-observer variability was assessed for 3DE.

There were no statistically significant differences between SV ($P = 0.16$) and EF ($P = 0.31$) obtained by MDCT and 3DE. There were significant differences between EDV ($P = 0.03$) and ESV ($P = 0.01$) RVV obtained by MDCT and 3DE. No statistically significant difference in HR was noted between methods ($P = 0.84$). The correlation between MDCT and 3DE was very good for EDV and ESV ($R = 0.87$), moderate for EF ($R = 0.60$) and poor for SV ($R = 0.31$). Bland-Altman analysis showed a systematic underestimation of RVV derived from 3DE compared to MDCT, with an average bias of 15 and 10.3 mL for EDV and ESV, respectively. The intra- (EDV 12%, ESV 18%) and interobserver (EDV 14%, ESV 11%) variability was acceptable for 3DE.

The results of this study suggested use of 3DE to measure RVV in healthy dogs was feasible with acceptable reproducibility. Measures of RVV by 3DE underestimate those made by MDCT, therefore absolute volumes of these imaging techniques are not interchangeable. However, there were no significant differences for EF between methods, which suggests that 3DE may be used to evaluate global RV function and monitor trends with disease states. A larger prospective study in dogs with and without cardiac disease is needed to delineate the benefits and constraints of these methods.

Disclosures: No disclosures to report.

ESVC – O – 11
FEASIBILITY OF INTRACARDIAC ECHOCARDIOGRAPHY IN DOGS: A PILOT STUDY .

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The intracardiac echocardiography (ICE) technology uses a catheter-based steerable ultrasound probe passed into the vessels to image intracardiac structures and blood flow from inside the cardiovascular system, with a similar to superior image resolution as

compared to transesophageal echocardiography (TEE). Its clinical applications in human cardiology are growing, particularly for interventional procedures. The aim of this pilot study was thus to assess the feasibility of ICE in the dog during interventional procedures, i.e., transcatheter PDA closures using Amplatz© Canine Ductal Occluder (ACDO).

The study population consisted of 4 dogs (median age: 0.75 year [0.3–2.1]; body weight: 15.1 kg [9.2–20.8]). A type II morphology PDA with left-to-right shunting was visualized in all cases based on transthoracic echocardiography (TTE) using two-dimensional (2D) and three-dimensional modes, as well as color-flow Doppler recordings. In 2 dogs, previous unsuccessful surgical closure of a PDA by thoracotomy was reported by the referent veterinarians, with placement of several hemostatic clips (Case #1) and mild hemorrhage of the PDA corrected with resorbable hemostatic compresses (Case #2). The ICE ultrasound system ViewMate Z© and the ViewFlex Plus catheter© (St Jude Medical, 4.5–8.5 MHz) were manipulated in all cases by a trained highly experienced observer in ICE imaging modality and a second observer for imaging settings if needed.

The ViewFlex Plus catheter was introduced by the left or the right femoral artery using a 9 to 10 French introducer (depending on dog's size) in all cases except for the smallest dog (9.2 kg), and was placed in the descending aorta dorsally to the ductus. In the two dogs that underwent a previous unsuccessful surgical closure of a PDA by thoracotomy, ICE provided a better evaluation of the PDA morphology (Case #1) and associated lesions (Case #2) than TEE. For Case #1, unlike ICE, TEE did not allow an optimal acoustic window to accurately visualize the PDA area because of the hemostatic clips. In all cases, ICE allowed confirmation of complete PDA occlusion using combined 2D and color-flow Doppler modes. Furthermore, in two dogs, ICE was used as the sole guidance for deployment of the ACDO device.

In conclusion, this report illustrates the safe and effective use of ICE in dogs during transcatheter procedures.

Disclosures: No disclosures to report.

ESVC – O – 12

USE OF TWO-DIMENSIONAL SPECKLE TRACKING ECHOCARDIOGRAPHY TO ASSESS LEFT VENTRICULAR SYSTOLIC FUNCTION IN DOGS WITH SYSTEMIC INFLAMMATORY RESPONSE SYNDROME. A. Corda[1], P. Gomez-Ochoa[2], G. Sotgiu[3], R. Zobba[1], M.L. Pinna Parpaglia[1], J. Prieto Ramos[4], A. French[4]. [1]Department of Veterinary Medicine, University of Sassari, Sassari, Italy, [2]Faculty of Veterinary Medicine, University of Zaragoza, Zaragoza, Spain, [3]Department of Biomedical Sciences, University of Sassari, Sassari, Italy, [4]School of Veterinary Medicine, University of Glasgow, Glasgow, UK

Systemic Inflammatory Response Syndrome (SIRS) is a clinical syndrome caused by systemic inflammation of infectious or non-infectious origin. SIRS is characterized by an endogenous cascade of interleukins and other inflammatory mediators such as TNF-α, IL-6 and IL-1 which are responsible for myocardial depression during systemic inflammation. Conventional echocardiographic indices of left ventricular systolic function such as fractional shortening (FS) and ejection fraction (EF) are not sensitive enough to detect mild or early systolic dysfunction in dogs suffering from SIRS. Two-dimensional Speckle-Tracking Echocardiography (2D-STE) is a new echocardiographic technique that allows an objective and quantitative evaluation of global and regional myocardial function through the analysis of the motion of speckles that are created by the interaction of ultrasonic beams and the myocardium during the 2-dimensional examination. We tested the hypothesis that 2D-STE may detect left ventricular systolic dysfunction, not diagnosed by conventional echocardiography, in dogs with SIRS. Seventeen dogs with evidence of SIRS and 17 healthy dogs as a control group were included in this prospective study. All the procedures were performed for diagnostic purpose; the control group was composed of healthy dogs undergoing surgical castration or ovariohysterectomy. We excluded from the study breeds predisposed to dilated cardiomyopathy, pregnant females, dogs treated with opioids, sedatives or anesthetic drugs during the 12 h before echocardiography. We also excluded dogs with previous diagnosis of, or echocardiographic evidence of congenital or acquired cardiac disease and dogs with an arrhythmia. At the time of Hospital admission each dog was submitted to standard 2D, M-mode, Doppler and 2D-STE with simultaneous ECG and blood pressure measurement. Furthermore, blood samples were obtained for CBC, biochemical profile and the measurements of cTnI and CRP serum levels. The results showed that the standard echocardiographic indices of systolic function such as EF, FS were not significantly different between the two groups. On the contrary, the Left Ventricular Global Longitudinal Peak Strain of endomyocardial layer and the STE-derived Ejection Fraction (STE-EF) were significantly lower in the SIRS group than in the control group. We did not find significant correlation between CRP serum levels and 2D-STE variables and between cTnI and STE variables. Furthermore we did not find a significant difference in cTnI serum levels between the two groups. Our study demonstrated that 2D-STE was more sensitive than standard echocardiography in detecting early or mild to moderate myocardial dysfunction, not detected by conventional echocardiography, in a population of dogs with SIRS.

Disclosures: No disclosures to report.

ESVC – O – 13

MAJOR HISTOCOMPATIBILITY COMPLEX CLASS II HAPLOTYPES ASSOCIATED WITH REMODELING IN CAVALIER KING CHARLES SPANIELS WITH CHRONIC VALVULAR HEART DISEASE. L. Bree[1], R.E. Shiel[1], A.T. French[2], L.J. Tong[3], J. Prieto-Ramos[2], L.J. Kennedy[4]. [1]University Veterinary Hospital, University College Dublin, Dublin, Ireland, [2]Small Animal Hospital, University of Glasgow, Glasgow, Scotland, [3]Murdoch University, Melville, Australia, [4]Glasgow University, Glasgow, Scotland

Chronic valvular heart disease is common in the Cavalier King Charles spaniel (CKCS). However, genetic factors contributing to development or progression of the disease are unknown. Although classically considered a non-inflammatory disease, upregulated expression of genes involved in inflammation and immune function has been identified in affected valvular tissue. Therefore, genetic determinants of the immune response could influence disease progression in individual dogs.

The aims of this study were to document major histocompatibility haplotype (MHC) dog leukocyte antigen (DLA) class II haplotypes in the CKCS, and to examine potential associations between individual haplotypes and progression of disease.

DLA three-locus haplotypes were determined in 190 CKCS from the UK ($n = 95$) and Australia ($n = 95$) using sequence-based typing methods. Six haplotypes were identified.

Echocardiography was performed in 187 dogs; 72 had evidence of remodeling and 115 did not. Three dogs were not tested. Remodeling was defined as increased left-atrial-to-aortic ratio (>1.5) or increased left ventricular internal diameter during diastole or systole (normalized to bodyweight) (LVIDDi>1.85 or LVIDSi>1.26). Associations between individual haplotypes and the presence of remodeling were investigated using the Fisher's exact test. Odds ratios (OR) and 95% confidence intervals (CI) were also calculated. The age of the dogs ranged from 0.6 to 16.3 years.

When data from all 187 dogs were considered, two haplotypes (DRB1*01101/DQA1*00201/DQB1*01303 and DRB1*02001/DQA1*00401/DQB1*01303 were significantly associated with the presence of remodelling ($P = 0.0239$ and $P = 0.0357$; OR 3.562 (95% CI: 1.188–10.68) and 0.5181 (0.2831–0.9482), respectively).

Echocardiographic evidence of remodelling was present in 24 dogs <9 years old and absent in 37 dogs ≥9 years old. DRB1*01101/DQA1*00201/DQB1*01303 was significantly ($P = 0.035$) associated with the presence of remodelling at a younger age (odds ratio 3.562, (1.188–10.68)).

These results suggest an association between MHC DLA haplotype and the progression of chronic valvular heart disease in the CKCS. Further studies are recommended to explore the potential role of the immune system in the pathogenesis of this disease.

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ESVC – O – 14
MIRNAS IN PROGRESSING CANINE MYXOMATOUS MITRAL VALVE DISEASE. F. Traub, K. Weber, G. Wess. Clinic of Small Animal Medicine, Veterinary Faculty, LMU Munich, MÜNCHEN, Germany

Micro ribonucleic acids (miRNAs) are short RNA molecules which regulate gene expression. They show a varying expression in many diseases, including heart disease. miRNAs are stable and detectable from blood. Therefore, they are potential biomarkers. Myxomatous mitral valve disease (MMVD) is the most common heart disease in dogs. In the long preclinical phase, progressive degeneration of the mitral valve leads to eccentric left-ventricular and -atrial hypertrophy, eventually succeeded by congestive heart failure and death. We aimed to investigate the expression of miRNAs in blood plasma of dogs in consecutive stages of MMVD.

183 miRNAs were quantified from blood plasma using RT-qPCR in 10 dogs passing 3 stages of MMVD (modified CHIEF stage B1, B2, and C2/C3). One-way repeated measures ANOVA and pairwise comparisons using Benjamini-Hochberg-correction showed significant differences ($P < 0.05$) in expression within 3 miRNAs: cfa-miR-92b was downregulated in MMVD stage C2 compared to stage B1 and B2 by the factor of 0.52 and 0.61, respectively. cfa-miR-92a and cfa-miR-1306 were downregulated in MMVD stage C2 compared to stage B1 by the factor of 0.60 and 0.53, respectively. There was no significant difference between any other stages.

The results show that there were miRNAs in canine blood plasma that differed in expression with progressing MMVD. However, the total number of miRNAs varying and the difference between stages were small. To evaluate the role of miRNAs as potential biomarkers, further studies are needed-with a bigger population eventually including more stages of disease and healthy control subjects.

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ESVC – O – 15
WHITE COAT EFFECT IN CLIENT-OWNED DOGS, AS ASSESSED BY HIGH DEFINITION OSCILLOMETRY (HDO). R.S. Tims, R.D. Baumwart, A.S. Hanzlicek, M.E. Payton. Oklahoma State University, Stillwater, USA

White coat effect is an elevation in blood pressure due to stress or anxiety in a clinical setting. Differentiating white coat effect from true systemic hypertension can be challenging. The objective of this study was to further characterize white coat effect in client-owned dogs and to determine if pharmacologic manipulation (butorphanol) decreases this effect.

Thirty client-owned dogs were enrolled. Clients were trained to collect high definition oscillometric (HDO) blood pressure measurements at home, and then HDO measurements were obtained in the hospital before and after the administration of butorphanol. A client questionnaire was completed to assess level of anxiety with measurements at home and in hospital.

Diastolic blood pressure (DYS), mean arterial pressure (MAP), and arterial pulse rate (HR) were significantly higher in the hospital before butorphanol as compared with at home. The administration of butorphanol abrogated these differences. The HR was significantly lower after sedation as compared with before sedation in the hospital, but it remained significantly higher as compared with that obtained at home.

The subjective anxiety scores at home and in the hospital were significantly positively correlated with the systolic (SYS), DYS, and MAP. Anxiety scores at home and in hospital were significantly positively correlated.

In conclusion, higher DYS, MAP, and HR seen in the hospital is likely related to a white-coat effect. The administration of butorphanol decreased this effect.

Disclosures: No disclosures to report.

ESVC – O – 16
PREVALENCE AND MURMUR CHARACTERISTICS OF INCIDENTALLY DETECTED HEART MURMURS AND HEART DISEASE IN 12,958 YOUNG HEALTHY SHELTER CATS. B.A.M. Mckeever[1], G.P. Nicolson[2], M. Awad[3], M. Lawler[3], B. Sette[2], N.J. Beijerink[2]. [1]Faculty of Science, Sydney School of Veterinary Scienc, The University of Sydney, Camperdown, Australia, [2]Faculty of Science, School of Veterinary Science, The University of Sydney, Camperdown, Australia, [3]RSPCA NSW, Yagoona, Australia

Information on the prevalence and cause of heart murmurs in young cats is scarce. This prospective study was performed to investigate prevalence of heart murmurs and heart disease, and to explore the association between auscultatory and echocardiographic findings in clinically healthy young cats.

Between May 2012 and March 2017, 12,958 healthy cats aged ≤12 months were screened by auscultation by shelter veterinarians in a single animal shelter (RSPCA Yagoona, NSW, Australia). Heart murmurs were detected in 221 (1.7%) cats, which were subsequently within 1 month investigated by a veterinary cardiologist (NB) or cardiology resident (GN). Murmurs were confirmed in 163 cats. Murmur characteristics (timing, grade, point of maximal intensity) were recorded. All but one murmur were systolic. The point of maximum intensity of murmurs was often difficult to localize.

Subsequently transthoracic echocardiography was performed in all 221 cats, after which the murmur was assessed to be pathological or non-pathological. Cats with multiple congenital heart anomalies were classified according to the most severe condition. No efforts were made to differentiate between physiological and innocent murmurs, both were considered non-pathological.

Heart disease was detected in 51 cats (prevalence 0.4% total population). Diagnoses included obstructive ($n = 19$) and non-obstructive ($n = 6$) mitral valve dysplasia, ventricular septal defect ($n = 15$), tricuspid valve dysplasia ($n = 7$), pulmonic stenosis ($n = 1$), double chamber right ventricle ($n = 1$), subvalvular aortic stenosis ($n = 1$), and hypertrophic cardiomyopathy ($n = 1$). The murmur was non-pathological in 170 cats (of which 3 cats had dynamic right ventricular outflow tract obstruction).

Grade 5–6 murmurs ($n = 5$) were all pathological. A positive predictive value of a grade 3–4 murmur being associated with pathological heart disease was 58.9% (CI 48.5% to 68.7%), whilst negative predictive values of grade 0 and grade 1–2 murmurs being associated with non-pathological heart disease were 96.6% (CI 87.0% to 99.1%) and 88.4% (CI 82.1% to 92.6%), respectively.

In conclusion, in this study the prevalence of heart murmurs and heart disease were 1.7% and 0.4%, respectively, with mitral valve dysplasia and ventricular septal defects most commonly diagnosed. Murmur grading was helpful in differentiating non-pathological from pathological heart murmurs.

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ESVC – O – 17
WHEN SHOULD WE TALK ABOUT TACHYPNEA IN CATS AT THE VETERINARIAN'S CONSULTATION ROOM?. V. Szatmári, E. Dijkstra. Utrecht University, Utrecht, Netherlands

Tachypnea is an important clinical finding in dogs with cardiac and respiratory disorders. Many healthy cats, however, have a high respiratory rate at the veterinarian's consultation room, making the interpretation of this finding difficult. The purpose of the present study was to establish a reference range of the respiratory rate in clinically healthy cats at the veterinarian's consultation room.

Clinically healthy, client-owned cats in 6 private veterinary practices were observed by a single investigator between May and August 2016. The cats were brought for consultations for various reasons. Medical history and clinical examination revealed no abnormalities. The respiratory rates were recorded under 4

circumstances: by the investigator at the veterinarian's consultation room prior and after manipulation, by the owner at home when the cat was resting or sleeping, and by the investigator by watching a video that was recorded by the owner at home when the cat was resting or sleeping. The owners were asked to perform the video-recording immediately after that they counted the respiratory rate.

A total of 95 adult cats with a median age of 4.7 years (range 8 months–17.1 years) fulfilled the inclusion criteria. Calculated reference interval for the respiratory rate at the veterinarian's consultation room was 33–133 breaths/min.

Physical examination by a veterinarian led to either increased ($n = 13$), decreased ($n = 10$) or unchanged ($n = 3$) respiratory rates in the 26 cats, on which this second measurement was could be performed.

Video-recordings were provided by 77 owners. The resting and sleeping respiratory rates were 14–48 breaths/min ($n = 36$) and 13–31 breaths/min ($n = 41$), respectively, both counted by a single investigator on the video-recordings. A significant decline in sleeping respiratory rate with older age was noted: −0.4 breaths/min/year. Only 32 owners was able to count the respiratory rate of her/his cat. In 17 out of these 32 cases the reported value differed from the respiratory rate that was observed from the video-recordings. The owners' results were either higher or lower than the respiratory rates counted by the investigator on the videos.

We conclude that the reference intervals that veterinary textbooks usually report for healthy cats is the resting respiratory rate. These values are not applicable at the veterinarian's consultation room because many cats would erroneously be categorized to have tachypnea. Since the resting and sleeping respiratory rates show less variations, owners should be educated and encouraged to count or record their pets respiratory rate before they visit veterinarian.

Disclosures: No disclosures to report.

ESVC – O – 18

HOW OFTEN DO PRIMARY CARE PRACTITIONERS RECOGNIZE INNOCENT CARDIAC MURMURS IN PUPPIES DURING THE FIRST VETERINARY HEALTH CHECK?.

V. Szatmári, M.D.B. van Staveren. Utrecht University, Utrecht, Netherlands

Innocent cardiac murmurs are often found in asymptomatic puppies at the age of 7–10 weeks. To what extent these soft murmurs are recognized by first opinion veterinary practitioners is unknown.

Between October 2015 and June 2016, 354 client-owned clinically healthy puppies of 11 different breeds with an age of 45–76 days were auscultated by a veterinary cardiology specialist and a final year veterinary student. The same dogs had been auscultated by various veterinary practitioner too, when they were 34–69 days old. Several practitioners of 43 different practices performed the auscultation, in average 9 days earlier than the cardiologist and the student. The student had undergone a 3-h practical training in cardiac auscultation before starting the study.

The findings of the cardiologist, student and practitioners were compared for agreement. The practitioners' judgments about the presence or absence of a murmur were looked up in the puppies' passport.

Of the 330 puppies that were auscultated by both the cardiologist and a practitioner, the cardiologist detected a murmur in 97 puppies. All murmurs were systolic and had a maximal intensity of 1 or 2 out of 6. The agreement between the findings of the cardiologist and the veterinary practitioners was poor ($\varkappa = 0.008$) and significantly different ($P < 0.001$). Cardiac murmur was heard by the practitioners in only 1 of the 97 puppies with a murmur. A total of 255 puppies were auscultated by both the cardiologist and the student. A fair agreement ($\varkappa = 0.401$) and a significant difference ($P = 0.046$) were found.

A weakness of the study is that the practitioners performed the auscultation on a different day and under various circumstances. However, because physiologic anemia is known to contribute to the genesis of innocent murmurs, the prevalence of innocent murmurs at the first veterinary health check should have been the same or higher than at the second time point.

We conclude that soft (innocent) cardiac murmurs in puppies at the age of 6–10 weeks are seldom recognized by first opinion veterinarians. Soft murmurs that are detected by practitioners are probably louder and therefore they are possibly not innocent, but are caused by congenital cardiac anomalies. Based on the better agreement between the findings of the cardiologist and the student, compared to the findings of the cardiologist and the practitioners we conclude that training has much higher effect on the recognition of soft cardiac murmurs than experience, even if the training is short.

Disclosures: No disclosures to report.

ESVC – O – 19

TOWARDS CARDIAC STEM CELL THERAPY: CHARACTERIZATION AND CRYOPRESERVATION OF CANINE CARDIOSPHERE-DERIVED CELLS.

L.C. Dutton[1], S.A.V. Church[1], H. Hodgkiss-Geere[2], B. Catchpole[1], A. Huggins[1], J. Dudhia[1], D.J. Connolly[1]. [1]Royal Veterinary College, Potters Bar, UK, [2]University of Liverpool, Liverpool, UK

The use of stem cells to treat cardiac disease has gained increasing interest in recent years. Cardiosphere-derived cells (CDCs), an adult cardiac progenitor cell population, are the most promising candidates for cellular therapy. Their application in rodent models and phase 1 human trials of ischemic myocardial disease showed promise measured by increased left ventricular function. However, much remains unknown about their basic biology, especially in dogs. To expand this treatment to treat canine dilated cardiomyopathy requires the creation of cryopreserved allogeneic cell banks since this allows timely access to large cell numbers and avoids obtaining diseased autologous myocardial tissue from potentially unstable dogs. However, CDCs in culture conditions are subject to plasticity similar to other adult stem cell populations. We therefore investigated how passage number or cryopreservation may affect cellular potency of CDCs obtained from canine atrial explants.

CDCs were isolated and characterized from five cadavers with consent. Mesenchymal stem cells (MSCs) were isolated for comparison. CDCs demonstrated a population doubling time that was slower than MSCs ($P < 0.05$) but importantly was unchanged by cryopreservation ($P = 0.71$). Cryopreserved CDCs also demonstrated the same multi-lineage potential as fresh cells by showing commitment to myocardial, endothelial and smooth muscle lineages and maintained the ability to form clonal colonies. Flow cytometry analysis revealed fresh CDCs had a high proportion of cells expressing CD105 ($89.0\% \pm 4.98$) and CD44 ($99.68\% \pm 0.13$) with varying proportions of $CD90^+$ ($23.36\% \pm 9.78$), $CD34^+$ ($7.18\% \pm 4.03$) and $c\text{-}Kit^+$ ($13.17\% \pm 8.67$) cells. $CD45^+$ ($0.015\% \pm 0.005$) and $CD29^+$ ($2.92\% \pm 2.46$) populations were negligible. Increasing passage number correlated with an increase in the proportion of $CD34^+$ cells and a decrease in $CD90^+$ cells ($P = 0.003$ and 0.03 respectively). Cryopreserved populations displayed increased positive populations for CD34 ($P < 0.001$) and fewer $CD90^+$ cells ($P = 0.042$).

Our data revealed the impact of different canine donors on cell phenotype, as there was significant inter-donor variability on cellular morphology and marker expression. Overall, this study shows that despite these differences in the CD marker population, cryopreservation of canine CDCs is feasible without altering their differentiation potential. Importantly the CDCs we obtained from atrial tissue conformed to the generally accepted profile of CDCs obtained from other species and canine ventricular tissue. Further studies are required to investigate the fundamental biology and further characterize the phenotype of this heterogeneous stem cell population prior to clinical application.

Disclosures: Disclosures to report.

PetPlan Charitable Trust funded the research.

ESVC – O – 20

ASSESSING THE FEASIBILITY OF ALLOGENEIC STEM CELL THERAPY FOR CANINE DILATED CARDIOMYOPATHY. L.C. Dutton[1], H. Hodgkiss-Geere[2], B. Catchpole[1], D. Werling[1], J. Dudhia[1], D.J. Connolly[1]. [1]Royal Veterinary College, Potters Bar, UK, [2]University of Liverpool, Liverpool, UK

Dilated cardiomyopathy (DCM) causes significant morbidity and mortality with the prevalence in European Dobermans >8 years at 44%. Clinical manifestations include a dilated phenotype with congestive heart failure or malignant arrhythmia causing sudden cardiac death. As treatment options are limited, there is interest in using cardiac stem cells. Cardiosphere-derived cells (CDCs) are an adult cardiac progenitor cell population that can be derived in large numbers from myocardial biopsies. Administration of CDCs to murine models of DCM showed improved survival and to Dobermans marginally increased systolic function. Allogeneic CDC therapy avoids obtaining cells from unhealthy donors and allows access to large cell numbers. Mesenchymal stem cells (MSCs) have been shown to induce an immune-tolerant phenotype in recipients from unrelated donors. However, MSCs are inferior to CDCs in their cardiac regenerative capability and it is currently unknown if canine CDCs possess a similar immune-privileged status.

Our aim was to characterize the immune-regulatory status of canine CDCs.

Cardiosphere-derived cells (CDCs), MSCs and lymph node cells (LNCs) were obtained from five dogs immediately post-mortem with owners' consent and University ethical approval. These cells were isolated as previously published. The ability of CDCs to form clones, self-renew and commit to multiple lineages was assessed. Dogs were genotyped for DLA-88 and DRB-1 and cells assessed for MHC antigens by flow cytometry. Mixed lymphocyte reactions (MLR) incorporating responder LNCs and allogeneic stimulator CDCs or MSCs were performed. LNCs were also cultured alone or in combination with concanavalin A. Proliferation was assessed by ^{3}H-thymidine uptake.

Canine CDCs demonstrated the ability to self renew, form clonal colonies and commit to multiple lineages (myocardial, endothelial and smooth muscle). All dogs in the study were heterozygous for both DLA-88 and DRB-1 and varied in haplotype. In MLR assays, lymphocyte proliferation ability was confirmed by response to concanavalin A stimulation. CDCs did not produce a significant proliferation in responder LNCs when compared to non-stimulated LNCs ($P = 0.36$). This lack of response was confirmed across multiple donor and responder cells with mismatched MHC I and II haplotypes. Interestingly, allogeneic MSCs stimulated a response in LNCs when compared to non-stimulated cell LNCs ($P = 0.011$).

These results show that CDCs do not produce an immunological response in an *in vitro* model of transplant immune-reactivity. This demonstrates that CDCs possess immune-privileged status. Our study provides evidence for the safe use of allogeneic CDCs to treat canine DCM.

Disclosures: Disclosures to report.

PetPlan Charitable Trust funded this research.

ESVC – O – 21

THE ASSOCIATION OF CLINICAL, LABORATORY AND ECHOCARDIOGRAPHIC FINDINGS WITH SURVIVAL IN 108 DOGS UNDERGOING PERICARDIOCENTESIS; A RETROSPECTIVE STUDY. D.G. Ohad[1], G. Segev[1], Y. Hazut[2], Y. Bruchim[1], S. Klainbart[1], J. Milgram[1], I. Aroch[1], E. Kelmer[1]. [1]Koret School of Veterinary Medicine, Hebrew University of Jerusalem, Rehovot, Israel, [2]Givatayim Vet Clinic, Givatayim, Israel

The median survival time (MST) for dogs with cardiac tamponade (CT) varies from 1–3 months with hemangiosarcoma, to 5.2–24.8 months in heart-base-tumor related or non-neoplastic effusions. We evaluated the prognostic usefulness of clinical, laboratory and echocardiographic findings in dogs with CT. Data were collected retrospectively from 108 dogs with CT undergoing pericardiocentesis (PC) from 2006 to 2011. Dogs alive at 30 days following the first PC were defined as short-term survivors. Longer-term MST was determined from the medical records, and from follow-up telephone interviews. The prevalence of CT was one of 265 presented dogs (0.004%). The overall long-term MST was 44 days (range 0.5–1455). Dogs with a sonographically demonstrated cardiac mass had a shorter MST compared to others (19 vs. 90 days, $P = 0.005$). Males were significantly over-represented. Golden retriever dogs were over-represented and had a higher occurrence of idiopathic CT. Mixed breed dogs were under-represented. PC at the Cardiology Service, ascites upon presentation, an idiopathic CT, and pericardiectomy, were associated with a higher, while pallor and an inability to ambulate upon presentation were associated with a lower 30-day survival rate. Survival rates did not differ between dogs undergoing PC from the right or the left hemithorax. Survival rates did not differ between dogs undergoing a single and those undergoing several PCs. However, median time-intervals from the first-to-second and from the second-to-third PCs were significantly longer in survivors compared to non-survivors (35 vs. 9, $P = 0.001$, and 21 vs. 5 days, $P = 0.04$, respectively). Two dogs died prior to PC completion. Seven dogs had an underlying myxomatous mitral valve disease. Four of these were Dachshunds, of which three had a left atrial-wall rupture leading to an acute, hemorrhagic CT. In the remaining three, the pericardial effusate was a modified transudate. In 31 dogs the drained effusate volume in the first PC significantly and positively correlated ($r = 0.77$, $P < 0.0001$) with the pre-PC sonographic apex-to-pericardial distance. There was no association between apex-to-pericardial distance ($P = 0.086$) or volume of fluid drained during PC ($P = 0.5$) with the 30-day survival. Generally, dogs presenting with CT have a poor long-term prognosis. However, Golden retrievers, dogs selected for surgical pericardiectomy, those that present with ascites, without pallor, and are ambulatory and those with longer inter-pericardiocentesis intervals have higher survival rates. Survival rate is not affected by the side of hemithorax from which pericardiocentesis is performed.

Disclosures: No disclosures to report.

ESVC – O – 22

USEFULNESS OF COLOR TDI AT THE LEVEL OF LATERAL ATRIAL TISSUE AS A PREDICTOR OF FUTURE DEVELOPMENT OF ATRIAL FIBRILLATION IN DOGS. J. Neves[1], P. Pedro[2], X. Navarro-Cubas[1], E. Bode[1], J. Dukes-Mcewan[1]. [1]University of Liverpool, Neston, UK, [2]Willows Vets, Solihull, UK

The total atrial conduction time is an independent predictor of atrial fibrillation (AF) in humans. It can be estimated by pulsed-wave tissue Doppler imaging (TDI) by measuring the time from onset of the P wave until the peak of A' velocity of the lateral left atrial wall (P-PA'). A prolongation of P-PA' identifies people at high risk of development of AF. This study investigated echocardiographic variables (including P-PA' measured with Color TDI) which may identify dogs which developed AF within 6 months.

All dogs with AF were retrospectively reviewed. Those that developed a new-onset AF within 6 months after previous echo were included in the AF group. Dogs with underlying cardiac disease that did not develop AF within 6 months after echo were also reviewed and included in the non-AF group. The non-AF group were selected to have similar body weight (BW) and left atrial dilatation (2D LA:Ao) to the AF group. P-PA' durations were measured offline from archived color TDI images by placing the region of interest over the interatrial septum (color P-PA'$_{IAS}$) and lateral left atrial wall (color P-PA'$_{lateral}$). P-PA' durations and echo variables of 2D, M-Mode and pulsed-wave TDI (S', E' and A' velocities) were compared between groups. Receiving operator characteristic curves were used to identify the best AF predictor.

65 dogs were included (22 AF; 43 non-AF). Degenerative mitral valve disease and dilated cardiomyopathy were the most frequent cardiac diseases in both groups. Risk of new-onset AF was not associated with a specific breed, gender, neutering status, or cardiac disease. BW, LA:Ao and color P-PA'$_{IAS}$ were not significantly different between groups. The AF group had significantly greater left-ventricular (LV) end-diastolic (ED) and end-systolic (ES) volumes, M-Mode LV ED and ES diameters, LV ES diameter indexed for body weight, LV ES volume indexed to body surface area (ESVi), LA maximal diameter (LA_{max}) and color P-PA'$_{lateral}$. The variables with highest Area Under the Curve (AUC) were P-PA'$_{lateral}$ (0.8), LA_{max}

(0.73), and ESVi (0.70). A color P-PA'$_{lateral}$ cut-off of 81.3 ms had a specificity of 81% and sensitivity of 65 %.

Color P-PA'$_{lateral}$ duration was superior to other echo variables at predicting AF development within 6 months. LA_{max} had the second highest AUC despite similar LA:Ao between groups. Absolute LA size appears to play a more important role in AF than relative atrial dilation. Clinically useful cut-offs and intra/inter-observer variability need to be confirmed in a prospective study.

Disclosures: No disclosures to report.

ESVC – O – 23

ECG-GATED COMPUTED TOMOGRAPHY ANGIOGRAPHY OF PATENT DUCTUS ARTERIOSUS IN 25 DOGS. N.J. Beijerink, E. Newfield, G.P. Nicolson, H. Laurendet, M.A. Makara. Sydney School of Veterinary Science, University of Sydney, Camperdown, Australia

Patent ductus arteriosus (PDA) is one of the most common congenital cardiac diseases in dogs. ECG-gated computed tomography angiography (CTA) can be a complementary minimally-invasive way in early planning of interventional occlusion. The aim of this prospective observational study was to report CTA findings associated with PDA.

A total of 25 dogs diagnosed with PDA aged 2 to 54 months and weighing 2.5 to 38.1 kg were enrolled: all dogs were planned to undergo possible interventional occlusion under the same anesthetic directly after CTA. The contrast medium injection protocol was individually tailored with total injection time equaling the sum of diagnostic scan delay and scan duration. First, 1 ml/kg undiluted contrast medium (370 mgI/mL) was administered for two thirds of the total injection time, directly followed by 2 ml/kg of 1:1 diluted contrast medium for one third of the total injection time. The CT scan was triggered manually under a single breath hold when the contrast bolus reached the descending aorta. Scanning was commenced regardless of the heart rate.

Image reconstruction was performed during mid-diastole (70% of the R-R interval). In 2 dogs the heart rate was too high (>140 BPM) to allow image reconstruction. In the other 23 dogs the sagittal plane of the images was optimized for visualization of the PDA. The minimal ductal diameter at the pulmonary ostium (median 3.4 mm, range 1.7–11.6 mm), ampulla diameter (median 7.0 mm, range 3.7–13.2 mm), ampulla length (median 10.7 mm, range 6.8–18.9 mm), angle between PDA and aorta (median 149°, range 134–155°) and Miller type PDA morphology (type I, $n = 5$; type 2A/B, $n = 16$; type III, $n = 2$) were determined. A total of 23 dogs (all except the 2 dogs with a type III PDA morphology) subsequently underwent successful interventional occlusion, and in all dogs with available CTA images the suspected PDA morphology could be confirmed with fluoroscopy.

In conclusion, despite fluoroscopy remaining the gold standard for accurate sizing of the PDA prior to interventional occlusion, CTA is a complementary diagnostic method that may provide additional relevant information for planning of catheter-based intervention, potentially shorten surgery time and reduce the amount of radiation to which the clinician is subjected.

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ESVC – O – 24

IS PROPHYLACTIC ANTIBIOTIC THERAPY NECESSARY TO PREVENT INFECTIOUS ENDOCARDITIS IN DOGS THAT UNDERGO TRANSCATHETER EMBOLIZATION OF A PATENT DUCTUS ARTERIOSUS?. V. Szatmári. Utrecht University, Utrecht, Netherlands

Transcatheter embolization of a patent ductus arteriosus (PDA) is a commonly performed minimal invasive cardiovascular intervention in dogs. Prophylactic antibiotics are routinely administered in the perioperative period to prevent implant-related bacterial endocarditis. Because of the worldwide increasing issue of antibiotic resistance, the question arises whether routine administration of prophylactic antibiotics is evidence-based.

The present retrospective case series included client-owned dogs that underwent a transcatheter embolization of their PDA at the author's clinic between 2004 and 2016. Further inclusion criteria were that the author had to be either the primary or the supervising surgeon, at least 3 months of follow-up information had to be available, at least one metal implant had to be delivered in the PDA, and no local or systemic antibiotics were given on the day of the intervention and the week thereafter. Follow-up information was gained either via telephone interview with the owner or with the referring veterinarian, or via re-check examinations at the author's clinic.

In total 54 dogs fulfilled the inclusion criteria. The occlusion devices were detachable coils in 18 dogs, Amplatz canine ductal occluders (ACDO) in 35 dogs and a human Amplatzer duct occluder in 1 dog. All coils and ACDOs were implanted via the femoral artery with the dogs under general anesthesia under fluoroscopic guidance. The median age of the dogs at surgery was 4 months (range 2–95 months) and their median weight was 7.5 kg (range 1.9–35.7 kg). An immediate closure of the PDA was reached in 36 dogs. The median length of the procedure was 100 min (range 45–192 min). The median length of the follow-up was 25 months (range 3–157 months).

None of the dogs developed clinical signs that could be compatible with bacterial endocarditis within 3 months after the PDA-occlusion.

The most important weakness of the present study is its retrospective nature. Another weakness is that in the majority of cases the follow-up information was gained via telephone interview. However, bacterial endocarditis is a life-threatening condition, which would not cause only mild symptoms. Though the 3 months follow-up might look arbitrarily chosen, several veterinary and humans studies use the same cut-off. Moreover, a longer incubation period is very unlikely, if bacteria are assumed to enter the circulation during surgery.

The findings of the present study are in line with the most recent human recommendations, which do not recommend the routine use of prophylactic antibiotics at transcatheter PDA-embolization.

Disclosures: No disclosures to report.

ESVC – O – 25

BIOLOGICAL VARIABILITY OF N-TERMINAL PRO-B-TYPE NATRIURETIC PEPTIDE IN FIFTY-THREE HEALTHY LABRADOR RETRIEVERS OVER AN 8 MONTH PERIOD. K. Borgeat[1], S. Gomart[1], M. Harrison[2], A. Colyer[2], F.J. Glen[1], J.R. Payne[1], M.J. Hezzell[1], D. Allaway[2]. [1]Langford Vets, Bristol, UK, [2]WALTHAM Centre for Pet Nutrition, Melton Mowbray, UK

Short-term biological variability of, and breed differences in, N-terminal pro-B-type natriuretic peptide (NTproBNP) that might influence interpretation of test results have been reported. This study aimed to assess the variability of plasma NTproBNP measurements over 8 months in healthy Labrador retrievers, and also to investigate correlation between urine NTproBNP:creatinine ratio (UBNP-C) and plasma NTproBNP concentration.

Fifty-three Labrador retrievers (median age 5.2 years, range 2.3–8.2 years) were maintained at WALTHAM in housing and with study procedures complying with the Animals (Scientific Procedures) Act 1986 (UK), and residual samples were used for this study. All dogs were healthy and echocardiographically normal. Serial sampling of fasted plasma and urine were performed (weeks 0, 8, 16, 24 & 32) including assessment of NTproBNP, measured in residual plasma and urine (latter indexed to creatinine).

The $\log_{10}$(plasma NTproBNP) was analyzed by a linear mixed model (REML) to allow for repeated measures on each dog over time, with a random effect of dog and categorical fixed effects of diet, week and their interaction. Changes from baseline to weeks 8, 16, 24, and 32, and the changes between each week, were analyzed. Percentage variability from baseline of plasma NTproBNP was calculated. An average plasma NTproBNP for each dog over the 5 study points was calculated (AV-BNP). NTproBNP standard deviation (SD-BNP) was also assessed. Spearman's correlation

analysis was performed to investigate correlation between UBNP-C and plasma NTproBNP.

Clinically important values in plasma NTproBNP were detected, with wide intra-individual variability (70–130%). There was no association between percentage variability of plasma NTproBNP, SD-BNP or AV-BNP and any other measured variable, other than a mild, positive correlation between age and AV-BNP (r 0.429, $P = 0.002$). A weak positive correlation between UBNP-C and plasma NTproBNP (rho 0.368, $P < 0.001$).

Plasma NTproBNP measurements in clinically healthy Labradors are frequently outside laboratory reference intervals, creating false positive tests, compounded by significant measurement variability. UBNP-C has questionable clinical utility; further studies are necessary to validate this measurement.

Disclosures: Disclosures to report.

Allaway, Harrison and Colyer are employees of WALTHAM, a division of Mars Petcare Ltd. Reduced cardiac biomarker fees were provided by IDEXX Laboratories for this study.

ESVC – O – 26

CLINICAL USE OF A PATIENT-SIDE FELINE NT-PROBNP ELISA TEST IN 281 CATS IN GENERAL PRACTICE. F. Glen[1], J.R. Payne[2], M.J. Hezzell[1], K. Borgeat[1]. [1]Langford Vets, University of Bristol, Bristol, UK, [2]Highcroft Veterinary Referrals, Bristol, UK

Although the utility of a patient-side NT-proBNP ELISA (BNP-POC) has been described in cats screened for cardiomyopathies, its usefulness in populations with potentially lower disease prevalence is unknown. This retrospective study aimed to describe general practice BNP-POC use and to estimate a positive predictive value (PPV) for echocardiographic evidence of cardiomyopathy in apparently healthy cats.

Clinical records from cats undergoing BNP-POC (March 2015–March 2017) were reviewed. Signalment, history, examination findings and other clinical data were recorded, along with the veterinarian's stated reason for test performance, test result (normal/abnormal), and echocardiographic findings (where available). Left ventricular wall thickness ≥6 mm classified cats as HCM, left atrial enlargement (LAE) was present where LA:Ao>1.5, LA diameter long-axis >16 mm).

BNP-POC was recorded in 281 cats: 155 were male and median age was 11.5 years (0.2–20.0). A murmur was detected in 207/281, a gallop in 24/281 and arrhythmias in 12/281. The most frequent reasons for testing were: auscultated abnormalities (61.6%), pre-anesthetic assessment (14.9%) and possible cardiac-related signs (13.1%).

Results were abnormal in 93/281 cats (33%). Excluding those with clinical signs ($n = 37$) or an unknown reason for testing ($n = 7$) 81/237 apparently healthy cats tested abnormal: 39/81 underwent echocardiography. Of these, 23/39 (59%) had HCM, with 17/39 (44%) having LAE. No cats were diagnosed with other classes of heart disease.

In a general practice population of apparently healthy cats, BNP-POC had an estimated PPV for HCM of 59%, and for LAE of 44%. Prospective studies are needed to validate this test in a larger population.

Disclosures: No disclosures to report.

ESVC – O – 27

DIAGNOSTIC AND PROGNOSTIC UTILITY OF SURFACE ECG IN CATS WITH LEFT VENTRICULAR HYPERTROPHY. G. Romito[1], C. Guglielmini[2], A. Diana[1], M.O. Mazzarella[1], M. Cipone[1], M. Baron Toaldo[1]. [1]University of Bologna, Ozzano Emilia, BO, Italy, [2]University of Padova, Padova, Italy

In human cardiology, surface electrocardiography (ECG) is used for the risk stratification of patients affected by cardiomyopathies. The aim of the present study is to assess if ECG can show similar usefulness in cats with left ventricular hypertrophy (LVH).

Fifty-five privately owned cats (20 clinically healthy and 35 with LVH) were retrospectively selected. Complete physical examination, indirect measurement of arterial blood pressure, echocardiography, 2-min peripheral 6-lead ECG, and standard blood work, including serum thyroxine concentration were available. ECG measurements included: detection of any type of arrhythmia; heart rate; amplitude and duration of P wave and QRS complex; ST segment elevation or depression; mean electrical axis of P and T wave, and QRS complex; and PQ, QRS, QT, and QT corrected for heart rate (QTc) duration. In cats with LVH, outcome data and cause of death were annotated, when available.

Sinus rhythm was diagnosed in all healthy and in 24/35 (68.6%) cats with LVH. The remaining cats with LVH showed different types of rhythm disturbance, including third degree atrioventricular block (AVB) (2/35, 5.7%), sinus rhythm with isolated atrial (2/35, 5.7%) or ventricular ectopic complexes (2/35, 5.7%), sinus bradycardia (1/35, 2.9%), sinus rhythm associated with both first degree and second degree AVB (1/35, 2.9%), sinus rhythm associated with second degree AVB (1/35, 2.9%), accelerated idioventricular rhythm (1/35, 2.9%) and ventricular tachycardia (1/35, 2.9%). The presence of any type of arrhythmia had sensitivity of 31%, specificity of 100%, negative predictive value of 45%, and positive predictive value of 100%, in identifying LVH. ECG measurements were performed in all healthy cats and in 29/35 cats with LVH. Only QT and QTc were statistically different between healthy cats and cats with LVH ($P < 0.007$ for both variables). Among the healthy cats, the highest values for QT and QTc were 180 ms, and 200 ms, respectively. Survival data were available for 23/29 cats with LVH where ECG measurements were performed. Of these 10/23 died for cardiac related cause. Median survival time was 58 days and not measureable for cats with QT>180 ms and QT≤180 ms, respectively, and 125 days and not measureable for cats with QTc>200 ms and QTc≤200 ms, respectively. Both QT>180 ms and QTc>200 ms were predictors of death for cardiac related causes ($P = 0.042$ and $P = 0.017$, respectively).

Surface ECG seems to provide useful diagnostic and prognostic information in cats with LVH.

Disclosures: No disclosures to report.

ESVC – O – 28

NOTCHED QRS COMPLEXES IN DOGS WITH AND WITHOUT STRUCTURAL CARDIAC DISEASE: 85 CASES. R.L. Winter, R.M. Bates, S. Jung. Auburn University, Auburn, AL, USA

The objectives of this study were to describe the signalment and cardiac disease diagnosis in dogs with notched QRS complexes of normal duration, as well as to describe the specific leads and number of leads with notched QRS complexes on ECG. Medical records and ECGs from 85 dogs with notched QRS complexes in at least 1 ECG lead were evaluated. A retrospective review of digitally stored ECGs and associated medical records of dogs with a recorded ECG as part of routine clinical evaluation was performed. Medical records were reviewed for signalment and cardiac disease diagnosis in dogs with notched QRS complexes identified. The age at time of ECG recording was 9.15 +/- 3.38 years for the 85 dogs with notched QRS complexes in at least 1 ECG lead. Most dogs (78.8%) had 3 or less ECG leads with notched QRS complexes. Most dogs (69.4%) with notched QRS complexes in at least 1 lead had cardiac disease. The odds ratio of a dog having cardiac disease if more than 1 lead was identified with notched QRS complexes was 3.97. The most common cardiac disease identified was chronic atrioventricular valvular degeneration (CVD), and the majority of these dogs (80%) had 2 or less leads with notched QRS complexes. In conclusion dogs with and without cardiac disease can have notched QRS complexes, and the likelihood of a dog having cardiac disease that has more than 1 ECG lead with notched QRS complexes is significant which should warrant diagnostic evaluation.

Disclosures: No disclosures to report.

ESVCN – O – 1
PLASMA METABOLOMICS REVEALS LOWERED CARNITINE CONCENTRATIONS IN OVERWEIGHT LABRADOR RETRIEVER DOGS. J.J. Söder, K. Höglund, J. Dicksved, R. Hagman, H. Eriksson Röhnisch, A. Moazzami, S. Wernersson. Swedish University of Agricultural Sciences, Uppsala, Sweden

The prevalence of dog obesity is increasing and a better understanding of the metabolism of overweight dogs is needed to improve obesity prevention and treatment. This study aim to detect and quantify plasma metabolites during a feed challenge-test in dogs and to identify alterations in the metabolism related to overweight. Twenty-eight healthy intact male Labrador retriever dogs were included, 12 of which were classified as lean (body condition score (BCS) 4–5 on a 9-point scale) and 16 as overweight (BCS 6–8). After overnight fasting, plasma samples were collected and dogs were fed a high-fat meal. Postprandial plasma samples were collected hourly for 4 h. Nuclear magnetic resonance (NMR) was conducted and 41 plasma metabolites were statistically evaluated. The results showed that all postprandial time points differed from the fasting time point in multivariate discriminant analysis (cross-validated ANOVA: $P = 0.00014$). Eleven specific metabolites with peak concentrations mainly at 2 or 3 h postprandially contributed to the separations. Carnitine was identified as a metabolite related to overweight at all time points in stepwise logistic regression analysis ($P = 0.03$) and overweight dogs had lower carnitine response in a mixed model repeated measures analysis ($P = 0.005$). Notably, the fasting carnitine concentration in overweight dogs (mean $\pm$ SD, 9.4 $\pm$ 4.2 mM) was very close to a proposed reference limit for carnitine deficiency. These findings demonstrate that NMR is suitable for metabolic evaluations in feed-challenges in dogs. The lowered carnitine concentration in overweight dogs warrants further investigation as it could indicate carnitine deficiency and an altered lipid metabolism in overweight dogs.

Disclosures: No disclosures to report.

ESVCN – O – 2
SILICA UROLITHIASIS IN A DOG - A CASE REPORT. B. Kiefer-Hecker, B. Dobenecker. Ludwig-Maximilians-Universität München, Oberschleissheim, Germany

Silica-containing uroliths in dogs occur very infrequently (≤0.5% of analyzed uroliths) in Europe,[1,2] although Schenk et al. (2010)[3] observed a peak of 13% in 2009 in Switzerland. The affected dogs were predominately male (88–93%)[4] and between 7.2 to 8.6[3,4] years old.

A 10 year old neutered male terrier mongrel (BCS 3/5) with a history of pancreatitis was examined for abdominal pain. During an abdominal ultrasonic examination that revealed no abnormalities of the pancreas but hyperechoic structures in the bladder the dog urinated. The urine sediment was positive for bacteria, erythrocytes and leucocytes but not crystals. Antimicrobial treatment was started. The pancreatic lipase was within the reference range. Two weeks later a urine sample collected by the owner contained numerous struvite crystals; another sample obtained one week later by cystocentesis revealed no crystals and no signs of inflammation and a urine pH of 7.1. The ultrasonographic examination of the bladder a few days afterward showed multiple uroliths. 20 stones were removed surgically and the analysis revealed 100% silica.

It is hypothesized that silica uroliths may be related to silica intake by plants or plant by-products with diet or by consumption of soil (>90% silica) secondary of diet-associated pica.[5] In this case the dog was fed a commercial gastro intestinal low fat dry diet for 1 year. Additionally, the dog regularly consumed feces of feral rabbits on its daily walks since more than 2 years. The analysis of a sample of such feces showed that it contained high amounts of insoluble ash (7% of fresh matter or 12.3% vs. 4% dry matter in pet rabbits). The intake of such feces together with soil sticking to it might have caused silica uroliths in this case, since no signs of dysuria or abnormal ultrasonographic examinations of the bladder or urinalysis did recur after the dog was kept from consuming rabbit feces for more than three month.

References: [1]Hesse et al. Canine cystine urolithiasis, Can Vet J 2016;57(3):277–281; [2] Roe et al. Analysis of 14,008 uroliths from dogs in the UK over a 10-year period, J Small Anim Pract 2012;53:634–640; [3] Schenk et al. Silica-containing uroliths in dogs from CH, ECVIM-CA Congress 2010:303; [4]Hesse & Neiger Harnsteine bei Kleintieren, Stuttgart: Enke, 2008; [5]Osborne et al. Canine silica urolithiasis, J Small Anim Pract 1999;1:213–230.

Disclosures: No disclosures to report.

ESVCN – O – 3
KNOWING THE TOTAL AMOUNT OF PHOSPHORUS IN A DIET IS NOT ENOUGH - DIFFERENT SOURCES HAVE DIFFERENT EFFECTS. B. Dobenecker, S. Siedler. Ludwig Maximilians University, Oberschleissheim, Germany

The restriction of phosphate (P) intake is crucial in patients with chronic renal insufficiency (CRI), especially in case of hyperphosphatemia. Major sources of P are proteins, bones and cartilages as well as inorganic supplements for nutritional and technical purposes. To date, the total amount of P in a diet is used to assess the daily load of P for the patient. Besides, P excess is suspected to play a role also in the pathogenesis of CRI. The aim of this study was to test the effects of different P sources on the body based on a different availability of the mineral.

In 8 adult Beagles the aD of P and Calcium (Ca) was determined after feeding a control diet (0.5% P/DM) for 18d (13d adaptation, 5d balance). This was repeated aiming at 2.2% P/DM by adding different phosphates ($CaHPO_4$, NaH_2PO_4, poultry meal, $Na_5P_3O_{10}$, Ca $(H_2PO_4)_2$, bone meal, KH_2PO_4, $K_4P_2O_7$) while adjusting the Ca/P ratio to ~1.3/1 using $CaCO_3$ (exceptions diet poultry meal: Ca/P 1.7/1; diet $Na_5P_3O_{10}$: 1.5% P/DM due to low acceptance) with wash-out periods of ≥10d. Serum P, Ca and PTH was determined at d18 pre- and 2 h postprandially. Pre- and postprandial urine was analyzed for creatinine and P. Statistics: ANOVA (Bonferroni) or Kruskal Wallis (Tukey) according to data distribution.

Compared to control aD P was reduced in diet CaHPO4, pentaphosphate, poultry and bone meal. In postprandial urine P/creatinine increased significantly in all diets but control, poultry and bone meal. The same was true for postprandial serum P concentrations with levels even above reference range in NaH_2PO_4, $Na_5P_3O_{10}$, Ca $(H_2PO_4)_2$, KH_2PO_4 and $K_4P_2O_7$. Postprandial PTH levels increased up to threefold in Na and K compounds (NaH_2PO_4, $Na_5P_3O_{10}$, KH_2PO_4, $K_4P_2O_7$) and Ca $(H_2PO_4)_2$ causing mean concentrations near or above reference range.

For the first time this study demonstrated in dogs systematic differences in P digestibility and metabolism between different P sources often used in petfood. Because of the relevance of P in renal diets but also because of the potentially harmful effects of elevated serum P and PTH levels on skeleton, cardio-vascular system and kidneys in healthy animals, the intake of highly soluble P compounds such as Na and K Phosphates have to be assessed differently. The knowledge of the total amount of P in a diet does not suffice to decide about adequacy or potential harm.

Disclosures: No disclosures to report.

ESVE – O – 1
AGREEMENT OF TWO PREPILL CORTISOL MEASUREMENTS IN DOGS WITH HYPERCORTISOLISM TREATED WITH TRILOSTANE. S. Sieber-Ruckstuhl[1], C. Musella[1], W. Burkhardt[1], B. Riond[2], C.E. Reusch[1], F.S. Boretti[1]. [1]Clinic for Small Animal Internal Medicine, Zürich, Switzerland, [2]Clinical Laboratory, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland

The ideal method to monitor trilostane therapy in dogs with hypercortisolism (HC) is still controversial. Lately, determination of the pre-trilostane (prepill) serum cortisol concentration has been shown to be more repeatable than either post-trilostane or post-ACTH stimulation cortisol. Therefore, the prepill cortisol

concentration may be superior to other cortisol measurements for monitoring purposes.

As it is well known that cortisol concentrations can fluctuate and are influenced by certain circumstances (e.g. stress), the aim of this study was to investigate the agreement of two prepill cortisol measurements in dogs with HC during trilostane therapy.

Client owned dogs with HC treated with trilostane twice daily were prospectively enrolled. Cortisol concentrations were measured two times 1 h apart just before the next trilostane dose (prepill 1 and 2). Each value was assigned to one of three groups according to the control of cortisol release: excessive (<41 nmol/L), adequate (41–138 nmol/L) or inadequate (>138 nmol/L). The Wilcoxon signed rank test was used to examine for significant differences between the paired measurements and the spearman rank correlation was calculated. The degree of agreement between group assignments was quantified by kappa.

A total of 47 cortisol pairs of 16 dogs with HC were included. Prepill 1 and 2 did not differ significantly ($P = 0.18$). There was a significant correlation between the two values ($P < 0.0001$, $r = 0.73$). Compared to prepill 1, prepill 2 was higher in 17, equal in 5 and lower in 25 pairs. Group agreement between prepill 1 and 2 was 70% (moderate agreement - weighted kappa 0.5). In 30% of the pairs group assignment disagreed, which would have led to a different therapeutic decision. In some dogs certain circumstances (e.g. excessive barking during hospitalization, difficulties during blood collection) were identified as potential factors explaining the discrepancy between prepill 1 and 2.

In conclusion, in a substantial number of dogs there was a large difference between the two prepill values, which was ascribable to certain events during hospitalization in some dogs. Recording of any incident during handling that might affect cortisol release seems important. Whether the measurement of two prepill values is of true benefit compared to the determination of only one has to be evaluated in further studies.

Disclosures: Disclosures to report.

NSR has been member of the Vetoryl novel monitoring meeting 2017 organized by Dechra Veterinary Products Ltd. CR was consultant for Boehringer Ingelheim and Novartis Animal Health and is currently consultant for Dechra Limited. She has received financial support for her endocrine research from various companies such as Nestlé Purina, Hills, Provet, Antlia SA, Glycemicon and from the clinical studies fund of the ECVIM-CA and from the Society of Comparative Endocrinology.

ESVE – O – 2
STEROL-O-ACYL TRANSFERASE 1 (SOAT1) EXPRESSION IN CANINE CORTISOL-SECRETING ADRENOCORTICAL TUMORS: PROVIDING THE BASIS FOR A FUTURE TREATMENT OPTION.

G.J. van Staalduinen, K. Sanders, D.M. Peterson, M.C.M. Uijens, A. Slob, S. Galac. Utrecht University, Utrecht, Netherlands

Current medical treatment options in dogs with cortisol-secreting adrenocortical tumors (ATs) are trilostane or mitotane. However, trilostane is a palliative treatment and has no effect on the tumor itself, while mitotane does have adrenocorticolytic activity, but can cause serious adverse effects. ATR-101, a new orally available drug, is known to have selective adrenocorticolytic activity in guinea pigs, dogs, monkeys and humans, and is currently being tested in a phase II clinical trial for ATs in humans. ATR-101 is a selective and potent sterol-O-acyltransferase 1 (SOAT1) inhibitor, which leads to the accumulation of free cholesterol in adrenocortical cells, resulting in endoplasmic reticulum stress and ultimately leading to apoptosis. Inhibition of SOAT1 could be an interesting therapy option in dogs with ATs, but can only be useful if canine ATs express SOAT1.

The aim of this study was to determine whether the use of a selective SOAT1 inhibitor such as ATR-101 could have potential in the treatment of canine ATs. To this end, we evaluated the SOAT1 mRNA expression with RT-qPCR in 59 ATs (44 carcinomas and 15 adenomas) and 12 normal adrenals (NAs), and protein expression with immunohistochemistry (IHC) in 47 ATs (36 carcinomas and 11 adenomas) and 4 NAs. Slides were stained with polyclonal rabbit-anti-human antibody and antibody specificity was confirmed with western blot. A semiquantitative H-score for SOAT1 protein expression was calculated by multiplying the area of positive staining with the staining intensity grading score.

SOAT1 mRNA was detectable with RT-qPCR in all samples tested. No significant differences were found between NAs (mean fold change 1.05 ± 0.31), adenomas (1.17 ± 0.60) and carcinomas (1.76 ± 1.39), but expression was more variable in ATs and in particular in carcinomas. No significant differences were found in protein expression between NAs (H-score 5.97 ± 1.82), adenomas (5.41 ± 2.03) and carcinomas (5.54 ± 3.26), but carcinomas again showed more variable expression and three carcinomas had low to absent SOAT1 protein expression (H-score lower than one).

In conclusion, SOAT1 mRNA was present in all and SOAT1 protein in 94% of our samples, providing a solid base that a selective SOAT1 inhibitor could have great potential as a future treatment in canine ATs. To determine the effect of ATR-101 in canine ATs, further studies are warranted.

Disclosures: No disclosures to report.

ESVE – O – 3
CYP17 INHIBITOR ABIRATERONE ACETATE AS A PROMISING FUTURE TREATMENT FOR CANINE HYPERADENOCORTICISM: *IN VITRO* INVESTIGATIONS.

W.L. de Wit, K. Sanders, J.W. Hesselink, J.A. Mol, S. Galac. Utrecht University, Utrecht, Netherlands

Cushing's disease or pituitary-dependent hypercortisolism (PDH) is a common endocrine disorder in dogs. At present, medical management of canine PDH consists of either trilostane or mitotane therapy. Both treatments have disadvantages associated with the induction of hypoadrenocorticism. Therefore, a more specific inhibition of glucocorticoid synthesis is desirable. Our recent studies indicate that the steroidogenic enzyme cytochrome P-450c17 (CYP17) could be an interesting target for selective inhibition of cortisol production without impeding the synthesis of aldosterone. Abiraterone acetate (AA), a highly selective irreversible CYP17-inhibitor, is already available on the market and successfully used for the treatment of castration-resistant prostate cancer in humans. In addition, the registration for human application will probably enable a relatively straightforward implementation into veterinary clinical practice. As side effects of AA are mostly related to hypocortisolism, this approach seems interesting as a novel medical treatment option for canine hypercortisolism.

The aim of this study was to determine the effects of AA on cortisol synthesis; on mRNA expression of steroidogenic genes encoding for CYP17, 3β-hydroxysteroid dehydrogenase (3β-HSD) and Ki67, a cellular marker for proliferation; and on adrenocortical cell viability.

Canine primary adrenocortical cell cultures from adrenal glands of seven healthy dogs were incubated with various concentrations of AA. PDH was mimicked by co-incubation with synthetic ACTH (Synacthen®). After 48 h of incubation, RNA was isolated to evaluate gene expression using real-time quantitative PCR (RT-qPCR). Culture medium was removed for measurement of cortisol after 72 h of incubation. In addition, cell viability was assessed using alamarBlue® assay.

AA dose-dependently decreased cortisol concentration in ACTH-stimulated adrenocortical cells with an IC_{50} value of 24.2 nM ($P < 0.0001$). At the highest AA concentration of 10 μM, the average suppression of cortisol synthesis was 92.5% (SEM ± 3.5). The mRNA expression of CYP17, 3β-HSD and Ki67 was not significantly altered after incubation with AA. Finally, AA did not significantly affect adrenocortical cell viability.

We conclude that AA is effective in reducing cortisol synthesis *in vitro* without affecting adrenocortical cell viability and proliferation. Therefore, AA seems to be a promising future treatment option in the medical management of canine Cushing's disease. To ascertain this, further *in vivo* studies are warranted.

Disclosures: No disclosures to report.

ESVE – O – 4

MOLECULAR PROGNOSTIC MARKERS IN CANINE CORTISOL-SECRETING ADRENOCORTICAL TUMORS. K. Sanders, E. Teske, K. Cirkel, B. van Nimwegen, M.C.M. Uijens, H.S. Kooistra, J.A. Mol, J.W. Hesselink, S. Galac. Utrecht University, Utrecht, Netherlands

Assessment of malignancy in canine cortisol-secreting adrenocortical tumors (ATs) remains challenging. No previous studies have linked molecular markers to survival times in dogs after adrenalectomy, making it difficult to give a reliable prognosis. The aim of this study was to identify molecular prognostic markers in a large cohort of canine ATs. This could not only enhance insight in individual prognosis, but could also provide potential future treatment targets.

Fifty-nine dogs with hypercortisolism due an AT that underwent adrenalectomy between 2002 and 2015 at the authors' institution and of which follow-up information was available, were included in this study. Three classes of potential prognostic factors were reviewed: firstly clinical data, including body weight, age at time of surgery, gender, neuter status and tumor size; secondly immunohistochemical Ki67 labeling index, and thirdly mRNA expression of factors associated with proliferation of ATs, including SF-1, PTTG1, PBX1, VAV2, RRM2, TOP2A, Ki67, CCND1, MC2R and BCL2. Univariate analysis was performed with the Cox proportional hazards model for continuous variables and the Log Rank test for bivariate variables. Multivariate analysis was performed using multiple linear regression with forward selection.

Median survival time was 63.6 ± 9.4 months. In the univariate analysis, significant prognostic factors were tumor volume in cm^3 ($P = 0.015$, hazard ratio (HR) = 1.004), maximal diameter of tumor in cm ($P = 0.047$, HR = 1.284), Ki67 labeling index ($P < 0.001$, HR = 1.220) and mRNA expressions of SF-1 ($P = 0.021$, HR = 60.244), PTTG1 ($P = 0.024$, HR = 12.321), PBX1 ($P = 0.005$, HR = 8.714), and TOP2A ($P = 0.035$, HR = 7.191). Forward stepwise multivariate analysis identified Ki67 labeling index ($P = 0.024$, HR = 1.574) and SF-1 mRNA expression ($P = 0.044$, HR = $1.936*10^6$) as independent predictors of poor survival.

In conclusion, most important predictors of poor survival are Ki67 labeling index and SF-1 expression. These results show the importance of including Ki67 staining in histopathological assessment of canine ATs. Moreover, since pharmacological manipulation of SF-1 is possible, the considerable impact of SF-1 expression on prognosis indicates great potential of SF-1 as a treatment target in canine ATs in the near future.

Disclosures: No disclosures to report.

ESVE – O – 5

THE USE OF CHROMOGRANIN A EPITOPES VASOSTATIN AND CATESTATIN AS BIOMARKERS FOR CATECHOLAMINE-PRODUCING TUMORS IN DOGS. O.V. Höglund[1], O. Yoshida[2], K. Asano[2], K. Ishigaki[2], M. Stridsberg[3], J.M. Hanson[1]. [1]Swedish University of Agricultural Sciences, Uppsala, Sweden, [2]Nihon University, Fujisawa, Japan, [3]Uppsala University, Uppsala, Sweden

Pheochromocytomas may be difficult to differentiate from adrenocortical tumors in dogs until diagnosis with histopathology is obtained. Fine-needle aspiration biopsy of adrenal masses is an invasive technique, with risk for complications. Measurement of urine catecholamine metabolites necessitates acidification of the urine with hydrochloric acid and associated handling risks. Ideally, a blood marker that reliably can differentiate between catecholamine-producing tumors and adrenocortical tumors, would be preferable. However, direct measurement of plasma catecholamines and their metabolites are less reliable than measurement of urine catecholamine metabolites in dogs. Measurement of serum inhibin concentrations is useful in gonadoectomized dogs only. In human medicine, chromogranin A (CgA) is an established marker for neuroendocrine tumors (NETs). Chromogranin A is stored in secretory granules of neuroendocrine tissues and co-secreted with epinephrine and norepinephrine at sympathetic stimuli. The metabolites of CgA are more stable in plasma than are the catecholamines. The aim of the present study was to measure and compare serum concentrations of the CgA epitopes vasostatin and catestatin in serum collected before surgery from dogs with histologically confirmed catecholamine-producing tumors and dogs with adrenocortical tumors.

Serum samples were collected before surgery from 23 dogs with adrenal tumors and in one dog with an extra-adrenal neuroendocrine tumor. All tumors and their tissue origin were confirmed by histopathology. There were 12 catecholamine-producing tumors (11 pheochromocytomas, 1 extra-adrenal tumor), and 12 adrenocortical tumors. Serum concentrations of vasostatin and catestatin were analyzed by a radioimmunoassay (RIA) that has previously been validated for the use in dogs. Statistical analysis was performed with a non-parametric test using the software R version 3.0.2.

In the dogs with catecholamine-producing tumors, the median serum vasostatin concentration was 0.82 nmol/L (IQ range, 0.52–1.60 nmol/L). In the dogs with adrenocortical tumors, the median serum vasostatin concentration was 0.50 nmol/L (IQ range, 0.34 to 0.59 nmol/L). Serum vasostatin concentrations were significantly higher in dogs with catecholamine-producing tumors, than in dogs with adrenocortical tumors (Wilcoxon signed rank test, independent groups, $P < 0.05$). There was no statistically significant difference in serum catestatin concentrations between the two groups.

Based on the results from this study, it can be concluded that the serum CgA epitope vasostatin may be a valuable serum biomarker to differentiate catecholamine-producing tumors from adrenocortical tumors.

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ESVE – O – 6

PILOT STUDY ASSESSING THE USE OF CABERGOLINE IN THE MANAGEMENT OF DIABETIC ACROMEGALIC CATS. C.J. Scudder, K. Hazuchova, R. Gostelow, V. Woolhead, Y. Forcada, D.B. Church, R.C. Fowkes, S.J.M. Niessen. Royal Veterinary College, Hatfield, UK

Cabergoline is a dopamine 2 receptor (D2R) agonist which is a second line medical therapy for human acromegalic patients. Pasireotide, a somatostatin analogue, is the only effective medical management option for feline acromegaly but its cost is a limiting factor for many owners. Our work has demonstrated dopamine receptors within the feline acromegalic pituitary and we hypothesized that cabergoline would improve diabetic control and IGF-1 concentrations of diabetic acromegalic cats.

This was a prospective cohort study of client-owned diabetic acromegalic cats, Ethics approval URN 2016 1604. Enrolment criteria were: a diagnosis of diabetes mellitus, an IGF-1 concentration >1000 ng/mL and owners declining alternative treatment options for acromegaly. Patients were admitted to the hospital on day 0, underwent pituitary imaging and started cabergoline therapy (Kelactin, Kela N.V.) on day 1. Cats were monitored in hospital until day 4 and were discharged to continue treatment at home. Serum IGF-1 and fructosamine were measured on day 0, day 4 and month 1. Any possible medication side effects were recorded. Descriptive statistics and non-parametric tests were used to analyze the data.

Six cats were enrolled. The first three cats received 5 μg/kg q24 h PO and the second three cats received 10 ug/kg q24 h PO of cabergoline. The median IGF-1 concentration at day 0 was 1797 ng/mL (range 890–>2000) which was not statistically different to day 4 and month 1 (1884 ng/mL and 1754 ng/mL, respectively). The median fructosamine concentration on day 0 was 551 μmol/L (range 454–887) which was not statistically different from day 4 and month 1 (551 to 569, respectively). All cats were receiving PZI insulin (ProZinc, Boehringer) and the median dose on day 0 (1.1 units/kg q12 h) was not different to day 4 and month 1 (1.1 and

1.2, respectively). Three patients experienced a single gastrointestinal upset event (inappetence, diarrhea) which resolved within three days. One of the six cats experienced an improvement of diabetic control (fructosamine day 0 was 454 μmol/L and month 1 was 288 μmol/L while insulin dose on day 0 was 1 unit/kg q12 h and month 1 was 0.2 units/kg q12 h) although there was no decrease of IGF-1 concentration (day 0: 890 ng/mL; month 1: 929 ng/mL).

Cabergoline therapy, using the investigated dose and duration, was not associated with a reduction in IGF-1 concentration in the tested diabetic acromegalic cats; glycemic control improved in one. Additional cases, alternative dosing regimens and longer-term follow-up are being assessed.

Disclosures: Disclosures to report.

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ESVE – O – 7

SERIAL CHANGES IN INSULIN-LIKE GROWTH FACTOR 1 AND IMPACT ON HYPERSOMATOTROPISM-SCREENING IN FELINE DIABETES MELLITUS.

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Hypersomatotropism [HS] is the underlying cause of diabetes mellitus in a substantial number of diabetic cats. Serum insulin-like growth factor-1 [IGF-1] measurement is currently the test of choice, with concentrations greater than 1000 ng/mL having a 95% positive predictive value. Therefore, all commercial laboratories currently use this value as a cut-off to indicate likely HS presence. However, endogenous insulin availability affects IGF-1 synthesis, thereby possibly reducing test sensitivity, especially in newly insulin-treated diabetic acromegalics.

This study's two main questions were: 1. How many newly diagnosed and treated diabetic cats demonstrate serum IGF-1 initially not suggestive to subsequently become suggestive of HS using this cut-off (1000 ng/mL)? 2. How strong is the correlation between endogenous insulin and IGF-1 concentrations in untreated diabetic cats?

Serial blood samples of diabetic cats were prospectively recruited from first opinion UK veterinary practices within 180 days of initiating insulin treatment. Serum IGF-1 and basal serum endogenous insulin were evaluated using a validated and commercially offered RIA and ELISA, respectively; the latter in untreated diabetic cats only. Mann Whitney test was used to compare groups and Spearman rank correlation coefficient to assess correlation between endogenous insulin and IGF-1; $P < 0.05$ was considered significant. Serial blood samples of 219 cats were recruited (two samples: 103 cats; three: 55; four: 44; ≥ five: 17). Sixty-two (28.3 %) cats had at least one IGF-1 measurement >1000 ng/mL (median 1576 ng/mL, range 1001–>2000); a median of 0.6 units/kg/injection insulin (range 0–2.4) was administered. Of the cats with IGF-1 >1000 ng/mL, 20 (9.1 %) initially showed IGF-1 <1000 ng/mL; therefore, the attending clinician could have discarded the possibility of HS in these patients. Median subsequent IGF-1 increase was 594 ng/mL (range 71–1495), having initially received a median of 73 days of insulin treatment (range 25–154). Basal endogenous insulin in untreated diabetic cats with IGF-1 <1000 ng/mL ($n = 106$; median 29.0 ng/L, range 9.2–791) was significantly lower than in those with IGF-1 >1000 ng/mL ($n = 15$; median 64.2 ng/L, range 9.2–490; $P = 0.024$). A moderate positive correlation ($r_s = 0.42$, $P < 0.0001$) was detected between endogenous insulin and IGF-1 in untreated cats. In this study, approximately 1 in 10 newly diagnosed diabetic cats with an IGF-1 suggestive of underlying HS, based on the currently advocated cut-off, will initially show a negative value using this cut-off. Lower endogenous insulin, which moderately correlates with IGF-1, and/or suboptimal current cut-off value advice, could be contributing factors.

Disclosures: No disclosures to report.

ESVE – O – 8

ULTRASTRUCTURAL CHARACTERIZATION OF PANCREATIC BETA-CELLS IN CATS WITH DIABETES MELLITUS.

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Dysfunctional pancreatic beta-cells are crucial in the pathophysiology of diabetes. Based on light microscopy, diabetic cats have reduced number of beta-cells but whether secretory granules and mitochondria, which are central to cellular function and viability, have abnormal morphology is unknown. Furthermore, a recent investigation questioned the role of islet amyloid in the pathogenesis of diabetes in cats since its amount did not differ between diabetic and age-matched control cats. However, intracellular aggregation of amylin into oligomers, rather than extracellular amyloid, may be the principle of beta-cell toxicity in type 2 diabetes. Therefore, the aims of the study were to characterize ultrastructural lesions of beta-cells in diabetic cats with emphasis on granules, mitochondria and intracellular amylin aggregation.

Pancreases of diabetic and control cats euthanized for any disease were prospectively collected. Samples were harvested within 1 h from death and glutaraldehyde-fixed. Control cats were selected to be matched for age, sex and body weight. Sections were prepared for electron microscopy and immunogold labeling by using anti-insulin and anti-amylin antibodies. Beta-cell morphology was assessed, including beta-cell granule area, eccentricity (minimum-to-maximum diameter ratio), granule number, as well as beta-cell mitochondrial area, number and inter-cristae distance. Intracellular accumulation of amylin-positive material outside the granules was explored. Non-parametric tests were used for statistical analysis.

Five diabetic cats and 5 controls were included. Diabetic cats had beta-cells with clearer cytoplasm than control cats. The median area of beta-cell granules was higher in diabetic than controls [0.144 μm^2 (0.047–0.252) vs. 0.035 μm^2 (range: 0.027–0.046); $P < 0.05$] and their median number lower [0.5/μm^2 (0.3–2.8) vs. 5.6/μm^2 (range: 3.9–7.8); $P < 0.05$]; eccentricity did not differ. The median inter-cristae distance of mitochondria was higher in diabetic than controls [0.064 μm (0.052–0.075) vs. 0.034 μm (range: 0.032–0.043); $P < 0.05$]; their area and number did not differ. Mitochondria of diabetic cats appeared swollen. Amylin-positive material outside the granules was observed in the cytoplasm of 3 diabetic cats and in none of the controls.

In conclusion, the reduced number of granules might suggest that the remaining pool of beta-cells in diabetic cats is less functional or exhausted by the excessive workload. The reason behind the larger granule size is uncertain. The increased inter-cristae distance of mitochondria in diabetic cats, as well as their swollen appearance, might suggest increased permeability and loss of function. The appearance of amylin-positive material outside of granules suggests intracellular aggregation of amylin monomers to oligomers, which may possibly contribute to beta-cell death.

Disclosures: Disclosures to report.

Claudia Reusch was consultant for Boehringer Ingelheim and Novartis Animal Health and is currently consultant for Dechra Limited. She has received financial support for her endocrine research from various companies such as Nestlé Purina, Hills, Provet, Antlia SA, Glycemicon and from the clinical studies fund of the ECVIM-CA and from the Society of Comparative Endocrinology.

ESVE – O – 9

THE DIABETIC CLINICAL SCORE (DCS): EVALUATION OF A SIMPLE STANDARDIZED QUANTIFICATION TOOL TO ALLOW RAPID DESCRIPTION OF CLINICAL SIGNS IN DIABETIC DOGS.

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Glycemic parameters, such as fructosamine, glycosylated hemoglobin and serial glucose measurements (SGMs), are always to be

interpreted in light of the clinical signs being exhibited by diabetic pets. Sample artifacts, assay-issues, inter-day variation and stress can yield deceiving laboratory results. Likewise, the clinical history suffers from inter-person variation, due to varying ways of asking or answering questions, interpreting non-standardized language, forgetting questions and lack of quantification. The aim of this study was to evaluate the newly designed simple Diabetic Clinical Score (DCS) in diabetic dogs. The DCS was previously validated for use in diabetic cats.

Diabetic dog owners were asked to choose the specific severity (ranging from none/ normal, mild, moderate to severe) of specific diabetic clinical signs (polyuria and polydipsia, polyphagia, attitude/ activity). The extent of possible weight loss was established by weighing (none; mild: <5%; moderate: 5–10%; severe: >10%). The severity was subsequently converted into a score ranging from 0 (none/ normal) to 3 (severe), yielding a summarized total score (DCS) for all signs combined ranging from 0 (no clinical signs) to 12 (maximum clinical signs). The DCS was correlated with one or more of following objective parameters obtained at the same visit: fructosamine, average blood glucose during SGMs (AvBG) or water intake diary. Appropriate descriptive and correlation statistics used.

Sixty-seven diabetic dogs were assigned a DCS (median 4; range 0–10). A significant correlation was present between the AvBG ($n = 16$, Spearman's rho: 0.656, $P < 0.001$), daily water intake ($n = 32$, Spearman's rho: 0.605, $P < 0.0003$) and the DCS. A significant correlation between the DCS and fructosamine ($n = 38$, Spearman's rho: 0.340, $P < 0.04$) was also present though only when dogs with concurrent hyperadrenocorticism, hyperlipidemia, hypothyroidism and diabetic ketoacidosis were removed from the analysis. Seventy-nine percent of owners reported the questions to be clear/ completely clear.

The DCS proved easy to comprehend by dog owners. The significant correlation between DCS and objective clinical parameters suggests it could represent a simple objective tool to describe, communicate and quantify the clinical signs encountered in diabetic dogs in clinical practice and research settings. Differences between the DCS and objective parameters should be further investigated.

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ESVE – O – 10

THYROID AND RENAL FUNCTION IN CATS POST LOW-DOSE RADIOIODINE THERAPY. N.C. Finch[1], J. Stallwood[1], S. Tasker[1], A. Hibbert[2]. [1]University of Bristol, Bristol, UK, [2]The Feline Centre, Langford Vets, Bristol, UK

Iatrogenic hypothyroidism can develop post-radioiodine treatment for feline hyperthyroidism; its incidence may be dose-dependent. Cats that develop iatrogenic hypothyroidism have a greater incidence of development of azotemia than cats that remain euthyroid. Dogs with experimentally-induced hypothyroidism have both decreased glomerular filtration rate (GFR) and endogenous creatinine production. This suggests that using creatinine as a marker of kidney function in hypothyroid cats could underestimate the incidence of development of kidney disease. This longitudinal study evaluated thyroid and renal function in cats post low-dose (111 MBq) radioiodine therapy.

Hyperthyroid cats presented for low-dose radioiodine therapy to The Feline Centre, Langford Vets were prospectively enrolled into the study. At baseline, one, six and 12-months post-radioiodine treatment, thyroid and renal function were evaluated via total thyroxine (TT4) and thyroid stimulating hormone (TSH), and via serum creatinine concentration (SCr) and GFR (corrected slope-intercept iohexol clearance), respectively. Cats were categorized as overt hypothyroid (TT4 < 15 nmol/L, TSH>0.15 ng/mL), subclinical hypothyroid (TT4≥15–60 nmol/L, TSH>0.15 ng/mL), euthyroid (TT4≤60 nmol/L, TSH≤0.15 ng/mL) and hyperthyroid (TT4>60 nmol/L) at each timepoint. Decreased GFR was defined as <0.92 mL/min/kg and azotemia as SCr>175 μmol/L.

Twenty-seven cats were recruited into the study with 21 completing the 12-months follow-up; two were lost at one-month and four at 12-months. Two cats (8%) remained persistently hyperthyroid, of which one underwent repeat radioiodine treatment. Five cats (20%) remained hyperthyroid at one-month but were euthyroid by 6-months. Seven cats (28%) developed overt hypothyroidism over the 12-months (2/7 at one-month, 4/7 at 6-months and 1/7 at 12-months) of which two were preceded by subclinical hypothyroidism and none of these cats regained normal thyroid function by 12-months. One cat had subclinical hypothyroidism at 12-months with no further follow-up available. No cats developed transient overt or subclinical hypothyroidism. Of the cats that developed overt hypothyroidism, 4/7 (57%) developed decreased renal function by 12-months. Decreased GFR preceded azotemia development in 2/4 (50%) of these cats.

Twenty-eight percent of cats developed overt hypothyroidism that could be documented up to 12-months post-treatment. This highlights the importance of continued monitoring of thyroid function post-treatment even for cats receiving low-dose radioiodine therapy. Reduced renal function was documented in 57% of overtly hypothyroid cats, with GFR detecting decline in renal function earlier than SCr, suggesting GFR may be more useful to monitor renal function in cats post-radioiodine therapy. However, the study is limited by the small number of cats developing overt hypothyroidism and further studies evaluating the optimal method for detecting early decline in renal function are required.

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ESVE – O – 11

EVALUATION OF SYMMETRIC DIMETHYLARGININE (SDMA) IN DOGS WITH PRIMARY HYPOADRENOCORTICISM UNDER LONG-TERM MINERALOCORTICOID REPLACEMENT THERAPY. J.I. Casado Diaz[1], N. Sieber-Ruckstuhl[1], F.S. Boretti[1], F. Fracassi[2], C.E. Reusch[1]. [1]Vetsuisse-Faculty, University of Zurich, Zürich, Switzerland, [2]Department of Veterinary Medical Sciences, University of Bologna, Bologna, Italy

In the majority of dogs with primary hypoadrenocorticism (PH), the disease is characterized by an absolute deficiency of glucocorticoids and mineralocorticoids. Consequently, those patients require life-long replacement of both hormones. Since application of the respective drugs do not restore physiological hormone levels and

biorhythm, overdose may be possible during long-term management. Unlikely to glucocorticoid excess, overdose of mineralocorticoids may go clinically unnoticed. Due to their role as key mediators for renal damage and progression of kidney disease, mineralocorticoid overdose represents a matter of concern.

The aim of the study was to investigate kidney function by means of SDMA and creatinine (Cr) in dogs with PH during long-term mineralocorticoid therapy.

Twenty-seven client-owned dogs with PH receiving either desoxycorticosterone pivalate (DOCP) or fludrocortisone acetate (FC) for a minimum of 12 months were included in the study. Concentrations of Cr had been measured during regular re-evaluations and were retrieved from the medical records retrospectively. SDMA was measured using the validated immunoassay at the reference laboratory (IDEXX Diavet).

Treatment time ranged from 12 to146 months (median 47). Nine dogs had been treated with FC, 8 dogs with DOCP and in 10 dogs FC had been changed to DOCP because of poor response or adverse effects. At the time of diagnosis 3 dogs had elevated SDMA whereas Cr was elevated in 8 dogs, both parameters normalized after starting therapy. Two dogs developed persistent elevated SDMA 18 and 32 months after starting therapy with FC and DOCP respectively, followed by an elevated Cr 14 and 4 months later. Clinical signs and further work up were consistent with chronic kidney disease (CKD) in both dogs. Although SDMA was within the reference interval in all other dogs, 3 dogs showed an elevated Cr, being permanent in one of them. A significant correlation between SDMA and Cr was demonstrated ($r = 0.35$; $P = .0013$). There was no statistical evidence of any differences in Cr or SDMA between the FC and the DOCP groups.

In conclusion, selected dogs may develop CKD during long-term mineralocorticoid therapy. The prevalence of CKD in PH might be higher than in the general dog population, however this has to be verified in a larger number of dogs. The significance of an elevated Cr with normal SDMA is unclear, possibly reflecting prerenal azotemia or early kidney dysfunction.

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CR was consultant for Boehringer Ingelheim and Novartis Animal Health and is currently consultant for Dechra Limited. She has received financial support for her endocrine research from various companies such as Nestlé Purina, Hills, Provet, Antlia SA, Glycemicon and from the clinical studies fund of the ECVIM-CA and from the Society of Comparative Endocrinology. NSR has been member of the Vetoryl novel monitoring meeting 2017 organized by Dechra Veterinary Products Ltd.

ESVE – O – 12
A COMPARISON OF THE ACTH CONCENTRATIONS IN DOGS WITH STABLE HYPOADRENOCORTICISM BEING TREATED WITH EITHER FLUDROCORTISONE OR DESOXYCORTONE PIVALATE AND PREDNISOLONE.

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Desoxycortone pivalate (DOCP) (Zycortal®, Dechra) is a pure mineralocorticoid and so concurrent doses of glucocorticoids need to be individually titrated; currently this is done on the basis of clinical signs. In contrast, most dogs treated with fludrocortisone (a mixture of mineralocorticoid and glucocorticoid) do not receive additional glucocorticoid supplementation following stabilization. The objective of this study was to compare the ACTH concentrations in dogs treated with fludrocortisone with the same dogs when treated with DOCP and prednisolone.

A prospective, cross-over trial was performed using 33 dogs with hypoadrenocorticism who had been previously stabilized on fludrocortisone. Each dog was randomly allocated to one of two groups, each of which were treated with 3 months of fludrocortisone then 3 months of DOCP and prednisolone (or vice versa). The prednisolone dose was adjusted according to clinical signs. Two dogs failed to complete the trial. Three patients received prednisolone concurrently for at least part of the fludrocortisone phase and the data from these dogs in this phase were removed from further analysis. ACTH levels were measured at the start and end of each treatment phase using an immunoradiometric assay (NationWide Laboratories). Tests for normality were performed and Mann-Whitney U tests were used to compare the various ACTH concentrations and the prednisolone doses at the start and end of the DOCP phase. A Pearson correlation was used to compare the final prednisolone dose and ACTH concentrations at the end of the DOCP phase.

There was a significant difference between the ACTH concentrations after DOCP (median = 2.5 pg/mL) compared to those after fludrocortisone (median = 150 pg/mL) or before starting DOCP (median = 128 pg/mL). There was also a significant reduction in prednisolone dose during the DOCP phase from a median starting dose of 0.22 mg/kg to 0.13 mg/kg. After 3 months of treatment with DOCP and prednisolone 21 out of 31 dogs had ACTH concentrations less than 10 pg/mL (suggesting suppression of the ACTH secretion). No significant correlation was found between the final prednisolone dose and the ACTH concentration at the end of the DOCP phase. In contrast, 18 of the 31 dogs had ACTH concentrations more than 100 pg/mL (possibly suggesting inadequate glucocorticoid supplementation) following 3 months of treatment with fludrocortisone.

It is concluded that in many dogs with hypoadrenocorticism being treated with DOCP, the dose of prednisolone has the potential to be further reduced based on ACTH concentrations.

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ESVE – O – 13
PREVALENCE OF HYPERALDOSTERONISM AND HYPERTENSION IN CATS WITH CHRONIC AZOTEMIA.

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Primary hyperaldosteronism (PHA) is suggested to be more common in cats than previously thought. Because of its profibrotic and proinflammatory effects, aldosterone may contribute to the progression of hypertension and kidney damage.

The aim of the present study was to perform a pilot study on the plasma aldosterone concentration (PAC), plasma renin activity (PRA), and hypertension in cats with chronic azotemia in Sweden.

Twenty-one cats with chronic azotemia were included in the study. Blood samples were collected into pre-chilled EDTA tubes and centrifuged at +4°C. The separated plasma was stored at −80°C until transport at −70°C to the commercial laboratory for analysis. PAC was measured with an ELISA, PRA with a radioimmunoassay, and blood pressure (BP) with high-definition oscillometry. Statistical analysis was performed with non-parametric tests with the free software R version 3.3.2.

In the 21 cats, median PAC was 21 pmol/L (range, <20 to 127 pmol/L; reference range, 87 to 224 pmol/L). In seventeen cats the PAC was below reference range, in 10 of these the PAC was below detection limit (20 pmol/L). Median PRA was 0.30 ng/mL/hr (range, 0.0 to 4.5 ng/mL/hr; reference range, 0.14 to 3.85 ng/mL/hr). Five of the 21 cats had a PRA below the reference range. Median aldosterone-to-renin activity ratio (ARR) was 86 (range, 14 to 4300). Eleven of the 21 cats were hypertensive (BP ≥ 160 mmHg). Median PAC in hypertensive cats was 43 pmol/L (range, <20 to 127). Median PAC in normotensive cats was <20 pmol/L (range, <20 to 77). There was no statistical difference in PAC or PRA between hypertensive and normotensive cats (Mann-Whitney-Wilcoxon test, $P = 0.09$ and $P = 0.10$, respectively).

Five of the 6 cats with a PAC >70 pmol/L were hypertensive. Four of the 5 hypertensive cats had a PRA below or in the lower reference range. The ARR in these 4 cats was 513, 673, 720, and 1200. One cat (ARR 1200) was euthanized. Histopathological examination revealed a mixed diffuse and nodular hyperplasia of the *z. glomerulosa* of the right adrenal gland, and bilaterally chronic to active interstitial nephritis. The remaining two cats had an ARR of 23 and 122.

The results of the present study indicate presence of renin-independent aldosterone secretion in 19% of the cats with chronic azotemia. A surprisingly high proportion of the cats had a subnormal PAC. This is an observation that needs further investigation, before conclusions are drawn.

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ESVE – O – 14

THE USE OF A TRH STIMULATION TEST, WITH MEASUREMENT OF PLASMA CONCENTRATIONS OF GROWTH HORMONE AND THYROID STIMULATING HORMONE, TO DIFFERENTIATE BETWEEN PRIMARY HYPOTHYROIDISM AND NON-THYROIDAL ILLNESS IN DOGS. T. Pijnacker, C.F. Vermeulen, M. van der Vinne, H.S. Kooistra, J.A. Mol. Utrecht University, Utrecht, Netherlands

Hypothyroidism is one of the most common endocrinopathies in dogs. The diagnosis of hypothyroidism relies upon measurement of basal plasma concentrations of total thyroxine (T_4) and thyroid stimulating hormone (TSH). A low plasma T_4 combined with a high plasma TSH points to primary hypothyroidism. However, 30–38% of hypothyroid dogs have TSH values within the reference range. Consequently, a low plasma total T_4 concentration in combination with a plasma TSH concentration within the reference range does not distinguish between dogs with hypothyroidism and dogs with non-thyroidal illness (NTI). A potential interesting observation from previous studies (Lee et al; 2001, and Diaz-Espiñeira et al; 2008) is that hypothyroidism in dogs is associated with increased release of growth hormone (GH).

The aim of this study was to evaluate whether a TRH stimulation test can differentiate between dogs with NTI and dogs with hypothyroidism that have a plasma TSH concentration within the reference range, by measuring plasma concentrations of GH and TSH.

21 dogs with clinical signs consistent with hypothyroidism, a plasma TT4 concentration below the reference interval (19–46 nmol/L), and a plasma TSH concentration within the reference interval (<0.60 μg/L) were included in this study. Thyroid scintigraphy was performed to classify dogs as having hypothyroidism or NTI. All dogs underwent a TRH stimulation test in which plasma concentrations of TSH and GH were measured twice before intravenous administration of 10 μg/kg TRH ($t = -15$ and t = 0) and 30 and 45 min after TRH administration.

11 of the 21 dogs were classified as hypothyroid and 10 dogs as having NTI by thyroid scintigraphy. There were no differences in baseline characteristics between the groups except for gender. The plasma TSH concentration did not change significantly in the hypothyroid dogs after administration of TRH, whereas it significantly increased in the NTI dogs ($P < 0.001$). In contrast, the plasma GH concentration increased significantly in the hypothyroid dogs after TRH administration ($P = 0.009$), whereas it did not change in the NTI dogs.

The TRH stimulation test with measurement of circulating concentrations of TSH and GH could be used to differentiate between hypothyroid dogs and NTI dogs that have clinical signs of hypothyroidism, a low basal TT4 concentration and a basal TSH concentration within the reference interval. This is a promising test which might be of valuable use in primary veterinary practice.

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ESVE – O – 15

INTERRELATION BETWEEN THYROID FUNCTION AND SEX HORMONES IN FEMALE GERMAN SHEPHERD DOGS. P. Scarpa[1], F. Iavazzo[1], M. Beccaglia[2], A. Monino[3], P. Dri[3], G. Milite[3]. [1]University of the Study of Milan, Milan, Italy, [2]Ambulatorio Veterinario Beccaglia, Lissone, MB, Italy, [3]Animal Care srl, Martignacco, UD, Italy

In veterinary literature, data about the interaction between thyroid gland and female reproductive status are lacking. Furthermore, previous studies have often referred to male dogs and few data are available about thyroid influence on different phases of the bitch estrous cycle.

The aim of this study was to determine the influences of the different phases of estrous cycle on thyroid hormones in German Shepherd bitches.

Seventeen clinically healthy German Shepherd bitches (9 months to 6 years old) were monitored during a complete estrous cycle (proestrus, estrus, diestrus, anestrus); the different phases were determined by vaginal cytology. Two blood samples were collected by cephalic vein in each phase, between 11 am and 2 pm, after 12–24 h fasting. Thyroid hormones (TT4, fT4, TT3, fT3), TSH, progesterone, 17-ß-estradiol, serum triglycerides and cholesterol were assessed in each blood samples. At the beginning and at the end of the study a complete hematological and biochemical evaluation was also performed. Seven bitches were bred during the study, and hormone concentrations were also evaluated during pregnancy.

Data were statistically analyzed: correlation test was performed between thyroid and pituitary hormones with age, between the different hormones assessed (thyroid, pituitary and sexual hormones) and between estradiol and cholesterol. One-way ANOVA was used to compare the averages of each parameter (thyroid/pituitary) in different phases of the cycle and in diestrus gravidarum and not gravidarum.

Effect Size (Cohen's d) or Root Mean Square Standardized Effect were calculated to measure the magnitude and strength of the statistically significant research findings.

A significant negative correlation between age and TT4 ($r = -0.367$; $P < 0.05$), fT4 ($r = -0.266$; $P < 0.05$), fT3 ($r = -0.335$; $P < 0.05$) was found.

One way ANOVA showed that TT4 concentration during estrous and diestrous phase, was significantly higher than in proestrous and anestrous phase ($P = 0.0332$).

TSH concentration during diestrus and pregnancy was not significantly different by two tails T-test ($P = 0.0507$), even though a higher TSH concentration during pregnancy was evident.

TT4 ($r = 0.40289$; $P < 0.001$) and fT4 ($r = 0.260$; $P = 0.0067$) were positively and significantly associated with progesterone.

TSH was positively and significantly correlated with 17-ß-estradiol ($r = 0.2$; $P = 0.0388$), while TT4 was negatively and significantly correlated with 17-ß-estradiol ($r = -0.3179$; $P = 0.0008$).

Cholesterol was negatively and significantly correlated with 17-ß-estradiol ($r = -0.3355$; $P = 0.0001$) and was significantly higher during diestrus ($r = -0.3355$; $P = 0.0001$). There was no significant correlation between total triglycerides and 17-ß-estradiol.

Results showed an influence of reproductive status on thyroid function, especially during progesterone-prevalent phase (diestrus) and especially relating to TT4 concentration.

Disclosures: No disclosures to report.

ESVIM – O – 1

CALIBRATED AUTOMATED THROMBOGRAPHY TO EVALUATE THROMBIN GENERATION IN DOGS WITH IMMUNE-MEDIATED HEMOLYTIC ANEMIA. B.Y. Cuq[1], S.L. Blois[1], R.D. Wood[1], A.C. Abrams-Ogg[1], C. Bédard[2], G.A. Wood[1]. [1]Ontario Veterinary College, University of Guelph, Guelph, Canada, [2]Faculty of Veterinary Medicine, University of Montreal, ST Hyacinthe, Canada

Up to 60% of the mortality in dogs with immune-mediated hemolytic anemia (IMHA) is associated with thrombosis or disseminated intravascular coagulation. No conventional hemostatic test is accurate to evaluate the risk for hypercoagulability. Viscoelastic testing has been proven to be influenced by anemia, and might not

reliably assess hemostasis in IMHA patients. Calibrated automated thrombography (CAT) is a thrombin generation (TG) assay that has been validated in clinically healthy dogs. The objective of the study was to assess the suitability of TG in the assessment of hypercoagulability in IMHA patients. IMHA was determined by the presence of anemia, spherocyte and positive slide agglutination test or positive Coomb's Test. CBC, coagulation profile and CAT parameters (lag time, time to peak, peak, endogenous thrombin potential) were performed in all IMHA patients, at the time of diagnosis and then at 48 and 96 h. Lag time was prolonged for IMHA patients at day 0 (D0) and D2; and time to peak was higher on D0 but not statistically different on D2 or D4 compared to healthy dogs. Peak was higher in dogs with IMHA at D0, D2 and D4. There was no statistical difference in the endogenous thrombin potential between IMHA and healthy dogs. No correlation between the CAT parameters and blood cell count, coagulation parameters or the likelihood for the patient to be discharged. Prolonged lag time and time to peak indicate hypocoagulation in IMHA dogs early in the disease onset, however, based on peak value, IMHA patients appear to generate more thrombin once coagulation is initiated compared to normal dogs. TG was not useful in predicting patient outcomes.

Disclosures: No disclosures to report.

ESVIM – O – 2

EFFECT OF IMMUNE-SUPPRESSIVE TREATMENT ON CYTOKINE PRODUCTION IN HEALTHY DOGS.

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Immunosuppressive drugs are the cornerstone of treating immune-mediated diseases in dogs. Currently, dosage adjustments are often based on resolution of clinical signs and monitoring for adverse effects. Recently, a validated pharmacodynamic assay (PD) has been used to monitor dogs treated with cyclosporine by assessing interleukin-2 (IL-2) and interferon-gamma (INFγ). There is no study to date looking at cytokine secretion and detection in dogs receiving other immunosuppressive drugs.

The aim of this study was to evaluate multiple immunosuppressive drugs and determine individually whether they affected secretion of IL-2, IL-6, IL-10, INFγ or tumor necrosis factor alpha (TNFα) in healthy dogs using a multiplex assay.

Blood was obtained from healthy adult Walker hounds before and after immunosuppressive treatment at standard doses using a randomized crossover study design. Treatments included azathioprine, cyclosporine, mycophenolate mofetil, leflunomide, or prednisone. Blood was sampled prior to and following 7 days of treatment. Four dogs were tested for each drug with a minimum wash out period of three weeks. Whole blood was activated with either phorbol 12-myristate 13-1 acetate and ionomycin (PMA/I) or lipopolysaccharide (LPS). Cytokines in the supernatant were analyzed using a multiplex assay. The Kruskal-Wallis test was used to test for carryover effects of the drugs. The Wilcoxon signed-rank test was used to assess each activator effect on cytokine production.

Pre-treatment, stimulation of blood with PMA/I significantly increased INFγ, IL-10, and TNFα, whereas stimulation with LPS significantly increased IL-6, IL-10, and TNFα production ($P < 0.001$ for all cytokines). There was no significant increase in IL-2 with either activator. No significant carry over effect was detected for any of the drugs used.

Azathioprine, leflunomide, and mycophenolate treatments did not reliably change cytokine production for any of the cytokines tested. Dogs treated with cyclosporine had no detectable IL-10, TNFα, and INFγ after treatment when blood was stimulated with PMA/I. All dogs treated with prednisone had marked reduction in their TNFα production (<30% of pre-treatment concentration) after PMA/I stimulation. All dogs, and 3 out of 4 dogs, had a reduction of at least 80% in TNFα and IL-6 concentrations respectively after LPS stimulation.

Specific patterns of cytokine suppression may be useful to monitor efficacy of immunosuppression in dogs treated with cyclosporine and prednisone. No clear trend was seen with the other immunosuppressive drugs tested.

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ESVIM – O – 3

IDENTIFICATION OF ANTINUCLEAR ANTIBODIES IN DOGS USING IMMUNODIFFUSION.

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Circulating antinuclear antibodies (ANAs) are commonly present in the systemic autoimmune disease Systemic Lupus Erythematosus (SLE) and in other SLE-related diseases, in humans as well as in dogs. Certain canine breeds, such as German shepherd dogs and Nova Scotia duck tolling retrievers (NSDTRs), have been shown to be overrepresented for autoimmune diseases.

The indirect immunofluorescence (IIF)-ANA test is the standard method for detecting ANAs. Further testing for ANA specificities with different techniques, such as ELISAs, immunoblot or immunodiffusion, is routinely performed in humans, but not in dogs, to aid in the diagnosis of disease. Several specific ANAs identified in humans have been identified also in suspected canine SLE or SLE-related disorders but in many cases the main antigen targeted by the antibodies cannot be identified. IIF-ANA positive dogs are usually divided into two subgroups depending on their fluorescence pattern, a speckled pattern with no chromosomal reactivity or a homogenous pattern with chromosomal reactivity. Previous studies have shown that only dogs with a speckled IIF-ANA pattern are positive on immunodiffusion.

Our aim was to investigate if the immunodiffusion (ID) technique, using sera from IIF-ANA positive dogs, may identify specific ANAs of relevance in human patients and also identify different subgroups of unknown antigens.

Sera from 32 IIF-ANA positive dogs with speckled fluorescence pattern were part of the study (21 German shepherd dogs, three NSDTRs and eight dogs of seven other different breeds). Ten healthy dogs of different breeds were used as controls. Thirty-one of the 32 IIF-ANA positive dogs were positive on immunodiffusion. Twenty-nine of the positive dogs could be further divided into three separate groups based on their reactions on immunodiffusion. Group 1 ($n = 4$) and group 2 ($n = 16$) had reactivity to unknown antigens (different between the groups). Group 3 ($n = 9$) had antibodies directed to RNP. A breed associated ANA specificity was observed in both NSDTRs and German shepherd dogs. All NSDTRs belonged to group 1, while group 2 consisted only of German shepherd dogs.

The ID technique thus shows that IIF-ANA canine sera may be divided into subgroups reflecting the same specific ANA reactivity. In most of the dogs the specific ANA reactivity could not be identified, which might indicate dog-specific autoantigens. Further investigations of canine sera are needed in order to identify the specific antigen reactivity of these ANAs.

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ESVIM – O – 4

SHORT- AND LONG-TERM MORBIDITY AND MORTALITY IN DOGS AND CATS FOLLOWING CARDIOPULMONARY ARREST.

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The RECOVER initiative has generated interest regarding the poor prognosis for veterinary patients suffering cardiopulmonary arrest (CPA) and produced evidence-based guidelines for their care. There is, however, scant documentation of post-discharge outcomes for animals that survive. This study aimed to describe mortality associated with in-hospital CPA, determine median survival time of dogs and cats that survive CPA, and examine the

incidence and persistence of acquired neurological deficits. Medical records of animals that underwent cardiopulmonary resuscitation (CPR) at a referral centre were reviewed. Factors examined included species and age, managing department, location in hospital of arrest, primary disease process, closed versus open CPR, return of spontaneous circulation (ROSC), time to death, and cause of death. Where survivors to discharge were identified, the animal's primary care veterinarian was contacted for provision of medical records following discharge. A total of 241 animals underwent CPR (196 dogs and 45 cats) with 116 (48%) animals achieving ROSC and 29 of 41 (12%) surviving to discharge. Complete medical records were obtained for 79% (23/29) of survivors. Five of 29 (17%) had neurological deficits including depressed mentation, ataxia, circling and blindness on leaving hospital. All had either complete resolution or significant improvement of neurologic deficits within one month. Eight animals (35%) died following discharge prior to completion of the study period, however two were excluded from analysis as they were discharged explicitly for a palliative visit. The remaining six animals had a median survival time of 1284 days (502–1508 days). Fifteen animals (65%) were alive on completion of the study, with a median of 1362 days following discharge (162–2901). The proportion of animals surviving to discharge was similar to that reported in the veterinary literature. Whilst the immediate prognosis for animals undergoing CPA is poor, for animals surviving to discharge life expectancy is reasonable and the prognosis good for improvement of acquired neurological deficits.

Disclosures: No disclosures to report.

ESVIM – O – 6

FELINE PRIMARY ERYTHROCYTOSIS: A MULTICENTRE RETROSPECTIVE CASE SERIES (18 CASES). H. Darcy[1], K. Simpson[2], I. Gajanayake[3], M. Seth[4], Y.L. Mcgrotty[5], B. Szladovits[1], B. Glanemann[1]. [1]Royal Veterinary College, Potters Bar, UK, [2]Goddard's Veterinary Group, London, UK, [3]Willows Referral Service, Solihull, UK, [4]Animal Health Trust, Newmarket, UK, [5]Vet Specialist Services Ltd., Stirling, UK

Feline primary erythrocytosis (PE) is a rare myeloproliferative disorder causing excessive increase in packed cell volume (PCV). Veterinary literature is sparse with isolated reports and minimal information regarding prognosis. We evaluated a retrospective multicentre case series of feline PE, with the aim of increasing understanding of disease progression to guide management and prognostication. Theories of possible underlying genetic causes were evaluated by comparing the natural history of feline PE to human polycythemia vera (PV).

Cases required documentation of increased PCV (>48%), sufficient investigation to exclude relative and secondary erythrocytosis, and follow-up data for at least twelve months or until death.

Eighteen cats from five UK veterinary hospitals were included. No significant trends in signalment were noted. Seizures and mentation changes were the most common presenting signs (both $n = 10$). Median PCV and total protein were 70% and 76 g/L respectively, with no other consistent blood cell changes. Sixteen cats survived to discharge. Phlebotomy was performed initially in 15/16 cats and after discharge in 10/16. Six cases eventually required no further phlebotomies. Hydroxyurea was the most common adjunctive therapy ($n = 10$). Fourteen patients were alive at the time of writing (survival time >12 months).

This case series demonstrates that management of feline PE is generally well-tolerated with evidence of prolonged survival times. Disease characteristics are similar to a subset of human PV caused by mutations in exon 12 of the janus kinase 2 gene, representing a possible future therapeutic target.

Disclosures: No disclosures to report.

ESVIM – O – 7

INVESTIGATION OF A FUNGAL ETIOLOGY IN CANINE IDIOPATHIC PULMONARY FIBROSIS. E. Roels[1], C. Barrera[2], L. Millon[2], M.M. Rajamäki[3], J. Talbot[4], C. Clercx[1], V. Barrs[4]. [1]University of Liège, Liège, Belgium, [2]Department of Mycology, UMR6249 Chrono-Environnement, University Hospital, Besançon, France, [3]Department of Equine and Small Animal Medicine, Faculty of Veterinary Medicine, Helsinki, Finland, [4]Sydney School of Veterinary Science, Faculty of Science, Marie Bashir Instit, Sydney, Australia

Canine idiopathic pulmonary fibrosis (CIPF) is a progressive parenchymal lung disease of unknown origin and poorly understood pathophysiology that mainly occurs in old West Highland white terriers (WHWTs). Computed tomographic and histopathological findings of CIPF share characteristics of both human usual intestinal pneumonia (UIP) (typical pattern of IPF in humans) and non-specific interstitial pneumonia (NSIP) patterns. In humans, a NSIP pattern is commonly observed in hypersensitivity pneumonitis. This inflammatory pulmonary syndrome results from sensitization to inhaled antigens such as fungal particles and can cause irreversible lung fibrosis in chronic stages. Given that no etiologies have been identified for CIPF, the objective of this study was to investigate a potential fungal cause. A conventional panfungal PCR assay targeting the conserved rDNA gene internal transcribed spacer (ITS) regions of fungi, using two primer pairs (ITS1-ITS2, ITS1-ITS4) was performed using DNA extracted from lung tissue samples from WHWTs affected with CIPF ($n = 26$) and age-matched unaffected controls ($n = 14$). DNA of soil *Aspergillus fumigatus* isolates were included as positive controls. Water samples were tested as negative controls. Additionally, serum samples from 8 WHWTs affected with CIPF and 8 age-matched unaffected WHWTs were tested for precipitins against 10 species of environmental fungus using electrosyneresis on cellulose acetate. Fungal ITS1-ITS2 and ITS1-ITS4 sequences were not amplified from any lung sample, suggesting that invasive fungal infection or heavy colonization is unlikely in CIPF. On the other hand, results of the serological assay revealed the presence of ≥ 2 arcs of precipitins (indicative of a positive result) in 55 of the 160 reactions tested (35 positive results in CIPF population vs. 20 in controls, $P = 0.013$), supporting an increased prevalence of environmental fungal exposure in CIPF dogs compared with controls. For *Lichtheimia corymbifera*, a commonly involved antigen in human farmer's lung hypersensitivity pneumonitis, the number of precipitin arcs was significantly higher in CIPF dogs in comparison with controls ($P = 0.04$). Whether this finding reflects a lung sensitization to fungal allergens and is involved in the pathogenesis of CIPF warrants further investigation.

Disclosures: No disclosures to report.

ESVIM – O – 8

CLINICAL FEATURES OF 70 CASES OF CANINE IDIOPATHIC EOSINOPHILIC LUNG DISEASE. S. Keegan[1], P. Silvestrini[2], Y. Martínez-Pereira[3], P. Watson[4], J. López-Alvarez[5], R. Blake[3], A. Kortum[4], D. Casamián-Sorrosal[6]. [1]University of Bristol, Langford, UK, [2]School of Veterinary Medicine, University of Liverpool, UK, [3]School of Veterinary Science, University of Edinburgh, UK, [4]School of Veterinary Medicine, University of Cambridge, UK, [5]UK, [6]Dick White Referrals, UK

Records of all cases diagnosed between 2004 and 2016 with eosinophilic bronchitis (EB) or idiopathic eosinophilic bronchopneumopathy (EBP) at four university hospitals in the UK were reviewed. Cases were excluded if full records were not available or if other pulmonary disease such as neoplasia or parasitic pneumonitis was identified. The following information was retrieved: breed, age, sex, weight, clinical signs, presence of eosinophilia, thoracic imaging findings, bronchoscopy results (classified as mild; moderate; severe), BALF cytology results (eosinophilic pleocytosis classified as mild 10–25%; moderate 25–50%; severe >50%), infectious disease screening and concurrent disease processes. The following subgroups were created: acute (<1 month of clinical signs) versus chronic (>1 month of clinical signs); EB1 (no radiographic changes or bronchial/peribronchial pattern) vs. EBP1 (interstitial / alveolar patterns) and EB2 (no radiographic changes) vs. EBP2

(any pulmonary pattern). Group comparisons by chi-square or Fisher's exact test were carried out in regards to age, weight, bronchoscopy score, presence of eosinophilia or bronchiectasis and degree of eosinophilia in BALF.

The inclusion criteria were met by 70 cases. Median age was 4 years (IQR 1–6). Females (63%; 44/70) and cross-breed dogs (17%; 17/70) were most commonly affected. The commonest clinical sign was cough (94%; 66/70). There were 69% (48/70) classified as chronic and 32% (22/70) as acute. EB1 group was 46% (32/70) versus EBP1 group 54% (38/72) and EB2 group was 81% (57/70) versus EBP2 group 19% (13/70). Circulating eosinophilia occurred in 36% (25/70) and bronchiectasis in 14% (10/70) of cases. Bronchoscopy score was mild (38%; 25/68), moderate (54%; 37/68) and severe (9%; 6/68). BALF results were mild in 10% of patients (7/70); moderate in 29%(20/70) and severe in 61%(43/70). EB cases (EB1 ($P = 0.003$) and EB2 ($P = 0.002$)) were less likely to have eosinophilia. EB2 cases had higher degree of eosinophilic pleocytosis on BALF ($P = 0.006$) and no EB2 case suffered from bronchiectasis. There was no difference ($P > 0.05$) in any of the other clinical variables between EB versus EBP groups or between acute and chronic cases.

The conclusions of this study include: dogs with eosinophilic lung disease (ELD) in general and EBD in particular were more commonly young to adult and female and cross-breed dogs were commonly affected. EB dogs without radiographic changes represent a different ELD population with less severe eosinophilic pleocytosis in BALF and absence of bronchiectasis and eosinophilia. Unlike the situation in human medicine, there are no obvious clinical or diagnostic differences between acute and chronic ELD in dogs.

Disclosures: No disclosures to report.

ESVIM – O – 9
THERAPY AND LONG-TERM FOLLOW-UP OF 70 CASES OF CANINE IDIOPATHIC EOSINOPHILIC LUNG DISEASE.

S. Keegan[1], P. Silvestrini[2], Y. Martínez-Pereira[3], P. Watson[4], J. López-Alvarez[5], R. Blake[3], A. Kortum[4], D. Casamián-Sorrosal[6]. [1]University of Bristol, Langford, UK, [2]School of Veterinary Medicine, University of Liverpool, UK, [3]School of Veterinary Science, University of Edinburgh, UK, [4]School of Veterinary Medicine, University of Cambridge, UK, [5]UK, [6]Dick White Referrals, UK

Records of 70 cases (2004–2016) diagnosed with idiopathic eosinophilic bronchitis (EB) or idiopathic eosinophilic bronchopneumopathy (EBP) were reviewed. Total response (TR) or partial response (PR) was resolution or improvement of clinical signs respectively. Remission or long-term remission was absence of respiratory signs following discontinuation of therapy for more than one or six months respectively. Relapse was reoccurrence of clinical signs during remission. The following subgroups were established: acute (<1 month of clinical signs) versus chronic (>1 month of clinical signs); EB1 (no radiographic changes or bronchial/peribronchial pattern) versus EBP1 (interstitial/alveolar patterns); EB2 (no radiographic changes) versus EBP2 (any pulmonary pattern); prednisolone dose (≤ = 1 mg/kg/day; antiinflammatory-A- vs. >1 mg/kg/day; immunomediated-I-). These groups were compared for achievement of remission and long-term remission with chi-square or Fisher's exact test. Probability of achieving remission and long-term remission was evaluated by Kaplan Meier curves/long rank test.

Oral Prednisolone was administered to 96%(67/70) of cases (4% received single-inhaled therapy) and 37%(25/67) of those also received combined inhaled fluticasone (no difference between subgroups; $P < 0.05$). Immunosuppressive or antiinflammatory prednisolone was started in 46%(31/67) or 54%(36/67) of cases respectively (no difference between subgroups; $P < 0.05$). In 5%(2/36) of the latter an increase to an immunosuppressive dose to control the clinical signs was required. The 1, 2, and 4-year survival to death/euthanasia due to respiratory disease was 95%, 95% and 91% respectively. TR and PR occurred in 93%(65/70) and 7% (5/70) of cases respectively. Remission and long-term remission was achieved in 60%(42/70) and 41%(24/58) of cases respectively. Relapse occurred in 24%(10/42) of cases during remission and in 4%(1/24) during long-term remission. Achievement of TR, PR, remission or long-term remission and the probability of achieving remission or long-term remission was not different ($P > 0.05$) between subgroups although a possible trend towards increased likelihood of achieving long-term remission for the I versus A group was observed.

The conclusions of this study include: Idiopathic eosinophilic lung disease rarely leads to euthanasia or death and clinical response is achieved in all dogs. Unlike the situations in humans we found no evidence that dogs with EB versus EBP or dogs with acute versus chronic disease differ in outcome. Many dogs achieved a total response and remission with anti-inflammatory dose of prednisolone (plus/minus inhaled therapy). However, whether dogs in which an immunosuppressive dose is not used are less likely to achieve long-term remission warrants further studies.

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ESVIM – O – 10
DEVELOPMENT OF RESPIRATORY DYSBIOSIS AS CATS TRANSITION FROM HEALTHY TO ASTHMATIC AIRWAYS.

A.I. Vientos-Plotts, A.C. Ericsson, C. Reinero, H. Rindt, M.E. Grobman. University Of Missouri College of Veterinary Medicine, Columbia, MO, USA

In humans, deviation from a core airway microbiota is thought to predispose to development, exacerbation or progression of respiratory diseases. Our objective was to describe changes in the airways and fecal microbiota as cats transitioned from healthy (day 0) to asthmatic, in the early (6 weeks) and chronic (36 weeks) stages. The gut microbiota influences microbial communities at distant sites. However, as asthma is a localized disease, we hypothesized that it would result in decreased richness and diversity of the lower airway microbiota, contributing to a state of dysbiosis, while the fecal microbiota would remain unaffected.

Fecal, oropharyngeal (OP), and bronchoalveolar lavage (BAL) samples were collected from eight healthy research cats before (day 0) and at 6, 12, 24 and 36 weeks after experimental asthma induction using Bermuda grass allergen. Extracted DNA underwent PCR of the 16S rRNA gene. Once sequenced, richness, diversity, and relative abundance of representative operational taxonomic units (OTUs) were determined via RM ANOVA on ranks ($P < 0.050$). Principal component analysis (PCA) was used to visualize relatedness of samples. Differences in community composition between time-points were tested using PERMANOVA of Bray-Curtis similarity indices.

Feces had decreased richness between day 0 and 6 weeks ($P < 0.001$) only. In OP samples, richness increased at 6 and 36 weeks versus day 0 ($P = 0.036$ and 0.02, respectively). No significant change in relative abundance of predominant taxa was found in fecal or OP samples over time. In BAL, richness significantly decreased from day 0 to 6 and 36 weeks (mean #OTUs 96, 47 and 21, respectively; $P < 0.001$). Relative abundance of *Pseudomonadaceae* decreased from day 0 to 36 weeks (68% to 0.12%; $P < 0.001$) with increases in *Sphingobacteriaceae*, and *Bradyrhizobiaceae* (from 0.08% to 52.16% and from 0.40% to 32.58%; $P < 0.001$). Within BAL, PERMANOVA detected significant differences ($P < 0.001$) in diversity between samples collected at day 0 and week 36 compared to all other time-points.

Upper and lower airway communities differ from each other and from the fecal microbiota. In upper airways, increased richness without change in relative abundance of predominant taxa was noted after asthma induction. In contrast, lower airway microbiota undergo significant changes in early and chronic stages of asthma. Decreases in relative abundance of organisms associated with healthy airways supports the concept of airway dysbiosis. Knowledge of changes in asthmatic airway microbial populations opens the door to investigation of modulation of airway microbiota to attenuate disease.

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ESVIM – O – 11
DOCUMENTING SILENT REFLUX AND MICROASPIRATION EVENTS USING NUCLEAR SCINTIGRAPHY IN HEALTHY DOGS. M.E. Grobman, C.A. Maitz, C. Reinero. University of Missouri College of Veterinary Medicine, Columbia, USA

Aspiration-related respiratory syndromes are well recognized in humans. About half of healthy adults aspirate without apparent clinical consequence. Understanding the frequency and severity of reflux and microaspiration in healthy individuals is critical to determining their role in respiratory disease pathogenesis. In dogs, analogous information is lacking. The objective of this pilot study is to use scintigraphic reflux studies to investigate frequency, location, and duration of reflux and aspiration events in healthy dogs.

Healthy dogs without aero-digestive symptoms within the preceding 6 months were fed a meal containing (3 mCi) colloidal 99 m-technetium phytate (99mTcP). Time activity curves (TACs) were quantified over the pharynx and three esophageal zones at 5 and 30 min post-ingestion. Static images of the lungs were obtained at 2 and 18 h to evaluate for aspiration. Reflux was characterized by counts exceeding background activity by 200%. Data were reported descriptively as median and range.

Five healthy adult dogs (median 4 years, range 3–9 years) were enrolled. All dogs had >1 reflux event (median 3, range 2–4, total 15) over the 5 min dynamic collection period. Reflux was limited to distal esophageal reflux with rising ($n = 1$; reflux with failure of clearance) and falling ($n = 14$; reflux with appropriate clearance) TACs. Pharyngeal contamination was identified in one dog. Aspiration was not observed in any dog.

In dogs, scintigraphic reflux studies can document reflux and may complement videofluoroscopic swallow studies and esophageal pH monitoring. Reflux, but not aspiration, is common in healthy dogs and must be considered during interpretation of results in clinically affected dogs.

Disclosures: Disclosures to report.

ESVIM – O – 12
DIAGNOSIS OF PULMONARY ANGIOSTRONGYLOSIS IN DOGS WITH NEGATIVE NON-INVASIVE TESTS (BAERMANN ANALYSIS AND ANGIODETECT™©). A.M. Canonne[1], F. Billen[2], I. Peters[3], C. Clercx[2]. [1]National Veterinary School of Alfort, Maisons Alfort, France, [2]Faculty of Veterinary Medicine, University of Liège, Liège, Belgium, [3]2TDDS Laboratories, University of Exeter, Exeter, UK

Canine angiostrongylosis is now considered as an emerging condition in Belgium. The gold standard for the diagnosis is based on the detection of first-stage larvae by Baermann fecal analysis. However, the imperfect sensitivity is the main disadvantage of this test. Alternative methods including serological or molecular assays have been developed to improve diagnosis. Detection of circulating antigens seems to enable diagnosis before patency; however, sensitivity in naturally-infected dogs with negative Baermann analysis has not been documented. PCR on bronchoalveolar lavage fluid (BALF) has recently been reported as valuable tool and helpful in dogs with negative Baermann analysis.

Comparative usefulness of fecal or serological tests and BALF analysis has not been investigated in naturally-infected dogs. The aim of this study was to report and compare results of the rapid test detecting circulating antigens, Baermann analysis and PCR on BALF in a small series of dogs with angiostrongylosis.

Dogs with suspected angiostrongylosis based on clinical findings, for which results of three different diagnostic methods were available, were retrospectively included. The three methods were PCR, performed on BALF, the rapid blood test (AngioDetect™©, Idexx Laboratories) and Baermann analysis, performed on three fecal samples.

Seven dogs were selected. Owners reported cough and dyspnea of variable severity from 2 weeks to 2 months' of duration. PCR on BALF was positive in all dogs while the rapid test was negative in 4 dogs and uninterpretable in another one. Among the 4 dogs with negative rapid test, Baermann analysis was also negative in 3 dogs. Bronchoscopy and PCR on BALF were thus essential for diagnosis in 3 dogs, which presented moderate-to-severe clinical signs from 2 to 4 weeks. If PCR on BALF is considered as gold standard, relative sensitivities of the rapid test and Baermann analysis would be of 29% and 42%, respectively.

In conclusion, even though Baermann analysis and the rapid test should be used as first-line tools because of their availability, cost-effectiveness and non-invasiveness, they might be of lower sensitivity than BALF PCR analysis in early cases. Based on this small descriptive series, bronchoscopy and PCR on BALF may be considered in clinically-suspected dogs in which both rapid test and Baermann analysis are negative. Further studies including ELISA assays for antigens or antibodies are warranted to help select the most appropriate diagnostic tests in canine angiostrongylosis.

Disclosures: No disclosures to report.

ESVIM – O – 13
DISCRIMINATION BETWEEN COUGH AND NON-COUGH BEHAVIORS USING ACOUSTIC WAVE RECORDINGS. M.E. Grobman[1], T.E. Lever[2], C. Reinero[1]. [1]University of Missouri College of Veterinary Medicine, Columbia, USA, [2]Department of Otolaryngology, University of Missouri, Columbia, USA

Cough is a protective mechanism, promoting clearance of the respiratory tract, while also contributing to pathology of clinical disease; as such, it is a both a marker for and target of therapeutic intervention. Cough assessment in dogs is subjective, generally based on owner's perceptions. An objective method of evaluation is needed. In humans, acoustic cough monitoring provides objective data on cough number and intensity by examining acoustic waveforms. We hypothesized that healthy dogs would demonstrate cough waveforms which could be distinguished from other acoustic behaviors (AB); whine, bark, growl, lick, drink, chew and throat-clear. Data were obtained from 10 healthy employee-owned dogs with informed consent. Acoustic behaviors were recorded using a CTA-laryngeal-microphone and analyzed using RavenPro © bioacoustics analysis software for AB duration, peak amplitude and frequency, time to peak amplitude and frequency, power, and energy. Inter- and intra-group statistical analysis was performed using a one-way ANOVA on ranks with $P < 0.05$ being significant. With the exception of throat-clear, cough was distinguished from every other evaluated AB by one or more of the analyzed waveform parameters ($P < 0.001$). No between-subject differences were identified between cough and throat-clear groups for any waveform parameter. All other behaviors showed statistically significant within-group variation ($P < 0.001$). Cough and throat-clear (a clinically similar mechanism to protect the airways) have repeatable acoustic features that are distinguishable from other common AB and are consistent between dogs. Acoustic monitoring may provide an objective means for evaluating cough in dogs with respiratory disease and assessing response to therapeutic intervention.

Disclosures: No disclosures to report.

ESVIM – O – 14
TRACHEAL STENT IN DOGS: OUTCOME PREDICTION AND OWNER SATISFACTION ASSESSMENT. E. Robin, K. Le Boedec, J. Hernandez. CHV Fregis, Arcueil, France

Tracheal stenting is indicated for dogs with refractory tracheal collapse. Information regarding clinical improvement and owner satisfaction following stenting is scarce. The objectives of this study were to (i) screen for clinical, radiographic, and endoscopic predictors of improvement and survival after tracheal stenting, and (ii) assess long-term owner satisfaction.

Dogs treated by tracheal stenting from 2011 to 2016 were retrospectively identified. Only dogs that had survived for = 100 days after stenting were included. Data extracted from medical records and thoracic radiograph review were assessed as potential clinical improvement and survival predictors via univariate and multivariate analyses. Clinical improvement was studied via 4 parameters (coughing, respiratory distress, noisy breathing, and fatigability)

ranked by owners based on severity before and after stenting using a subjective 10-point scale. Owner satisfaction was measured via a 10-point scale.

Twenty-seven dogs were included. Median survival time after stenting was 560 days (range 104–1837). No predictors of clinical improvement after stenting were identified. Age at stenting ($P = 0.036$), fatigability score improvement ($P = 0.007$), noisy breathing score improvement ($P = 0.044$), total clinical score improvement ($P = 0.019$), and owner satisfaction ($P = 0.001$) were significantly associated with survival after stenting on univariate analysis. Age at stenting ($P = 0.01$), noisy breathing score improvement ($P = 0.028$), and owner satisfaction ($P = 0.002$) remained significant survival predictors on multivariate analysis. The median satisfaction score was 7.5 (range 0–10) and 85 % of owners would redo the procedure.

Based on these results, age at stenting, owner satisfaction, and noisy breathing improvement are prognostic factors after tracheal stenting. Owner satisfaction was overall good.

Disclosures: No disclosures to report.

ESVIM – O – 15
METICULOUS DEBRIDEMENT AS SOLE MANAGEMENT FOR SUCCESSFUL OUTCOME IN 6 DOGS WITH SINONASAL ASPERGILLOSIS (SNA). C. Stengel. Tierklinik Hofheim, Hofheim, Germany

We have shown than topical antifungal medication with meticulous debridement results in an overall success rate for SNA in 58 of 62 (94%) dogs (JAVMA 2017; 250:309). It is well known, however, that fungal hyphae do not invade the mucosa but can only be found at the mucosal surface and within material collected from the nasal cavity (J Comp Pathol 2005; 132:283). Consequently, meticulous debridement alone might be successful to clear SNA.

Dogs with nasal discharge were prospectively enrolled if CT and endoscopic findings were indicative of SNA and fungal culture and PCR was positive for *A.fumigatus*. Trephination of frontal sinus was performed if involvement was seen on CT and it could not be reached endoscopically. Fungal plaques were loosened with a curette and removed from the affected frontal sinus by suction or with flushing using copious amounts of balanced electrolyte solution (up to 5 L). If no trephination was performed, fungal plaques and necrotic material in the sinus were loosened with forceps under endoscopic guidance and then flushed out. Once there was no evidence of fungal material left in the frontal sinus, flushing and suction were continued in the nasal cavity. This procedure of flushing and suctioning, lasting up to 2 h, was performed until all visible fungal material and necrotic tissue were removed. No antifungal drugs were used. Recheck endoscopy with sinonasal flushing was repeated 3–5 weeks later. Resolution of SNA was defined as absence of visible fungal plaques with no or negligible amounts of necrotic material present during the second flushing and no clinical signs 4 months later based on telephone communication.

So far 9 dogs were enrolled, 6 (mean 6.5 years old) with >4 months re-evaluation. 1 dog died unrelated to SNA 2 months after enrolment. Trephination was performed in 4/6 dogs. No fungal material was seen in any of the 6 dogs at the recheck endoscopy (after median 26 days) and all owners confirmed no nasal discharge at the telephone communication (after median 204 days).

This preliminary study suggests that antifungal drugs are not needed for the treatment of canine SNA if debridement is performed meticulously and absolutely all fungal material is removed.

Disclosures: No disclosures to report.

ESVNU – O – 1
FIBROBLAST GROWTH FACTOR 23 AND SYMMETRIC DIMETHYLARGININE IN FELINE CHRONIC KIDNEY DISEASE. H.J. Sargent, J. Elliott, Y.M. Chang, R.E. Jepson. Royal Veterinary College, London, UK

The diagnosis of chronic kidney disease (CKD) in cats is currently made using creatinine as an indirect marker of glomerular filtration rate (GFR), together with historical and clinical information and evaluation of urine concentrating ability. However, creatinine is recognized to be insensitive for the early decline in GFR. Symmetric dimethylarginine (SDMA) is a novel biomarker of GFR, with studies suggesting it may be more sensitive than creatinine in detecting this early decline. Fibroblast growth factor 23 (FGF-23) is a phosphaturic hormone known to increase with declining GFR and has been shown to be predictive of the onset of azotemia in cats >9 years, indicating disturbed phosphate homeostasis.

The introduction of SDMA, has led to the identification of cats where SDMA is increased but plasma creatinine remains within reference interval (RI). There is currently little understanding of the metabolic changes present in these cats. The aim of this study was to examine the relationship between plasma FGF-23 and SDMA concentrations in non-azotemic geriatric cats.

Clinicopathological information from cats (≥ 8 years) was sourced from the records of two first opinion practices. Cats with a current or historical diagnosis of azotemic CKD (creatinine >177 μmol/L), a serum thyroxine >40 nmol/L or other chronic disease were excluded. Cats were categorized into two groups: elevated SDMA (>14 μg/dL) and SDMA within RI (≤14 μg/dL). Stored samples were used to quantify FGF-23 in all cats. Data are presented as median [25^{th}, 75^{th} percentile]. Comparisons were made between groups using Mann-Whitney U tests and relationships between numerical variables were evaluated using Spearman's correlation.

Twenty-eight cats with elevated SDMA (17 [16, 19] μg/dL) and 61 cats with SDMA within reference interval (11 [10, 12] μg/dL) were included. Cats with elevated SDMA had significantly higher FGF-23 (377.7 [202.6, 610.9] pg/mL vs. 219.6 [143.2, 295.1] pg/ml, $P = 0.003$) and creatinine (156 [141.8, 171.5] μmol/L vs. 128 [109, 148] μmol/L, $P < 0.001$) concentrations. Phosphate concentration did not differ between groups ($P = 0.593$). A weak positive relationship was demonstrated between FGF-23 and SDMA ($r_S = 0.34$, $P = 0.001$) and between FGF-23 and creatinine ($r_S = 0.23$, $P = 0.03$).

Cats with elevated SDMA had higher FGF-23 concentrations than those with SDMA within RI suggesting the presence of alteration in phosphate homeostasis despite no significant difference in plasma phosphate concentrations. Further studies are required to identify factors influencing this relationship and the utility of FGF-23 concentration to inform management of cats with early stage CKD.

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ESVNU – O – 2
IMMUNOHISTOCHEMICAL STAINING OF A-KLOTHO PROTEIN IN FELINE KIDNEY TISSUE. D.H.N. van den Broek, J.S. Lawson, R. Chang, J. Elliott, R.E. Jepson. Royal Veterinary College, London, UK

Renal a-klotho functions as a co-receptor for fibroblast growth factor 23 (FGF-23) and therefore plays an important role in phosphate homeostasis. The transmembrane protein is primarily found in the renal tubules and its expression is reduced in patients with

chronic kidney disease (CKD). In human studies and animal models, a-klotho deficiency has been associated with hyperphosphatemia, renal fibrosis, and increased mortality. Chronic kidney disease is a common disorder in aging cats, with hyperphosphatemia and FGF-23 excess as important prognostic indicators, but the role of a-klotho has not been assessed in cats to date. Therefore, we aimed to localize renal a-klotho protein in feline kidney tissue.

Formalin-fixed paraffin-embedded sections of post-mortem kidney tissue from cats with varying kidney function were immunohistochemically stained using a rabbit polyclonal anti-a-klotho antibody (1:2000 dilution, anti-klotho antibody, ab203576, Abcam, Cambridge, UK) and visualized with an immunoenzymatic antigen detection system (rabbit specific HRP/DAB detection kit, ab64261, Abcam, Cambridge, UK). Mouse kidney sections were used as a positive control, and feline kidney sections incubated with isotype-specific immunoglobulins as a substitute for the primary antibody served as a negative control for staining specificity. Sections were counterstained with hematoxylin. Western blot analysis was performed on feline renal tubular cell lysate to assess molecular size of the antibody-bound protein.

Western blot analysis showed the primary antibody bound a single antigen of 120–130 kDa in size, which is the appropriate molecular size for a-klotho. No positive staining was detected in the negative isotype control sections, confirming the specificity of the staining for a-klotho. Alpha-klotho protein expression was identified immunohistochemically both in the proximal and distal tubules of murine and feline kidney tissue, with more intense staining of the distal tubules compared to the proximal tubules.

Renal a-klotho protein expression in cats shows similarities to its expression reported in other species. Further work is necessary to investigate if loss of a-klotho expression occurs in feline CKD and how this relates to renal fibrosis and mineral and bone disorder in cats with CKD.

Disclosures: Disclosures to report.

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ESVNU – O – 3

SYMMETRIC DIMETHYLARGININE (SDMA) COMPARED TO CREATININE FOR DETECTION OF DECREASED GFR IN 97 DOGS WITH STABLE KIDNEY FUNCTION.

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Early detection of decreased glomerular filtration rate (GFR) in dogs is difficult. Current methods are insensitive and reference ranges are wide. More sensitive biomarkers are warranted. The aim of this study was to investigate the usefulness of the new marker symmetric dimethylarginine (SDMA) in comparison with creatinine for detection of decreased GFR in dogs with and without a stable diagnosis of chronic kidney disease (CKD).

Ninety-seven client-owned dogs were prospectively included into the study, 67 dogs with a diagnosis (or a strong suspicion) of CKD, and 30 healthy dogs. All dogs underwent physical examination, blood pressure measurements, urinalysis, hematology and blood biochemistry, cardiac and urinary ultrasound examinations, and scintigraphy for calculation of glomerular filtration rate (mGFR). Decreased mGFR was predefined as <30.8 ml/min/L and it was normalized to estimated extra-cellular plasma volume (ECFV) instead of body weight because of less dependency on hydration status of the dog. Estimation of ECFV was performed according to routine using the Rutland-Patlak plot, a mathematical model that describes the transfer of ^{99m}Technetium-DTPA from the blood compartment to the renal compartment.

Creatinine and SDMA were positively correlated ($r = 0.82$). The reciprocal of creatinine and SDMA were both linearly correlated with GFR ($R^2 = 0.62$ and 0.55, respectively). The sensitivity of creatinine and SDMA at their pre-specified cut-offs (46–115 μmol/L and 0–14 μg/dL, respectively) for detection of an abnormal GFR was exactly the same (89.7%) in the dogs of this study. The specificity was 89.7% for creatinine and 86.8% for SDMA.

In conclusion, the diagnostic performance of creatinine and SDMA, when using their pre-specified cut-offs, for detection of a decreased GFR in the dogs of this study was similar.

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ESVNU – O – 4

SDMA IN HYPERTHYROID CATS BEFORE AND AFTER TREATMENT WITH RADIOIODINE.

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Increased glomerular filtration rate (GFR) and decreased muscle mass make identification of chronic kidney disease (CKD) in hyperthyroid cats challenging. Symmetric dimethylarginine (SDMA) is a promising indirect renal biomarker that correlates closely with GFR in healthy geriatric and CKD cats. The aim of this study was to evaluate SDMA reliability as a renal biomarker in hyperthyroid cats. Forty-seven client-owned hyperthyroid non-azotemic (creatinine <168 μmol/L) cats were prospectively enrolled and treated with radioiodine (^{131}I). Antithyroid medication was discontinued 10 days prior to ^{131}I treatment. Cats had to be free of any other medication at least for 14 days prior to ^{131}I treatment and free of any other clinically relevant systemic disease. Creatinine and SDMA (IDEXX SDMA™ Test) were determined before (T0) and 1 month after (T1) treatment. GFR (plasma exogenous creatinine clearance test) was measured at T0 and T1 in 10 of 47 cats. As expected, creatinine significantly increased ($P < 0.001$) and GFR significantly decreased ($P < 0.001$) after ^{131}I treatment. SDMA did not significantly change over time ($P = 0.37$). Only 1 cat became azotemic (creatinine >168 μmol/L) at T1 while having normal SDMA at both time points. SDMA was elevated (>14 μg/dL) in 6 of 47 cats at T0 and normalized after treatment in 4 cats. GFR was available in 1 of these 6 cats and was within normal limits (SDMA normalized at T1). SDMA at T1 was increased above 14 μg/dL in 1 cat with borderline low GFR which was defined as GFR <1.9 ml/min/kg. Pearson correlation ($n = 10$) between GFR and SDMA was moderate to low ($r = -0.48$, $P = 0.16$ at T0 and $r = -0.36$, $P = 0.31$ at T1) and correlation between GFR and creatinine was moderate ($r = -0.54$, $P = 0.11$ at T0 and $r = -0.51$, $P = 0.13$ at T1). Forty of forty-one cats with pre-treatment SDMA within reference interval remained non-azotemic post-treatment. However, not enough patients became azotemic post-treatment to evaluate if SDMA can predict post-treatment renal azotemia. Previous studies showed that SDMA is a promising renal biomarker but further studies are necessary to more fully assess its utility in feline hyperthyroidism.

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ESVNU – O – 5

INTERLEUKIN 6 AND INTERLEUKIN 18 AS MARKERS OF KIDNEY INJURY IN DOGS.

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Available markers of acute kidney injury (AKI) lack sensitivity and specificity; consequently, diagnosis of AKI is delayed and Grade-I AKI is commonly unrecognized. We hypothesized that urinary interleukin (IL) 6 (IL-6) and 18 (IL-18) are sensitive and specific markers of AKI. Urine samples from healthy dogs, dogs with lower urinary tract disease (LUTD), chronic kidney disease

(CKD), acute kidney injury (AKI) and at risk for AKI, were collected. Urine concentrations of IL-6 and 18 were measured using ELISA and corrected to urinary creatinine (uIL-6.18/uCr). Sixty-six dogs were included. There was a positive correlation between IL-6 and IL-18 ($P < 0.001$, r: −0.65). Median uIL-6/uCr of healthy, LUTD, CKD, AKI and dogs at risk were 0.026 pg/mg (range:0.01–2.28), 0.04 pg/mg (range:0.02–2.93), 0.08 pg/mg (range:0.04–8.28), 0.46 pg/mg (range:0.06–58.05) and 6.5 pg/mg (range:0.04–19.74) respectively. Median uIL-18/uCr was 0.025 pg/mg (range:0.01–0.14), 0.03 pg/mg (range:0.02–0.26), 0.08 pg/mg (range:0.03–4.29), 0.32 pg/mg (range:0.01–5.38) and 0.12 pg/mg (range:0.03–0.95) respectively. There was a significant difference in uIL-6/uCr and uIL-18/uCr among the study groups, with both higher in the AKI group compared with other groups, except uIL-18/uCr, which was not different between the AKI and CKD groups. Median uIL-6/uCr and uIL-18/uCr of dogs at risk for AKI, were higher compared with healthy dogs ($P = 0.034$, $P = 0.045$ respectively). ROC analysis of uIL-6/uCr and uIL-18/uCr as AKI predictors had an area under the curve of 0.85 and 0.78 respectively. uIL-6/uCr and uIL-18/uCr cut-off points of 0.11 and 0.13 were associated with sensitivity and specificity of 96% and 70% respectively, and 83% and 70% respectively. In conclusion, IL-6 and IL-18 are sensitive and specific markers of AKI.

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ESVNU – O – 6

APPLICATION OF NOVEL KIDNEY-SPECIFIC BIOMARKERS FOR CANINE KIDNEY DISEASES.

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AKI is associated with high mortality, partially due to its late recognition using available markers. Current research aims to identify new AKI biomarkers, however, their specificity is hampered when these are also expressed in extra-renal tissues. Recently, assays were developed for kidney-specific urinary clusterin (uClus) and serum and urine cystatin B (sCysB, uCysB, respectively). To assess their utility, 40 dogs were recruited and categorized to healthy controls, chronic kidney disease (CKD), AKI and UTI.

Median uClus/uCr was 40 ng/mg (range 3–157), 43 (12–6189), 1740 (391–11,834) and 6964 (102–69,855) in control, UTI, CKD and AKI groups, respectively. It differentiated control and AKI (receiver operating [ROC] area under curve [AUC] 0.96, 95% CI: 0.88–1.00). ROC analysis applied to all dogs, had an AUC of 0.86, (95% CI: 0.72–0.97). A cut-off of 3380 ng/mg resulted in 80% sensitivity and 90% specificity. Median sCysB was 206 ng/mL (range 113–291), 608 ng/mL (200–1348) and 1763 ng/mL (604–4175), in control, CKD and AKI groups, respectively. It differentiated control and AKI (AUC 1.0, 95% CI: 1.00–1.00). ROC analysis applied to all dogs showed AUC of 0.91 (95% CI: 0.79–1.00). A 700 ng/mL cut-off, gave 88% sensitivity and 86% specificity. ROC analysis of uCysB comparing AKI to all other groups gave an AUC of 0.87 (95% CI: 0.74–1.00). A 485 ng/mL cut-off was associated with sensitivity and specificity of 79% and 83%, respectively.

In conclusion, these novel kidney-specific biomarkers differentiated AKI from healthy controls and other urinary tract conditions. Their specificity is a major advantage compared to previously reported biomarkers.

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ESVNU – O – 7

PREVALENCE OF URINARY TRACT INFECTION IN DOGS WITH CHRONIC KIDNEY DISEASE: A RETROSPECTIVE STUDY OF 201 CASES.

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Studies have shown an increased prevalence of urinary tract infection (UTI) in cats with chronic kidney disease (CKD) but no information is available in dogs. The aims of our study were to determine the prevalence of UTI in a cohort of dogs with CKD and to investigate the impact of age, sex (including neuter status) and IRIS stage.

Dogs were retrospectively recruited from two veterinary teaching hospitals between January 2010 and June 2016 if they were diagnosed with CKD and had a culture performed on urine collected by cystocentesis. CKD was diagnosed in dogs with an increased blood creatinine concentration (≥125 μmol/L) and consistent clinical and/or ultrasonographic signs (azotemic dogs); and in dogs with a creatinine concentration <125 μmol/L but having renal proteinuria, minimally concentrated urine with ultrasonographic signs of CKD or abnormal renal histology (IRIS stage 1). Azotemic dogs were categorized in IRIS stages 2 to 4 if they had creatinine values measured at least two weeks apart, others were left unstaged. Dogs with diseases which could predispose to UTI or receiving treatment which could impact urinary specific gravity were excluded. Differences between groups were assessed using the Chi-square or the Mann-Whitney tests with statistical significance defined as $P < 0.05$.

Two hundred and one dogs were included and 32% of them had a UTI. Escherichia coli was identified in 73% of them. Lower urinary tract signs were only reported in 9% of dogs with a UTI. Sixty-one azotemic dogs could not be staged and 41% of them had a UTI. Twenty eight percent of dogs with stage 1, 44% of dogs with stage 2, 30% of dogs with stage 3 and 9% of dogs with stage 4 CKD had a UTI. Dogs with stage 4 had significantly less UTI than dogs in stage 2 or 3 ($P = 0.005$ and 0.046, respectively). There was no significant difference between the other groups. No significant difference was found in the prevalence of UTI with age or neutering, but the prevalence of UTI was higher in females (46%) than in males (21%) ($P = 0.0003$).

The prevalence of UTI in this population of dogs with CKD was 32% but most of them were asymptomatic. As already described, females were overrepresented. Because of this high prevalence, a urine culture could be recommended in any dog with CKD regardless of its age, sex and IRIS stage; even though the true clinical impact of this finding is currently unknown.

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ESVNU – O – 8

WHOLE GENOME SEQUENCING OF ESCHERICHIA COLI ISOLATED FROM THE URINARY TRACT OF INDIVIDUAL DOGS OVER TIME.

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Phylogeny and antibiotic resistance profile (resistome) of urinary *E. coli* isolated from individual dogs at different time points were investigated to gain a better understanding of recurrent or persistent *E. coli* UTI. The microbiology database of the U-Vet Werribee Animal Hospital was screened for urinary *E. coli* isolated from dogs with at least two positive urine cultures. Comorbidities on the date of the respective urine culture were retrieved from the dogs' medical records. *E. coli* strains were recovered from frozen storage banks and subjected to whole genome sequencing. The core genome of study strains was compared to reference strain ABU83097 and multi-locus sequence types (MLST) were identified. Strain resistomes were determined by searching genomes for 38 known antibiotic resistance genes. Seventy-six *E. coli* strains from 19 dogs were analyzed. All dogs had conditions that predisposed to UTI and were treated with antibiotics after positive urine cultures. The number of examined *E. coli* strains per individual dog ranged from 2 to 8 (median 3.5); they had originally been recovered over a median time span of 146.5 days (range 9–

2450 days). Overall, *E. coli* were phylogenetically diverse; 25 different MLST were recorded. Core genomes were 73.9–95.2% similar to the reference. None of the *E. coli* isolated had identical core genomes. However, in 18/19 dogs, 2 to 6 (median 2.5) *E. coli* with highly similar core genomes (with single nucleotide differences ranging from 25 to 457) were identified. These highly similar *E. coli* had originally been cultured from urine of affected dogs over a median time span of 84 days (range 7 to 602 days) and in 15/18 cases, all highly similar strains had identical resistomes over time. In 10 dogs, at least one strain that was phylogenetically different was also present; in 3 dogs, these strains were cultured between episodes with 2 highly similar strains. Thirty-five of 76 strains (46%) were phenotypically multi-drug-resistant (MDR). Up to 13 different antibiotic resistance genes (median 2.5) were identified. There was no apparent correlation between time point of strain isolation (i.e. late or early in disease) and MDR status. Results of this study suggest that the majority of *E. coli* isolated from the urine of dogs with comorbidities either belong to one evolving lineage, or that several highly similar lineages co-exist in any given dog. Changes in resistome were uncommon.

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Dr Bulach is affiliated with Doherty Applied Microbial Genomics, The Doherty Institute, Melbourne, Australia.

The laboratory work for this abstract was performed at the Doherty Institute, which is affiliated with the University of Melbourne.

ESVNU – O – 9

VIRULENCE AND ANTIMICROBIAL RESISTANCE OF ESCHERICHIA COLI SEQUENCE TYPE 131 H30 AND OTHER HUMAN PANDEMIC CLONES SPREADING IN COMPANION ANIMALS.

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The fluoroquinolone-resistant (FQ^R) O25b-H30 subclone of *E. coli* sequence type 131 (ST131-O25b-H30), with its nested ESBL (CTX-M-15)-associated H30Rx subset, is the most global disseminated virulent B2 group *E. coli* multidrug-resistant lineage causing infection in humans. Within phylogenetic group D, the sequence type 648 complex (STc648) is another human increasingly resistance-associated *E. coli* lineage. This study aimed to detect and evaluate the prevalence of human pandemic clones among *E. coli* strains causing urinary tract infection in companion animals and to characterize their virulence and antimicrobial resistance.

For this study 298 *E. coli* (1999–2014) isolated from companion animals with urinary tract infection were studied regarding clonal background, virulence and antimicrobial resistance. Susceptibility towards sixteen antimicrobial agents was done by the disk diffusion. PCR-based assays were used to detect the phylogroup (A, B1, B2 and D), Pathogenicity associated-islands (PAIs) ($n = 8$), urovirulence genes ($n = 8$), antimicrobial resistance genes ($n = 13$), the human pandemic *E. coli* ST131–O25b, O25b-H30, O25b-H30Rx and O16 lineages. Furthermore, all third-generation cephalosporin (3GC) resistant *E. coli* were typed for MLST in order to detect *E. coli* sequence type 648 complex. Regarding phylogenetic background the isolates were predominantly from group-B2 (55.4 %, $n = 165/298$), followed by group-A (16.1%, $n = 48/298$), group-B1 (14.8%, $n = 44/298$) and group-D (13.8%, $n = 41/298$).

The group-B2 ST131-O25b and O16 lineages represented 10% ($n = 30/298$) of all the uropathogenic strains and ST131-O25b-H30 was the most common 25.0% ($n = 7/28$), all were MDR and FQ^R. The ST131-O25b-H30 most common pathogenicity and virulence-associated genes profiles were PAI I_{CFT073}- PAI IV_{536}-PAI II_{CFT073} (28.6%, $n = 2/7$), *ecp-pap*EF-*iuc*D (27.3%, $n = 3/7$). About 43% of ST131-O25b-H30 strains ($n = 3/7$) were the FQ^R H30Rx–$bla_{CTX\text{-}M\text{-}15}$ producer subclone. Among the 3GC-resistant *E. coli* phylogroup D, the most represented lineage was the ST648 71.4% ($n = 10/14$), followed by ST405, ST1775, ST57 and ST354 (7.1 %, $n = 1/14$ each). All ST648 isolates were MDR, $bla_{CMY\text{-}2}$ producers and one had also $bla_{CTX\text{-}M\text{-}9}$. ST648 PAIs and virulence genes profiles belonged mostly to PAI I_{CFT073}PAI IV_{536} (40.0%, $n = 4/10$), PAI II_{536}-PAI I_{CFT073}-PAI IV_{536} (30.0%, $n = 3/10$), and *ecp*A-*pap*EF (70%, $n = 7/10$), respectively.

In this study we report for the first time the detection of the worldwide-disseminated ST131-O25b-H30 virulent, MDR and FQ^R human clone and its CTX-M-15-H30Rx subclone in companion animals. The detection of human high-risk pandemic *E. coli* lineages causing UTI in companion animals besides the animal health problem is a great public-health concern.

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ESVNU – O – 10

URINARY BIOMARKER CONCENTRATIONS IN CANINE URINARY TRACT INFECTIONS.

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Diagnosis of canine urinary tract infections (UTI) is based on a positive urine culture and inflammatory sediment. In practice, culture and/or sediment analysis are not always performed prior to using antibiotics; which is at odds with rational prescribing. In-clinic measurement of biomarkers to specifically test for a UTI, would therefore be of great value. In humans, the concentration of a number of urinary biomarkers increases in UTI. As yet, these have not been evaluated in dogs to determine if they behave similarly.

Aim: To determine whether measuring inflammatory biomarkers in canine urine could correctly identify bacterial infection.

Hypothesis: CRP, IL-6, procalcitonin and lactoferrin concentrations in canine urine with confirmed infections are significantly increased compared with controls.

Specific canine ELISAs were developed for CRP, IL-6, procalcitonin and lactoferrin. These were selected given their association with UTI in human medicine. Assays underwent comprehensive validation prior to initiating this study.

The above biomarkers were measured in residual urine samples following routine urinalysis, from a cohort of dogs with confirmed UTI ($n = 25$) and from a control cohort without UTI ($n = 26$). Inclusion criteria for the UTI group was a positive urine culture and inflammatory urine sediment. Control samples had an inactive sediment and sterile culture. This study was approved by the establishment's ethical review committee.

For comparing non-parametric datasets, Mann-Whitney tests were performed; for multiple comparisons between non-parametric datasets, the Kruskal Wallis test was used.

There was a significant increase in CRP ($P < 0.009$) and lactoferrin ($P < 0.018$) concentrations between UTI samples and controls. Enterococci significantly increased CRP concentrations compared with Coliforms ($P < 0.008$) and mixed bacterial populations ($P < 0.03$). Enterococci significantly increased IL-6 concentrations compared with Coliforms ($P < 0.03$). Enterococci significantly increased procalcitonin concentrations compared with mixed bacterial populations ($P < 0.0004$). ROC curves were used to determine sensitivity and specificity for CRP and lactoferrin for detecting a UTI. A CRP cut-off of 1.87 ng/mL, gave a sensitivity of 52% and specificity of 90%. A lactoferrin cut-off of 151.3 ng/mL, gave a sensitivity of 80% and specificity of 100%. Combining CRP and lactoferrin gave a sensitivity and specificity of 100% for a UTI. Correlation between CRP and lactoferrin was excellent ($r = 0.95$).

This pilot study demonstrates novel urine biomarkers, either alone or in combination, can identify UTI in dogs. Some bacteria increase the concentration of biomarkers in the urine more than others. These results demonstrate potential value in measuring urinary biomarkers in-clinic to screen urine samples for infection, improving antibiotic stewardship.

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Dr Dunning has a consultancy role for AVACTA animal health. Dr Slater is Chief Scientific Officer for AVACTA animal health Dr's Moody and Barrass-Hemmens are assay development scientists employed by AVACTA animal health.

ESVNU – O – 11
EVOLUTION OF IONIZED CALCIUM CONCENTRATION OVER TIME IN CATS WITH URETERAL OBSTRUCTION: 39 CASES. M. Garcia[1], M. Manassero[2], M. Canonne-Guibert[2], V. Fabres[2], M. Menard[2], G. Benchekroun[2], C. Maurey[2]. [1]Ecole Veterinaire D'alfort, Maisons Alfort, France, [2]National School of Alfort, Maisons Alfort, France

Calcium oxalate (CaOx) ureterolithiasis has emerged as a cause of feline ureteral obstruction (UO) in the last few years. Several risk factors of UO were identified including hypercalcemia. One study showed that hypocalcemia is frequent in cats with urethral obstruction and hyperphosphatemia has been hypothesized as a causal factor. The aim of this retrospective study was to assess how ionized calcium concentration (iCa) varies in cats with UO after UO management.

Cats with UO (group 1) in which iCa was measured at least three times over a minimal period of 15 days, were enrolled and compared to a control group including cats with CKD (stage IRIS 2 or over: group 2). UO was treated by medical or surgical procedure.

Group 1 included 39 cats and group 2 included 37 cats. At time of diagnosis (D0), there was no difference in median creatinine concentration, median iCa and distribution of hypercalcemic, normocalcemic or hypocalcemic cats between both groups. Median phosphorus concentration was significantly higher in group 1 (73.7 mg/L [32–200] vs. 42 mg/L [25–91]) ($P < 0.001$) at D0.

Over time, a significant increase in proportion of hypercalcemic cats was observed in the group 1 at the end of the study versus at D0: 33.3% [95% CI: 18.5–48.1] versus 12.8% [95% CI: 2.3–23.3%] ($P < 0.001$). The average time of onset of hypercalcemia in these 13 cats was 50.5 days (range: 2–1170) and among them only 2 were hypercalcemic from D0. In group 2 proportion of cats normo- or hypercalcemic did not vary during the study period.

Our results suggest that iCa should be monitored in cats with UO as presence of ionized hypercalcemia could be misdiagnosed at time of diagnosis and becomes evident after UO treatment. These results suggest that concurrent hyperphosphatemia could explain this finding. Identification of ionized hypercalcemia as a potential risk factor for UO is important and should appropriately be managed in these cats.

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ESVNU – O – 12
URINARY FINDINGS SUGGESTING EARLY RENAL INVOLVEMENT IN CATS WITH FELINE MORBILLIVIRUS INFECTION. P.E. Crisi[1], F. Dondi[2], E. de Luca[3], E. Febo[1], K. Vasylyeva[2], E. Ferlizza[2], G. Savini[3], A. Luciani[1], A. Lorusso[3], A. Boari[1]. [1]University of Teramo, Teramo, Italy, [2]Alma Mater Studiorum-University of Bologna, Ozzano Dell'Emilia, Bologna, Italy, [3]Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Teramo, Italy

Feline Morbillivirus (FeMV) has been associated with renal lesions in cats, however a clear association between infection and the development of chronic kidney disease (CKD) remains to be elucidated.

With the aim of characterizing urinary findings, urinalysis, urine chemistry and qualitative proteinuria results were retrospectively evaluated in 14 cats with RT-PCR positive urine for FeMV (FeMV+). FeMV+ were compared to 21 CKD and 22 healthy blood donor cats. For all of the animals the following information was available: signalment, history, physical exam, clinicopathological evaluation including CBC, serum chemistry profile, urinalysis including urine specific gravity (USG), dipstick, sediment examination, urine protein-to-creatinine ratio (UPC), fractional excretion of electrolytes, urine SDS-PAGE stained with Coomassie blue, and urine culture. Kidney histopathology and immunohistochemistry for FeMV were evaluated at necropsy ($n = 3$). Data were analyzed with descriptive statistics and compared using non-parametric tests (Kruskal-Wallis test). P -values <0.05 were considered significant.

The FeMV+ were outdoor domestic shorthaired cats, 8 neutered males, 6 females (5/6 spayed), median age was 35 months (range 14–101). FeMV+ had significantly decreased USG (median 1054, range 1022–1065) and urine creatinine (median 227.23 mg/dL, range 83.02–489.75) when compared to healthy subjects (median 1067, range 1040–1080, $P < 0.00001$; median 406.50 mg/dL, range 195.32–575.58; $P < 0.00001$; respectively). No statistical differences were detected for serum creatinine (median 0.81 mg/dL, range 0.67–2.13 vs. median 1.46 mg/dL, range 0.78–2.13) and urea (median 45.35 mg/dL, range 30.20–63.30 vs. median 46.47 mg/dL, range 31.47–73.01) and for electrolyte fractional excretions. All urine cultures were negative.

A significant increase in UPC was observed in FeMV+ (median 0.19, range 0.08–1.03) when compared to healthy subjects (median 0.10, range 0.04–0.40, $P < 0.0003$), while statistical differences were not detected between infected cats and CKD cats (median 0.23, range 0.10–0.80). In FeMV+, SDS-PAGE qualitative proteinuria showed differences if compared to the healthy cats. In particular, a tubular pattern was evidenced, with a decrease of uromodulin and an increase in the number and intensity of low molecular weight proteins, indicating a renal involvement, although less severe than in CKD cats. Renal pathology showed tubulo-interstitial nephritis and positive immunohistochemical stain for FeMV-N protein in tubular cells.

Urine findings in FeMV+ suggest the presence of early tubulo-interstitial damage characterized by tubular proteinuria and mild reduction of urine concentrating ability. No urine electrolyte handling dysfunctions were detected. Further prospective studies combining long-term patient follow-up, renal pathology and urine evaluation are warranted to obtain a better characterization of potential FeMV-associated renal damage.

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ESVNU – O – 13
EFFECTS OF A NON-ABSORBENT LITTER ON URINALYSIS RESULTS IN CATS. J.G. Pebre, H.P. Lefebvre, B.S. Reynolds. National Veterinary School, Toulouse, France

Commercially available non-absorbent litters are becoming increasingly popular for urine collection in cats. The objective of this study was to assess the effects of such device on routine feline urinalysis results, a potential issue that has not been addressed to date.

Thirty-one cats subjected to cystocentesis for urinalysis as part of their diagnostic work-up were included. A fraction of the urine sample collected by cystocentesis was immediately processed to obtain a reference urinalysis (USG, dipstick and UPC). The remaining urine was poured on the non-absorbent litter in a tray, urine specimens were then retrieved from the tray immediately and after 3, 6 and 12 h at room temperature and urinalysis was repeated at each term The effects of urine timely contact with litter on urinary analytes were assessed using a General Linear Model and Dunnett's test.

The range of results obtained from the reference specimens was wide but the vast majority of samples were negative for ketones, glucose and bilirubin. Testing urine retrieved from the tray with ketones reagent pads was found to be unreliable. Results for 5/8 analytes tested were statistically different from those of the reference specimen at 9 occasions. The observed differences were clinically relevant for USG after 3, 6 and 12 h and for the protein reagent pad result of the dipstick after 12 h.

In conclusion, urine collected within 12 h of contact with the non-absorbent litter tested is suitable for UPC measurement and most dipstick reagent-pads but not for USG assessment.

Disclosures: No disclosures to report.

ESVNU – O – 14
DETERMINING THE PH IN CANINE URINE: COMPARING VISUAL AND AUTOMATED READING VARIABILITY OF URINE DIPSTICK ANALYSIS WITHIN A SMALL ANIMAL TEACHING HOSPITAL. M. Garcia, M. Ferreira, A. Gow. Royal (Dick) School of Veterinary Studies, Roslin, UK

Urine pH measurement is performed during routine urine analysis evaluation. Although using a pH meter has been shown to give

more accurate results, urine dipsticks are most commonly used in veterinary medicine. Accurate pH measurement is important, as it may indicate urinary infection, risk of urolith formation and reflect the acid-base systemic status of a patient. This study evaluated the inter-operator reproducibility of canine urine pH readings when performing urine dipstick chemical analysis by direct standard visualization and automated analysis in a small animal teaching hospital.

Urine from in-patients was collected between 28 and 40 h prior to the study and was kept refrigerated. The pooled sample was divided in three and each sample was titrated with NaOH and HCl to achieve a consistent visual urine dipstick pH reading of 6 (Sample 1), 7 (Sample 2) and 7.5 (Sample 3). Respective readings of 5.44, 6.55 and 7.66, were obtained with a calibrated reference bench top pH meter. Samples were kept chilled during the study period.

Study participants were given one aliquot each sample and six urine dipsticks. Each operator was asked to measure and record the urine pH from each aliquot using first standard visual and then automated analyzer reading methods.

Nineteen final year students, 7 veterinarian surgeons and 4 veterinary nurses participated in the study. Standard visual reading pH values, with number of participants recording the results in brackets, were: Sample 1: 6 (14), 6.5 (14), 7 (2); Sample 2: 6 (2), 6.5 (2), 7 (1), 7.5 (22), 8 (3); and Sample 3: 6 (1), 7 (1), 7.5 (3), 8 (25). Using the automated analyzer, the results obtained were: Sample 1: 5.5 (1), 6 (29); Sample 2: 7 (26), 7.5 (4); Sample 3 7 (1), 7.5 (25), 8 (3), 8.5 (1). Concordance of results between study participants and the authors occurred in 39/90 (43%) of visually read, and 79/90 (88%) of automated analyzer results. Sample 2 was visually reported as alkaline (pH of 8) by 4 participants and acid (pH of 6) by 2 participants.

In conclusion, standard visual reading of urinary dipstick demonstrated poorer inter-operator reproducibility when measuring canine urinary pH in comparison with an automated method. This has potential clinical implications in that the same sample was classified as acidic and alkaline in some instances, potentially affecting clinical decision making.

Disclosures: No disclosures to report.

ESVNU – O – 15

ASSESSMENT OF KIDNEY INJURY IN CANINE PARVOVIRAL INFECTION BY COMPARING NOVEL URINARY KIDNEY INJURY BIOMARKERS WITH ROUTINE RENAL FUNCTIONAL PARAMETERS.

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Dogs with naturally occurring parvovirus infection may be at risk of developing acute kidney injury due to several risk factors, including severe dehydration, systemic inflammatory response syndrome, and sepsis. Early detection of kidney injury is important, yet challenging, because conventional renal parameters, such as serum creatinine (sCr) and blood urea nitrogen (BUN), are insensitive markers for early stages of kidney injury and dysfunction. Therefore, the aim of this study was to investigate potential kidney injury in dogs with naturally occurring parvoviral infection by comparing standard to novel urinary biomarkers.

Twenty-two dogs with parvoviral infection were prospectively enrolled and compared with eight clinically healthy control dogs. Blood and urine samples were collected at presentation (T_0) in both groups and 24 h later (T_1) in the patient group. Urinary immunoglobulin G (uIgG) and C-reactive protein (uCRP) were measured to document glomerular injury, whereas urinary retinol-binding protein (uRBP) and neutrophil gelatinase-associated lipocalin (uNGAL) served as biomarkers for tubular injury. These biomarkers were compared to routine renal functional parameters, including sCr, BUN, urinary protein:creatinine ratio (UPC), and urine specific gravity (USG). Commercial ELISAs validated for the measurement of canine uIgG, uCRP, uRBP, and uNGAL were used. Statistical analysis was performed using non-parametric Mann-Whitney and Wilcoxon signed rank tests.

At T_0, dogs with parvovirus infection had significantly higher concentrations of uIgG ($P < 0.01$), uCRP ($P < 0.0001$), uRBP ($P < 0.001$), and uNGAL ($P < 0.05$) compared to healthy dogs. At T_1, only uCRP and uRBP remained significantly higher compared to controls ($P < 0.0001$ and $P < 0.01$, respectively), while concentrations of uIgG decreased significantly from T_0 ($P < 0.001$) in parvovirus infected dogs. In marked contrast, both at T_0 and T_1, sCr was significantly lower in dogs with parvoviral infection ($P < 0.01$ and $P < 0.001$, respectively) compared to healthy dogs, while BUN was not significantly different ($P = 0.21$). Although both USG and UPC were significantly higher in dogs with parvovirus at T_0 ($P < 0.01$ and $P < 0.001$, respectively), only UPC remained significantly higher at T_1 ($P < 0.05$) compared to healthy dogs.

In conclusion, this study shows that dogs with parvoviral infection had acute kidney injury, which manifested both at the glomerular and tubular level, and remained undetected by the routine renal functional markers sCr and BUN. Our results emphasize the added value of novel kidney injury urinary biomarkers to detect and monitor these patients at risk.

Disclosures: No disclosures to report.

ESVONC – O – 1

ARE PROTEIN KINASE INHIBITORS OF USE IN THE TREATMENT OF CANINE LYMPHOMA? A SCREENING *IN VITRO* STUDY WITH MULTIPLE PROTEIN KINASE INHIBITORS IN CANINE LYMPHOID CELL LINES|.

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Introduction: Canine lymphoma, the most common hematopoietic neoplasia in the dog, is routinely treated with a multi-drug chemotherapy protocol. Despite a high initial response rate, tumor relapse is common and often resistant to chemotherapy, resulting in treatment failure. Alternative treatment options are mandatory and since masitinib showed a mild anti-proliferative effect on lymphoid cells other protein kinase inhibitors (PKIs) might provide this alternative.

Materials and Methods: GL-1 is a canine B-cell lymphoid cell line and GL-40 its doxorubicin/vincristine resistant subline demonstrating P-gp overexpression. Cell lines were cultured as previously described. Cell viability was assessed using a colorimetric assay (alamarBlue®). Cells were seeded in 96-well plates at a density of 2 x104 cells per well in cell culture medium containing a concentration range (0, 0.1, 1 and 10 μM) of the PKI tested and incubated for 48 h at 37°C, 5% CO2. AlamarBlue® (resazurin) was added 3 h prior to analysis and the reduced fluorescent molecule (resorufin) was measured by light absorbance in a fluorescence spectrophotometer (560EX nm/590EM nm). Experiments were performed in triplicate.

Cell survival was calculated by dividing light absorbance in treated cells by that in control cells after correction for background absorbance. Concentration dependent effects were analyzed by non-linear regression after log transformation of PKI concentration. Median inhibitory concentration (IC50) was calculated as a measure of the PKI's antiproliferative effect. Graphs were fitted according to a sigmoïd dose–response curve.

Results: IC50 for the various PKIs in the GL-1 cells ranged from <0.1 μM (BI-2536, Sorafenib, Quizartinib, Sunitinib, Toceranib), 0.1–1 μM (TAE684, SGI-1776, TAE226, Tozasertib), 1–10 μM (Dasatinib, Pazopanib, Nilotinib, Erlotinib, Axitinib) and >10 μM (Gefitinib, Imatinib, Masitinib, Lapatinib, Vandetanib). No relevant differences were found in IC50 between GL-1 and GL-40 for any of the PKIs tested.

Conclusion/Discussion: Several PKIs inhibited lymphoid cell proliferation with good direct activity shown for inhibitors of PLK1, Raf, FLT3, ALK, Pim-kinase, FAK, and Aurora Kinases and these require further (clinical) evaluation. PKIs targeting c-KIT, PDGFR, VEGFR showed variable antiproliferative effects, while PKIs targeting EGFR had little to no inhibitory effect. The PKIs tested showed similar IC50 in both the GL-1 and GL-40 cells suggesting that P-gp overexpression has no role in tumor resistance to PKIs guaranteeing their value in case of tumor resistance to cystostatic drugs.

Disclosures: Disclosures to report.

P. Dubreuil has been involved in research on Masitinib and ABScience.

ESVONC – O – 2
MASITINIB TREATMENT FOR ADVANCED STAGE III AND IV CANINE MELANOMA. A. Giuliano, J. Dobson. University of cambridge, Cambridge, UK

Masitinib is a tyrosine kinase inhibitor (TKI) licensed for treatment of non-resectable canine mast cell tumors, its major targets include c-kit, PDGFR and FAK kinases. Aberrant expression of c-Kit and FAK have been found in human patients affected by cutaneous and mucosal melanoma. Masitinib and other TKIs with similar targets have been used in human patients with advanced stage melanoma bearing c-kit mutations with some encouraging results. The role of c-kit, FAK and PDGFR in canine melanoma has not be extensively investigated. Although c-kit mutation seems uncommon, strong c-kit expression has been found in around 50% of canine oral melanoma, however, correlation of c-kit mutation/expression with prognosis is still uncertain PDGFR expression has been found in around 50% of oral canine melanoma and was shown to correlate with a worse prognosis in one study. The expression and importance of FAK in canine melanoma has not been reported yet.

The aim of this small study was to assess response rates and to a lesser extent survival, in advanced stage III and IV canine melanoma treated with masitinib, as a proof of concept that masitinib may potentially play a role in treatment of this disease.

Eleven dogs were prospectively enrolled, two with digital, one anal and eight oral melanoma. Only dogs with progressive gross disease despite conventional treatment were included in the study. All the dogs were staged with thoracic radiography and fine needle aspirate of the regional lymph node when palpable. One dog had thoracic CT and abdominal ultrasound. All dogs had previously received various combinations of surgery, radiotherapy and melanoma vaccine treatment.

Two dogs achieved partial response, five dogs stable disease and four progressive disease. For all 11 dogs median TTP (time to tumor progression) and MST (median survival time) were 66 and 124 days respectively. Masitinib was generally well tolerated with side effects only observed in three patients. One experienced Grade 1 anemia and neutropenia, one Grade 2 anorexia and one Grade 1 diarrhea.

Mucosal melanoma is an aggressive disease that carries a poor prognosis, no effective systemic treatments are currently available to control the progression of metastatic disease. This small study showing some efficacy in end stage disease, indicates that masitinib offers potential for treatment of canine melanoma. Further studies in earlier stage disease and possibly in combination with other modalities are needed to support our findings.

Disclosures: Disclosures to report.
Masitinib tablets were donate by AB Science.

ESVONC – O – 3
TOCERANIB PHOSPHATE IN FIFTEEN DOGS WITH STAGE 4 ANAL SAC APOCRINE GLAND ADENOCARCINOMA. J. Elliott. Willows Referral Service, Solihull, UK

A variety of therapies are employed in the management of anal sac apocrine gland adenocarcinoma (ASAGA); including surgery, radiotherapy and chemotherapy. Toceranib phosphate (Palladia®) has shown anti-cancer activity in dogs with advanced ASAGA, which may be related to receptor tyrosine kinase expression such as KIT, RET and PDGFR.

Whilst some patients present with advanced regional nodal metastases (typically to the ilio-sacral lymphatic centre; stage 3b) unfortunately some present with distant metastases which can temper owners' desire to choose aggressive loco-regional therapies including lymph node extirpation or radiotherapy. Indeed such therapies would also not treat the distant metastatic deposits and so systemic therapy would still be a requirement for successful management.

Fifteen dogs presented between 2012 and 2016 with stage 4 ASAGA (presence of distant metastases) with no prior therapy; other than in two patients where the primary tumor in the anal sac had been surgically excised as a diagnostic procedure.

Presenting clinical signs were related to abnormal defecation in only eight patients with other dogs diagnosed due to incidental discovery for another problem ($n = 4$), PUPD ($n = 1$) and spinal pain ($n = 2$).

A variety of breeds were represented though 40% were English Cocker Spaniels. All dogs had lymph node metastasis. Other sites of metastasis included lung ($n = 11$), liver (confirmed in $n = 4$ and highly suspicious in $n = 3$), lumbar spine ($n = 2$) and kidney, skin and peritoneum (all $n = 1$).

The median toceranib dose was 2.4 mg/kg (range 2.1–2.6) and was administered on a Monday-Wednesday-Friday basis. Concurrent medications were firocoxib ($n = 5$), carprofen ($n = 1$) and prednisolone ($n = 1$); the latter being for management of concurrent hypercalcemia of malignancy. No serious toxicities were seen during toceranib therapy. Three episodes of hematological toxicity (grade I anemia; $n = 2$ and transient mild thrombocytosis; $n = 1$) were seen. One dog experienced an episode of grade 2 diarrhea; necessitating a short treatment break and re-institution at a lower dose.

Routine repeat staging was advised, and when performed a reduction in tumor burden (but classified as stable disease) was seen in all but one patient; where progressive disease was observed.

Median survival time of toceranib-treated patients was 359 days (range 66–1024 days) which is substantially higher than 71 days (median; 95% CI: 6–136 days) or 82 days (95% CI: 0–247 days) previously reported with a variety of non-TKI therapies.

Toceranib phosphate can be a successful and well-tolerated monotherapy for dogs with stage 4 ASAGA.

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ESVONC – O – 4
EFFECT OF TOCERANIB PHOSPHATE (PALLADIA®) ON OUTCOME IN DOGS WITH ANAL SAC CARCINOMA. K.D. Lyons[1], C. Siedlecki[2], H. Wilson-Robles[1], P. Bergman[3]. [1]Texas A&M University, College Station, USA, [2]VCA Bay Area Veterinary Specialists, San Leandro, USA, [3]VCA Clinical Studies, Los Angeles, USA

Canine apocrine gland anal sac adenocarcinoma (AGASACA) comprises 17% of perianal malignancies in the dog. Despite local and systemic therapy, relapse is common. Evidence suggests varying expression of tyrosine kinase inhibitor targets in canine AGASACA. Objective responses to toceranib phosphate (Palladia®) have been reported. The purpose of this study was to evaluate progression and survival outcomes in dogs with AGASACA treated with toceranib. Medical records were retrospectively reviewed for response, outcome, and toxicity. Data was available for 83 dogs with a median age of 11 years and a median weight of 23 kg. Sixty percent of patients had presumed metastasis at the time of diagnosis. Twenty four percent were hypercalcemic at the time of diagnosis. Seventy-seven percent received previous therapy including surgery, radiation, and chemotherapy. Toceranib was a first-line systemic agent in 48% of dogs, either adjunct to previous local therapy or as the sole treatment modality. Median toceranib dosage was 2.7 mg/kg with a median treatment duration of 126 days. Most adverse events were mild, but resulted in dose alteration and/or treatment holiday in 53% and drug discontinuation in 38%. Objective response rate was 62% with an additional 23% of patients experiencing stable disease. Twenty two percent of patients were alive at time of statistical analysis, 23% died of disease, and 23% were lost to follow up. Median overall survival time (OST) was 1395 days. Median progression-free survival (PFS) was 1247 days, including patients who received additional therapy after toceranib. Median progression-free interval (PFI) was 328 days. Response to toceranib was associated with previous treatment (P: 0.026) and lack of previous steroid therapy (P: 0.012). On multivariate analysis, only tumor size at diagnosis was prognostic for OST (P: 0.018), although presence of metastasis at diagnosis showed a trend towards significance (P: 0.055). Tumor size at diagnosis, lack of previous steroid therapy, and metastasis at diagnosis were all prognostic for PFI on multivariate analysis (P: 0.01, 0.035, and 0.020, respectively). Neither response to toceranib therapy nor previous treatment (other than toceranib) were significantly associated with outcome.

This is the first study evaluating outcome and survival data in dogs with AGASACA treated with toceranib. Results suggest that

toceranib may extend overall survival in dogs with AGASACA. Reported response rates and toxicity are similar to previous studies.

Disclosures: No disclosures to report.

ESVONC – O – 5

THE OCCURRENCE OF FELINE NEOPLASIA; A COMPARISON BETWEEN DANISH AND NORTH AMERICAN CATS. B. Børresen[1], M.A. Heden[2], M.S. Kent[3], A.T. Kristensen[1]. [1]Copenhagen University, Frederiksberg, Denmark, [2]Evidensia Djursjukhuset Göteborg, Göteborg, Sweden, [3]University of California Davis, Davis, USA

Feline cancer epidemiologic studies from North America all date prior to 1980 and suggest hemolymphatic cancers are the most common types of cancer. More recent publications are mainly European and suggest the integument is the most commonly affected system. This may be due to geographical or temporal differences. This study aimed to describe and compare the occurrence of cancer using a North American and Danish population of cats from the same time period.

Cases from the Danish Veterinary Cancer Registry (DVCR) and UC Davis (UCD) between 2005 and 2013 were included; finding 511 neoplasms from 479 cats (DVCR) and 1544 neoplasms from 1352 cats (UCD). There were significantly more neutered males and females ($P = 0.041$ and $P < 0.001$) and a significantly higher percentage of malignant tumors from UCD ($P < 0.001$) compared to the DVCR. Epithelial neoplasms were the most common tissue in both data sets. Skin and adnexa was the most commonly affected site in both groups, followed by the gastrointestinal system. Intact females had a similar relative risk of having mammary neoplasia compared to neutered females in both data sets (UCD 5.35 [1.53–18.65], DVCR 5.42 [4.02–7.31]), but there was a significant higher proportion of mammary gland tumors in the Danish data ($P < 0.001$).

Comparison between Danish and American cats showed that epithelial tissue and the integument were most commonly affected at both sites. The higher proportion of mammary gland tumors in DVCR data is likely related to the higher percentage of intact females.

Disclosures: No disclosures to report.

ESVONC – O – 6

EXPRESSION OF FELIS CATUS GAMMAHERPESVIRUS-1 ORF73, F7 AND ORF50 IN FIV-ASSOCIATED LYMPHOMA BIOPSIES. M. Aghazadeh[1], M. Shi[1], R. Troyer[2], A. Mcluckie[1], S. Lindsay[1], V. Barrs[1], J. Beatty[1]. [1]University of Sydney, Sydney, Australia, [2]College of Veterinary Medicine, Oregon State University, Corvallis, USA

Felis catus gammaherpesvirus-1 (FcaGHV-1), a candidate lymphomagenic virus discovered in 2013, infects an estimated 200 million cats worldwide. In humans, the gammaherpesviruses (GHV) Epstein-Barr virus (EBV) and Kaposi's sarcoma-associated herpesvirus (KSHV) are causal in up to 95% of HIV-associated lymphomas. In cats, feline immunodeficiency virus (FIV) infection is associated with the development of high-grade B-cell lymphomas. Whether FcaGHV1 plays a role in FIV-associated lymphomas is under investigation.

The gold standard for determining causality in EBV-associated lymphomas is the detection of viral transcripts expressed during latency that promote uncontrolled growth. The aim of this study was to investigate FcaGHV1 gene expression in FIV-associated lymphoma. We targeted 3 FcaGHV1 open reading frames (ORFs). Two were identified by comparative sequence analyses; *ORF73*, a homologue of EBNA1 which is expressed in all EBV-associated malignancies and *F7*, a homologue of KSHV vFLIP, which encodes an anti-apoptotic protein. The third, *ORF50*, was identified during our RNA-Seq analyses of feline lymphoma transcriptome. Its homologue is a KSHV lytic cycle activator.

Frozen biopsies from cases of high-grade B cell lymphoma arising in cats seropositive for FIV and seronegative for FeLV were identified in our tissue bank. Cases were included if tumor DNA was positive for FcaGHV1 on PCR. Nine samples met the inclusion criteria.

Total RNA was purified from frozen tissue and treated with DNase. One-step RT-PCR assays amplifying FcaGHV1 *ORF73*, *F7*, and *ORF50* (mRNA splice product) were designed and optimized. The identity of RT-PCR products migrating at the expected size was confirmed by sequencing. In 5 cases, expression of 1, 2 or 3 FcaGHV1 genes was detected. Four cats tested negative for all three transcripts.

This study demonstrates, for the first time, expression of FcaGHV1 in feline lymphoma tissues. Investigations to localize FcaGHV1 gene expression to cell type and to determine tissue specificity are warranted.

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Disclosures: No disclosures to report.

ESVONC – O – 7

HIGH PRETREATMENT D-DIMER CONCENTRATION IS ASSOCIATED WITH POOR PROGNOSIS IN 48 DOGS WITH HIGH-GRADE LYMPHOMA. P. Boye[1], F. Serres[1], F. Floch[1], L. Marescaux[1], D. Tierny[2]. [1]ONCOVET, Villeneuve D'ascq, France, [2]OCR, Siric ONCOLille, Parc Eurasanté, Loos, France

In humans, pretreatment plasma D-dimer levels have been reported to predict survival in several types of malignancies. The objective of this study was to evaluate the prognostic value of pretreatment D-dimer levels in dogs with high-grade lymphoma.

Forty-eight owned-dogs with multicentric high-grade lymphoma were enrolled in a prospective and observational clinical study. Signalments, clinical findings, histology and cytology reports, immunophenotype, complete clinical staging and response to treatment were recorded for all dogs according to the WHO classification. Pretreatment D-dimer levels were measured with a quantitative D-dimer turbidometric immunoassay (Nyco Card Reader II, NYCOMED).

Dogs were randomly assigned into two different treatment groups in a blinded fashion, for receiving anti-neoplastic drug (etoposide phosphate or F-14512). All dogs involved in the study followed the same protocol over a period of 8 weeks. The protocol consisted of four cycles of F14512 (0.075 mg/kg) or etoposide phosphate (100 mg/m^2) IV injections every 2 weeks with a 3-h injection once daily on 3 consecutive days. Short-term response was assessed by repeating complete staging at day 62, according to the RECIST criteria published for peripheral nodal lymphoma in dogs. Dogs were then followed every month until relapse. In case of relapse, a complementary CHOP-based chemotherapy protocol was proposed to the dog's owner.

The median value of pretreatment plasma D-dimer was 0.4 μg/mL (range: 0.1–14.3 μg/mL). The optimal cut-off value of D-dimer based on Progressive Free Interval (PFI) was 0.5 μg/mL (HR: 2.22, $P = 0.014$). A D-dimer level >0.5 μg/mL was significantly associated with inferior PFI (54 vs. 104 days, $P = 0.01$). Dogs with a D-dimer level >0.5 μg/mL had a significantly worse survival than those with a D-dimer level ≤ 0.5 μg/mL (OS: 93 vs. 177 days, $P = 0.01$). High D-dimer levels were not correlated with naïve versus relapsed lymphoma, B versus T lymphoma, clinical stage, substage and morphotype. High D-dimer levels remained an independent predictor for treatment received (etoposide phosphate vs. F14512, $P = 0.97$). There was no difference in response rate and PFI between dogs treated with F-14512 versus etoposide phosphate (ORR: 44% vs. 45%, $P = 0.92$; PFI: 86 vs. 87.5 days, $P = 0.34$ respectively).

In conclusion, pretreatment plasma D-dimer level may serve as a simple but effective predictor of prognosis in dogs with high-grade lymphoma. High pretreatment D-dimer levels were associated with short PFI and poor overall survival in 48 dogs enrolled in a prospective double-blind randomized clinical trial.

Disclosures: Disclosures to report.

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ESVONC – O – 8

EFFICACY OF CHEMOTHERAPY AND CLINICAL OUTCOME IN PRIMARY, METASTATIC FELINE PULMONARY CARCINOMAS: AN OBSERVATIONAL STUDY. E. Treggiari[1], A. Taylor[2], M.A. Pellin[3], G. Romanelli[4], P. Valenti[5], G.A. Polton[6], K. Curran[7], P. Brown[8], S.L. Mason[9]. [1]Willows Veterinary Centre and Referral Service, Solihull, UK, [2]Royal Veterinary College, Hatfield, UK, [3]School of Veterinary Medicine, University of Wisconsin, Madison, USA, [4]Clinica Veterinaria Nerviano, Nerviano, Milano, Italy, [5]Clinica Veterinaria Malpensa, Samarate, Varese, Italy, [6]North Downs Specialist Referrals, Bletchingley, UK, [7]Oregon State University, College of Veterinary Medicine, Corvallis, USA, [8]Small Animal Specialist Hospital, North Ryde, Australia, [9]Queens Veterinary School Hospital, University of Cambridge, Cambridge, UK

Pulmonary carcinomas are infrequently documented in cats and intra/extrathoracic metastatic disease appears common. While surgery is the gold standard for operable tumors, there are no studies assessing the efficacy of medical treatment in cases of metastasis. The aim of this study was to determine the clinical response to chemotherapy in primary feline pulmonary carcinomas with evidence of metastatic disease.

Medical records from multiple institutions were searched for cats with cytologically or histopathologically confirmed primary pulmonary carcinomas, with concurrent computed tomography-suspected metastases, that subsequently underwent treatment with cytotoxic chemotherapeutics or tyrosine kinase inhibitor drugs. Cats that underwent surgical resection of the primary tumor and/or associated metastases were not included.

Thirteen cats were selected for inclusion. Median age was 12 years (range 6–16 years) and median body weight 3.9 kg (range 3.1–8.2). Presenting clinical signs included coughing (9), tachypnea (5), gastrointestinal signs (4), abdominal pain (1) and lethargy (1). A diffuse nodular pattern, consistent with metastasis to the lung parenchyma, was present in all cases: additional locations were identified in 6 cases (intrathoracic nodes [5], kidneys [1]). Medical treatments included vinorelbine (3), carboplatin (4), toceranib phosphate (4) and metronomic cyclophosphamide (2). All cats had variable improvement in clinical signs after initiation of treatment and experienced moderate to mild toxicity, with no cats requiring hospitalization due to adverse events.

Overall median time to progression (TTP) with first line medical treatment was 99 days (range 32–317 days). Four cats had evidence of disease progression while on chemotherapy and received rescue treatment, with a TTP ranging from 8 to 85 days. In 2 cases, only a clinical response could be assessed; of these, one had renal metastases at diagnosis and the other developed renal metastases while receiving treatment. These two patients initially demonstrated stable disease but later developed intraocular and retrobulbar metastases, respectively. Of patients with repeat imaging, 1 cat had a partial response, 6 had stable disease and 4 progressive disease. The overall median survival time was 139 days (range 50–497 days). Four cats were still alive at the time of data analysis with a median follow-up of 428 days (range 81–625 days).

This study suggests that chemotherapy may achieve stable disease in cats with primary, metastatic lung tumors. Extended survival times are possible, with some cats surviving over a year. Based on these results, medical treatment appears to be well tolerated and should be considered in advanced disease stage.

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ESVONC – O – 9

OVARIAN TUMORS IN THE BITCH - PATHOLOGICAL FINDINGS AND AMH VALUES. H. Aupperle-Lellbach[1], K. Klose[2], A. Coelfen[3], C. Beitzinger[3], B. Walter[4], K. Jäger[3], F. Kassous[5], C. Weber[3]. [1]Laboklin GmbH&Co.KG, Bad Kissingen, Germany, [2]Institut of Veterinary -Pathology, Leipzig, Germany, [3]Laboklin, Bad Kissingen, Germany, [4]Clinic of Small Animal Surgery and Reproduction, München, Germany, [5]National veterinary school, Alfort, France

Although various neoplasms may occur in the canine ovary, only few studies with mainly small case numbers are available (Review: Arlt & Haimar 2016). Elevated Anti Muellerian-Hormone (AMH) concentrations have been described in granulosa cell tumors (GCT) in women and mares but not in dogs until now.

Aims of the study: (i) Pathological characterization of a higher number of canine ovarian neoplasms with a correlation to breed and age; (ii) Evaluation of AMH values in canine GCTs and other ovarian tumors.

Ovarian neoplasms of 280 bitches (age 9 ± 3 years) were submitted (2013–2016) for histopathological routine diagnosis, including macroscopic and immunohistochemical (cytokeratin, CD3, CD79a, CD31, actin) investigations.

In 21 cases, pre-operative serum samples were available for retrospective AMH value measurements with an automated Chemiluminescence-Immunoassay.

Ovarian tumors (unilateral/bilateral) were diagnosed as GCT (86/11), ovarian carcinoma (41/23) and adenoma (32/8), teratoma (17/3), dysgerminoma (14/2), leiomyoma (6/0), leiomyosarcoma (5/0), hemangiosarcoma (3/0), stromal tumor (2/0), lymphoma (4/3), luteoma (5/0), multiple different neoplasms (4/11). Certain signs of malignancy were obvious in 23 GCTs, six dysgerminomas, one teratoma and all carcinomas, lymphomas, sarcomas and cases with multiple tumors.

Bitches with teratomas were younger (median 6 years) than dogs with other ovarian neoplasms (median 9 years).

Median diameters were 1.5 cm of normal ovaries, 3.0 cm of ovarian adenomas and carcinomas, 4.5 cm of GCTs and dysgerminomas, 5.3 cm of teratomas.

Within the ovarian tumor population, the breed groups, Sheepdogs & Cattledogs (FCI-1) and Spitz & primitive types (FCI-5) were represented with 14.7% and 5.3% respectively. However, looking at all samples (AS) and percentage of all tumor samples (TS) submitted to LABOKLIN during the years, these breed groups were less represented: Sheepdogs & Cattledogs: AS 7.33% and TS 6.7%; and Spitz & primitive types: AS 7.8% and TS 1.74%.

AMH Values (ng/mL) were significantly higher in GCTs (median: 5.13, 1.12 to >23.00, $n = 9$) than in dysgerminomas (median: 0.25; 0.03–0.26, $n = 3$), ovarian carcinomas and adenomas (median: 0.61; 0.01–0.89, $n = 9$).

In conclusion, Sheepdogs & Cattledogs (FCI-1) and Spitz & primitive types (FCI-5) seem to have a predisposition for ovarian tumors. Although varying in median size and age of the bitch, ovarian neoplasms are not distinguishable by clinical or macroscopical findings. Histological investigation is needed for final diagnosis and prognosis. However, measurement of AMH serum concentration may help to identify GCT pre-surgically. Further studies will be performed to investigate AMH values in cases with ovarian cysts.

Disclosures: Disclosures to report.

Several authors of this study belong to Laboklin GmbH & Co.KG - a diagnostic laboratory, which is offering the AMH measurement for clients.

ESVONC – O – 10

INITIAL EVALUATION OF GUM ARABIC COATED RADIOACTIVE GOLD NANOPARTICLES IN CANINE PROSTATIC CANCER. S.M. Bechtel[1], A. Upendran[1], J.C. Lattimer, J. Kelsey[2], C.S. Cutler[2], K.A. Selting[1], J.N. Bryan[1], C.J. Henry[1], B.K. Flesner[1], E. Boote[3], D.J. Tate[1], M.E. Bryan[1], K.V. Katti[1], R. Kannan[1]. [1]University of Missouri, Columbia, USA, [2]Missouri University Research Reactor, Columbia, USA, [3]Spectrum Health, Grand Rapids, USA

Gum arabic coated radioactive gold nanoparticles (GA-^{198}AuNP) are effectively retained and result in 80% tumor reduction in a

mouse model of human prostatic carcinoma. Our objectives were to determine the toxicity and preliminary efficacy of GA-^{198}AuNP administered intralesionally to dogs with spontaneously occurring carcinoma of the prostate. The hypothesis was that intralesional GA-^{198}AuNP would cause short term swelling but cause no systemic toxicity and result in tumor stabilization or shrinkage. Following Institutional Animal Care and Use Committee approval, dogs with a diagnosis of prostate carcinoma without bladder involvement were eligible for enrollment with informed owner consent. Staging was performed and injection of GA-^{198}AuNP was achieved with CT guidance (100–200 μL per site in multiple sites, total amount varied based on tumor size). A complete blood count, chemistry panel, and urinalysis were performed weekly for 4 weeks following treatment; a CT scan was performed 4 weeks after treatment. Nuclear scintigraphy was performed regularly (15 min, 1 h, 4 h, 1, 2, 4, and 5 days post-injection) to determine the degree of retention of GA-^{198}AuNP in the prostate. Following the 4 week trial period, chemotherapy could be started at the discretion of the pet owner. Twenty-two dogs were enrolled; 3 dogs had metastasis to the lymph nodes in the sublumbar region and 19 dogs had no evidence of metastasis. Two dogs were treated to a biologically equivalent dose of 50 Gy and 20 dogs were treated to 105 Gy. One dog died 12 days post injection due to urethral obstruction from either tumor swelling or disease progression. Following this event, dogs with evidence of urethral obstruction had urethral stents placed ($n = 15$) prior to treatment. Fifteen dogs received chemotherapy. The median survival time of dogs receiving chemotherapy was 132 days (range 55–420 days) compared to 56 days (range 12–255 days) in dogs that did not. The average tumor retention of GA-^{198}AuNP was 70% at 5 days post-injection; loss occurred into the urine through the bladder. No accumulation of dose was found in heart, lung, liver, spleen, and kidney as determined by whole body planar imaging up to 5 days post-treatment. The median reduction in tumor volume was 10% one month after GA-^{198}AuNP therapy in 14 dogs. In conclusion, intratumoral administration of GA-^{198}AuNP caused no acute systemic toxicities in any dog and may be effective in decreasing tumor size, however, local tumor swelling is possible and dogs must be closely monitored for evidence of urethral obstruction.

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ISCAID – O – 1

RE-EMERGENCE OF FELINE PANLEUKOPENIA IN AUSTRALIA. V. Barrs[1], J. Brailey[1], A. Allison[2], M. Kelman[1], J. Meers[3], J.A. Beatty[1], E.C. Holmes[1]. [1]University of Sydney, Camperdown, Australia, [2]Cornell University, Ithaca, USA, [3]Australia

Feline panleukopenia, a highly contagious and often fatal disease of cats, is caused by feline panleukopenia virus (FPV) or canine parvovirus (CPV), both strains of *Carnivore protoparvovirus* 1. Clinical disease has rarely been seen in Australia since the mid-1970s until 2014, when an outbreak was reported to a national online disease surveillance reporting tool.

The aim of this study was to determine the strains of *Canine protoparvovirus 1* and epidemiological factors involved in outbreaks of feline panleukopenia reported since 2014. Veterinarians and shelter owners were contacted to arrange site-visits, collect samples and obtain information about animal movements, biosecurity and vaccination protocols for qualitative analysis. DNA was extracted from feces or tissues of representative cats from each outbreak with clinical signs of panleukopenia and/or positive fecal antigen CPV tests, for PCR and sequencing of the VP2 gene. Phylogenetic analysis of outbreak and CPV-like and FPV-like VP2 sequences available on GenBank was performed using the maximum likelihood method.

Three outbreaks causing over 350 fatalities were identified in; (A) 2014, Melbourne; (B) 2015, Melbourne and Mildura, a city 540 km from Melbourne; (C) 2016, Melbourne and Sydney. Outbreaks in Mildura and Melbourne were caused by identical or closely related FPV genotype(s), while the Sydney outbreak was caused by a different FPV genotype. Most cases were from municipal, charitable or private shelters. Shelters with the highest number of fatalities did not perform routine vaccination. In shelters that did administer vaccines, disease occurred in incompletely vaccinated cats or cats not vaccinated due to respiratory disease. Movement of unvaccinated cats from municipal shelters to networks of private foster carers was identified in all outbreaks, including between Melbourne and Mildura in outbreak B. The median age of cats at diagnosis was 8 weeks. All outbreaks occurred from summer to autumn, coinciding with peak shelter intakes of kittens.

Feline panleukopenia, caused by FPV, has re-emerged as a major cause of mortality in Australian feline shelters in association with inadequate vaccination and biosecurity practices.

Disclosures: Disclosures to report.

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ISCAID – O – 2

INVESTIGATION OF FECAL PARVOVIRUS SHEDDING IN ASYMPTOMATIC SHELTER HOUSED CATS IN AUSTRALIA. P.J. Byrne, J.A. Beatty, V.R. Barrs. University of Sydney, Camperdown, Australia

Canine parvoviruses (CPVs) and feline panleukopenia virus (FPV) are strains of *Carnivore protoparvovirus* 1. CPV2a-c can infect and replicate in both canids and felids. Using conventional PCR, a recent study reported a high prevalence of fecal shedding of CPVs among asymptomatic shelter cats in the UK, identifying cats as a potential reservoir of infection.

The aim of this study was to determine the prevalence of fecal shedding of CPVs in asymptomatic shelter-housed cats in Australia. One hundred stool samples from unvaccinated cats housed in a dual canine/feline shelter were collected and stored at −80°C until testing. Viral DNA was extracted from feces by homogenization of a 10% w/v solution of feces in phosphate buffered saline (PBS), boiling of the supernatant after centrifugation, chilling on ice and repeat centrifugation. To identify PCR inhibition in fecal DNA extracts, dilutions (1:10 and 1:20) of supernatant were spiked with feline genomic DNA (138 ng) and tested using a PCR amplifying the feline GAPDH gene. Feline GAPDH was amplified in all spiked fecal samples at a 1:20 dilution, and in 99 samples at a 1:10 dilution. PCR inhibition of GAPDH in one sample at 1:20 dilution was abolished at a 1:50 dilution.

Fecal DNA extracts (1:10 and 1:20 dilutions ($n = 99$), 1:50 dilution ($n = 1$)) from shelter cats were screened for the presence of CPV and FPV using a PCR assay amplifying a 529 bp region of the VP2 gene using primers 555-F and 555-R. PBS processed in parallel with samples from extraction to PCR served as a negative control and DNA from a previously sequenced canine CPV isolate as a positive control. In samples testing positive, the complete VP2 gene was sequenced to differentiate FPVs from CPVs. CPV DNA was not detected in the stool of any cat. FPV DNA was detected in the stool of 4 cats.

In contrast to results of a UK shelter, fecal shedding of CPV by asymptomatic shelter-housed cats was not detected in this study and the prevalence of FPV shedding was low. Future studies to screen for *Carnivore Protoparvoviruses* using quantitative PCR assays are warranted to rule out low-level shedding undetectable by conventional PCR.

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ISCAID – O – 3

CLASS A CPG OLIGONUCLEOTIDES IN CATS WITH NATURALLY OCCURRING FELINE PANLEUKOPENIA INFECTION: A PROSPECTIVE CASE-CONTROL STUDY. F.F. Ferri[1], F. Porporato[1], H. Lutz[2], M. Meli[2], G. Gerardi[3], L.M. Coppola[3], D. Bernardini[3], B. Contiero[3], N. Kohan Ranjbar[2], C. Callegari[1], R. Hofmann-Lehmann[2], E. Zini[4]. [1]Istituto Veterinario di Novara, Granozzo Con Monticello - Novara, Italy, [2]Clinical Laboratory, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland, [3]University of Padua, Padova, Italy, [4]Clinic for Small Animal Internal Medicine, University of Zurich, Zurich, Switzerland

Feline panleukopenia virus (FPV) infection leads to severe leukopenia and gastrointestinal signs in cats, with mortality rate of up to 70%. Besides supportive therapy, information regarding specific treatments is yet very limited in affected cats. Class A CpG oligodeoxynucleotides (CpG-A) are short single-stranded DNA molecules containing unmethylated cytosine-phosphate-guanosine motifs that stimulate production of type I interferons. Studies in cats showed the ability of CpG-A to induce an antiviral state *in vivo* and to inhibit replication of FPV *in vitro*. Therefore, aims of this study were to investigate the effects of CpG-A on survival and clinical score, white blood cell (WBC), red blood cell (RBC) and platelet counts, as well as viremia and fecal viral shedding in cats naturally infected with FPV. Cats with positive fecal parvovirus antigen test were prospectively enrolled if presenting clinical or laboratory sings of FPV, had body weight >500 g, were unvaccinated and not previously treated. Cats were randomly allocated to receive 100 μg/kg of CpG-A or placebo subcutaneously, at admission and after 48 h; all cases were treated with supportive therapy. A clinical score derived from attitude, appetite, vomiting, diarrhea and temperature was assigned daily until death or during 7 days. Blood and fecal samples were collected at admission and at 1, 2, 7 days; complete blood counts were obtained and real-time PCR was performed to quantify FPV DNA in blood and fecal samples. Chi-square test and mixed ANOVA were used to compare treatment groups. Forty-two cats were included: 22 received CpG-A and 20 placebo. Survival rate did not differ between cats treated with CpG-A and placebo [11 of 22 (50%) vs. 8 of 20 (40%), respectively; $P = 0.516$]. Differences between groups were not observed for clinical score, RBC, platelets, viremia and fecal viral shedding at any time point. Mean WBC count was higher in cats treated with CpG-A than with placebo at 7 days ($25{,}800 \pm 13{,}800/\mu L$ vs. $14{,}900 \pm 8400/\mu L$, respectively; $P = 0.017$) but not at the other time points. All cats showed discomfort during CpG-A injections. In conclusion, treatment with CpG-A did not improve survival or clinical score and did not reduce viral shedding, suggesting that the drug or the treatment regimen used in this study is not beneficial in cats affected with FPV. The lack of favorable response to CpG-A might be due to the delayed improvement of WBC counts. Of note, the administration of CpG-A may be painful in cats.

Disclosures: No disclosures to report.

ISCAID – O – 4

FERAL CARNIVORES ARE RESERVOIRS OF CARNIVORE PROTOPARVOVIRUS 1 IN AUSTRALIA. J. Brailey[1], D. Jenkins[2], M. Aghazadeh[1], J. Slapeta[1], J. Gorrell[3], J.A. Beatty[1], V.R. Barrs[1]. [1]University of Sydney, Camperdown, Australia, [2]Charles Sturt University, Wagga Wagga, Australia, [3]University of New England, Armidale, Australia

Disease in dogs caused by canine parvovirus (CPV) is common in Australia. A related strain of *Canine Protoparvovirus 1* (CPPV1), feline panleukopenia virus (FPV), re-emerged in 2014 in Australia as a major pathogen in shelter cats. In North America and Europe, wild carnivore hosts are implicated in the emergence of novel strains of CPPV1. Australia has large populations of introduced feral carnivores including cats (*Felis catus*) and foxes (*Vulpes vulpes*) as well as endemic carnivores such as the endangered Tasmanian devil (*Sarcophilus harissii*).

The aim of this study was to i) determine whether there is evidence of CPPV1 infection in feral carnivores and viral traffic between these and companion animals (ii) model *in silico* the susceptibility of the Tasmanian devil to CPPV1. Reticuloendothelial tissue samples were sourced from deceased feral carnivores for PCR amplification and sequencing of a 529 bp region of the CPPV1 VP2 gene. Phylogenetic analysis of partial VP2 gene sequences was performed using the maximum likelihood method. Tasmanian devil susceptibility to infection was investigated by comparison of their transferrin receptor type 2 (TfR) sequence at binding sites for CPPV1 to susceptible carnivores, and phylogenetic analysis of TfR protein.

Tissue samples from 62 feral cats and 53 foxes collected between 2010 and 2016 were analyzed. CPPV1 DNA was detected in 14/62 feral cats and 0/53 foxes. CPPV1-positive cat samples, all from animals culled in 2010, comprised 5 related FPV genotypes, including one genotype identical to that detected in FPV outbreaks in cat shelters in Melbourne (2014–2016), and another that was closely related to an FPV strain identified in a Burmese kitten in Melbourne in 1970. TfR amino-acid residues 224 and 389, critical to parvovirus binding, are glutamate and arginine, respectively in Tasmanian devil TfR, in contrast to leucine and lysine or asparagine in canid and felid hosts. Tasmanian devil TfR protein was only distantly related to these hosts.

This study provides evidence of feral cat reservoirs of CCPV 1 infection and viral traffic between feral carnivores and companion animals in Australia. TfR gene analysis indicates that Tasmanian devils are unlikely to be susceptible to CCPV1, which has important biosecurity implications for captive breeding programs.

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ISCAID – O – 5

FELINE MORBILLIVIRUS INFECTION IN DOMESTIC CATS IN ITALY: EPIDEMIOLOGICAL AND PATHOLOGICAL ASPECTS. E. de Luca[1], P.E. Crisi[2], E. Febo[2], M. di Tommaso[2], D. Malatesta[1], G. Zaccaria[1], M. Marcacci[1], G. di Francesco[1], M. di Domenico[1], A. Giovannini[1], G. di Guardo[2], G. Savini[1], A. Boari[2], A. Lorusso[1]. [1]Istituto Zooprofilattico Sperimentale of Abruzzo and Molise, Teramo, Italy, [2]University of Teramo, Teramo, Italy

A novel paramyxovirus, Feline morbillivirus (FeMV), has recently been detected in a stray cat in Italy (Piuma/2015). According to previous studies conducted in other Countries, FeMV has been suspected to be associated with feline chronic kidney diseases (CKD). We aimed at: i) investigating FeMV occurrence in the province of Teramo, central Italy, ii) associating FeMV with CKD lesions; iii) analyzing the genome of circulating FeMVs.

Urine samples collected from cats presented to the Veterinary Teaching Hospital (VTH, UniTE) or to local veterinary practitioners were screened (Group A, *n* 60). In addition, urine from cats (Group C, *n* 72) belonging to 4 colonies were also tested, as well as internal organs of carcasses (Group B, *n* 35). Formalin-fixed and paraffin embedded sections of kidney of cats were either stained with H&E or incubated with Ab against FeMV-N protein. qPCR-positive RNAs were employed for SISPA/NGS. Finally, a portion of the polymerase (L) gene was amplified by RT-PCR from all positive samples. Carcasses were divided into subgroups, including B1 (+virus +lesions), B2 (+virus -lesions) and B3 (-virus +lesions).

In Group A, 7/60 urine samples were positive by qPCR, whereas in Group C, 20/72 samples were positive. Eight/35 carcasses resulted positive by qPCR, with kidneys and urinary bladders being constantly positive. Viral RNA was also detected in the brain and spleen of one cat. A bilateral, subacute-to-chronic, lympho-plasmacytic interstitial nephritis was observed in all the qPCR positive cats, which also showed scattered immunolabeling for viral antigen within their renal parenchyma, mostly involving the cortical kidney tubules and the surrounding inflammatory cells. Sequences of the L gene have been also obtained from all positive samples. Genetic diversity has been observed between different groups. In C1, two putative different viral variants (97.8 % of nt id) have been observed, with one of these variants being present in C2. The highest nt difference was shown by most of the obtained sequences from all groups with Piuma/2015 (88.4–88.9% of nt id).

While the occurrence of FeMV in Group A mirrors that seen in cats from other Countries, FeMV occurrence in Group C is higher. As in previous studies, genome diversity has been also demonstrated in FeMVs circulating in our province. We believe that the scattered viral antigen immunolabeling detected in renal tubular epithelia, as well as in the surrounding inflammatory cells, gets along very well with an intermittent viral excretion through urine. Statistical analyses are currently underway.

Disclosures: No disclosures to report.

ISCAID – O – 6

EVALUATION OF A DISCRIMINATIVE REAL-TIME RT-PCR IN CEREBROSPINAL FLUID FOR THE DIAGNOSIS OF FELINE INFECTIOUS PERITONITIS. S. Felten[1], C.M. Leutenegger[2], H.J. Balzer[3], N. Pantchev[3], K. Matiasek[4], L. Sangl[1], S. Doenges[1], S. Gruendl[1], A. Fischer[1], K. Hartmann[1]. [1]Clinic of Small Animal Medicine, Ludwig-Maximilians-Universitaet Munich, MUNICH, Germany, [2]IDEXX Laboratories Inc., West Sacramento, USA, [3]IDEXX Vet Med Labor GmbH, Ludwigsburg, Germany, [4]Section of Clinical and Comparative Neuropathology, LMU Munich, MUNICH, Germany

Ante-mortem diagnosis of feline infectious peritonitis (FIP) is particularly difficult in cats without effusions, of which about 40% have neurological signs indicative of central nervous system (CNS) manifestation.

Aim of this study was to evaluate sensitivity and specificity of a real-time reverse transcription polymerase chain reaction (RT-qPCR) able to distinguish the two feline coronavirus (FCoV) pathotypes (feline infectious peritonitis virus (FIPV) and feline enteric coronavirus (FECV)) in cerebrospinal fluid (CSF) of cats suspected of having FIP.

The study population consisted of 31 cats with confirmed FIP (six with neurological signs) and a control group of 29 cats (ten with neurological signs) for which FIP was considered a differential diagnosis, but which were definitively diagnosed with other diseases. CSF of these cats was tested for presence of feline coronavirus (FCoV) RNA by RT-qPCR and in positive cases, the pathotype was determined according to the S gene sequence. Sensitivity and specificity including 95% confidence intervals (95% CI) were calculated.

FIPV was detected in the CSF of three cats with FIP. In six cats with FIP, FCoV RNA was detected, but virus load was too low to allow pathotyping. FCoV was not detected in any of the control cats.

Specificity of the RT-qPCR was 100% (95% CI: 88.1–100.0); sensitivity for detection of any FCoV was 29.0%; sensitivity of detection of the FIPV pathotypes in all cats was 9.7% (95% CI: 2.0–25.8), 16.7% in cats with neurological signs.

Specificity of the RT-qPCR was excellent, but a negative test result cannot rule out FIP.

Disclosures: Disclosures to report.

Dr. Christian Leutenegger is the Head of Molecular Diagnostics at IDEXX Laboratories, Inc. Dr. Hans-Jörg Balzer and Dr. Nikola Pantchev are employed at IDEXX Laboratories, Ludwigsburg. This laboratory offers the FCoV and FIP virus real-time RT-PCR on a commercial basis and performed the testing in this study. IDEXX played no role in the study design, in the collection and interpretation of data, or in the decision to submit the manuscript for publication. There is no commercial conflict of interest as the information generated here is solely for scientific dissemination. The authors declare that they have no competing interests.

ISCAID – O – 7

SCREENING FOR SELECTED PATHOGENS IN TICKS INFECTING CATS IN THE UNITED KINGDOM: A LARGE-SCALE SURVEILLANCE PROGRAMME. F. Duplan[1], S. Davies[2], S. Filler[3], S. Abdullah[2], S. Keyte[1], H. Newbury[4], C.R. Helps[3], S. Tasker[1], R. Wall[2]. [1]Langford Vets University of Bristol, Langford, UK, [2]Veterinary Parasitology and Ecology Group, School of Biological Sciences, Life S, Bristol, UK, [3]Molecular Diagnostic Unit, Diagnostic Services, Langford Vets, School of Veterin, Langford, UK, [4]MSD Animal Health, Milton Keynes, UK

Ticks are important vectors; cats acquire tick-borne pathogens when bitten by ticks. Ticks derived from cats have rarely been evaluated for the presence of pathogens; small studies have been described in Spain, Italy and Poland but no studies have yet been performed in ticks found on cats in the UK.

The aim of this study was to determine the prevalence of selected tick-borne pathogens in ticks collected from cats in the UK: pathogens evaluated were *Anaplasma phagocytophilum, Bartonella* spp. including *Bartonella henselae, Hepatozoon* spp., *Babesia* spp., *Borrelia* spp. including *Borrelia burgdorferi* sensu lato, and hemoplasma species including *Mycoplasma haemofelis (*Mhf), '*Candidatus* Mycoplasma haemominutum' (CMhm) and '*Candidatus* Mycoplasma turicensis' (CMt).

Ticks were collected from cats presenting to veterinarians in UK practices. Tick species were identified morphologically and underwent DNA extraction using commercially available kits followed by PCR assays (either conventional or quantitative real-time [qPCR]) for the tick-borne pathogens specified above. All assays had been previously validated for detection of the target species. Feline 28S rDNA served as an endogenous internal PCR control (assessed within the hemoplasma qPCRs). Additionally, the samples were spiked with an internal amplification control (IAC) to monitor for inhibition. Positive samples from the generic PCRs (*Bartonella* spp., *Hepatozoon* spp., *Borrelia* spp.) were submitted for DNA sequencing for species identification.

A total of 541 ticks were collected. Of these 309 (57.1%) were *Ixodes ricinus*, 224 (41.4%) were *Ixodes hexagonus* and 8 (1.5%) were *Ixodes trianguliceps*. 28S rDNA was amplified from 476 (88.0%) of the ticks (undetected results likely being due to some ticks being unfed). The IAC PCR results revealed no evidence of inhibition. Of 541 ticks, 33 (6.1%) contained pathogens, and 1 tick contained two. Agents detected were: 6 (1.1%) *Babesia* spp. (*Babesia microti*-like & *Babesia venatorum*), 10 (1.8%), *Borrelia* spp. (*Borrelia afzelii* & *Borrelia garinii*), 5 (0.9%) *A. phagocytophilum*, 7 (1.3%) *Bartonella* spp. (including *B. henselae* & *Bartonella clarridgeiae)*, 6 (1.1%) hemoplasma species [4 (0.7%) CMhm, 1 (0.2%) Mhf and 1 (0.2%) CMt]. Additionally, *Hepatozoon silvestris* was detected.

The resulting data provide valuable information on the prevalence of tick-borne pathogens in ticks found on cats in the UK. The prevalences found were similar to those reported in ticks collected from dogs in the UK but lower than those reported in ticks from cats in other European countries. This is the first report of the detection of *H. silvestris* in ticks collected from domestic cats in the world.

Disclosures: Disclosures to report.

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companies, around the world. Â ST is a member of the World Forum for Companion Animal Vector Borne Diseases, supported by Bayer Animal Health. ST is a member of the European Advisory Board on Cat Diseases, which is supported by Merial.

ISCAID – O – 8
THE ROLE OF HYPOVITAMINOSIS D IN COMPLICATED CANINE BABESIOSIS. E. Dvir[1], C.T. Rosa[2], R.J. Meiianby[3], J.P. Schoeman[2]. [1]Tel Hai Academic College, Upper Galilee, Israel, [2]University of Pretoria, Pretoria, South Africa, [3]University of Edinburgh, Edinburgh, Scotland

Canine babesiosis is caused by *Babesia rossi* and the infection is very virulent. Some cases suffer from major complications including hemolytic anemia, hepatopathy, acute renal failure, acute respiratory distress syndrome, hypoglycemia, cerebral hemorrhages and pancreatitis. The disease has a mortality rate between 7 and 10%. Consequently, there is a need to improve understanding of the risk factors associated with poor clinical outcome. The current study examines the association between *B. rossi* infection and serum concentrations of 25 hydroxyvitamin D (25(OH)D), the major circulating vitamin D metabolite. Hypovitaminosis D has been reported in a wide range of infectious diseases in humans and dogs and low vitamin D status has been associated with poor clinical outcomes. This is the first study to investigate vitamin D status in canine babesiosis.

The hypothesis of this study was that dogs with babesiosis would have a lower vitamin D status than healthy dogs and that hypovitaminosis D would be associated with disease severity. The serum 25(OH)D metabolites were measured by high-performance liquid chromatography. Dogs were excluded from all groups if they were less than 1 year old, had concurrent diseases or were receiving corticosteroids. Blood was collected upon admission. The babesiosis cases were scored for severity. Each of the previously described babesiosis complications, inter alia, high serum lactate, hypoglycemia, hypercortisolemia, hypothyroxinemia, presence of SIRS received a score of 1. Finally, the total individual severity score was calculated.

Dogs with babesiosis ($n = 35$) had significantly lower 25(OH)D concentrations than the control group ($n = 24$) (24.05 ± 17.71 vs. 88.75 ± 38.25, $P < 0.001$). ANCOVA analysis demonstrated that the effect of babesiosis on 25(OH)D concentrations compared to control dogs was still significant after considering the effect of age and weight. In addition, hypovitaminosis D was not significantly affected by serum creatinine and ALT concentrations, thereby eliminating the effect of renal insufficiency or liver damage, respectively. Moreover, correlation analysis revealed that hypovitaminosis D was not significantly correlated with the time from last meal (anorexia). Yet, hypovitaminosis D, was significantly influenced by hypoproteinemia, hypoalbuminemia and hypoglobulinemia. Finally, among the babesiosis cases, the severity score had a significant inverse correlation ($r = -0.39$, $P = 0.04$) with serum 25 (OH)D concentrations.

These results indicate that hypovitaminosis D is associated with canine *Babesia rossi* infection. The inverse correlation between 25 (OH)D concentrations and the severity score and the association between hypovitaminosis D and hypoproteinemia, hypoalbuminemia and hypoglobulinemia indicate that hypovitaminosis D might be a helpful indicator of severity and prognosis.

Disclosures: No disclosures to report.

ISCAID – O – 9
IS URINE CULTURE THE POOR MAN'S BLOOD CULTURE? CONCORDANCE BETWEEN PARALLEL CANINE BLOOD AND URINE CULTURES. N.R. Barash, A.J. Birkenheuer, J. Megan. North Carolina State University, Raleigh, USA

Bloodstream infections are a substantial cause of morbidity and mortality in critically ill veterinary patients. Blood cultures are the gold standard for diagnosis of bacteremia, but are infrequently obtained due to technical and practical difficulties in sample acquisition. In ill patients, urine cultures are sometimes recommended as surrogates for blood cultures as part of a "better than nothing" approach. This study evaluated the ability of urine culture to predict blood-stream infection. We retrospectively evaluated all blood, aerobic, and anaerobic cultures submitted at NC State Veterinary Hospital between 2011 and 2016. We calculated growth rates of 18% (blood), 24% (urine), and 61% (non-urine) from 511 blood, 6797 urine, and 6552 non-urine cultures submitted. Blood isolates were most commonly coagulase-positive *Staphylococcus* spp (27%) and *Escherichia* coli (14%); *Escherichia coli* was the most common urinary isolate (43%), along with *Enterococcus* (14%) and coagulase-positive *Staphylococcus* (11%). 324 urine and blood samples were submitted in parallel, of which 21 yielded simultaneous growth. Of these, only 14 samples were concordant, while 7 yielded discordant urinary and bloodstream infections. Overall, urinary isolates were poorly reflective of bloodstream isolates, with a sensitivity of 24% but a specificity of 87%. General concordance, including true positive ($n = 14$) and true negatives ($n = 232$), between urinary and bloodstream isolates was 76%. Urine culture isolates had a poor positive predictive value (29%) but a negative predictive value of 84% for bloodstream infection. An apparent exception is patients with suspected urogenital infection sources (renal, prostatic, etc), in which 100% ($n = 7$) had concordant urinary and bloodstream infections. Coagulase-positive *Staphylococcus* infections were most likely to be concordant. 133 non-urine samples submitted in parallel with blood cultures were also evaluated; only biliary and intravenous catheter samples carried a PPV >40%. In short, we recommend that if bloodstream infection is suspected, blood cultures be acquired. Coagulase-positive *Staphylococci*, if isolated from urinary tract of ill patient, should raise clinical suspicion of a potential concordant bloodstream infection. Due to a high discordance rate, in particular, blood cultures should be performed in any potentially septic animal who is immunosuppressed. Bacteriuria is neither a substitute nor a screen for bacteremia, and in fact, based off of our calculated false negative rate, treatment of urinary tract pathogens in likely bacteremic animals would lead to treatment for the incorrect bloodstream pathogen 76% of the time. Though urine cultures are encouraged as part of a complete diagnostic workup, they do not substitute for blood cultures.

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ISCAID – O – 10
COMPANION ANIMALS AND HUMANS WITH UTI SHARE COMMON UROPATHOGENIC KLEBSIELLA PNEUMONIAE. C. Marques[1], G. Trigueiro[2], P. Cavaco[3], J. Menezes[1], A. Belas[1], C. Pomba[1]. [1]Faculty of Veterinary Medicine, CIISA, University of Lisbon, Lisbon, Portugal, [2]Laboratório de Análises Clínicas Dr. Joaquim Chaves, Lisbon, Portugal, [3]Centro de InvestigaçÃ£o Interdisciplinar Egas Moniz [CiiEM], Instituto Superior d, Lisbon, Portugal

Klebsiella pneumoniae are important nosocomial pathogens that are increasingly reported as multidrug-resistant (MDR). Companion animals (CA) with urinary tract infections (UTI) may become infected with MDR and virulent *K. pneumoniae* and thus act as reservoir to humans. This study aimed to characterize and compare the clonal relatedness of *K. pneumoniae* isolated from companion animals and humans with UTI. *K. pneumoniae* isolated from CA ($n = 26$) and from community and hospital-acquired human UTIs ($n = 76$) were tested by disk diffusion for susceptibility (AST) against 28 antimicrobials according to CLSI. Resistant isolates were screened for sixteen resistance genes and seven virulence genes by PCR. All CA isolates and third-generation cephalosporin resistant (3GCr) human isolates were typed by MLST. Population structure of CA and human isolates were further characterized by PFGE-*Xba*I macro-restriction using Dice/UPGMA clustering analysis with a 1.5% tolerance.

The high-risk clonal *K. pneumoniae* lineage ST15 predominated in CA isolates (61.5%, $n = 16/26$) and clustered together with a similarity index (SI) = 69%. Most CA ST15 isolates belonged to two clusters (ST15a, ST15b) with SI>80%. Interestingly, all CA ST15 showed resistance to fluoroquinolones and 75% ($n = 12/16$)

were 3GCr mainly due to CTX-M-15. Two human ST15-CTX-M-15 *K. pneumoniae* were detected, one of which belonging to ST15b cluster. CA and human ST15-CTX-M-15 *K. pneumoniae* shared *fim*H-*mrk*D-*kfu*-*ycf*M virulence profile with few ($n = 4$) also harboring yersiniabactin. Additionally, 3GC-susceptible human *K. pneumoniae* (unknown ST) also clustered with ST15a ($n = 2$) and ST15b ($n = 1$). All CA/human ST15a and ST15b strains were fluoroquinolone-resistant.

The hospital adapted ST11 *K. pneumoniae* clonal lineage was detected in CA ($n = 1$) and humans ($n = 1$) showing the same MDR AST profile. On PFGE analysis, both ST11 were closely related (SI = 81.1%) and shared several virulence (*fim*H-*mrk*D-*kpn*-*ycf*M-yersiniabactin) and resistance (DHA/aphAI-IA/aac(6′)-Ib/tet(A)/sul1) genes. CA ST11 strain also harbored CTX-M-15 and *qnr*B.

3GCr ST348 from CA ($n = 1$) and humans ($n = 1$) showed a cluster SI = 86.7%. Although similar in PFGE analysis, the AST varied between the strains with CA and human ST348 harboring CMY-2 and CTX-M-15, respectively.

This study shows that CA and humans can become infected with clonal related *K. pneumoniae* some of which belonging to high-risk clonal lineages. These results reveal the potential zoonotic nature of *K. pneumoniae* UTIs in CA and therefore infection control measures should be advised to owners to avoid the spread of resistant and virulent *K. pneumoniae*.

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ISCAID – O – 11

VALIDATION OF A QPCR PANEL TO AID IN THE DIAGNOSIS OF DERMATOPHYTOSIS.

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Dermatophytosis (ringworm) is a common cutaneous fungal infection in both cats and dogs. As many as 90% of cats with dermatophytosis are infected by *Microsporum canis*. This strain is highly contagious and has zoonotic potential, but it is not life-threatening and it is treatable and curable. Due to the highly contagious nature of this disease, an accurate and timely diagnosis of dermatophytosis is very important.

The laboratory diagnosis of dermatophytes routinely includes direct microscopic evaluation of clinical specimens followed by culture on special media considered to be the gold standard. It is considered sensitive, is able to speciate, but requires 21 days of plate observation to yield a negative result.

Real-time polymerase chain reaction (PCR), also called quantitative PCR (qPCR) is an advanced molecular technology ideally suited for the detection of infectious pathogens. qPCR tests were developed targeting the ITS-1 gene sequences for genus specific *Trichophyton* spp. and *Microsporum* spp. and a beta-actin specific *Microsporum canis* assay. A clinical validation included 273 samples collected from 214 cats. 201 samples were collected from 195 exposed cats without lesions; 72 samples were collected from 19 cats with confirmed dermatophytosis lesions. Culture was positive in 17 lesion samples from 7 dermatophytosis confirmed cats. PCR was positive in 15 of those samples, as well as in an additional 7 positive lesion samples from a total of 8 cats. Culture was 87% sensitive and 88% specific when compared to PCR on lesioned samples. Cats without lesions but exposed to diseased cats were also tested to determine if PCR is too sensitive by detecting fomite carriers. PCR detected 7 positive samples from 4 exposed cats; compared to 10 culture positives from 10 exposed cats. Of the 19 cats with lesions, 6 were monitored at regular intervals during systemic and topical therapy. The average time to resolution was 47 days. The shortest duration to resolution was 23 days. It is therefore recommended that PCR monitoring should start at around 3 weeks of treatment. In summary, qPCR compared to conventional culture showed excellent sensitivity in clinical cases with lesions, did not pick up significant false positive signals in cats exposed to but not infected with Dermatophytes and can be used to monitor therapy success. Paired with its speed to result, the qPCR panel has excellent utility in the diagnosis of Dermatophytosis.

Disclosures: Disclosures to report.

Author and coauthors are employees of Idexx Laboratories, Inc.

SCH – O – 1

PREDNISOLONE THERAPY FOR CHRONIC HEPATITIS IN THE ENGLISH SPRINGER SPANIEL: A PROSPECTIVE STUDY OF 14 CASES.

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English Springer Spaniels (ESS) in the UK show an increased prevalence of chronic hepatitis (CH). As a viral etiology was initially suspected, historically these dogs were rarely treated with corticosteroids. In a previous study of 68 ESS with CH, in which only 3 dogs were treated with corticosteroids, a median survival time of 189 days was noted [range: 1–1211 days]. CH in the ESS shares similarities with human autoimmune hepatitis; it occurs more commonly in young females and has a similar histological appearance. Anecdotally some ESS with CH responded well to prednisolone. This study aimed to investigate the clinical and biochemical response following corticosteroid treatment.

ESS being treated in first opinion and referral practice with a histological diagnosis of idiopathic chronic hepatitis were enrolled prospectively between 2009 and 2017. Attending veterinary surgeons were asked to give prednisolone 1–2 mg/kg/day and submit regular blood results and progress reports to the authors. Ten female and four male ESS were enrolled with a median age at diagnosis of 5 years 7 months [range: 11 months–10 years]. No cases had been treated with corticosteroids within 6 months of the study. The mean prednisolone starting dose was 1.1 mg/kg/day [range: 1–2 mg/kg/day]. All cases received additional therapies including combinations of S-adenosylmethionine, Silybin, Ursodeoxycholic acid, and hepatic diet. The prednisolone dose was tapered appropriately over several months according to the patient's clinical and biochemical response, focusing on alkaline phosphatase (ALKP), alanine aminotransferase (ALT) and bilirubin.

All cases showed an improvement clinically, including resolution of jaundice (4/4), vomiting (5/5) and polyuria/polydipsia (4/4). Two out of the 14 cases were euthanized due to CH while receiving prednisolone, with survival times of 122 and 741 days from diagnosis. The remaining 12 patients are alive and clinically well, with 9 patients still receiving a mean dose of 0.4 mg/kg prednisolone every other day (EOD) [range: 0.25 mg/kg/EOD-1 mg/kg/day]. The median time since diagnosis is 630 days [range: 60–1350 days]. Two-sided Wilcoxon test demonstrated significant ($P < 0.05$) reductions in serum ALKP, ALT and bilirubin following prednisolone therapy. Median values before and immediately after starting immunosuppressive doses of prednisolone were 810 to 403 iu/L, 1000 to 299 iu/L and 24.0 to 4.0 μmol/L for ALKP, ALT and bilirubin respectively.

The results of this study demonstrate a markedly improved survival over a historical cohort when ESS with CH are managed with immunosuppressive doses of prednisolone. Serial measurements of ALKP, ALT and bilirubin are useful for monitoring the patient's progress.

Disclosures: No disclosures to report.

SCH – O – 2

CYCLOSPORINE IN THE TREATMENT OF CANINE CHRONIC HEPATITIS.

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Chronic hepatitis (CH) is a common hepatic disorder in dogs. Diagnostic criteria of canine CH include persistent ALT elevations

>2 times normal and histopathologic features based on WSAVA guidelines, characterized by moderate to severe chronic inflammation, hepatocellular apoptosis or necrosis, and fibrosis. Most cases are classified as idiopathic and therefore, optimal management for CH has not been established. Corticosteroids are reported to prolong survival in some dogs, suggesting an immune-mediated mechanism to the disease. However, corticosteroids cause significant side effects and induce a steroid hepatopathy that confounds interpretation of liver enzymes during therapy. To date, there are no studies investigating the use of alternative immunosuppressive therapy, such as cyclosporine (Cys), in the management of canine idiopathic CH.

The primary aim of this retrospective study was to evaluate the safety and efficacy of Cys in the treatment of idiopathic CH. A secondary aim was to identify any factors influencing Cys treatment response or time to remission. Remission was defined as normalization of serum ALT. Our hypotheses were that: (i) Cys therapy would achieve remission and (ii) Lower pretreatment clinical scores and higher serum ALT would predict prolonged times to remission.

Forty-six dogs diagnosed with idiopathic CH and treated with Cys met the inclusion criteria. Cases were excluded if there was a lack of biochemical data, concurrent immunosuppressive therapy, failure to complete at least 2 weeks of Cys therapy, or evidence of biochemical improvement with penicillamine or antibiotic administration. Twenty-five different breeds were represented. Ages ranged from 0.7–14 years with a median of 8 years. Fifty-two percent were female spayed and 43% were male castrated. Treatment side-effects included gastrointestinal signs ranging from mild inappetence to vomiting and diarrhea in 39% and gingival hyperplasia in 26%. Thirty-five dogs (76%) achieved remission based on ALT normalization. The median time to remission was 3 months. Three dogs (6.5%) reached partial remission (ALT values declined but remained between 1.1 and 2x the upper limit of normal). Eight cases (17%) did not achieve remission. Initial serum ALT activity, hepatic copper concentration (>1000 μg/g dry weight), and clinical score did not influence remission.

Cys proved to be effective in achieving remission based on normalization of serum ALT in canine idiopathic CH. Limitations include the retrospective nature of the study, concurrent therapies given, variability of long-term follow-up, and the lack of post treatment biopsies.

Disclosures: No disclosures to report.

SCH – O – 3

INVESTIGATION INTO HEPATOCYTE EXPRESSION AND PROGNOSTIC SIGNIFICANCE OF SENESCENCE MARKER P21 IN CANINE CHRONIC HEPATITIS. A.J. Kortum, E.A. Cloup, F. Constantino-Casas, P.J. Watson. University of Cambridge, Cambridge, UK

Canine chronic hepatitis (CCH) is characterized histologically by hepatocellular apoptosis or necrosis, a variable mononuclear or mixed inflammatory infiltrate, regeneration and fibrosis. Life-expectancy following diagnosis is unpredictable, ranging from days to years. Reported prognostic indicators (hyperbilirubinemia, hypoalbuminemia and presence of ascites or cirrhosis) are unreliable, particularly in end-stage disease. Hepatocyte expression of p21, a universal cell-cycle inhibitor and marker of cellular senescence, is strongly negatively correlated with outcome in humans with alcoholic and non-alcoholic related liver disease and is a better prognostic marker than histological or clinical scoring systems. P21 expression has not been investigated in CCH.

This study investigated whether hepatocyte p21 expression is increased in CCH and if expression is associated with survival. Cases of CCH were retrieved from the pathology database (2004–2016) and liver biopsy samples were reviewed using routine stains (hematoxylin & eosin, rhodanine, and Sirius red). Immunohistochemistry was performed using monoclonal mouse anti-human p21 on all selected cases and four control liver samples with normal histology and no history of liver disease. P21 expression was manually quantified by scoring p21-positive and p21-negative hepatocytes in eight high-power fields for each case by two blinded observers and expressed as a percentage of total hepatocyte number. Kendall's Tau correlation coefficients were used to assess relationships between p21 expression and survival time or age; significance was set at $P < 0.05$ (2 tailed).

Twenty two dogs with CCH were selected. There was a significant negative correlation between hepatocellular p21 expression (median 83.17%; range 15.30–99.40) and survival (460 days; range 12–1559), but no correlation between p21 expression and age (median 7.3 years; range 2.0–12.0). Inclusion or exclusion of cases with copper-associated disease gave similar results. Three of four control samples from young dogs (< 6.5 years) displayed negligible p21 expression as expected (<10%). The fourth control sample from a 16.5-year-old dog had a high percentage of p21-positive hepatocytes (85%).

This study demonstrates that p21 expression in normal dogs increases with age as expected but is upregulated in CCH, indicating a state of cellular senescence irrespective of age. The median percentage of senescent hepatocytes in CCH was higher than in human hepatitis. These cells are indistinguishable from normal hepatocytes using routine stains but are unable to perform normal hepatic functions. p21 quantification in CCH may therefore provide additional information regarding hepatic function. Furthermore, a negative correlation between p21 expression and survival was identified, suggesting a role for p21 quantification in determining prognosis in CCH.

Disclosures: No disclosures to report.

SCH – O – 4

CHRONIC PORTAL VEIN THROMBOSIS IN ELEVEN DOGS. K. Sato, M. Sakai, Y. Sakamoto, C. Ishikawa, T. Watari. Nihon University, Fujisawa Kanagawa, Japan

Portal vein thrombosis (PVT) causes partial or total obstruction of portal blood flow, leading to pre-hepatic portal hypertension. Canine PVT is considered a rare entity and is classified into two categories, acute and chronic, based on the presenting clinical conditions. Diagnosis of canine PVT is generally performed using abdominal ultrasound. However, ultrasound is operator dependent. In humans, computed tomography (CT) angiography is preferred for the diagnosis and extensive evaluation of PVT.

We retrospectively reviewed veterinary clinical data from 2008 through 2017, and included cases that were diagnosed as PVT using CT angiography. Chronic PVT was classified as PVT with the absence of abdominal pain or shock. Variables including signalment, clinical signs, clinicopathological data, diagnostic imaging findings, treatment, and outcome were collected.

Eleven dogs were included in this study (seven male, four female). The median age and body weight were 11 years and 9.7 kg, respectively. Ten dogs had concurrent conditions, with pancreatitis ($n = 6$) as the most frequent one. Glucocorticoids were administered prior to the diagnosis of PVT in six dogs, and ascites was confirmed in four dogs. Clinicopathological analysis revealed elevation of liver enzyme levels in eight dogs, hypoalbuminemia in nine, and thrombocytopenia in four. Serum D-dimer concentration was measured in ten dogs, with elevated values observed in all ten. Abdominal ultrasonography revealed PVT in eight dogs, but the diagnosis was missed in three. CT scan revealed PVT of the main portal vein in ten dogs. For those dogs for which we obtained follow-up data, two were re-examined using CT angiography. A reduction in size or organizing thrombi were confirmed in both.

In our study population, pancreatitis and the administration of glucocorticoids were found to be closely associated with chronic PVT. Although we succeeded in diagnosing PVT by ultrasonography in the majority of the dogs, this technique failed to provide a correct diagnosis in three. Thus, in cases where PVT is suspected based on laboratory test results and is undetected on an abdominal ultrasound scan, CT angiography would provide an alternative option for detailed diagnosis and follow-up.

Disclosures: No disclosures to report.

SCH – O – 5

BREED PREDISPOSITION TO GALL BLADDER MUCOCOELES IN BORDER TERRIERS. F. Allerton[1], F. Swinbourne[1], M. Dunning[2], A. Kent[1]. [1]Willows Veterinary Referrals, Shirley, UK, [2]School of Veterinary Medicine and Science, University of Nottingham, UK

Gall bladder mucocoeles (GBM) are a leading cause of biliary disease in the dog. Predisposed breeds include Shetland Sheepdogs, Cocker Spaniels, Chihuahuas and Miniature Schnauzers. Border Terriers (BT) have not previously been described as being predisposed, which may reflect geographic differences in popularity.

A high incidence of GBM was noted in BTs in our hospital suggesting a breed predisposition. Retrospective evaluation of the medical records between January 2010 and April 2017 was performed to identify all dogs with an ultrasonographic diagnosis of GBM; 27965 dogs >2 years of age were seen over the study period. Of these 382 (1.4%) were BTs. Thirty-seven dogs (18 BTs and 19 non-BTs including 2 Labrador retrievers, 2 Affenpinschers, 2 Shetland sheepdogs, 2 Miniature Schnauzers and 11 other individual breeds) were diagnosed with a GBM based on ultrasound alone (9) or ultrasound with histopathologic confirmation (28).

Odds ratio (OR) calculation was performed to evaluate predisposition. BTs with GBM were compared to non-BTs with GBM with respect to signalment (age, sex, neuter status), hematologic and biochemical measures and outcome data.

The OR for BTs to present with a GBM was 72 (95% confidence interval 37–138). There was no significant difference in gender or neuter status between BTs with GBM and the wider hospital population. Of the dogs with GBM, BTs were significantly older than non-BTs (median 10y10 m (range 5y11 m to 13y11 m) vs. 8y9 m (range 4y3 m to 13y) ($P = 0.032$)). There was no significant difference in hematologic or biochemical parameters between BTs and non-BTs.

6/19 of the non-BTs and 3/18 of the BTs were managed without surgery. 2 BTs and 5 non-BTs had one or two (2 non-BTs) concomitant endocrinopathies (diabetes mellitus, hypothyroidism, hyperadrenocorticism) at presentation; post-cholecystectomy 2 BTs were diagnosed with one endocrinopathy and 1 BT with diabetes mellitus and hyperadrenocorticism. Median survival times could not be calculated for either of the groups (<50% mortality). There was no significant difference in survival rate between groups with 11/19 non-BTs and 11/18 BTs still alive at time of writing.

On the basis of this single-centre study, BTs may have a breed predisposition to GBM. It would be interesting to see if this data is replicated in other European hospitals. Further study of BTs is warranted to identify factors influencing this predisposition and possible preventative measures.

Disclosures: No disclosures to report.

SCH – O – 6

OUTCOME OF CATS UNDERGOING SURGICAL ATTENUATION OF CONGENITAL EXTRAHEPATIC PORTOSYSTEMIC SHUNTS THROUGH CELLOPHANE BANDING: 23 CASES. P. Valiente, B. de la Puerta, M. Trehy. North Downs Specialist Referrals, Redhill, UK

Aim: To retrospectively evaluate attenuation of congenital extrahepatic portosystemic shunts (CEHPSS) in cats by means of cellophane banding (CB). To report post-operative complications and long term outcome. (clinical response and results of serial bile acid stimulation tests (BAST)).

Methods: Retrospective study. Medical records (from July 2008 through February 2017) of cats with CEHPSs were reviewed. Diagnosis of CEHPSs was made by diagnostic imaging and confirmed during coeliotomy. Cats treated with CB that had BAST performed pre- and post-operatively were included.

Results: Twenty- three cats were included. The study population comprised 8 different breeds with a median age of 8 months (4 to 33) and median body weight of 2.5 kg (1.45 to 4.7). Eleven cats were female (5 entire, 6 spayed) and 12 cats were male (6 entire, 6 neutered).

Common clinical findings included: abnormal behavior (20/23), ptyalism (16/23), ataxia (12/23), stunted growth (12/23) copper colored irides (10/23), inappetence (10/23), depression (9/23) and seizures (4/23). Post-meal BAST before surgery was abnormal in all cats. Only two cats had normal fasting bile acids.

All cats received medical treatment before and after surgery. Treatment included: lactulose (23/23); clavulanate/amoxicillin (19/23), ampicillin (4/23) or metronidazole (2/23); levetiracetam (6/23) phenobarbitone (2/23). Protein restricted diet was prescribed in 18/23 cats. Median duration of medical treatment was 21 days (8 to 209) prior to surgery and 62 days (range from 14 to 2046) after surgery.

In most cases CEHPSs were detected by ultrasound. One cat had computed-tomography angiography. Portovenography was performed in 9/23 cats.

BAST was performed following CB after a median of 84 days (14 to 280 days). BAST normalized in 20/23 cats and 3/23 cats had persistently increased results. Two of them developed multiple acquired portosystemic shunts (one remained free of clinical signs until 6 years later, and the other was euthanized due to seizures). Complete closure of a patent shunt was achieved with a second surgery in the remaining cat with abnormal BAST.

Nineteen cats were alive and free of signs at last follow-up at least 8 months after surgery (3 to 66 months) Three cats developed post-operative seizures. Treatment with anticonvulsants resulted in complete or partial resolution of seizures in two cats. One cat was euthanized due to uncontrollable seizures.

Conclusion: CEHPSs occlusion by CB in cats carries a very good short and long-term prognosis.

Disclosures: No disclosures to report.

SCH – O – 7

TRANSCUTANEOUS FLUOROMETRIC MEASUREMENT OF INDOCYANINE GREEN CLEARANCE AS DYNAMIC LIVER FUNCTION TEST IN DOGS WITH CONGENITAL PORTOSYSTEMIC SHUNT. L. Hausmann[1], N. Gretz[2], M. Schneider[1], R. Neiger[3]. [1]Small Animal Clinic, University of Giessen, Giessen, Germany, [2]Medical Research Center, University of Heidelberg, Mannheim, Germany, [3]Tierklinik Hofheim, Hofheim, Germany

Indocyanine green (ICG), a fluorescent dye, is solely excreted by the liver without enterohepatic re-circulation. We have recently shown the feasibility of a noninvasive transcutaneous ICG clearance to assess hepatic function instantaneously.

In this follow-up study 10 dogs with congenital extrahepatic single portosystemic shunt (PSS) were included. Before and 3 months after surgical closure with cellophane banding or silk ligature a ICG clearance study was both done transcutaneously and fluorometrically by taking serial blood samples 0, 1, 3, 6, 9, 18, 42 and 64 min after iv injection of 0.2 mg/kg ICG. Transcutaneous ICG clearance was measured using two miniaturized devices to detect ICG fluorescence with an excitation wave length of 760 nm and an emission wave length of 820 nm. For both methods, half life time (HLT_{Se}, HLT_{tc}), plasma disappearance rate (PDR_{Se}, PDR_{tc}) and 15 min retention rate ($R15_{Se}$, $R15_{tc}$) were calculated based on the curve within minutes 1 to 15 after ICG injection. PSS closure was defined based on Doppler sonography and angiography.

In 6/10 dogs, the shunt vessel was closed after 3 months. In 3/10 dogs, the PSS was still partially open. One dog died after the operation. Transcutaneous ICG clearance was easily performed without complications and was well tolerated by all dogs. There was a significant difference between open and closed PSS for PDR (PDR_{Se}: $P = 0.0095$; PDR_{tc}: $P < 0.0001$) and R15 ($R15_{Se}$: $P = 0.0323$; $R15_{tc}$ $P < 0.0001$) but not for HLT. Linear correlation coefficient between PDR_{Se} / PDR_{tc}, $R15_{Se}$ / $R15_{tk}$ and HWZ_{Se} / HWZ_{tk} were $R^2 = 0.6169$, $R^2 = 0.4629$ and $R^2 = 0.08629$ respectively. In contrast to the invasive method there was no overlap except one dog of PDR_{tc} and $R15_{tc}$ of open and closed PSS.

In this first transcutaneous ICG clearance study of dogs with liver disease, transcutaneous assessment was superior to the invasive method and results are available immediately. The very limited invasiveness of this method and its dynamic character make the transcutaneous liver function test with ICG clearance a worthy test for veterinary medicine.

Disclosures: One author (N. Gretz) is owner or a patent using transcutaneous measuring devices.

VBPS – O – 1
EFFICACY OF TELMISARTAN IN HYPERTENSIVE CATS: RESULTS OF A LARGE EUROPEAN CLINICAL TRIAL.
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Hypertension (HT) and the associated risk of target organ damage (TOD) is a well-recognized cardiovascular problem of elderly cats. Consequently, early recognition and treatment of HT are crucial. This prospective, multicentre, placebo controlled, blinded study evaluated telmisartan in hypertensive cats diagnosed with systolic blood pressure (SBP) ≥160 mmHg on two days. HT causes were classified as chronic kidney disease (CKD), controlled hyperthyroidism, both combined and idiopathic. Cats with SBP>200 mmHg, evidence of TOD or pre-treated with vasoactive substances were excluded. Cats were randomized (2:1 ratio) to either receive 2 mg/kg telmisartan oral solution, or placebo q24 h. The study consisted of a 28 day efficacy phase and a 120 day extended use phase. Efficacy of telmisartan was defined *a priori* as significant mean SBP-reduction on day 14 compared to placebo and >20 mmHg SBP population mean reduction on day 28 compared to baseline. Pre-defined post inclusion removal criteria were adverse events, withdrawal of owner consent, owner non-compliance, TOD and SBP>200 mmHg. Missing SBP data were imputed in the database using the last observation carried forward method, if removal reasons had been TOD or SBP>200 mmHg. Data are presented as mean ± 1SD.

The efficacy population included 174 telmisartan and 88 placebo cats. Age, body weight, breed distribution, HT causes, and baseline SBP were similar in both groups (baseline SBP: telmisartan-group: 179 (± 9.9) mmHg; placebo-group: 177 (± 10.1) mmHg). Telmisartan treatment gave rise to a significantly larger reduction in mean SBP (relative to baseline) when compared to placebo on day 14 (−19 ± 22.0 mmHg, $n = 174$ vs −9 ± 17.7 mmHg, $n = 88$; $P < 0.0001$). At day 28, the data from 9 and 1 cats were excluded and that of two and two cats were imputed giving reduction in SBP relative to baseline of −25 ± 22.8 mmHg, ($n = 165$) and −11 ± 16.4 mmHg, ($n = 87$) for the telmisartan and placebo groups respectively. The proportion of cats with SBP reduction >20 mmHg between baseline and day 28 was 27.6% in the placebo group and 54.6% in the telmisartan group. The mean SBP decrease in the telmisartan group on day 120 was 28 ± 26.9 mmHg relative to baseline ($n = 144$). Adverse events were evenly distributed in both groups during the efficacy phase and were as would be expected for elderly cats suffering from CKD and other diseases of aging in the extended use phase.

In conclusion, telmisartan oral solution was safe and significantly reduced SBP by a clinically relevant magnitude in hypertensive cats for the four-month study period.

Disclosures: Disclosures to report.

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POSTER ABSTRACTS

ESCG – P – 1
FACTORS AFFECTING GASTRIC MUCOSAL BARRIER FUNCTION IN DOGS.
T.L. Hill[1], D. Lascelles[2], M. Law[2], I. Handel[3], A.T. Blikslager[2]. [1]University of Georgia, Athens, USA, [2]North Carolina State University, Raleigh, USA, [3]University of Edinburgh, Edinburgh, UK

Gastroduodenal ulceration is a recognized complication of NSAID or corticosteroid therapy, liver disease, sepsis, and neoplasia. Retrospective studies indicate that male, middle-aged and large breed dogs are most commonly affected. Rottweilers were affected at younger ages. Helicobacter has been associated with chronic gastritis; its effect on gastric mucosal barrier function (GMBF) is unknown. Previous Using chamber *ex vivo* injury models have examined changes in GMBF that relate to ulcer injury *in vivo*. Identification of factors associated with GMBF, as measured by transepithelial electrical resistance (TER), could identify risk factors for gastroduodenal ulceration *in vivo*. In this prospective study, TER was measured in control and acid-injured canine tissue to determine factors associated with changes in GMBF. These included: age, sex, neuter status, breed (large/small), and presence/degree of Helicobacter infection.

Canine gastric mucosa was collected immediately post-mortem from random-source dogs scheduled for euthanasia by an animal control facility. Acidic Ringer's solution (pH 1.2) was applied to the mucosa for 45-min. Tissue from each dog was also maintained at neutral pH Ringer's solution as control. GMBF was assessed using TER. Age, gender, neuter status, breed (large vs. small breed) and presence/degree of Helicobacter infection were correlated with baseline TER, change in control TER over time, change in TER with acid injury, and recovery of TER after acid injury. T-tests or Mann-Whitney Rank Sum tests were used to compare gender, neuter status, breed (large vs. small) and presence of Helicobacter with TER based on normality. Helicobacter infection was correlated with TER using Spearman rank correlation. Age was compared to TER using linear regression. Multiple linear regression identified predictive factors. Significance was set at $P < 0.05$.

Female dogs and neutered dogs had a higher baseline TER ($P = 0.025$, 0.028). Higher age was associated with decreased recovery from acid injury ($P = 0.011$). Helicobacter and breed size were not associated with changes in TER. Sex and neuter status were predictive of baseline TER; age was predictive of recovery from acid injury.

This study demonstrated factors associated with decreased GMBF either at baseline or with injury. Elevated baseline TER in female dogs may support previously reported male sex predilection. Because most of the dogs in the current study were young to middle-aged, decreased recovery of injured mucosa may support previous findings of predilection for middle-aged dogs to develop ulcers. Further work is needed to determine if these factors are relevant *in vivo* and to determine overall prevalence of disease.

Disclosures: No disclosures to report.

ESCG – P – 2
EVALUATION OF THE HEMOCCULT FECAL OCCULT BLOOD TEST KIT IN CATS.
J.E. Slovak, K. Spies, N. Villarino. Washington State University College of Veterinary Medicine, Pullman, USA

Fecal occult blood (FOB) testing provides a quick and easy way to screen patients for gastrointestinal bleeding. The sensitivity of the Hemoccult® FOB test kit has been recently evaluated for use in cats fed canine packed red blood cells. However, the development time for test interpretation and the limit of detection of fresh whole blood in a given stool sample has not yet been reported. Our goal was to determine the limit of detection of whole blood in a feline stool sample, as well as determine the most accurate time to assess the FOB sample utilizing the Hemoccult® testing kit in a population of cats.

Stool from recently dewormed, healthy, indoor cats were enrolled in the study. Two grams of stool from 3 separate cats that tested negative on the Hemoccult® FOB test were utilized as sample controls. Incremental quantities of EDTA whole blood (1–200 μL) were added to the 6 gram pooled stool controls. The stool samples were set up in triplicate and interpreted for each of the following time points; fresh, 24, 48, and 72 h. The lowest repeatable and reliable quantity of blood detected in the stool at all time points was 50 μl of blood. However, as little as 2 μl of blood was detected in all control samples at fresh, and 24 h.

A minimum of 6 grams or 0.2 ozs of stool should be collected to detect 50 μl of blood in a stool sample. Additionally, results are repeatable when FOB tests are interpreted as fresh, 24, 48, and 72 h post set-up. FOB testing is a fast non-invasive diagnostic tool to screen for low levels of blood in the stool of cats.

Disclosures: No disclosures to report.

ESCG – P – 3
FECAL OCCULT BLOOD TESTING IN A PRESUMED HEALTHY POPULATION OF CATS. J.E. Slovak, K. Spies, N. Villarino. Washington State University College of Veterinary Medicine, Pullman, USA

Fecal Occult Blood (FOB) testing, can be a useful screening test for cats. Unfortunately, there is limited information on using human point of care tests in our feline patients. There are no recent published reports of clinical FOB tests used as surveillance for disease in a population of cats.

Our goal was to perform FOB testing using the human point of care test Hemoccult®, on healthy cats to screen for potential subclinical disease. Fresh stool samples were collected from the litterbox within 12 h of defecation for sample testing at three separate time points. All cats were presumably healthy, recently dewormed, and individually housed, ranging in age from 6 weeks to 5 years. A total of 30 stool samples from 18 cats were analyzed.

The stool from each cat at each time point was tested in triplicate using the Hemoccult® FOB test kit. Test interpretation was performed as fresh, 24, 48, and 72 h after the FOB test was set-up. Nine stool samples were positive (30%) when tests were interpreted as fresh. Only 4 or (13%) of samples remained positive at subsequent test interpretation at 24, 48, and 72 h. The fresh positive stools were from 6 different cats. The subsequent positive stools were from 2 different cats, one of which was later diagnosed with ulcerative stomatitis and the other, a kitten, with significant parasitism.

When used as a screening test, the Hemoccult® FOB test detected a positive result in 30% of the studied patient population when interpreted as a fresh sample. However, when the test was interpreted at 24, 48, and 72 h post set up, the positive results were only 13% of the patient population. The FOB test is a useful screening test in cats. Repeated testing is recommended to differentiate transient from active bleeding.

Disclosures: No disclosures to report.

ESCG – P – 4
SPECIFICITY OF SNAP FPLTM FOR THE DIAGNOSIS OF PANCREATITIS IN HEALTHY CATS AND SICK CATS WITHOUT CLINICAL SUSPICION OF PANCREATITIS. P.G. Xenoulis, M.K. Chatzis, K. Kokkinaki, E.M. Stavroulaki, M.N. Saridomichelakis. University of Thessaly, Karditsa, Greece

Clinical diagnosis of pancreatitis in cats is challenging. Clinical signs are non-specific, and most available serum tests, including serum amylase and lipase activities and feline trypsin-like immunoreactivity (fTLI) lack specificity and/or sensitivity in this species. Serum specific feline pancreatic lipase (Spec fPL) is currently the most useful serum test for pancreatitis in cats. Based on this test, a rapid, in-clinic, semi-quantitative test for the estimation of fPL (SNAP fPL^{TM}) in serum has been developed. Currently, no studies have evaluated the sensitivity and specificity of this tool for pancreatitis in cats. The aim of this study was to evaluate the specificity of SNAP fPL in two groups of cats: a) healthy cats and b) sick cats without clinical suspicion of pancreatitis.

A total of 196 cats were included in the study. Of them, 105 were clinically healthy (based on history and physical examination) and 91 cats were sick. The group of sick cats consisted of cats with a wide variety of diseases, for which pancreatitis was not considered a major differential or for which a final diagnosis other than pancreatitis that would explain the clinical signs was available. Whole blood was collected from all cats, and serum was separated and stored until analysis. The SNAP fPL test was performed and interpreted according to the manufacturer's instructions. Specificity was calculated for each group of cats separately and for both groups combined.

A total of 8 of the 196 cats (4.1%) were found to have an abnormal SNAP fPL result. All 8 cats belonged to the group of sick cats. The specificity of SNAP fPL was 100% and 91.2% among healthy and sick cats, respectively, with an overall specificity of 95.9%.

The SNAP fPL test has a high specificity for pancreatitis in both healthy cats and sick cats without clinical suspicion of pancreatitis. An abnormal SNAP fPL result is not always indicative of pancreatitis and should be followed by quantitative analysis. In addition, due to the lack of histopathologic examination of the pancreas, subclinical pancreatic inflammation cannot be excluded in any of the 8 cats with abnormal SNAP fPL results. Further studies are needed to evaluate the specificity of this diagnostic tool in cats with clinical signs compatible with pancreatitis but no histopathologic evidence of pancreatitis.

Disclosures: Disclosures to report.

(i) Dr. Xenoulis has presented lectures sponsored by Idexx Laboratories in the past (ii) The SNAP fPL tests were provided by Idexx but had no involvement in the designing of the study or the interpretation of the results.

ESCG – P – 6
METABOLIC AND CLINICAL FOLLOW-UP OF SEVEN INAPPETENT CATS DURING ENTERAL REFEEDING. C. Fuchs, B. Rannou, M. Hugonnard. VETAGRO SUP - Campus Vétérinaire de Lyon, Marcy L'etoile, France

Refeeding after starvation can lead to a range of fluid, electrolyte and hematologic shifts associated with metabolic abnormalities that is called "refeeding syndrome" in humans. Refeeding syndrome is not well documented in cats.

A prospective study was conducted on ill cats hospitalized in an internal medicine service who had inadequate food intake for more than three days and were refed with enteral feeding. The objective was to follow clinical and biological parameters known to be modified in refeeding syndrome during the first five days of enteral refeeding. An initial nutritional assessment was done for each cat. Sodium, phosphorus, potassium, ionized calcium, magnesium, glucose, insulin, albumin, hematocrit, creatine kinase, cardiac troponin I and serum amyloid A were evaluated at the time of feeding tube placement, and then after three and five days of refeeding. Physiological parameters were recorded twice a day. A daily weight was done. A nutritional plan based on the nutritional assessment was implemented for each cat.

From February 2015 to December 2015, 16 cats were recruited. Seven cats completed the study (stress precluded adequate blood sampling in six cats, one cat removed the feeding tube before day 5, two cats died). The seven cats were 9.3 ± 3.8 years old. Six cats were anorectic from three to seven days, one cat was dysorexic for three months. Two cats with an hepatic lipidosis were considered at risk to develop a refeeding syndrome. One of them with a three-month history of dysorexia, icterus and marked emaciation at admission developed at day 3 of refeeding severe electrolyte shifts (marked hypokalemia and hypomagnesemia, moderate hypophosphatemia), aggravation of anemia, acute elevation of creatine kinase activity and bilirubinemia concomitantly with respiratory distress, vomiting, muscle weakness and hypotension. He was strongly suspected of refeeding syndrome. None of the six other cats developed clinical signs or remarkable biological abnormalities potentially linked with refeeding. Glycemia and insulinemia were consistently higher on day 3 and 5 than on day 0 on all cats. Mild to moderate hypophosphatemia was documented in 4/6 cats, mild hypokalemia in 2/6 cats and mild hypomagnesemia in 1/6 cats.

In this pilot study, significant combined biological abnormalities suspected to be linked with refeeding were observed in 1/7 cats. A careful nutritional plan and an adequate electrolyte supplementation are critical to avoid refeeding complications. Strongly debilitated cats could be at risk to develop complications despite adequate precautions.

Disclosures: No disclosures to report.

ESCG – P – 7
S100A12 AND MYELOPEROXIDASE AS POSSIBLE BIOMARKERS FOR INTESTINAL INFLAMMATION IN DOGS. M. Hanifeh[1,2], S. Sankari[1], M.M. Rajamäki[1], P. Syrjä[1], S. Kilpinen[1], J.S. Suchodolski[3], P. Guadiano[3], J. Lidbury[3], J.M. Steiner[3], T. Spillmann[1]. [1]University of Helsinki, Helsinki, Finland, [2]University of Tabriz, Tabriz, Iran, [3]Gastrointestinal Laboratory, Texas A&M University, College Station, USA

S100A12 and myeloperoxidase (MPO) are considered inflammatory markers of chronic enteropathy (CE) and mainly originate

from granulocytes. Increased concentrations of canine S100A12 (cA12) in feces and serum were found in dogs with CE. Intestinal mucosal MPO activities have been reported to be increased in humans with inflammatory bowel disease (IBD) and also in animal models of human IBD. However, intestinal mucosal cA12 and MPO have not been investigated in dogs with CE.

We evaluated the levels of mucosal cA12 and MPO in dogs with CE in comparison with healthy dogs using an enzyme-linked immunoassay and a spectrophotometric method, respectively. Additionally, we assessed the association of mucosal cA12 and MPO levels with the canine clinical IBD activity index (CIBDAI), histopathologic findings, clinical outcome, and serum albumin concentration. Intestinal mucosal biopsies were collected from 40 dogs with CE (duodenum [$n = 35$], ileum [$n = 12$], colon [$n = 15$], and cecum [$n = 6$]). Historical intestinal tissue samples from 18 healthy beagle dogs served as controls (duodenum, ileum, and colon [$n = 18$, each] and cecum [$n = 6$]). Data are presented as medians (interquartile range).

In comparison to healthy controls, mucosal cA12 concentrations in CE-dogs were higher in duodenum (43.93 [23.62–78.03] vs. 11.86 [7.66–29.1] μg/L; $P < 0.0001$) and colon (63.04 [33.53–211.53 vs. 15.94 [6.95–59.3] μg/L; $P < 0.001$] μg/L). Mucosal MPO activities of CE-dogs were higher than in control dogs in duodenum (1.3 [0.77–2.16] vs. 0.41 [0.11–0.64] ΔA/min; $P < 0.0001$), ileum (1.91 [0.72–2.83] vs. 0.75 [0.21–1.27] ΔA/min; $P < 0.01$), colon (1.46 [0.57–3.01 vs. 0.09 [0.03–0.17] ΔA/min; $P < 0.0001$] ΔA/min), and cecum (0.68 [0.3–1.55] vs. 0.19 [0.08–0.4] ΔA/min; $P < 0.05$).

Mucosal cA12 concentrations showed a significant association ($P < 0.05$) with severity of macrophage infiltration in the duodenum and total histopathologic injury and epithelial injury in the colon. Mucosal MPO activities showed a significant association ($P < 0.05$) with severity of total histopathologic injury, epithelial injury, and eosinophil infiltration in the duodenum. Duodenal cA12 concentrations showed a strong negative correlation with serum albumin concentration (r_s = Ë-0.449; $P = 0.007$). There was no significant association between mucosal cA12 and MPO levels with CIBDAI or clinical outcome.

This study showed that both mucosal cA12 concentrations and MPO activities are increased in the duodenum and colon of dogs with CE, with mucosal MPO being also increased in the ileum and cecum. The results provide supporting evidence for the possible diagnostic value of cA12 and MPO for dogs with CE.

Disclosures: No disclosures to report.

ESCG – P – 8
FASTING AND POSTPRANDIAL VARIATIONS OF PLASMA TLI, COBALAMIN AND FOLATE CONCENTRATION IN HEALTHY BEAGLE DOGS.

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Trypsin-like immunoreactivity (TLI), cobalamin and folate are frequently measured in canine gastrointestinal disorders. However the effects of preanalytical conditions on canine TLI, cobalamin and folate have not been clearly documented. This study evaluated the circadian variations of canine TLI, cobalamin, and folate concentrations in fasted and postprandial conditions.

Plasma TLI, cobalamin, and folate concentrations were measured after 12 h of fast (Time 0), every 2 h for 12 h and at 24 h in 8 healthy dogs. The same protocol was repeated after feeding after T0 samples. TLI, cobalamin and folate were measured by immunoassays validated in dogs (Siemens). Changes of TLI, cobalamin and folate were evaluated with a generalized linear model and Dunnett post-hoc test.

Mean ± SD circadian TLI concentrations in fasted dogs varied between 13.6 ± 4.3 and 21.3 ± 7.7 ng/mL and were significantly lower than T0 ($P < 0.01$) at 2, 4, 6, 10, and 12 h. In contrast TLI concentrations were not affected by feeding. Folate concentrations had no circadian variation in fasted dogs but were above the upper limit of quantification (24 ng/mL) in most time points after feeding. Mean fasted circadian cobalamin concentrations varied between 466 ± 134 and 559 ± 170 pmol/mL and were significantly different from T0 at 6, 8, 10, 12, and 24 h ($P < 0.01$). At 4, 6, 8, 10, and 12 h post-feeding, cobalamin concentrations were significantly lower than at T0 ($P < 0.01$).

Plasma TLI and cobalamin concentrations have significant circadian variations in fasted dogs. Plasma cobalamin is significantly decreased for 12 h after feeding but plasma TLI remains unchanged.

Disclosures: Disclosures to report.

Benoit Rannou is an employee of the Laboratoire de Biologie Médicale, VetAgro Sup, University of Lyon, France where the sample TLI, cobalamin and folates measurements were performed.

ESCG – P – 9
TOTAL SERUM MAGNESIUM AND COBALAMIN CONCENTRATION IN 20 CATS WITH INFLAMMATORY SMALL BOWEL DISEASE OR SMALL INTESTINAL NEOPLASIA.

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Magnesium is the second most abundant intracellular cation. Magnesium concentration is predominantly regulated by ileum absorption and renal excretion. In human medicine hypomagnesemia may accompany inflammatory small bowel disease (IBD), affecting treatment and prognosis. The aim of this study was to evaluate total serum magnesium (tMg) and cobalamin (CBL) concentrations in cats with IBD and small intestinal neoplasia (IN) and to reveal possible correlations.

Thirty-two client owned cats were included in this study. Twelve clinically healthy cats had comprised the control group, 13 cats histopathologically diagnosed with lymphocytic- plasmacytic IBD and 7 cats with IN (5 small intestinal lymphoma, 2 small intestinal adenocarcinoma). Blood serum tMg concentration was measured by atomic absorption using the Perkin-Elmer, A Analyst 100, while serum CBL was measured by direct chemiluminescence technology using the ADVIA Centaur, Siemens.

Mean (SD) tMg serum concentration was 2.2 (0.3) mg/dL (median: 2.2 mg/dL, range: 2–3.1 mg/dL) in the control group, 2.34 (0.33) mg/dL (median: 2.3 mg/dL, range: 2.1–3 mg/dL) in the IN group and 2.05 (0.35) mg/dL (median: 2 mg/dL, range: 1.3–2.9 mg/dL) in the IBD group. Mean (SD) CBL serum concentration was 838 (306) pg/mL (median: 795 pg/mL, range: 494–1429 pg/mL) in the control group, 358 (204) pg/mL (median: 402 pg/mL, range: 130–572 pg/mL) in the IN group and 445 (314) pg/mL (median: 420 pg/mL, range: 114–1176 pg/mL) in the IBD group.

Kruskal-Wallis test indicated that there was a statistically significant effect of group on the median tMg values, $\chi^2(2) = 7.089$, $P = 0.029$, but the Mann-Whitney test after conducted the Bonferroni-Dunn correction did not find significant differences among the three groups. Also, correlation between tMg and CBL groups was non-significant, $r(24) = 0.3$, $P = 0.155$.

Although there was a significant difference in the concentration of serum tMg among the three groups, statistical analysis failed to verify a correlation between tMg and CBL concentrations. This could be attributed to the limited number of animals.

Disclosures: No disclosures to report

ESCG – P – 10
MEGAESOPHAGUS ASSOCIATED WITH GASTRO-ESOPHAGEAL JUNCTION NEOPLASIA IN DOGS: 7 CASES (2004–2016).

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Esophageal neoplasia has been reported in dogs with regurgitations but only anecdotal case-reports describe megaesophagus associated with gastroesophageal junction (GEJ) neoplasia. This retrospective case series reports 7 cases of megaesophagus associated with GEJ neoplasia in dogs. Median (range) age and weight at presentation were 12 (10–14) years and 26 (19–29.3) kg, respectively. All cases were medium to large breed dogs. Duration of clinical signs ranged from 3 days to 3 months with clinical signs

including regurgitations (7), weight loss (6), cough (4), polydipsia (3), ptyalism (2), lethargy (2), cachexia (2), and increased lung sounds (2). Plain thoracic radiographs showed a megaesophagus (7), a soft-tissue opacity within the caudal esophagus (3), and signs of aspiration pneumonia (2). GEJ mass was confirmed by contrast esophagogram in two dogs. Transabdominal ultrasonography of the GEJ was performed in 6 dogs and was abnormal in 5 dogs. Endoscopy performed in 4 cases revealed a protruding mass in all cases. CT imaging performed in 3 cases showed a mass at the GEJ. One dog was treated by GEJ stenting, resulting in resolution of clinical signs; this dog is still alive. Six dogs were euthanized before diagnosis or lost to follow-up. Biopsies of the esophageal masses were obtained endoscopically (2), surgically (1) or after necropsy (3) and revealed esophageal leiomyoma (3) and leiomyosarcoma (1) but the endoscopic samples were non-diagnostic. Considering that long term survival is possible, this case series emphasizes the importance of using additional imaging diagnostic procedures before diagnosing idiopathic megaesophagus.

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ESCG – P – 11
FEASIBILITY OF MEASURING FECAL CALPROTECTIN CONCENTRATIONS IN DOGS AND CATS BY THE FCAL® TURBO IMMUNOASSAY.

R.M. Heilmann[1], K. Truar[1], J. Nestler[1], J. Schwarz[1], N. Grützner[2], C. Gabris[3], K. Kock[3], C. Niederberger[3], R.M. Heilmann[1]. [1]University of Leipzig, College of Veterinary Medicine, Leipzig, Germany, [2]Farm Animal Clinic, Vetsuisse Faculty Bern, University of Bern, Bern, Switzerland, [3]Bühlmann Laboratories AG, Schönenbuch, Switzerland

Calprotectin, also referred to as the S100A8/A9 protein complex, is involved in acute and chronic inflammatory responses. Fecal calprotectin concentrations have been demonstrated to be increased in dogs diagnosed with inflammatory bowel disease (IBD) and to decrease with successful treatment. Fecal calprotectin concentrations in dogs with IBD were also correlated with the severity of clinical signs, microscopic inflammatory lesions in the small intestine, and the need for more aggressive (i.e., anti-inflammatory/immunosuppressive) treatment (cut-off concentration: 15 µg/g). In-house canine calprotectin assays were found to also reliably measure calprotectin in feline samples. Given the lack of wide availability of the in-house canine calprotectin assay, the aim of the study was to assess the feasibility of measuring fecal calprotectin concentrations in dogs and cats by the commercial fCAL® turbo immunoassay used routinely for the diagnosis and monitoring of IBD in human medicine.

Fecal samples were obtained from 58 animals (45 dogs and 13 cats) with acute or chronic gastrointestinal disease ($n = 29$), other diseases ($n = 11$), and clinically healthy individuals ($n = 18$). Fecal samples were collected into the CALEX® Cap stool extraction device, extracted at a 1:500 dilution, and stored frozen until analysis using the commercial fCAL® turbo particle-enhanced turbidimetric immunoassay. Statistical analysis was performed by a non-parametric (unpaired) group comparison, with statistical significance set at $P < 0.05$.

Fecal calprotectin concentrations ranged from 0–3468.5 µg/g (median: 18.9 µg/g) in this study, with a fecal calprotectin concentration of <10 µg/g in 28 (48.3%) animals, 10–50 µg/g in 8 (13.8%), 50–200 µg/g in 13 (22.4%), and >200 µg/g in 9 (15.5%). Significantly higher concentrations of fecal calprotectin were detected in dogs with acute or chronic gastrointestinal diseases (median: 89.7 µg/g; $n = 21$) compared to healthy controls and patients with diseases not localized to the gastrointestinal tract (median: 0 µg/g; $n = 24$; $P = 0.0017$). Fecal calprotectin levels were also higher in cats with acute or chronic gastrointestinal diseases (median: 49.7 µg/g; $n = 8$) compared to healthy controls and cats with conditions not localized to the gastrointestinal tract (median: 2.9 µg/g; $n = 5$), but the difference did not reach significance ($P > 0.05$).

These results suggest that the fCAL® turbo immunoassay can detect fecal calprotectin in dogs and cats and can separate those animals with gastrointestinal diseases from healthy controls. An assay validation is currently underway and will allow further studies on the clinical utility of the assay for fecal calprotectin in dogs and cats with gastrointestinal diseases.

Disclosures: Disclosures to report.

Dres. Gabris, Kock, and Niederberger are employed by Bühlmann Laboratories AG where the fCAL® turbo immunoassay is offered on a fee-for-service basis.

ESCG – P – 12
CLINICAL FEATURES OF ENGLISH COCKER SPANIELS WITH CHRONIC PANCREATITIS MIMIC HUMAN IGG4RD.

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English cocker spaniels (ECS) suffer from a distinctive form of chronic pancreatitis (CP) associated with large numbers of duct and vein-centered T-lymphocytes on histology. Recent studies show a predominance of IgG4 positive plasma cells on immunohistochemistry in affected dogs, suggesting a disease similar to human IgG4-related disease (IgG4-RD). IgG4-RD typically affects older men and multiple organs, particularly causing inflammatory mass lesions in the pancreas and dry eye, dry mouth and glomerulonephritis. We recognized a similar spectrum of diseases in ECSs presenting to our center with CP and observed an over-representation of roan dogs. The aim of this study was to describe the clinical features of these ECS.

ECSs with CP presenting to the QVSH between December 2011 and March 2017 were recruited. CP was diagnosed either with pancreatic histology ($n = 2$) or with both elevated cPLI and abnormal pancreatic ultrasound ($n = 9$, of which one had positive fine needle aspirate cytology). Case records were searched for details of signalment, clinical and clinicopathological findings, particularly evidence of keratoconjunctivitis sicca (KCS); xerostomia; proteinuria or other immune-mediated diseases.

20 ECS presented with suspected CP but only 12 dogs fulfilled the strict inclusion criteria. There were 8 females and 4 males. Median age was 9 years (range 4. 3–14 years). 6/10 dogs were blue roan and 1/10 was orange roan. All dogs had gastrointestinal signs and pain. 7/10 dogs where tears were checked had KCS. 6/7 cases had dry oral mucous membranes suggesting xerostomia; 8/11 dogs had proteinuria (Urine protein:creatinine ratio range 0.7–8.3). 4 cases had UPC <2 but in 2/4 cases it increased >2 on subsequent visits. Glomerulonephritis was confirmed post mortem in one dog. Two dogs had atopy; one had inflammatory bowel disease and one had pemphigus foliaceus. Three dogs had biliary tract disease. One dog had epilepsy and two dogs developed intervertebral disc disease. Three dogs had large mass lesions in the pancreas which resolved on symptomatic treatment.

CP in ECSs shows remarkable clinical similarities to human IgG4-RD with a high prevalence of KCS, xerostomia, proteinuria and other immune-mediated diseases. Affected dogs can present with benign mass-like pancreatic lesions. The disease appears to be more common in blue roan dogs.

Disclosures: No disclosures to report.

ESCG – P – 13
CONTRAST-ENHANCED ULTRASONOGRAPHY OF THE DUODENUM IN DOGS WITH INFLAMMATORY BOWEL DISEASE: PRELIMINARY FINDINGS.

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Inflammatory bowel disease (IBD) commonly causes chronic diarrhea in dogs. Diagnosis is often challenging and relies on results of subjective clinical indices, gastrointestinal endoscopy and histopathological assessment of intestinal mucosal biopsies. In humans, contrast-enhanced ultrasonography (CEUS) can quantify intramural intestinal perfusion and correlates with disease severity in Crohn's disease.

We sought to evaluate the feasibility of, and describe perfusion patterns of CEUS in the duodenum of dogs affected by IBD. We hypothesized that CEUS would demonstrate changes in the perfusion of inflamed duodenum and provide additional information in the diagnosis of canine IBD.

We prospectively enrolled seventeen dogs with IBD (based on Canine Inflammatory Bowel Disease Activity Index-CIBDAI, endoscopic evaluation and histopathological assessment of duodenal mucosa samples). Each dog was placed in left lateral recumbency and the cranial portion of the duodenum was imaged in a transversal plane. Before the endoscopy, each dog received two boluses (0.03–0.06 ml/kg IV) of contrast agent (SonoVue®, Bracco, Italy): first, while conscious and then after being anesthetized (using the same anesthetic protocol). Duodenal enhancement patterns were first evaluated qualitatively, then quantified using dedicated software (Qontrast®, Bracco, Italy).

In all dogs, the duodenal vascularization pattern was characterized by an initial rapid enhancement of the submucosal layer, followed by a gradual enhancement of the mucosa. Serosa and muscularis propria showed poor enhancement. We identified 2 patterns at peak enhancement: (i) complete enhancement of the submucosal and mucosal layers without subjective demarcation between the wall layers; (ii) incomplete enhancement of the mucosal layer that had a non-homogeneous, pointed, or streaked appearance. Dogs had similar perfusion patterns whether conscious or anesthetized. We quantitatively analyzed enhancement only in anesthetized dogs because of improved image quality. Analysis revealed a 50% reduced peak enhancement intensity, reduced regional blood flow and reduced regional blood volume in dogs with CIBDAI scores >6 ($n = 4$). These dogs all showed the non-homogeneous, pointed or streaked pattern. However, we found no relationship between perfusion patterns/parameters and endoscopic or histopathological findings.

Our study demonstrates that CEUS of the duodenum in dogs is feasible, and highlights the presence of different vascular patterns and contrast-enhancement features in dogs with IBD. Our findings showed some association with dogs that had higher clinical grades of IBD, but did not correlate with histopathological findings. Our study offers a novel, non-invasive imaging modality for the diagnosis and monitoring of canine IBD.

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ESCG – P – 14

UTILITY OF CAPSULE ENDOSCOPY AS A COMPLEMENT TO TRADITIONAL ENDOSCOPY. T.L. Hill[1], J. Pomrantz[2], J. Solomon[2]. [1]University of Georgia, Athens, USA, [2]Infiniti Medical LLC, Menlo Park, USA

Capsule endoscopy (CE) has a number of advantages over traditional endoscopy (TE): it allows for assessment of mucosal abnormalities of the entire gastrointestinal tract and can be performed in conscious dogs. CE has been described in dogs as a method to evaluate for gastrointestinal mucosal lesions. CE may be a valuable tool in reassessment of dogs that previously were evaluated by TE. This study describes the use of capsule endoscopy (CE) in dogs following traditional endoscopy (TE). Ten dogs were retrospectively identified that received CE within 6 months of TE (range 0–151 days). Seven dogs received CE for assessment of suspected gastrointestinal hemorrhage; CE detected gastrointestinal mucosal lesions in the stomach and jejunum ($n = 2$), diffusely throughout SI and colon ($n = 2$), jejunum ($n = 1$), ileum ($n = 1$), and colon ($n = 1$) that were not detected with TE. Three dogs received CE to assess lack of response to therapy in dogs with chronic enteropathy. In these dogs, CE detected persistent gastric erosions and duodenal mucosal changes seen previously with TE; in 2/3 dogs, CE also identified lesions in additional locations not seen with TE. CE detected gastrointestinal mucosal lesions not detected by TE in 9/10 dogs. Though further investigation is needed, CE appears to be a complementary and informative technique in the management of dogs with chronic GI signs that have undergone TE.

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Jill Pomrantz is an employee of Infiniti Medical LLC. Jeff Solomon is an equity holder of Infiniti Medical LLC.

ESCG – P – 15

SERUM PROTEIN PROFILING OF 100 CATS WITH INFLAMMATORY BOWEL DISEASE AND LYMPHOMA . E. Benvenuti[1], E. Bottero[2], P. Ruggiero[2], A. Pierini[1], E. Magnanini[1], G. Lubas[1], V. Marchetti[1]. [1]University of Pisa, San Piero A Grado, Pisa, Italy, [2]Associazione Professionale Endovet, Rome, Italy

Inflammatory bowel disease (IBD) and lymphoma are common in middle-aged to older cats, associated with chronic vomiting, weight loss, and diarrhea, included in the chronic enteropathy (CE) disorder. In cats, hypoalbuminemia in CE is considered infrequent, but specific investigations about protein profile in these patients have been not published . The aim of this study was to evaluate serum protein profiling in cats with IBD and lymphoma, and to compare it with clinical symptoms, endoscopic assessments and histopathological diagnoses. FCEAI clinical index score, CBC, serum biochemical profile and urinalysis were evaluated in 100 cats affected by IBD and lymphoma. Endoscopy of upper and lower gastrointestinal tract was performed and a severity score from 0 to 3 was assigned based on WSAVA guidelines. Histopathological diagnosis was based on WSAVA guidelines. Total serum protein, serum protein agarose gel electrophoresis, and albumin-globulin ratio (A/G) were evaluated at time of diagnosis. Cats ranged from 1 to 17 years old (10 median), 46% were females and 93% were European shorthair. The histologic diagnosis was IBD (66%) and lymphoma (34%). The most common symptoms were vomiting (70%), weight loss (67%) and diarrhea (37%). Mean FCEAI score was 9.4 ± 2.59. Mean serum total protein was 6.01 ± 0.99 g/dL. Low total protein (5.04 ± 0.63 g/dL) occurred in 41% of cats and only 10% had hypoalbuminemia. Beta globulins were decreased in 70% of cats, and gamma globulins were increased in 75%. A/G ratio was significantly higher in cats with hypoproteinemia (1.1 ± 0.3) compared to non-hypoproteinemic cats (0.9 ± 0.1). No statistical differences between protein profile and symptoms, FCEAI, gastrointestinal tract concerned, endoscopic score, type and severity of histologic pattern were found. Despite the hypoproteinemia was a relatively frequent finding in this work, a correlation with the clinical variables was not established. In addition, the clinical severity, the endoscopic and histological grading was not related to protein profile. Dysproteinemia with low beta globulin and high gamma globulin were the most common alterations. In hypoproteinemic cats A/G was higher than in non-hypoproteinemic cats. The decrease of beta globulin could be due to malnutrition but also to iron metabolism modifications occurring in chronic inflammatory disease, with reduction of transferrin and ferritin. Hypergammaglobulinemia is reported in human medicine as a common feature of IBD associated to extraintestinal manifestation. No data so far are available for the prevalence and clinical significance in cats.

Disclosures: No disclosures to report.

ESVC – P – 1

RELIABILITY OF VENA CONTRACTA FOR STAGING DEGENERATIVE CHRONIC MITRAL VALVE DISEASE IN DOGS. A. Caro-Vadillo[1], E. Pintado-Carretero[2], A. Casasúsolea[3]. [1]Complutense Veterinary School, MADRID, Spain, [2]Centro Veterinario Asís, Alcazar De San Juan [CR], Spain, [3]Servicio Veterinario de Ecografía de Alejandro Casasús, Madrid, Spain

It is important to obtain an accurate quantification of mitral regurgitation severity. This fact is especially important in order to identify B2 patients -ACVIM classification- that can benefit from starting medication or to prevent congestive heart failure. The vena contracta is the narrowest portion of a jet downstream from the regurgitant orifice. The objective of the present study is to prove if the vena contracta could be used as criteria for classification in dogs with DCMVD. One hundred and thirteen dogs suffering from DCMVD in different phases according to ACVIM classification, have been included: B1, $n = 54$; B2, $n = 51$ and C, $n = 8$. The vena contracta was measured from the parasternal left apical four-chamber long axis view. Three measurements were obtained for each dog and the average was obtained. The results showed a statistically significant difference between stages for end-diastolic left ventricular index (EDVI), end-systolic left ventricular index (ESVI) and vena contracta (Kruskal-Wallis for independent

samples test). The differences were significant between B1 dogs and B2 dogs ($P = 0.022$) and between B1 and C dogs ($P = 0.035$) for vena contracta. The differences were significant between B1 dogs and B2 dogs ($P < 0.0001$) and between B1 and C dogs ($P < 0.001$) for EDVI. The differences were significant between B1 dogs and B2 dogs ($P = 0.044$) and between B1 and C dogs ($P = 0.032$) for ESVI. There were no differences for these values between B2 and C dogs. The vena contracta appears to be useful to differentiate between early phases of DCMVD and congestive phase of DCMVD but it seems less useful to differentiate between B2 dogs and C dogs. It is important to remember that this measurement is not useful if multiple jets are present, which is common in dogs with DCMVD. The vena contracta has an ellipsoidal shape so the measurements could vary depending on the plane of acquisition. Due to the fact that the vena contracta usually is small (typically less than 0.5 cm), slight measurement errors could lead to large mistakes and misclassifications. In human, it is recommended to measure the vena contracta from the right parasternal long axis. All of these factors must be taken into consideration from a critical point of view in the face of the present results.

Disclosures: No disclosures to report.

ESVC – P – 2

RETROSPECTIVE ANALYSIS OF PULMONARY HYPERTENSION IN CATS WITH LEFT-SIDED CONGESTIVE HEART FAILURE. T. Vezzosi[1], K.E. Schober[2]. [1]University of Pisa, San Piero A Grado, Pisa, Italy, [2]The Ohio State University, Department of veterinary Clinical Sciences, Columbus, OH, USA

Pulmonary hypertension (PH) is present in approximately 70–80% of dogs with left-sided congestive heart failure (L-CHF) and contributes to clinical signs and outcome. Anecdotal evidence suggests that PH in cats with L-CHF is much less frequent. However, data on the prevalence of PH in cats with L-CHF is not available. This study addresses the general hypothesis that PH secondary to L-CHF is uncommon in cats and that echocardiographic findings in cats with PH are different compared to dogs.

This retrospective observational study included 56 healthy cats and 131 cats with L-CHF imaged between 2004 and 2016 at the Ohio State University, Veterinary Medical Center. Key diagnostic variables included tricuspid regurgitation (TR) peak velocity, right atrial (RA) size, right ventricular (RV) size and function, RV wall thickness, pulmonary artery (PA) size, Doppler-derived systolic time intervals of PA flow (STIs), presence of septal flattening, and variables characterizing left atrial size and left ventricular size and function. PH was identified if TR peak velocity was >2.7 m/sec (estimated systolic PA pressure >35 mmHg). Parametric and non-parametric statistical test procedures were used to compare normal cats to cats with L-CHF, and cats with and without PH.

Tricuspid regurgitation was present in 57/131 (44%) of cats with L-CHF. Pulmonary hypertension was present in 22/131 of cats with L-CHF (17%). In 15/22 cases PH was associated with cardiomyopathy, in 5/22 cases with congenital heart disease, and in 2/22 cases to other causes. All cats with PH (22/22, 100%) had subjectively-assessed right-sided enlargement, with larger RA and RV diameters ($P < 0.0001$), thicker RV wall thickness ($P < 0.05$) and higher prevalence of septal flattening (6/22, 27%, $P < 0.0001$) in comparison to cats without PH. Pulmonary artery size and Doppler-derived STIs were not statistically different between cats with and without PH. Maximum right atrial diameter (>21.5 mm; Sensitivity [Sn] 0.82, Specificity [Sp] 0.42) and RV ventricular diameter (>7.8 mm; Sn 0.91, Sp 0.64) had the most accurate cutoff to predict PH compared to other variables. Method reproducibility (measurement variability) was good, with most coefficients of variation <15%.

Compared to dogs, PH is not a common finding in cats with L-CHF. Right-sided enlargement is the main finding in cats with PH, and right-heart dimensions should be used to suspect PH if TR is absent or difficult to measure. Further studies are needed to identify reasons and mechanisms for the obvious differences between dogs and cats.

Disclosures: No disclosures to report.

ESVC – P – 3

FREQUENCY OF MITRAL VALVE PROLAPSE IN ADULT HEALTHY DACHSHUND DOGS. P.H. Itikawa, G.T. Goldfeder, A.M. Gimenes, P.S. Backschat, S.L. Oliveira, D.P.S. Oliveira, C.A.B. Lorigados, M.H.M.A. Larsson. School of Veterinary Medicine and Animal Science, University of São Paulo, Sao Paulo, Brazil

Dachshunds are affected by chronic mitral valve disease (CMVD) which is the most often heart disease in dogs. CMVD develops mainly in small animals, but in chondrodystrophic breeds is more common. Dachshunds are predisposed to develop mitral valve prolapse (MVP) which is a systolic displacement of one or both mitral leaflets beyond the mitral valve annulus. The MVP is associated with marked sinus arrhythmia in Dachshund. The hypothesis is that adult healthy Dachshund dogs are predisposed to exhibit MVP before mitral regurgitation. We performed a prospective study with client-owned animals that were screened by physical examination, thoracic radiography, electrocardiography, systolic blood pressure measurement, echocardiography and laboratory tests (CBC, biochemical blood urea and creatinine). A complete echocardiographic examination with electrocardiogram monitoring was performed. We enrolled 69 Dachshund healthy dogs (28 [40.6%] males and 41 [59.4%] females); from 18 months to 10 years-old, weighting 8.4 ± 2.3 kg. No heart diseases were observed, including mitral regurgitation. Mild MVP was present in 28 (40.58%). Of these, 24 (85.71%) with sinus arrhythmia, 3 (10.71%) with normal sinus rhythm and 1 (3.57%) with sinus tachycardia. In addition, those with sinus arrhythmia, 17 (70.83% with mild) and 7 (29.16% with marked) sinus arrhythmia. Therefore, healthy adults Dachshunds dogs may present MVP associated with marked sinus arrhythmia that can be a predisposing factor to develop mitral regurgitation in the future.

Disclosures: No disclosures to report.

ESVC – P – 4

PREVALENCE OF PULMONARY HYPERTENSION IN DOGS NATURALLY INFECTED WITH ANGIOSTRONGYLUS VASORUM. E. Darnis, K. Gommeren, C. Clercx, K. Mc Entee, A.C. Merveille. Liège University, Liège, Belgium

Pulmonary hypertension (PH) has been reported in dogs infected with *Angiostrongylus vasorum*. Moderate to severe PH was identified in a small portion of dogs, associated with shorter survival time in a retrospective study. Only mild PH was identified in experimentally infected dogs. The objective of this study was to determine the prevalence and severity of PH in dogs presented to a university clinic with *A. vasorum* infection and to describe associated echocardiographic changes in these dogs.

Dogs presented between November 2013 and February 2017 with confirmed *A. vasorum* infection based on positive Baerman coproscopy, Ag detection in blood or PCR in BALF were retrospectively included. Diagnosis of PH was based solely on radiography (group 1) or plus echocardiography (group 2). In group 2, PH severity was determined by tricuspid regurgitation velocity (TRmax), pulmonic insufficiency velocity (PRmax). When no regurgitation was measurable, indirect signs of PH such as, right heart remodeling, main pulmonary artery dilation (PA/Ao), acceleration time to ejection time (AT/ET), tricuspid annular plane systolic excursion (TAPSE) and pulmonary vein diameter-to-pulmonary artery diameter ratio (PV/PA) were taken into account.

Thirty-six dogs were included (group 1: 16; group 2: 20). Median age at the time of diagnosis was 4.5 years (3 months to 10 years). Chronic cough, dyspnea and exercise intolerance were the main clinical complaints.

In group 2, 40% of dogs (8/20) had severe PH, 7/8 displaying a right apical systolic heart murmur, and 3/8 being in right-sided congestive heart failure. Prevalence of moderate and severe PH in group 2 was 65% (13/20), two dogs displaying only indirect signs of PH. In these dogs, median TRmax and PRmax were respectively 4.65 m/sec (3.93–6.28) and 2.75 m/sec (2.03–3.73). Median AT/ET, PA/Ao, PV/PA were 0.295 (0.178–0.49), 1.05 (0.64–1.28) and 0.7 (0.4–1.3), respectively. Right ventricular dilation was observed in 11/13 dogs and was considered as severe in all dogs

with severe PH. However, TAPSE was within confidence interval for all dogs.

In group 1, only 25% of dogs had evidence of PH with mild enlargement of pulmonary arteries. However, in group 2, two dogs with severe PH had normal pulmonary vasculature on X-ray, questioning the sensitivity of thoracic radiography for PH.

In conclusion, based on Doppler-echocardiography, the prevalence of moderate and severe PH in dogs naturally infected with *A. vasorum* seems more important than previously described. Systematic ultrasound scanning of dogs infected with *A. vasorum* is advised to evaluate presence and severity of PH.

Disclosures: No disclosures to report.

ESVC – P – 5

SYMMETRIC DIMETHYL-ARGININE IN DOGS WITH MYXOMATOUS MITRAL VALVE DISEASE WITH AND WITHOUT PULMONARY HYPERTENSION. H. Poser, M. Berlanda, S. Graziotto, T. Badon, B. Contiero, C. Guglielmini. University of Padua, Legnaro, Italy

The symmetric Dimethyl-Arginine (SDMA) is produced by protein metabolism and eliminated by renal clearance. In the recent years, it has been used as a marker of kidney disease as it correlates with the glomerular filtration rate. In humans, SDMA is increased in patients with cardiovascular disease and has a negative prognostic value. The aim of the study is to assess the SDMA in dogs with myxomatous mitral valve disease (MMVD) at various disease stages, to evaluate the effect of pulmonary hypertension (PH) and the possible influence of cardiovascular therapies.

Dogs visited between May-2014 and September-2016 were retrospectively recruited if they had a diagnosis of MMVD after complete cardiovascular assessment (physical examination, thoracic radiogram, ECG, trans-thoracic echocardiography), CBC, biochemistry profile and a sample of serum stored at −20°C ($n = 45$). A control group of healthy dogs was also included ($n = 8$). Dogs with MMVD were divided according to the ACVIM guidelines in stage B1 ($n = 9$), B2 (N = 11), C+D (N = 17). Dogs in the ACVIM-groups were further subdivided into treated (N = 0, 3, and 14,) and non-treated (N = 9, 8, 3) for groups B1, B2 and C+D, respectively. Dogs were considered affected by PH if they had tricuspid regurgitation with peak velocity >3 m/sec and no right ventricle outflow tract obstruction ($N = 11$). SDMA was determined by a referring laboratory using a routinely available immunoassay. Selected echocardiographic, CBC, biochemical parameters, and SDMA were compared among ACVIM-groups using Kruskal-Wallis test; the same test was used to assess the combined effect of therapies and ACVIM-group on serum urea nitrogen (BUN), creatinine and SDMA. Correlations between SDMA and echocardiographic, CBC, and biochemical variables were assessed using Pearson's test. Man-Whitney test was used to assess differences of SDMA between PH-groups.

SDMA was increased in ACVIM-group C+D compared to group B1 ($P = 0.035$) and B2 ($P = 0.021$); BUN was increased in group C+D compared to healthy ($P = 0.01$), B1 ($P = 0.007$) and B2 ($P = 0.009$), while creatinine was not significantly different among groups. SDMA was positively and significantly correlated with BUN ($r = 0.55$; $P < 0.001$), Creatinine ($r = 0.529$; $P < 0.001$), Sodium ($r = 0.448$; $P = 0.003$), Left-atrium to Aorta ratio ($r = 0.335$; $P < 0.025$) and Mitral Valve E-wave velocity ($r = 0.334$, $P = 0.27$). Treatment did not significantly affect SDMA, BUN, or creatinine in any ACVIM-group. No significant difference of SDMA was observed between PH-groups.

Increased SDMA is observed in the advanced stages of canine MMVD and likely reflects reduced renal function better than BUN and creatinine. Therapies and PH do not seem to affect SDMA in dogs with MMVD.

Disclosures: Disclosures to report.

SDMA was determined by IDEXX Laboratories and the cost of the analysis was partially reduced.

ESVC – P – 6

LEFT VENTRICULAR HYPERTROPHY IN DOG: AN ECHOCARDIOGRAPHIC STUDY. C. Locatelli[1], A. Savarese[1], P.G. Brambilla[1], I. Spalla[2]. [1]University of Milan, Milan, Italy, [2]Royal Veterinary College, Hawkshead Lane, Hatfield, Hertfordshire, UK

The assessment of the severity of left ventricular (LV) hypertrophy in human medicine consists of three main cardiac parameters: LV wall thickness, LV mass (LVM) and LV geometry. The latter is assessed either by LVM/body surface area (BSA) and relative wall thickness, RWT. Based on LV geometry, the LV is classified as normal if LVM/BSA and RWT are within reference ranges, concentric remodeling as normal LVM and increased RWT, concentric hypertrophy as increased LVM and RWT and eccentric hypertrophy as normal/decreased RWT and increased LVM. Data about normal values for LVM and RWT are scant in dogs.

The aims of this retrospective study were: (i) to determine normal values for LVM/BSA e RWT (M-mode derived) in healthy dogs, (ii) to evaluate the effect of sex, age and breed on these echocardiographic parameters and (iii) to compare LVM/BSA e RWT in healthy (>7 years) and hypertensive dogs.

The clinical archive (2015–2016) of the cardiology unit of DIMEVET (University of Milan, Italy) was searched for all dogs with a complete echocardiographic examination and systemic blood pressure determination. Dogs were grouped into healthy (based on no cardiac, metabolic or renal disease) or hypertensive (according to ACVIM guidelines). From the digitally stored echocardiographic M-mode data, LVM/BSA and RWT were calculated. LVM was derived from geometric formula and indexed to BSA. RWT was calculated as the ratio between 2 × posterior wall thickness and LV internal diameter at end diastole.

Eighty-three healthy dogs (48 female/35 male) and 26 hypertensive dogs were included in the study. The mean (SD) LVM/BSA and RWT were respectively 151 g/m^2 (57) and 0.53 (0.10) in healthy dogs. No difference in sex and age (dogs >7 years vs. <7 years) was found. Sighthound dogs ($n = 20$) showed a statistically larger LVM/BSA (221 g/m^2 vs. 129 g/m^2, $P = 0.00$) with similar RWT than non-sighthound dogs ($n = 63$) (0.54 vs. 0.53, $P = 0.74$). Hypertensive dogs showed otherwise a statistically different RWT (0.69 vs. 0.55; $P = 0.011$) from healthy dogs >7years with similar LVM (153 vs. 132 g/m^2, $P = 0.098$).

The results of our study suggest that these echocardiographic parameters may be of help in routinely classifying the hypertrophy pattern/LV geometry in dogs. In contrast with human findings, no sex difference was found in LVM/BSA. Sighthound dogs tended to show greater LVM/BSA values, likely to represent physiologic hypertrophy (normal RWT with increased LVM/BSA). Dogs with systemic hypertension had increased RWT with normal LVM and this could represent the first response of the LV to pressure overload.

Disclosures: No disclosures to report.

ESVC – P – 7

PULMONARY VEIN TO PULMONARY ARTERY RATIO IN HEALTHY AND CARDIOMYOPATHIC CATS. V. Patata[1], D. Caivano[2], F. Porciello[2], M. Rishniw[3], O. Domenech[4], F. Marchesotti[4], M.E. Giorgi[2], H. Poser[5], C. Guglielmini[5], F. Spina[2], F. Birettoni[2]. [1]Istituto Veterinario di Novara, Novara, Italy, [2]Department of Veterinary Medicine, University of Perugia, Perugia, Italy, [3]Veterinary Information Network, Davis., USA, [4]Department of Cardiology, Istituto Veterinario di Novara, Novara, Italy, [5]Department of Animal Medicine, Production & Health, University of Padua., Padua, Italy

Recognition of congestive heart failure (CHF) in dyspneic cats is crucial for correct intervention. The pulmonary vein (PV) to pulmonary artery (PA) ratio (PV/PA) has been proposed as an index that might help discriminate dogs in CHF but has never been studied in cats. We sought to determine reference intervals for various, previously published, PV and PA variables in healthy cats. We then examined these variables in cats with subclinical and clinical (CHF) cardiomyopathies to determine the diagnostic utility in identifying CHF.

We prospectively enrolled 99 cats: 51 healthy cats, 24 subclinical cardiomyopathic cats and 24 cardiomyopathic cats with CHF. PV and PA were measured at the minimal and maximal diameters from M-mode images obtained from a modified right parasternal long axis view. Aorta and left atrium were measured from the right parasternal short axis just after the end of systole.

Median PV_{min}/PA_{min} in healthy cats was approximately 0.51 and PV_{max}/PA_{max} was 0.67. The median distensibility of the vessels was 23% for ΔPA and 41% for ΔPV. Several variables (PV_{max}/PA_{max}, PV_{max}/Ao and PV_{min}/Ao) increased incrementally between all 3 groups ($P < 0.0001$). Cats with CHF had a larger PV_{min}/PA_{min} than subclinical and healthy cats ($P < 0.0001$). When evaluating diagnostic performance of these variables (using only cardiomyopathic cats with or without CHF), PV_{min}/PA_{min} and PV_{min}/Ao had 100% specificity and 84% and 80% sensitivities, respectively. By comparison, LA/Ao had 71% specificity and 88% sensitivity.

Our study provides reference values for PV and PA variables in cats. Moreover, PV/PA variables performed better than LA/AO in discriminating cardiomyopathic cats with and without CHF.

Disclosures: No disclosures to report.

ESVC – P – 8

COMPARATIVE ANALYSIS OF A PORTABLE SMARTPHONE-BASED ELECTROCARDIOGRAPH (D-HEART®) VERSUS STANDARD 6-LEADS ELECTROCARDIOGRAPH IN THE CANINE PATIENT. A.S. Savarese[1], C.L. Locatelli[1], N.M. Maurizi[2], N.B. Briante[3], P.G.B. Brambilla[1]. [1]University of Milan, Milan, Italy, [2]Department of Clinical and Experimental Medicine, University of Florence, Florence, Italy, [3]D-Heart srl, Genova, Italy

Electrocardiogram (ECG) is an essential tool for diagnoses and monitoring cardiac arrhythmias in veterinary medicine. However, a low-cost, user friendly, 6-leads, smartphone-based electrocardiograph is still lacking.

D-Heart® is a portable, smartphone-based device, which streams the tracing via Bluetooth to any smartphone, enabling the acquisition of an ECG on multiple leads, currently used in human cardiology.

Aim of the study was to determine the accuracy of D-Heart® tracings, compared with the gold standard non-portable 6-lead electrocardiograph in dog.

Standard 6-lead ECGs and D-Heart® ECGs were subsequently acquired in conscious dogs in right lateral recumbency. Each tracing was saved with an anonymous ID. Two experienced observers, independent and impartial, performed data analysis. In case of disagreement, a third impartial observer adjudicated the tracing.

The sample was described, for continuous variables, by mean and standard deviation or median and interquartile range (IQR), when appropriate, and for categorical variable by proportion. The concordance between the ECG methods was assessed by weighted kw-Cohen index, with its relative significance, taking as the end point variable the standard 6-lead ECG group. The Bland-Altman method with a 95% confidence level was applied for P, PR, QRS, T and QT interval measurements. Since differences between the two measurements did not follow a normal distribution, a non-parametric approach (median value and IQR) was used to determine the limits of agreement. P values were considered significant at the 0.05 level. Amplitude of the waves was not considered in this preliminary analysis because currently the software doesn't allow voltage variation.

115 dogs of different weights and breeds admitted to the Cardiology Service of DIMEVET were enrolled. Mean age of dogs was 7.5 ± 4 years. Most were intact males (45%, $n = 51$). The most represented breed were mongrels (27%, $n = 32$).

Weighted Cohen's kappa (kw) test between ECGs demonstrated an excellent concordance of 0.989 ($P < 0.001$) in the evaluation of the heart rhythm, of 0.991 ($P < 0.001$) for ST segment morphology and of 0.838 ($P = 0.040$) for T wave morphology. There was a 100% concordance among P morphology assignment. P, PR, QRS, T and QT intervals comparison with Bland-Altman method showed an extremely good concordance for D-Heart® measurements (95% limit of agreement ± 0.9 ms for P, ± 10 ms for PR, ± 35 ms for QRS, ± 5 ms for T wave). Less concordance resulted for QT (± 80 ms).

D-Heart® proved effective accurate recording of ECG comparable to standard 6-lead ECG, opening new perspectives to improve diagnostic tools in veterinary cardiology.

Disclosures: Disclosures to report.

This project was funded by D-Heart. Niccolò Maurizi and Nicolò Briante are the co-founders of the social innovative start-up D-Heart.

ESVC – P – 9

USE OF GRAPHIC ORGANIZERS IN AN ELECTIVE VETERINARY CARDIOLOGY COURSE. J.L. Ward[1], S.B. Marcketti[2]. [1]Iowa State University College of Veterinary Medicine, Ames, USA, [2]Iowa State University Center for Excellence in Learning and Teaching, Ames, IA, USA

Effective teaching methods are critical for veterinary student learning of complex subjects such as cardiology. Graphic organizers (GO) are visual and spatial displays, such as tables or charts, that facilitate learning by making conceptual relationships between content more apparent. We hypothesized that, in an elective veterinary cardiology course, study aids in the form of GOs would lead to improved learning outcomes (higher post-test scores), improved study efficiency (less time spent studying), and higher student satisfaction compared to traditional outline (OUT) format.

This study was a mixed-method prospective randomized crossover design. Study participants ($n = 31$) were 3rd year veterinary students at the Iowa State University College of Veterinary Medicine enrolled in an elective veterinary cardiology course. Participants completed a comprehensive pre-test and were randomized into two groups (A and B). All students received identical cardiology content presented by the instructor via live weekly in-class lectures. Following 8 pre-designated "experimental" lectures, students were given instructor-prepared study aids summarizing the lesson material, presented in either GO or OUT format. The following week, students completed a post-test of content knowledge for that lesson only, and indicated the amount of time they spent studying for that lesson. Crossover occurred such that Group A and Group B alternated between receiving GO and OUT for each experimental lesson. Qualitative data were collected in the form of in-depth pre-course and post-course surveys.

Groups were comparable at baseline in terms of demographic data, academic achievement, pre-course survey results, and pre-test scores. Post-test scores did not differ ($P > 0.05$) based on type of study aid provided to students for that lesson (GO vs. OUT). Students spent an average of 10 min (17%) less time studying per lesson when using GO compared to OUT ($P = 0.05$). Student satisfaction with both study aid formats was high, but students preferred GO over OUT in terms of study efficiency ($P = 0.002$), visual appeal ($P < 0.001$), ease of use ($P < 0.004$), and likelihood of referencing the study aid in the future ($P < 0.001$). In conclusion, in an elective veterinary cardiology course, use of GO compared to OUT format study aids resulted in equivalent higher study efficiency and student satisfaction, while resulting in equivalent short-term learning outcomes.

Disclosures: No disclosures to report.

ESVC – P – 10

FREQUENCY OF HEART MURMUR IN 69 HEALTHY ADULT DACHSHUNDS. P.H. Itikawa, G.T. Goldfeder, A.M. Gimenes, C.T. Amaral, P.S. Backschat, S.L. Oliveira, D.P.S. Oliveira, C.A.B. Lorigados, M.H.M.A. Larsson. School of Veterinary Medicine and Animal Science, University of São Paulo, Sao Paulo, Brazil

A physiological heart murmur (PHM) can be identified in animals with no structural abnormalities of the heart and great vessels. It is a sound produced by blood flow, usually detected in puppies, but can be commonly observed in healthy young adult dogs. PHM may be a result of an increased sympathetic tone, and is possible

to be secondary to anxiety. It has been described in some breeds and in athletic dogs during adulthood. A cross-sectional study was performed with 69 healthy Dachshunds, including 28 males (40.6%) and 41 females (59.4%), aging between 18 months to 10 years-old and weighting 8.4 ± 2.3 kg. The dogs underwent through physical examination, blood testing, echocardiogram, electrocardiogram, blood pressure measurement and thoracic radiography. No abnormalities were found. Systolic heart murmurs were detected in 36 dogs (52.2%): 32 (46.4%) with grade II/VI and 4 (5.8%) with grade III/VI (Levine/Freeman Scale). Murmurs were mostly located in mitral valve area (72.2%). Heart murmurs in adult dogs are frequently indicative of pathological conditions. However, none of the 36 dogs had structural heart abnormalities or systemic disturbances. Therefore, this study shows a high prevalence of PHM in healthy adult Dachshunds.

Disclosures: No disclosures to report.

ESVC – P – 11

CHOLINE CONCENTRATION AS A NEW POTENTIAL BIOMARKER TO DISTINGUISH PLEURAL EFFUSIONS FROM HEART BASE TUMORS AND CARDIOMYOPATHY IN DOGS. P.L. Levent[1], Z. Yilmaz[1], M.C. Cansev[2]. [1]Faculty of Veterinary Medicine, Uludag University, Bursa, Turkey, [2]Faculty of Medicine, Department of Pharmacology, Uludag University, Bursa, Turkey

Research of new biomarkers in body fluids to detect the primary problem is crucial in human and veterinary medicine. Although serum choline is suggested as emerging biomarkers in human and dogs with myocardial ischemia, there is no available data on usefulness of choline levels for predicting cardiac events. Therefore, this study was aimed to evaluate the use of choline concentration as a potential biomarker for distinguishing pleural effusions due to heart base tumors (HBT) and dilated cardiomyopathy (DCM), and determine whether there was a correlation between pleural and serum choline levels in dogs.

Dogs with pleural effusion due to DCM ($n = 11$) and HBT ($n = 8$) were used as materials. Pleural effusions were diagnosed by clinical, radiological and ultrasonographic (US) examinations along with US-guided thoracentesis. DCM was diagnosed based on the sum of the scores (≥6 points) recommended by European Society of Veterinary Cardiology taskforce. Pre-operative diagnosis of HBTs was confirmed by histopathological evaluations showing mesothelioma, chemodectoma, hemangiosarcoma, and aortic body tumors. Healthy age- and breed-matched dogs ($n = 10$) were used as controls. Serum free-choline concentration of each sample was analyzed by high performance liquid chromatography in triplicate and results were expressed as micromolar (μM).

Serum choline concentrations in dogs were (median [range]) 14.8 [6.5–19.2] μM for healthy dogs, 14.7 [7.9–28.4] μM for DCM and 8.7 [5.0–13.9] μM for HBTs (but not significant between groups). There was a statistically significant difference ($P < 0.05$) on choline concentration (Mean ± SEM) in pleural fluids between dogs with DCM and HBTs; 13.5 ± 3.9 μM and 23.1 ± 8.5 μM, respectively. Choline level was higher ($P < 0.05$) in pleural fluid, compared to that of serum in dogs with HBTs, whereas there was not statistically significant difference between them in dogs with DCM. In all dogs ($n = 19$), choline level in pleural effusions (24.9 ± 6.3 μM) was higher ($P < 0.001$) than its serum level (10.6 ± 1.2 μM). There were no significant relationships (Pearson correlation) between choline levels in serum and pleural fluids in dogs with DCM and HBT.

These data suggest that pleural fluid choline concentration, rather than its serum concentration, might be used as a new potential biomarker for distinguishing from DCM and HBTs in dogs.

Disclosures: No disclosures to report.

ESVC – P – 12

EPIDEMIOLOGICAL, CLINICAL, AND ECHOCARDIOGRAPHIC FEATURES, AND SURVIVAL TIMES OF DOGS WITH EBSTEIN ANOMALY: 40 CASES (2002–2017). C. Poissonnier[1], E. Bomassi[2], V. Gouni[3], C. Jamin[1], C. Damoiseaux[1], M. Lavennes[1], J.L. Pouchelon[1], L. Desquilbet[1], V. Chetboul[1]. [1]National Veterinary School of Alfort, Maisons-Alfort, France, [2]Centre Hospitalier Vétérinaire des Cordeliers, Meaux, France, [3]INSERM U 955, Créteil, France

Ebstein anomaly (EA) is a rare type congenital heart disease characterized by an apical displacement of the tricuspid valve leaflets in the right ventricle (RV), causing dilation of the right atrium (RA) and decrease in the functional RV size. Few studies have been dedicated to canine EA. The objective of this retrospective study was to characterize the epidemiological, clinical, and echocardiographic findings associated with canine EA, as well as survival.

The case records of dogs diagnosed with EA by use of echocardiography (2002–2017) were reviewed. The study population consisted of 40 dogs with EA (median age at diagnosis = 15 months [IQR 7–36], male-to-female ratio = 1.5). Only medium to large breeds were represented, the most common breed being Labrador retriever (24/40, 60%). Eight dogs (20%) had a hemodynamically compromise concurrent heart disease ($n = 7$) or respiratory disease ($n = 1$), and were therefore excluded from subsequent analysis.

A right apical systolic heart murmur (median grade = 5 [IQR 4–5]) was detected in all dogs, and 13/32 dogs (41%) presented clinical signs related to EA. Dilation of the RA was moderate to severe in most dogs (median RA to left atrium (LA) ratio = 1.45 [IQR 1.29–1.72]). Several echocardiographic indices used in human pediatrics to evaluate EA were calculated, including the displacement index (distance from the hinge point of the anterior mitral leaflet to that of the delaminated septal leaflet divided by body surface area: median = 17.4 mm/m^2 [IQR 12.0–21.9]) and the Celermajer index (ratio between the RA area and the sum of the areas of the RV, LA and left ventricle, median = 1.0 [IQR 0.5–1.3]).

Follow-up was available for 25/32 dogs. Death of cardiac origin was reported in 4/25 dogs (16%) and all-cause death in 8/25 dogs (32%); median age at all-cause death was 73 months. Median time to all-cause death was 74 months after the diagnosis of EA. Median time to cardiac death (CD) could not be calculated, due to the high proportion of dogs still alive at the end of study. It is estimated that 72% dogs [95% CI: 50–86%] did not present CD 160 months after the diagnosis of EA. Univariate analyses showed that time from diagnosis to CD was associated with the presence of ascites, clinical signs, a RA:LA ratio≥2, the presence of a right thrill, and a Celermajer index≥1.

In conclusion, RA enlargement is significantly associated with decreased survival time of dogs with EA although most may live years and may not die from CD.

Disclosures: Disclosures to report.

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ESVC – P – 13

UTILITY OF THE SNAP FELINE N-TERMINAL PRO-B-TYPE NATRIURETIC PEPTIDE TEST IN DETECTING ASYMPTOMATIC HYPERTROPHIC CARDIOMYOPATHY: A PROSPECTIVE STUDY IN 61 CATS. C. Damoiseaux[1], C. Poissonnier[1], M. Rospabé[2], V. Gouni[1], M. Lavennes[1], E. Trehiou-Sechi[1], R. Tissier[3], O. Sarret[2], V. Chetboul[1]. [1]Unité de Cardiologie d'Alfort, Ecole Nationale Vétérinaire d'Alfort, Maisons Alfort, France, [2]IDEXX Laboratories, Saint Denis, France, [3]Unité de Pharmacie-Toxicologie, Maisons Alfort, France

Hypertrophic cardiomyopathy (HCM) is the most common feline heart disease. Currently, echocardiography is the gold standard to diagnose feline HCM, including occult forms of the disease. However, this imaging technique requires expertise to interpret the data and represents a financial cost for the owner, thus limiting its widespread use for screening "apparently healthy" cats. Therefore, a rapidly assessed biomarker, such as a pet-side test able to identify asymptomatic HCM cats would be of interest.

Previous studies showed that the circulating cardiac biomarker N-terminal pro-B-type natriuretic peptide (NT-proBNP) is significantly increased in cats with moderate to severe occult HCM, as compared to healthy cats. The aim of this prospective study was to determine the sensibility (Se) and specificity (Sp) of the Idexx SNAP Feline proBNP Test to diagnose HCM in asymptomatic adults cats.

Material and Methods: The study population consisted of prospectively recruited "apparently healthy" adult cats (2015–2017), with or without heart murmurs. Cats with congenital heart diseases, with other cardiomyopathy than HCM, with current or past diagnosis of congestive heart failure, and with gallop rhythm, were not included in the study. All cats underwent a complete physical examination, blood pressure measurement, serum urea and creatinine measurements, and conventional echocardiography. Total T4 was also assessed in cats >6 years old. Plasma NT-proBNP concentration was measured using EDTA-potassium samples and a commercially available feline specific assay. A Snap Feline NT-proBNP was also performed (positive detection limit: 200 pmol/L), according to the manufacturer's instructions.

Results: The study population consisted of 61 "apparently healthy" cats (29 males and 32 females; median age: 4.9 years [1.1–16.6]; body weight: 4.6 kg [2.5–10.5]): 31 normal cats with both normal cardiac auscultation and echocardiography and 30 asymptomatic cats with a left apical systolic heart murmur either related to HCM ($n = 9$; 6 diffuse HCM forms and 3 segmental HCM forms with hypertrophy of the sub-aortic interventricular septum) or to a minor to mild mitral valve regurgitation without any other echocardiographic abnormality (MVR; $n = 21$). The SNAP test distinguished asymptomatic HCM cats from other "apparently healthy" cats (i.e., normal cats or cats with minor to mild MVR) with 64% sensibility (Se) and 100% specificity (Sp), the negative and positive predictive values were 93% and 100% respectively and when only considering diffuse HCM forms with 100% Se and 100% Sp.

In conclusion, the SNAP Feline NT-proBNP Test may help identifying diffuse HCM forms in asymptomatic cats.

Disclosures: Disclosures to report.

Study financed by IDEXX's laboratories.

ESVCN – P – 1
A RANDOMIZED DOUBLE-BLIND, PLACEBO CONTROLLED STUDY EVALUATING THE EFFECTS OF SHORT-CHAIN FRUCTO-OLIGOSACCHARIDES (SCFOS) ON CAT STOOLS ODORS.

F. Herpin, F.A. Allaert. CEN Nutrition Animal, Dijon, France

Objectives: The main objective was to evaluate the effects of the addition of short-chain fructo-oligosaccharides (scFOS) to the daily cat feed ration on the intensity of unpleasant odors of cat feces. The secondary objectives were to evaluate the digestive tolerance of the product and the cat owner's satisfaction.

Methods: The study was a randomized, double blind, placebo controlled study conducted on 2 parallel arms. The experimental products were dry cat food with 1 % scFOS (Profeed®, TEREOS) or without scFOS. The inclusion criteria were: healthy cats living in naturalistic conditions at the owner's home, 1–15 years old, using cat litter and whose owners were complaining of their intense bad smells. Cats recently or currently under treatment were excluded. The main criterion was the intensity of the odor of the feces evaluated by owners on a 7-point Likert scale (0: no odor, 6: unbearable). The digestive tolerance was evaluated by the consistency of stools on a fecal score scale and the satisfaction criterion was evaluated on a Likert scale. These criteria were daily collected during 2 weeks at the beginning of the study and after about 30 days of feeding.

Results: The study covers 57 cats aged of 4.3 ± 3.4 among which 54.4% were female: 27 cats were included in the verum group and 30 in the placebo group. Their characteristics and past history were similar. The intensity of the odor of the feces were similar in both groups at inclusion (verum 3.5 ± 0.7 vs. placebo 3.3 ± 0.6; *P*: 0.2767). The comparison between the two groups showed that the reduction of the feces odor was greater in the verum group than in the placebo group, 2.25 more (*P*:0.06) for a reduction described in absolute values (−0.9 ± 0.9 vs −0.4 ± 1.1) and 2.5 more (*P*:0.05) when described as a percentage (−26.9 ± 29.8 vs. −10.4 ± 31.7). The percentage of owners who were very satisfied or extremely satisfied with the improvement of the odor was significantly greater in the verum group than in the placebo group (53.8% vs. 43.3%) and in particular the percentage of very satisfied owners (19.2% vs. 0.0%). Stool consistency remained stable in both groups, confirming that scFOS are well tolerated by cats.

Conclusions: Adding scFOS into the daily cat feed ration is beneficial in order to reduce unpleasant odors of cats' stools without altering digestive tolerance.

Disclosures: Disclosures to report.

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ESVCN – P – 2
INCREASED DIETARY LONG-CHAIN POLYUNSATURATED FATTY ACIDS ALTER PLASMA FATTY ACID CONCENTRATIONS AND LOWER RISK OF URINE STONE FORMATION IN CATS.

D.E. Jewell[1], J.A. Brockman[1], S. Davidson[1], J.L. MacLeay[1], J.A. Hall[2]. [1]Hill's Pet Nutrition, Topeka, USA, [2]Oregon State University, Corvallis, USA

Increasing concentrations of dietary (n-3) polyunsaturated fatty acids (PUFA), e.g., eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), relative to (n-6) FA, e.g., arachidonic acid (AA), have been shown to increase plasma concentrations of EPA and DHA and reduce AA concentrations. The purpose of this study was to investigate the effects of increasing dietary PUFA concentrations on urine characteristics. We have recently shown that lifespans of cats with non-obstructive kidney stones is shortened compared with control cats indicating a need to prevent stone formation and decrease the rate of chronic kidney disease progression.

Domestic short hair cats ($n = 12$; mean age 5.6 years, range 2 to 9 years) were randomized into two groups and fed one of two diets for 56 days and then crossed over to the other diet for another 56 days. The protocol was reviewed and approved by the Institutional Animal Care and Use Committee, Hill's Pet Nutrition, Inc. For 30 days before study initiation, cats consumed a pretrial (control) food that contained 0.07% AA and no measurable EPA or DHA. After 30 days, cats were split into two groups. Group 1 continued eating control food for 56 days. Group 2 was fed test food for 56 days, which contained 0.16 % AA, and 0.27% EPA and DHA combined. After 56 days, Group 1 cats were fed test food and Group 2 cats were fed control food for another 56 days. Serum was analyzed for FA concentrations at baseline and after each feeding period. Concurrently, urine was analyzed for urine specific gravity (USG), calcium concentration, and relative super saturation for struvite crystals. In addition, a urine calcium oxalate titrimetric test (COTT) was performed.

After consuming test food, cats had increased (all $P < 0.01$) plasma concentrations of AA (36%), EPA (352%) and DHA (200%) compared with cats consuming control food. In addition, urine from cats fed test food had decreased USG ($P = 0.04$), decreased calcium concentration ($P = 0.03$; −9%), decreased struvite super saturation ($P = 0.03$; −51%) and enhanced titratability to added oxalate before forming calcium oxalate crystals ($P = 0.06$; −26%). Resistance to oxalate crystal formation was negatively correlated with blood calcium concentration ($r = ?0.41$; $P < 0.01$) and this relationship was unaffected by test food. However, feeding test food decreased USG, decreased urine calcium concentration, and increased resistance to oxalate crystal formation. These data show that there could be significant urinary tract benefit for cats, i.e., reduced urine stone formation, by increasing dietary AA, EPA and DHA.

Disclosures: Disclosures to report.

D.E. Jewell, J.A. Brockman, S. Davidson, J.L. MacLeay are all employees of Hill's Pet Nutrition, Inc. J.A. Hall has received grant money from Hill's Pet Nutrition, Inc.

ESVCN – P – 3

FOODS ENRICHED WITH BIOACTIVE INGREDIENTS INCLUDING FISH OIL INCREASE CIRCULATING (N-3) FATTY ACID CONCENTRATIONS, DECREASE PGE2, AND INCREASE LEAN BODY MASS IN CATS. D.E. Jewell[1], M.I. Jackson[1], J.A. Hall[2]. [1]Hill's Pet Nutrition, Topeka, USA, [2]Oregon State University, Corvallis, USA

Increasing concentrations of dietary (n-3) polyunsaturated fatty acids (PUFA), e.g., eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), relative to (n-6) FA, e.g., arachidonic acid (AA), have been shown to increase plasma concentrations of EPA and DHA and reduce AA concentrations. The purpose of this study was to investigate the effects of enriching food with bioactive ingredients, including EPA and DHA, on body composition, and concentrations of circulating fatty acids and the inflammatory biomarker prostaglandin E_2 (PGE_2). Domestic short hair cats ($n = 81$; mean age 11.1 years, range 6 to 14 years) were fed a pretrial food for 30 days, randomized into three groups, and then fed one of three diets for 180 days. The protocol was reviewed and approved by the Institutional Animal Care and Use Committee, Hill's Pet Nutrition, Inc. The pretrial food contained 33.4% protein, 0.12% arachidonic acid (AA) and negligible EPA and DHA. The control food contained 32.6% protein, 0.10% AA, 0.03% EPA, and 0.02% DHA. Test food 1 (TF1) and Test food 2 (TF2) contained 31.8% and 30.2% protein, respectively, as well as 0.04% AA, 0.095% EPA, and 0.06% DHA. Both TF1 and TF2 contained additional bioactive food factors (from broccoli, tomatoes, oats, and peas), with TF2 having increased bioactive ingredient concentrations compared with TF1. Serum was analyzed for FA and PGE_2 concentrations initially, and at 45, 90 and 180 days. Concurrently, body composition was determined by dual energy x-ray absorptiometry. After consuming food for 180 days, lean body mass (LBM) was unchanged in cats fed control food (42 ± 30 g), whereas cats fed TF1 (73 ± 30 g; $P = 0.02$) and TF2 (197 ± 31 g; $P < 0.01$) had increased LBM. Body fat was unchanged in cats fed control food (-11 ± 43 g), but decreased in cats fed TF1 (-124 ± 42 g; $P < 0.01$) and TF2 (-185 ± 43 g; $P < 0.01$). PGE_2 concentrations were decreased in cats fed control and TFs, and were positively correlated to the ratio of (n-6) to (n-3) FA in serum ($r = 0.31$; $P < 0.01$) and negatively correlated to the sum of (n-3) FA ($r = ?0.30$; $P < 0.001$). Cats consuming foods containing plant bioactives and fish oil had reduced concentrations of the inflammatory biomarker PGE_2 and enhanced lean body composition, which together may aid in offsetting inflammation and adiposity associated with aging in cats.

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D.E. Jewell, and M.I. Jackson are employees of Hill's Pet Nutrition, Inc. J.A. Hall has received grant money from Hill's Pet Nutrition, Inc.

ESVCN – P – 4

STUDIES IN A NEW BODY CONDITION SCORING BY MORPHOMETRIC METHOD IN DOGS. A.K. Koizumi, R. Aihara, M. Sakurada, H. Asakawa, K. Otsuji. Teikyo University of Science, Tokyo, Japan

Body condition scoring (BCS) is the method that many clinical veterinarians adopt as a nutritional assessment method. However, the BCS assessment can be inconsistent because of its subjective method. Therefore we developed a BCS palpation model to improve the precision of the BCS assessment. Furthermore, we studied a new BCS assessment by the morphometric method to further improve the precision of BCS assessment. BCS is assessed by measuring body length and the current body weight in this method.

Thirty-nine dogs which varied in their BCS levels were used. Breed, gender and age were neglected for the selection of the dogs. Measurement of body fat percentage: the deuterium water dilution method was used. After the blood collection, deuterium water of 0.2 g/kg was subcutaneously injected and the blood samples were collected 3 h after the administration. The concentration of deuterium water in the blood was analyzed by radio isotope mass-spectrometry. Body length: the length between the scapula and ilium (BLs-i) and between the scapula and base of tail (BLs-b) was measured. Calculation of the body weight corresponding to each BCS: ideal body weight (IBW) was calculated as the body weight at the body fat percentage of 20%. The body weight corresponding to each BCS was calculated as follows: BCS of 5: more than IBW $\times 1.21$, BCS of 4: IBW $\times 1.11$~1.20, BCS of 3: IBW $\times$ 0.91~1.1, BCS of 2: IBW $\times$ 0.81~—0.9., and BCS of 1: IBW $\times$ 0.80 or less.

The results suggest that the correlation coefficient between BLs-b and IBW was $r = 0.8355$, $P < 0.01$ and higher than the correlation coefficient between BLs-i and IBW. This means that measuring the length of BLs-b is more accurate than measuring the length of BLs-i. The results suggest that the IBW of each dog could be estimated by measuring the BLs-b. The correlation coefficient between the BLs-b and IBW in 5 long bodied dogs (Miniature Dachshund, Welsh Corgi, etc.) was higher than it in the all subject dogs. This suggests that it is better to divide dogs into following three types: standard shape, long and square bodied dogs for the morphometric BCS assessment. In addition, individual BCS can be calculated from an estrangement percentage between IBW and current weight by using above formula. This morphometric method is simpler and more objective than the conventional method.

Disclosures: No disclosures to report.

ESVCN – P – 5

VALIDATION OF A MODIFIED 9-INTEGER-UNIT BODY CONDITION SCORE SYSTEM AND A COMPUTER-BASED MODELING TOOL TO ESTIMATE BODY CONDITION IN PET DOGS. W. Saengsoi[1], E. Morel[2], M.A. Hours[2], E.J. Comerford[1], S. Tew[1], V. Biourge[2], A.J. German[1]. [1]University of Liverpool, Neston, UK, [2]Royal Canin Research Center, Aimargues, France

Body condition scoring (BCS) is the most widely accepted clinical method for estimating body fat mass in dogs. The 9-point system is preferred but, since visual characteristics are depicted with only 5 silhouette images from a single breed, assessment of visual characteristics of dogs of different size and body shape is challenging.

Two modifications to the original 9-point BCS system were developed with reference to an image archive of almost 3799 photographs from 155 dogs attending the Royal Canin Weight Management Clinic, University of Liverpool (Gant. BMC Veterinary Research 2016, 12:18). Body fat mass (measured by dual-energy X-ray absorptiometry [DEXA]) and BCS was known for all dogs, and owners gave written permission for use of these photographs (VREC50). The first modification was a paper-based system that used a set of 5 size-specific BCS charts, for small, medium, large, and giant breeds, respectively. The written descriptions for each category were identical, but different images were included for the different size categories. The second was a computer-based system whereby visual characteristics were modeled on-screen by altering body shape in 5 different zones (chest, abdomen, back, thigh, and pelvis), with the computer software then calculating the body condition score automatically using an algorithm.

Thirty dogs of a range of breeds were used to validate both systems, all of which had been referred for surgical treatment of cranial cruciate ligament disease at Small Animal Teaching Hospital, University of Liverpool. Owners had consented to their participation in a separate research study (VREC192), involving body fat measurement by DEXA (under the same anesthetic used for diagnostic and therapeutic procedures). One author (WS) assessed the BCS for all dogs, under the supervision of a second author experienced in body condition scoring (AJG). The computer system was used first, followed by the paper-based system.

Median BCS was 6/9 (3/9–8/9) and median body fat was 35% (range 8–52%). There was a strong positive correlation between body fat measured by DEXA and BCS for both the paper- ($R_s = 0.74$, $P < 0.001$) and computer-based ($R_s = 0.80$, $P < 0.001$) systems. Both systems also correlated strongly with each other ($R_s = 0.97$, $P < 0.001$), and agreement was almost perfect (Cohen's kappa 0.89, $P < 0.001$).

These findings demonstrate that both the modified paper-based and computer-based BCS systems correlate with body fat mass measured by DEXA and can be considered for use with clinical cases.

Disclosures: Disclosures to report.

Alex German's academic post is funded by Royal Canin. This author has also received financial remuneration and gifts for providing educational material, speaking at conferences, and consultancy work. Elodie Morel, Marie-Anne Hours, and Vincent Biourge are all employees of Royal Canin.

ESVE – P – 1

SAFETY AND EFFICACY OF DAPAGLIFLOZIN, A NOVEL ANTIDIABETIC DRUG, IN HEALTHY CATS. R.K. Burchell, A. Gal, S.E. Burton, N.J. Cave. Massey University, Palmerston North, New Zealand

Renal sodium glucose transporter type 2 (SGLT2) inhibitors are a novel class of drug developed for the management of type-2 diabetes (T2DM) in humans. Inhibition of SGLT2 induces profound renal glucosuria reducing blood glucose and lowering insulin requirements in man. Adverse effects are uncommon. These drugs have not been evaluated in cats to the authors' knowledge. In this study 3 healthy cats were sequentially dosed with 5, 10, 15 and 20 mg of dapagliflozin for 5 days per treatment with a 2 week washout between each regimen. Cats were housed in individual cages. Hematology, serum biochemistry and urinalysis were performed before and after each trial. Daily food, water intake, urine production and 24 h urinary glucose excretion were measured for the duration of each trial. Data was analyzed using a mixed linear model with a fixed effect of 'dose' and 'day', and the random effect of 'cat'. Dapagliflozin induced significant glucosuria at all doses used, which persisted for 5 days after the last dose for each regimen. The 10 mg dose induced the most significant increase in daily urine glucose output with a concomitant decrease in daily urine output. One cat developed a mild hyperglobulinemia and leukocytosis, but no other adverse effects were noted. The cats lost weight during each of the trials, which is one of the touted benefits of the drug in human diabetics. Polydipsia/polyuria were not observed, nor were urinary tract infections detected during the trial. In conclusion, dapagliflozin appeared safe and is effective in inducing glucosuria.

Disclosures: No disclosures to report.

ESVE – P – 2

EVIDENCE FOR REGIONAL VARIATION OF PATIENT CHARACTERISTICS IN DOGS WITH HYPERADRENOCORTICISM. K.F.A. Langner[1], B.C. Duff[2], S. Foster[2]. [1]Murdoch University Australia, PERTH, Australia, [2]Vetnostics, NORTH RYDE, Australia

Patient signalment and pathological causes of canine hyperadrenocorticism have been largely derived from studies on North American dog populations. It is has been suggested that these findings are not necessarily applicable to other countries.

This retrospective study assessed 200 consecutive records of Australian dogs between 2006 and 2009 that had samples submitted to an accredited laboratory for measurement of endogenous adrenocorticotropic hormone (ACTH) by radioimmunoassay. Adrenal ultrasonography was not easily available for most general veterinary practices at this time and the endogenous ACTH assay was routinely used for differentiation of pituitary from adrenal dependent disease. Clinical and clinicopathologic data were obtained from the laboratory submissions and/or submitting practitioner patient records. A total of 175 dogs met the inclusion criteria for a confirmed diagnosis of hyperadrenocorticism. This subset was evaluated for age, body weight, sex, breed and lesion location (pituitary vs. adrenal).

Median age of the assessed dogs was 11 years and median body weight was 8.17 kg. Sixty-one percent of the dogs were female and 39% male. The most commonly affected breeds were crossbred dogs (32.6%) and Maltese (20.6%). Maltese crossbreds and Maltese purebreds together comprised 31.4% of the study population. Other commonly identified breeds included Australian Cattle Dog, Jack Russell Terrier (3.4% each), Poodle, Miniature Fox Terrier, Shi Tzu and Bichon Frise (2.9% each). Pituitary dependent hyperadrenocorticism was identified in 171 dogs (97.7%). A functional adrenal tumor was found in 3 dogs (1.7%) and suspected in a fourth dog.

The results demonstrated that Australian dogs with hyperadrenocorticism have a lower median body weight and a higher prevalence of pituitary dependent disease when compared to the North American data. In addition a striking percentage of the study population were Maltese dogs and their crosses. These findings have implications for investigation and therapy of canine hyperadrenocorticism in Australia. They also highlight that regional differences in hyperadrenocorticism should be recognized by veterinarians worldwide.

Disclosures: Disclosures to report.

This study was a population study and involved no conflict of interest by the authors. One of the authors (BD) is employed by the accredited laboratory that was the source of the raw data. One of the authors (SF) is a consultant to the same laboratory. The study was an independent collaborative retrospective study. It was not performed for any commercial benefit and was not funded by any person or entity.

ESVE – P – 3

SYMMETRIC DIMETHYLARGININE (SDMA) IN HYPERTHYROID CATS. A. Corsini[1], S. Crosara[1], G. Carotenuto[2], F. Fracassi[2]. [1]Parma University, Parma, Italy, [2]Department of Veterinary Sciences, Bologna, Italy

Hyperthyroidism leads to a decrease in serum creatinine (Crea) by increasing glomerular filtration rate (GFR) and decreasing body muscle mass. This can mask a concurrent chronic kidney disease that might become evident after the onset of treatment. Symmetric dimethylarginine (SDMA) is a novel, early, renal biomarker independent of body muscle mass, therefore it might be a useful marker of renal disease in hyperthyroid cats. In humans is not clear if hyperthyroid state could influence SDMA.

Aim of this study was to evaluate SDMA in hyperthyroid cats at the time of diagnosis and after treatment.

This was a retrospective observational study. Nineteen hyperthyroid cats (TT4 > 40 mmol/L) with normal Crea (<1.8 mg/dL) were included. Eighteen healthy cats, older than 7 years, with normal TT4 and Crea <1.8 mg/dL were enrolled as control group. Data about physical exam, emogram, serum biochemistry and serum TT4 concentration were evaluated. SDMA was measured on serum left over from previous analyzes and stored at −80°C. SDMA measurement was performed in serum samples collected at the time of diagnosis of hyperthyroidism and after methimazole treatment when TT4 normalized, between 10 to 90 days after initiation of the treatment. Follow-up was available for 8/19 hyperthyroid cats; SDMA was measured using a validated immunoassay (IDEXX SDMA test).

Hyperthyroid cats were older ($P = 0.0005$) and had a lower weight ($P < 0.0001$) than control cats. In hyperthyroid cats Crea at diagnosis was positively correlated with SDMA ($r = 0.47$, $P = 0.04$) and negatively correlated with TT4 ($r = -0.46$, $P = 0.04$). No correlation was found between SDMA and TT4 at diagnosis ($P = 0.10$). In hyperthyroid cats weight was positively correlated with creatinine ($r = 0.51$, $P = 0.004$) but not with SDMA ($P = 0.39$). There was no difference for Crea between hyperthyroid cats and controls at diagnosis ($P = 0.3$). Creatinine significantly increased ($P = 0.03$) after treatment despite body weight did not ($P = 0.13$). No difference was found when comparing SDMA in hyperthyroid and control cats at diagnosis ($P = 0.11$) nor after treatment ($P = 0.86$). Five hyperthyroid cats had SDMA value higher than reference range at diagnosis. Follow-up after treatment was available for 2/5 only; in these 2 cats when TT4 was normal Crea was still normal and SDMA was increased in one. 2/5 cats showed increased creatinine when TT4 normalized, but none of them had high SDMA at diagnosis.

Based on this preliminary study hyperthyroidism seems not to influence SDMA concentration.

Disclosures: No disclosures to report.

ESVE – P – 4

LOW THYROXINE CONCENTRATIONS AFTER CONTROLLED FEEDING OF BOVINE THYROID GLAND TO DOGS. L. Steinhoff[1], B. Ruhmann[1], A. Mösseler[2], M. Schmicke[1]. [1]Clinic for Cattle, Endocrinology, University of Veterinary Medicine Hannover, Hannover, Germany, [2]Institute for Animal Nutrition, University of Veterinary Medicine Hannover, Hannover, Germany

Feeding of biologically appropriate raw food (BARF) including gullet is popular: Due to the close anatomical position of the thyroid gland and the respective muscle tissue such diets are likely to be contaminated with thyroid gland tissue and may cause alimentary thyrotoxicosis. However, as controlled studies are missing, it is unclear which effect the absorbed total thyroxine (T_4) and triiodothyronine (T_3) may have on the thyroid hormone status. Because T_4 levels are still routinely checked in the elderly dog and commonly in dogs suspicious of behavioral issues it would be of high diagnostic interest, if potential thyroid gland feeding may interfere with the diagnostic approach. Therefore, the present study aimed in investigating the short term effect of thyroid gland feeding on the thyroid hormone concentration in dogs. Bovine thyroid gland from the slaughterhouse (0.5 g/kg body weight) was fed after 12 h fasting together with a complete dry diet. Blood samples were taken 19 days before the experiment in order to verify euthyroidism in the healthy beagle dogs ($n = 5$). On the day of the feeding experiment blood was taken before (0 and 4, 8, 24, 52 h as well as 6 days after feeding. In the samples T_4-, free T_4-, T_3 and thyroid stimulating hormone (TSH) as well as thyroglobulin autoantibodies (TgAA) were measured either using an automated chemiluminescence immunoassay (Immulite® 1000 System, Siemens Diagnostics, USA) or a commercially available TgAA assay (Oxford Laboratories, MI, USA).. No dog had TgAA. After feeding thyroid gland there was an increase up to 7.8 fold basal levels of T_4, free T_4 and T_3 serum concentrations. Serum levels returned to basal levels after 52 h, however, three of five dogs showed T_4 and fT_4 concentrations below the reference range 52 h and 6 days after single controlled thyroid gland feeding. TSH levels were suppressed after feeding for 52 h. None of the dogs showed any clinical symptoms of hyperthyroidism. Feeding of thyroid tissue to healthy dogs resulted in distinct effects on the thyroid hormone blood concentration. Initially single feeding of thyroid gland lead to considerably higher T_4 levels but afterwards also to lower T_4 and fT_4 concentrations. Therefore, if euthyroidism should be diagnosed, administration of dog food containing thyroid gland should be carefully ruled out for the last seven days.

Disclosures: No disclosures to report.

ESVE – P – 6

C-REACTIVE PROTEIN IN DOGS DIAGNOSED WITH HYPOADRENOCORTICISM. J.G. Lyngby, J.F.H. Lundsgaard, L.R. Jessen, L.N. Nielsen. University of Copenhagen, Frederiksberg, Denmark

C-reactive protein (CRP) is a major acute phase protein and a marker of systemic inflammation in dogs. C-reactive protein, and indirectly the innate immune system, has not previously been evaluated in dogs with Hypoadrenocorticism (HA). Accordingly, the aim of this study was to investigate if dogs with HA were able to mount an acute phase response assessed by an elevated CRP.

Medical records were reviewed for patients newly diagnosed with hypoadrenocorticism between May 2010 to March 2017. Dogs were considered having HA if both a pre- and post ACTH stimulation cortisol were ≤55 nmol/L. Dogs were excluded if they were not newly diagnosed with HA, or had received treatment for either hypoadrenocorticism or hyperadrenocorticism, or if they did not have a CRP measured around the time of diagnosis.

Three hundred and twenty-two medical records from dogs with an ACTH stimulation performed were screened. Seventeen dogs with HA were identified. Of these, nine dogs with hypoadrenocorticism were included in this retrospective case series. The median age at time of presentation was 5.5 years and included three intact males, two neutered males, two intact females and two spayed females. The most prevalent clinical signs included vomiting (6/9), weight loss (6/9), and diarrhea (3/9), and all of the dogs had at least one of these clinical signs. Six of nine dogs had azotemia. The mean CRP was 62.2 mg/L, with an inter quartile range: 20.45–89.66 mg/L (reference 0–25 mg/L). Seven out of nine dogs had an elevated CRP. Interestingly, the two dogs with normal CRP were non-azotemic and clinically stable at the time of presentation.

In conclusion, dogs with hypoadrenocorticism are able to induce CRP production. This could indicate that at least part of the innate immune response is functional. Dogs with HA often have a normal neutrophil count, making neutrophils unreliable as marker of inflammation in HA. C-reactive protein could therefore be a useful biomarker for acute inflammation in patients with HA when other markers of inflammation are not reliable.

Disclosures: No disclosures to report.

ESVE – P – 7

SYSTEMIC HYPERTENSION IN DIABETIC CATS: DOES IT REALLY MATTERS?. P. García San José[1], I. Clares Moral[1], S. González Sanz[1], P. Casals Canal[1], R. García del Real Torralva[1], M.D. Pérez Alenza[2]. [1]Hospital Veterinario Complutense, Madrid, Spain, [2]Departamento de Medicina y Cirugía Animal, Universidad Complutense, Madrid, Spain

Hypertension in diabetic humans is common (prevalence 40–80%) and related with hyperglycemia, duration of the disease and several complications. In diabetic cats, previous studies shown that hypertension is not present or it is uncommon. The aims of this study were to determine prevalence of hypertension in feline diabetes mellitus (DM) and its potential relation with different parameters (age, body condition score (BCS), BCS previous to diagnosis, sex, glycemic control, time since diagnosis, concurrent diseases, chronic corticoid treatments, diabetic neuropathy and remission).

Thirty diabetic cats were assessed for the first time at the Veterinary Teaching Hospital Complutense between January 2013 and April 2016. Systolic blood pressure (SBP) was measured using Doppler methodology. Hypertension was defined as ≥160 mm Hg, and subclassified following the ACVIM consensus and the ISFM guidelines. BCS was categorized from 1 to 9, being 5 the ideal weight. No cat was receiving anti-hypertensive treatment.

Age ranged from 3 to 16 years, 23/30 males and 7/30 females; all neutered excepting one male. At diagnosis 12/30 (40%) of the cats were underweight. Previous to diagnosis no cat was underweight, in fact 83% (25/30) were overweight.

Prevalence of hypertension was 30% (9/30) and 4/30 had severe hypertension (≥180 mm Hg). Concurrent diseases known to be associated with hypertension were present in 9/30 cats (30%).

Hypertension and SBP values were not correlated with age, time since diagnosis, sex, glycemic control, corticoid excess, remission or diabetic neuropathy.

BCS previous to diagnosis was negatively correlated with SBP ($P = 0.039$). None of the overweight cats previous to diagnosis were hypertensive ($P = 0.008$). Also, underweight cats at diagnosis shown a higher prevalence of hypertension than those with a BCS≥5 (50% and 25% respectively; $P = 0.038$).

Prevalence of hypertension was different in diabetic cats without concurrent diseases (0%), diabetic cats with a disease not associated with hypertension (29%) and those with a disease known to increase SBP (56%)($P = 0.023$).

Remission was present in 11/27 cats (41%) with a median time of 4.2 ± 3.5 months. Remission was positively correlated with the presence of diabetic neuropathy at first visit ($P = 0.052$).

Hypertension seems to be infrequent in diabetic cats as previously reported, and it is positively correlated with concurrent diseases associated with hypertension and negatively correlated with BCS before diagnosis. The relation between hypertension, obesity and diabetes in cats is not similar to observed in humans. In hypertensive diabetic cats, it is recommended to search for other diseases causing the elevated blood pressure.

Disclosures: No disclosures to report.

ESVE – P – 8

SYSTEMIC HYPERTENSION IN DOGS WITH DIABETES MELLITUS. P. Casals Canal[1], P. García San José[1], I. Clares Moral[1], S. González Sanz[1], R. García del Real Torralva[1], M.D. Pérez Alenza[2]. [1]Hospital Veterinario Complutense, Madrid, Spain, [2]Departamento de Medicina y Cirugía Animal, Universidad Complutense, Spain

The relationship between diabetes mellitus (DM) and hypertension is complex. In humans, DM is associated with hypertension, but information on blood pressure in diabetic dogs is scarce. It has been reported in diabetic dogs, that males and dogs with longer duration of diabetes have higher blood pressure (BP) values. Furthermore, obesity is associated with increases in BP in a variety of species but its role in dogs is unclear. Aims of this study were to identify the frequency of hypertension in dogs with DM, and characterize the relationship between hypertension and age, sex, reproductive status, duration of DM, body condition score, concurrent diseases and treatment with corticoids.

Medical records of all diabetic dogs presented to the Internal Medicine Service of the Veterinary Teaching Hospital Complutense Madrid from July 2013 to March 2017 were reviewed. BP using a Doppler device was assessed at the first visit. Hypertension was defined as a systolic blood pressure (SBP) ≥160 mm. Dogs receiving antihypertensive medication at this moment were excluded. Following the ACVIM guidelines, hypertensive animals were sub-classified according to the risk of target organ damage and antihypertensive treatment was administered if deemed appropriate. Good control of DM was considered with fructosamine values <350 micromol/L, glucose curve values ranging from 90 to 250 mg/dL and absence of DM clinical signs.

Fifty-three dogs were included, 25 females (12/25 intact and 13/25 neutered), and 28 males (15/28 intact and 13/28 neutered). Ages ranged from 0.2 to 13.7 years. At first visit in our hospital, 44/53 dogs did not have a good control of DM.

Twenty-five dogs were considered hypertensive (25/53; 47%). Hypertension was significantly positively correlated to age ($P = 0.009$). No significant correlation between hypertension and sex, reproductive status, concurrent diseases, time since DM diagnosis or obesity was observed. Hypertension was not significantly correlated with the control of DM; however, none of the dogs considered as in good control of the diabetes had severe hypertension ($P = 0.067$).

Hypertension was significantly associated with chronic corticoid excess, due to hyperadrenocorticism or exogenous administration (12/19)($P = 0.05$).

Hypertension was present in 47% of diabetic dogs (similar to the prevalence reported in previous studies), and age and corticoid excess were significantly related to it. Obesity in diabetic dogs was not related to hypertension as it has been observed in non diabetic dogs.

Disclosures: No disclosures to report.

ESVE – P – 9

CANINE ELECTROLYTE ANALYSIS IN DOGS WITH HYPOADRENOCORTICISM: A COMPARISON OF TWO IN-HOUSE ANALYZERS WITH A REFERENCE LABORATORY. S.J. Fowlie, S. Spence, E. Roberts, I. Ramsey. University of Glasgow, Glasgow, UK

Dogs receiving treatment for hypoadrenocorticism are typically monitored by analysis of their serum sodium (Na^+) and potassium (K^+) concentrations and the Na^+: K^+ ratio alongside their clinical signs. There is a desire for veterinarians to be able to measure these concentrations in-house, allowing same day dose changes as opposed to waiting for the results from a reference laboratory.

The aim of this study was to compare these electrolyte concentrations and Na^+: K^+ ratios obtained from two in-house electrolyte analyzers (IDEXX Catalyst Dx® and IDEXX Vetstat®) with a reference laboratory (Olympus AU600) in a cohort of dogs with hypoadrenocorticism.

Cases ($n = 33$) were prospectively enrolled into a clinical trial comparing fludrocortisone to DOCP in the treatment of hypoadrenocorticism. All dogs had multiple electrolyte measurements taken at various time points during treatment. A total of 343 samples were tested by the reference laboratory using the Olympus AU600 analyzer. Of these, 280 samples were also tested using the Catalyst Dx® analyzer and 61 by the Vetstat® analyzer. Some samples were tested using all three analyzers.

The Catalyst Dx® and Vetstat® showed good correlation to the Olympus AU600 for Na^+ and K^+ concentrations and Na^+: K^+ ratio. For the Catalyst Dx® these were r = 0.714, 0.830 and 0.858 respectively, all with a $P < 0.0001$. For the Vetstat® these were r = 0.816, 0.955 and 0.959, all with a $P < 0.0001$. The mean difference (Bland-Altman plot) for Na^+ was −5.84 mmol/L with a standard deviation of 3.69 for the Catalyst Dx® and −11.67 mmol/L and 2.46 for the Vetstat®. The mean difference and standard deviation for K+ was −0.15 mmol/L and 0.36 respectively for the Catalyst Dx® and 0.01 mmol/L and 0.17 for the Vetstat®. Finally, the mean difference and standard deviation for the Na^+:K^+ ratio was −0.20 and 2.90 respectively for the Catalyst Dx® and −3.07 and 1.83 for the Vetstat®.

Both in-house analyzers displayed good correlation with the reference laboratory for the electrolytes measured. However, both analyzers persistently recorded higher Na^+ concentrations. Analysis of K^+ concentrations was closer to the reference laboratory but the effect of the increased Na^+ resulted in the Na^+: K^+ ratio also being higher. This could have clinically significant effects in the management of dogs with hypoadrenocorticism and care should be taken when using target ranges based on a reference analyzer when using results from in-house electrolyte measurements.

Disclosures: Disclosures to report.

The lead author's position and this study are jointly funded by Dechra Ltd and the University of Glasgow.

ESVE – P – 10

CONCURRENT PITUITARY AND ADRENOCORTICAL TUMORS IN DOGS WITH SPONTANEOUS HYPERCORTISOLISM. K.L. van Bokhorst, S.A.E.B. Boroffka, H.S. Kooistra, S. Galac. Faculty of Veterinary Medicine, Utrecht University, Utrecht, the Netherlands

Spontaneous hypercortisolism or Cushing's syndrome in dogs is due to a pituitary tumor (PT) or an adrenocortical tumor (AT), but concurrent PT and AT have also been reported. The objective of this retrospective study was to analyze the clinical and computed tomographic (CT) imaging data of a large group of dogs diagnosed with spontaneous hypercortisolism to report for concurrent PT and AT.

The clinical records of 202 dogs with spontaneous hypercortisolism, referred to the authors' institution, were reviewed. Diagnosis was based on physical and biochemical changes suggestive of hypercortisolism and confirmed by endocrine function tests. Endocrine tests revealing dexamethasone resistance in combination with an endogenous plasma ACTH concentration <40 ng/mL was interpreted as functional AT. In all dogs, pre- and postcontrast CT of both the pituitary gland and the adrenal glands was performed. A pituitary/brain (P/B) ratio >0.31 was interpreted as enlarged, consistent with a PT. Heterogeneous adrenal structure, asymmetric shape, and adrenal width >15 mm were consistent with an AT. Adrenal expansion into blood vessels greatly supported the diagnosis of an AT.

In dogs with suppressible hypercortisolism (122/202), 78 dogs (64%) showed an enlarged pituitary gland (median P/B ratio 0.43, range 0.32–1.21) on CT. Two of these 78 dogs were diagnosed with a concurrent AT. In the remaining dogs with suppressible hypercortisolism (44/122; 36%) a pituitary microadenoma (median P/B ratio 0.27, range 0.07–0.31) was diagnosed.

In the non-suppressible group (80/202), 47 of the 80 dogs (59%) had an enlarged pituitary gland (median P/B ratio 0.57, range 0.35–1.50) and in 8 of the 80 dogs (10%) a concurrent AT was present. In the remaining 33 dogs (41%) from this group, the pituitary gland was not enlarged (median P/B ratio 0.23, range 0.09–0.30). Among them, a pituitary microadenoma was diagnosed in 6 dogs. In the other 27 dogs, ATs (2 bilateral, 25 unilateral) were diagnosed and confirmed by a plasma ACTH concentration < 40 ng/mL in all cases and by histopathology in 21/27 cases.

We conclude that concurrent adrenal and pituitary lesions are present mainly in dogs with non-suppressible hypercortisolism. Results of this study show that CT evaluation of both the pituitary and the adrenal glands should always be included in the diagnostic work-up of dogs with hypercortisolism to provide optimal treatment and prognosis.

Disclosures: No disclosures to report.

ESVE – P – 11

PREVALENCE OF NEUROLOGICAL SIGNS IN HYPOTHYROID DOGS AT DIAGNOSIS. S. González Sanz[1], R. García del Real Torralva[1], P. García San José[1], I. Clares Moral[1], P. Casals Canal[1], M.D. Pérez Alenza[2]. [1]Hospital Veterinario Complutense, Madrid, Spain, [2]Departamento de Medicina y Cirugía Animal, Universidad Complutense, Spain

Neurological signs (NS) can occur in canine hypothyroidism and sometimes, they are the unique manifestation of this disease. The objective of the present retrospective study was to evaluate the frequency of NS, including seizures, among hypothyroid dogs at diagnosis. Fifty-nine dogs newly diagnosed with hypothyroidism at The Veterinary Teaching Hospital Complutense Madrid between October 2011 and March 2017 were reviewed.

Age ranged between 2.3 and 6.5 years, 24/59 females, 37/59 males, 29/59 intact and 30/59 neutered. Duration of clinical signs before diagnosis ranged from 1 to 24 months (mean 9 ± 6.7 months). Clinical signs, body condition score (BCS), concurrent diseases, body weight, total-thyroxine (tT4) ,free-thyroxine (fT4), thyroid stimulating hormone (TSH) and cholesterol levels were recorded.

Neurological signs were present in 17/59 dogs (29%), being seizures the most common (13/17), while 4/17 dogs presented other NS (vestibular deficits, megaesophagus, head bobbing syndrome and peripheral neuropathies).

No association was observed between seizures and age, sex, BCS, duration of signs before diagnoses, tT4 and fT4 levels, reproductive status or other NS.

Mean plasma TSH in dogs without seizures (2.0 ± 1.7 ng/mL) was significantly higher than in dogs without this NS (1.3 ± 2.2 ng/mL) ($P = 0.04$). Among the 13 dogs that presented seizures, 7/13 (54%) had normocholesterolemia and 6/13 (46%) hypercholesterolemia; including one dog (8%) with plasma cholesterol levels above 620 mg/dL. However, in the group of dogs without seizures, only 4/29 (14%) presented normal cholesterol levels and 25/29 (85%) hypercholesterolemia, including 12/29 (41%) with plasma cholesterol levels above 620 mg/dL of ($P = 0.01$).

Prevalence of seizures at diagnosis was higher in dogs with clinical evidence of myxedema (4/9; 44%) compared with dogs without this clinical sign (9/50; 18%) ($P = 0.078$).

Neurological signs have been described to occur in 7.5% of hypothyroid dogs. However, in the present study, 29% of hypothyroid dogs had NS, and among them, 76.5% presented seizures. Probably, our diagnostic protocol used for convulsive patients, were thyroid hormones testing is always included before anticonvulsive treatment is administered, is related with this finding. Different mechanisms have been proposed to explain the development of NS in hypothyroid dogs, including alterations in axonal transport and ischemia. Hypercholesterolemia and atherosclerosis and consequent hypoxia of Central Nervous System has been observed and proposed as a cause of NS; however, in the present study hypercholesterolemia is definitely not related to seizures. Clinical evidence of myxedema though seems to be related with seizures.

Disclosures: No disclosures to report.

ESVE – P – 12

EVALUATION OF ONE PORTABLE BLOOD GLUCOSE METER AND ONE PORTABLE GLUCOSE-KETONES METER IN DOGS. F. del Baldo, E. Malerba, S. Corradini, I. Rovatti, A. Zeppi, F. Dondi, F. Fracassi. University of Bologna, Ozzano Dell'Emilia, Italy

Nowadays only few Portable Blood Glucose Meters (PBGMs) have been developed specifically for use in dogs and cats. Recently one glucometer (Gluco Calea, WellionVet; GC) and one glucose-ketones meter (Belua, WellionVet; BE) have been developed for use in veterinary medicine. The aims of this study were to assess the accuracy and precision of these devices in canine venous and capillary blood samples based on ISO 15197:2013 and to evaluate packed cell volume (PCV) interferences.

Samples were obtained from 45 non anemic dogs (PCV 37–54%) and 10 anemic dogs (PCV<37%) divided into three glycemic ranges: high (>140 mg/dL), medium (90–139 mg/dL), and low (<90 mg/dL). Paired measurements of glucose and 3-á°ž-hydroxybutyrate (3-HB) from capillary and venous blood samples were determined using the two devices and compared with the results of reference methods (enzymatic hexokinase and 3-HB-dehydrogenase, respectively) obtained by an automated chemistry analyzer (Beckman-Coulter AU480). Linear regression, Bland Altman plots and the Parkes error grid analysis (EG) were used to assess the accuracy. PCV interferences for glucose measurement were assessed comparing the differences between PBGMs readings and reference method values in anemic and non-anemic dogs. To assess within-run precision, glucose concentrations obtained from 12 samples, belonging to the three glycemic ranges, were measured 10 times within 10 min. Between-day precision was assessed by testing each manufacturer's glucose control solution over 10 consecutive days. $P < 0.05$ was considered significant.

Mean differences (mg/dL) between measurements of each PBGM on capillary and venous blood and values measured by the reference method were: GC 37.8 ± 24.2, 44.1 ± 27.2, BE 20.4 ± 28.6 and 10.2 ± 25.1 respectively. A positive significant correlation between all paired samples was found for both devices ($r > 0.89$). However neither PBGMs fulfilled ISO requirements: 82.21% and 84.08% of glucose values measured respectively on capillary and venous blood using GC fell in zone A+B of EG; 86.7% and 97.8% of glucose values measured respectively on capillary and venous blood by BE fell in zone A+B of EG. Within-run and between-day precision were adequate. The effect of PCV was significant and higher results with lower PCV were observed.

The correlations between capillary and venous 3-HB and reference 3-HB were $r = 0.48$ and $r = 0.59$, respectively. Mean differences between capillary and venous 3-HB and reference method were 0.05 (± 0.57) and -0.07 (± 0.79) respectively; within-run precision was adequate.

Our results show that both GC and BE are not sufficiently accurate and safe for clinical use in dogs.

Disclosures: Disclosures to report.

Devices and test strips were provided by manufacturers (WellionVet).

ESVE – P – 13

SERUM SYMMETRIC DIMETHYLARGININE (SDMA) IN DOGS WITH HYPOTHYROIDISM. G. Carotenuto, S. Corradini, A. di Paola, F. Dondi, F. Fracassi. University of Bologna, Ozzano Dell'Emilia, Italy

Canine hypothyroidism is associated with decreased glomerular filtration rate (GFR), while serum creatinine (SCr) concentrations are rarely increased above the reference interval (RI) in hypothyroid dogs. Symmetric dimethylarginine (SDMA) is considered a biomarker for early detection of renal dysfunction and resulted strongly correlated with GFR in dogs. In humans, SDMA is significantly higher in hypothyroid compared to healthy people. The aim of this study was to evaluate the SDMA concentrations in a population of hypothyroid dogs (HD) at the time of diagnosis (T0) and after treatment (T1). Fourteen dogs affected by spontaneous hypothyroidism and 20 healthy dogs (control group) were included. The diagnosis of hypothyroidism was based on consistent clinical signs, laboratory findings, including serum total T4

and cTSH concentrations below and above the RI, respectively. In dogs with normal cTSH, rhTSH stimulation test was performed to confirm the diagnosis. SCr was measured for diagnostic or check-up purposes and SDMA was measured afterwards from surplus of serum stored at −20°C. In HD such measurements where performed at T0 after 15 to 112 days (median 64.5) of treatment (T1) with levothyroxine (10–15 µg/kg q12 h PO). SDMA was measured using a validated immunoassay (IDEXX SDMA test).HD had a median age of 4 years (4–15), median body weight (BW) of 37.5 kg (7.9–53), 7/14 were male (1 castrated) and 7/14 female (3 spayed). There were no significant differences regarding signalment and BW between HD and control group. Median SDMA concentrations (RI <14 µg/dL) were 10 µg/dL (6–17), 13.5 µg/dL (7–20) and 10.5 µg/dL (5–17) in healthy dogs, HD at T0 and T1, respectively. SDMA concentrations were significantly higher in HD at T0 in comparison with healthy dogs ($P < 0.029$) and HD at T1 ($P < 0.031$). Among HD, 7/14 had SDMA above the RI at T0 and only 1/14 (7%) at T1. At T0, 4/14 HD had SCr above the RI (>1.35 mg/dL). SCr concentration was significantly higher in HD at T0 compared to HD at T1 ($P < 0.0082$), and in one dog SCr was above the RI at T1. No significant correlation was observed between SDMA and T4, and SDMA and SCr in the HD at T0 and T1.

This study shows that in HD SDMA concentrations are frequently above the RI at diagnosis and normalize after treatment. The GFR modifications that are present in canine hypothyroidism may be better detected with SDMA compared to SCr.

Disclosures: No disclosures to report.

ESVE – P – 14

EVALUATION OF ONE PORTABLE BLOOD GLUCOSE METER AND ONE PORTABLE GLUCOSE-KETONES METER IN CATS.

E. Malerba, F. del Baldo, S. Corradini, A. Zeppi, I. Rovatti, F. Dondi, F. Fracassi. University of Bologna, Ozzano Dell'Emilia, Italy

Numerous portable blood glucose meters (PBGMs) have been developed during the last decade, the majority of which is designed for use in humans. Recently one glucometer (Gluco Calea, WellionVet; GC) and one glucose-ketones meter (Belua, WellionVet; BE) have been developed for use in veterinary medicine. The aims of this study were to assess the accuracy and precision of these devices in feline venous and capillary blood samples based on ISO 15197:2013 and to evaluate packed cell volume (PCV) interferences.

Samples were obtained from 29 non anemic cats (PCV 30–47%) and 18 anemic cats (PCV<30%) divided into three glycemic ranges: high (>140 mg/dL), medium (90–139 mg/dL), and low (<90 mg/dL). Paired measurements of glucose and 3-á°ż-hydroxybutyrate (3-HB) from capillary and venous blood samples were determined using the two devices and compared with the results of reference methods (enzymatic hexokinase and 3-HB-dehydrogenase, respectively) obtained by an automated chemistry analyzer (Beckman-Coulter AU480). Linear regression, Bland Altman plots and the Parkes error grid analysis (EG) were used to assess the accuracy. PCV interferences for glucose measurement were assessed comparing the differences between PBGMs readings and reference method values in anemic and non-anemic cats. To assess within-run precision, glucose concentrations obtained from 14 samples, belonging to the three glycemic ranges, were measured 10 times within 10 minutes. Between-day precision was assessed by testing each manufacturer's glucose control solution over 10 consecutive days. $P < 0.05$ was considered significant.

Mean differences (mg/dL) between measurements of each PBGM on capillary and venous blood and values measured by the reference method were: GC 30.7 ± 35.4, $35.6.2 \pm 40.5$, BE 15.5 ± 35.5 and 15.0 ± 24.1 respectively. A positive significant correlation between all paired samples was found for both devices ($r > 0.89$). However neither PBGMs totally fulfilled ISO requirements, but 100% of glucose values measured on venous blood using BE fell in zone A+B of EG. Within-run and between-day precision were adequate. The effect of PCV was significant (higher results with lower PCV) only for BE.

The correlations between capillary and venous 3-HB and reference 3-HB were $r = 0.66$ and $r = 0.82$ respectively. Mean differences between capillary and venous 3-HB and reference method were −0.07 (±1.15) and −0.30 (±1.48) respectively; within-run precision was adequate.

Our results show that GC is not sufficiently accurate while the superior performances of BE supports its clinical use in cats.

Disclosures: Disclosures to report.

Devices and test strips were provided by manufacturers (WellionVet).

ESVIM – P – 1

BRONCHOALVEOLAR LAVAGE ANALYSIS USING UREA DILUTION STANDARDIZATION IN DIAGNOSIS OF RESPIRATORY DISEASES IN DOGS.

A.E.H. Paul[1], P. Irwin[2], J. Stayt[3], C.S. Mansfield[4]. [1]Anderson Moores Veterinary Specialists Ltd, Hursley, Winchester, UK, [2]Murdoch University, Murdoch, Perth, Australia, [3]Vetpath Laboratory Services, Perth, Australia, [4]University of Melbourne, Parkville, Melbourne, Australia

Considerable variation has been reported in total cell counts and concentration of biochemical markers due to variable recovery of pulmonary epithelial lining fluid (PELF) in bronchoalveolar lavage (BAL) fluid. A number of chronic respiratory conditions can be difficult to diagnose definitively and accounting for dilution of PELF may allow us to better differentiate respiratory disease. Differentiation of various chronic respiratory diseases may be made via analysis of BAL fluid using urea concentration of BAL relative to blood urea concentration as a marker of dilution of PELF. Assessment of cell counts after adjusting for dilution may allow differentiation of the primary disease process in dogs presenting with respiratory signs.

Client-owned dogs presenting for investigation of respiratory disease were included. All dogs had a BAL performed and BAL cell counts were corrected after using urea as a marker for dilution and comparison of urea in blood to that of urea in BAL fluid. A final diagnosis of respiratory disease was made after retrospective analysis of all diagnostic investigations and response to treatment.

Seventy two BAL samples from a total of 48 dogs were analyzed and thirteen primary causes of respiratory disease identified based on diagnostic investigation including BAL cell cytology and treatment response. Respiratory diseases were also assigned to inflammatory, non-infectious, infectious, upper respiratory tract or respiratory neoplasia categories based on the disease diagnosed. There was no statistical difference in the adjusted total cell counts of BAL fluid (BALF) from dogs with different respiratory diseases or disease groups. *Mycoplasma* spp had no effect on the total cell count in dogs with chronic bronchitis.

This study suggests total cell counts of BAL fluid corrected for dilution by urea concentration cannot be used to distinguish between different respiratory diseases. A larger number of cases and cross section of respiratory disease may further identify significant differences in total and differential cell counts of various different diseases.

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ESVIM – P – 2
PREVALENCE OF DEGENERATIVE JOINT DISEASE IN MATURE INDOOR CATS. H.P. Huang[1], T.C. Tai[2], S.H. Chiu[1], Y.C. Wu[2], Y.H. Lien[2]. [1]National Taiwan University, Taipei, Taiwan, [2]Azu Clinic for Animals, Taipei, Taiwan

The aims of this investigation were to report the radiographic prevalence of DJD and physical changes in the appendicular skeleton and its clinical relevance in mature indoor cats.

One hundred and sixteen apparently healthy mature client-owned cats were included (age $\geq$ 6 years). All cats were kept exclusively indoors. These owners reported no lameness was observed of these cats over the last six months. All cats underwent a full physical examination and orthopedic evaluation of the appendicular and axial skeleton (signs of pain, instability, effusion and crepitus, performed by the same assessor). Body condition score (BCS, 5-point system) was also assessed. Each cat was gently restrained for radiographic examination without sedation. Radiographs of both shoulders, elbows, carpi, coxofemoral joints, stifles, and tarsi were evaluated. Among 116 cats, 111 (95.7%) cats had at least one appendicular joint affected with radiographic osteoarthritis. The prevalence of DJD in shoulders, elbows, carpi, coxofemoral joints, stifles, and tarsi were 15/116 (12.9%), 86/116 (74.1%), 82/116 (70.7%), 17/116 (14.7%), 71/116 (61.2%), and 11/116 (9.5%), respectively. Results of multivariate general linear model analyses indicated that DJD in elbows and coxofemoral joints was associated with BCS ($P = 0.008$ and $P = 0.014$, respectively). DJD in hocks was associated with BCS, gender and neutering ($P = 0.039$). Sixty six (56.9%) cats had decreased mobility, and further discriminant analysis indicated that decreased mobility was associated with presence of DJD in hocks ($P = 0.014$); whereas 21 (18.1%) cats hesitated to jump down, and further discriminant analysis indicated that hesitation of jump down was associated with presence of DJD in elbows ($P = 0.009$). Presence of DJD and decreased mobility was not associated with age or body weight.

Based on this investigation, DJD was highly prevalent in indoor cats. The front limb joints were commonly affected with DJD. The living environment (exclusive indoors, flooring materials and limited access to exercise) might contribute to the high prevalence of DJD in this cohort.

Disclosures: The study was self-funded. The authors declare that they have no competing interests. The study was carried out in accordance with the code of the Research Ethics Office of National Taiwan University: No ethical approval was needed if no trial therapy (tested medicine) was involved in the study. All owners of cats whose cases were included in this study signed up their written consent for agreement of participating in a research study.

ESVIM – P – 3
ORAL CARICA PAPAYA IN THE SUPPORTIVE CARE OF INFECTIOUS THROMBOCYTOPENIA IN BLEEDING DOGS. B. Rengaswamy, A.P. Nambi. Madras Veterinary College, Chennai, India

Carica papaya leaf extracts have been used orally to recover platelet counts and to control bleeding in human patients with Dengue fever. The active components of papaya carica extract have been proved earlier to inhibit immune mediated platelet destruction and possible bone marrow suppression to fasten the natural course of recovery by increasing the platelet counts. In this report we studied the effect of *Caprica papaya* in the treatment of infectious thrombocytopenia in dogs. During a one-year period 60 thrombocytopenic dogs with ehrlichiosis, babesiosis, and/or leptospirosis referred to Madras Veterinary College Teaching Hospital were studied. They had mild (platelets 50,000–100,000/µl) to severe (platelets 25,000–50,000/µl) thrombocytopenia and evidence of bleeding. In addition coagulation profiles, buccal mucosal bleeding times, saline agglutination tests, spherocyte reviews, direct Coombs' (Direct Antiglobulin) tests, von Willebrand Factor assays, platelet-associated antibody (PSAb) assays, bone marrow aspiration cytology, and DEA 1 typings were determined. Platelet-rich plasma or fresh whole blood were transfused in case of severe (platelets <20,000 cells/µL) thrombocytopenia and/or anemia and all dogs received doxycycline and prednisone for ehrlichiosis and leptospirosis, Imidocarb for babesiosis,. *Carica papaya* leaf extract was administered at 5 mL per 10 kg body weight twice a day for 3 weeks. Platelet counts increased significantly faster in dogs receiving *Carica papaya* from day 2–7 compared to those receiving only other treatments. Also the bleeding signs appear to improve more rapidly with *Carica papaya*, and no side effects were observed. In conclusion *Carica papaya* may be an inexpensive, easily available thrombopoietic supplement to more rapidly control thrombocytopenia and bleeding in dogs with hemoprotozoan diseases along with transfusions, specific infectious disease and immunosuppression.

Disclosures: No disclosures to report.

ESVIM – P – 4
METHEMOGLOBINEMIA CAUSED BY CYTOCHROME B5 REDUCTASE DEFICIENCY: GENETIC STUDIES AND LONG-TERM TREATMENT WITH ORAL METHYLENE BLUE. J. Jaffey[1], M. Harmon[1], N. Villani[1], E. Creighton[1], G. Johnson[1], U. Giger[2], J. Dodam[1]. [1]University of Missouri Veterinary Health Center, Columbia, USA, [2]University of Pennsylvania School of Veterinary Medicine, Philadelphia, USA

Methemoglobin, which cannot carry oxygen due to oxidized iron, may accumulate when the cytochrome b5 reductase system is overwhelmed by toxins or genetically dysfunctional. We report here on the diagnostic study of hereditary methemoglobinemia of a dog and a novel long-term treatment.

A juvenile male mixed breed was presented for lethargy, exercise intolerance, and aggression. Cyanosis, tachycardia, and tachypnea were observed which persisted during oxygen supplementation. Arterial blood gas analysis by co-oximetry indicated increased methemoglobin concentration (27%; normal < 2%) with normal arterial oxygen tension. After initial intravenous methylene blue (MB; 1 mg/kg) administration, the dog was treated long-term with oral MB (1.5 mg/kg, q48 h). Both reduced the methemoglobinemia and resolved the clinical signs during the 63-day observation period.

The erythrocytic cytochrome b5 reductase activity, measured by NADH-ferricyanide reductase assay, was low (6% compared to control), while the cytochrome c reductase activity was normal. A whole genome sequence (36×) of this dog contained two heterozygous *CYB5R3* missense mutations with a serine for glycine substitution predicted at codon 72 and a leucine for isoleucine substitution predicted at codon 190. Both missense mutations are very likely to be deleterious, suggesting that each was inherited from a different parent and that each contributed to the recessive methemoglobinemia in a compound heterozygous state.

This is the first molecular genetic report of *CYB5R3* variants and long-term management with oral MB of hereditary methemoglobinemia of a dog with cytochrome b5 reductase deficiency. Further studies on other affected dogs are in progress.

Disclosures: No disclosures to report.

ESVIM – P – 5
PREVALENCE OF GAIT ABNORMALITIES IN PUGS: A QUESTIONNAIRE BASED SURVEY. C. Rohdin[1], K. Hultin Jäderlund[2], I. Ljungvall[1], K. Lindblad-Toh[3], J. Häggström[1]. [1]Swedish University of Agricultural Sciences, Uppsala, Sweden, [2]Norwegian University of Life Sciences, Faculty of Veterinary Medicine, Oslo, Norway, [3]Department of Medical Biochemistry and Microbiology, Science for Life Laboratory, Uppsala, Sweden

Abnormal gait can be the result of musculoskeletal and/or neuromuscular conditions. The Pug breed is predisposed for specific orthopedic conditions and neuromuscular problems in the Pug breed has become increasingly recognized in the last few years. Lameness, as the result of musculoskeletal problems, and spinal cord disorders, characterized by paresis and ataxia, were reported in a British study in 2.4% versus 1.4% of the Pugs attending primary veterinary care. The prevalence of spinal cord disorders presented from the United Kingdom poorly corresponds to a Swedish insurance data report suggesting a seven-fold increase in mortality rate for ataxia, paresis and collapse in Pugs compared to other

breeds. Adding the attention 'wobbly Pugs' are given on the internet suggests a need to investigate the prevalence of gait abnormalities in the Pug in a systematic way. The aim of this prospective study was to investigate the prevalence of gait abnormalities in a cohort of Swedish Pugs by using an owner-based questionnaire targeting signs of gait abnormality and video footage showing the dog´s gait. The study also aimed at evaluating associated conditions of abnormal gait; including other health disorders prevalent in the breed. The owners reported gait aberrations in 20.2 % of the Pugs with a prevalence increase with increasing age. Adding the Pugs that were reported to show indirect signs of gait abnormalities (wearing their nails and dorsal aspect of the skin on their paws) increased the prevalence of gait abnormalities in the breed from 20.2% to 30.7%. These results suggest gait abnormalities to be a more significant health problem than previously reported. Indeed, the single, listed, most common cause for death/euthanasia, reported by the owners, was a gait abnormality. In conclusion, gait abnormalities were a common finding in the Pug breed. Wearing of the nails and/or skin on the dorsum of the paws, predominately in the thoracic limbs, were frequently found and from a comparably young age. The result of the questionnaire and the video analysis suggest neurological disorders are predominately responsible for the high prevalence of gait abnormalities in the Pug breed. The prevalence of abnormal gait was significantly associated with age and with dyspnea. The gait abnormalities were not associated with overt signs of pain but were associated with reluctance to go for walks.

Disclosures: No disclosures to report.

ESVIM – P – 6
COMPARING THE SUBMAXIMAL EXERCISE TEST RESULTS AND SEVERITY OF BRACHYCEPHALIC OBSTRUCTIVE AIRWAY SYNDROME IN PUGS AND FRENCH BULLDOGS. M. Aromaa, M.M. Rajamäki, L. Lilja-Maula. University of Helsinki/Faculty of Veterinary Medicine, Helsinki, Finland

In addition to respiratory difficulties, exercise intolerance and impaired recovery are major signs of brachycephalic obstructive airway syndrome (BOAS). Therefore, we investigated the correlations of the 6 min walk test (6MWT) or the 1000 m walk test results with a veterinary assessment of BOAS severity in a group of prospectively recruited 1–5 years old Pugs ($N = 35$) and French Bulldogs (FBs) ($N = 42$). For severity of BOAS, dogs graded as having no or mild signs of BOAS were referred to as the BOAS- group and those having moderate or severe signs as the BOAS+ group based on veterinary physical examination findings. The BOAS- Pugs walked longer distance ($P = 0.002$) in 6MWT (mean 584 ± 33 m, range 505–630) and shorter time ($P = 0.006$) in 1000 m walk test (mean 10.17 ± 0.67 min, range 9.39–11.94) than BOAS+ Pugs (6MWT 517 ± 64 m, range 400–585; 1000 m test 12.26 ± 2.23 min, range 10.25–17.55). Similarly, the BOAS- FBs walked longer distance ($P = 0.063$) in 6MWT (639 ± 51 m, range 575–745) and shorter time ($P = 0.012$) in 1000 m test (9.47 ± 0.66 min, range 8.15–10.77), than BOAS+ FBs (6MWT 593 ± 73 m, range 435–695; 1000 m test 10.72 ± 1.25 min, range 8.42–12.15). BOAS- Pugs and FBs recovered also more quickly than BOAS+ Pugs and FBs ($P = 0.002$; $P = 0.007$). In conclusion, submaximal exercise test could be used as non-invasive tool for evaluation of severity of BOAS.

Disclosures: No disclosures to report.

ESVIM – P – 7
BRONCHIECTASIS IN IRISH WOLFHOUNDS WITH RECURRENT BACTERIAL PNEUMONIA. S.J. Viitanen, A.K. Lappalainen, M.M. Rajamäki. University of Helsinki, Helsinki, Finland

The development of bronchiectasis (BE), an irreversible dilation of the bronchi, is a well-established complication after bacterial or viral pneumonia in humans. BE leads to defects in the mucociliary clearance and predisposes to the development of new bacterial respiratory infections. BE has been described in dogs with variety of respiratory diseases, but the connection to recurrent bacterial infections has not been fully established. A breed predisposition to acute bacterial pneumonia (BP) has been described in the Irish wolfhound (IWH), but the etiology is largely undiscovered.

High resolution computed tomography (HRCT) was performed to 10 IWHs with recurrent BP (median age 6.0 years, range 0.8–7.7 years; median number of previous BPs 4, range 2–6). All dogs were examined when they were clinically healthy and not receiving antibiotics. HRCT findings comprised mild to severe bronchiectasis (9/10 dogs), mild to moderate local bronchointerstitial pattern (2/10), mild local interstitial pattern (1/10), parenchymal band (1/10), locally thickened pleura 1/10 and subpleural band (1/10). Bronchiectasis was detected in a single lung lobe in 3/9, in 2 lung lobes in 3/9 and in 3 lung lobes in 3/9 dogs. Left and right cranial lobes and the right middle lobe were most often involved.

In our study, BE was commonly detected in IWHs with recurrent BP. The development of BE is likely a post-infectious consequence of previous BPs. The presence of BE may further facilitate the development of new respiratory infections and may therefore act as a predisposing cause to recurrent BP.

Disclosures: No disclosures to report.

ESVIM – P – 8
INVESTIGATION OF THE NASAL MICROBIOTA IN HEALTHY DOLICHOCEPHALIC DOGS AND DOGS WITH SINONASAL ASPERGILLOSIS (SNA). E. Vangrinsven, B. Taminiau, E. Roels, A. Fastres, C. Auquier, F. Billen, G. Daube, C. Clercx. University of Liege, Angleur, Belgium

Sinonasal aspergillosis (SNA) most commonly affects middle-aged dolichocephalic dogs and is characterized by a destructive rhinitis and sinusitis, in the absence of fungal deeper tissue invasion. Pathogenesis of the disease is, to date, not fully understood. An uncontrolled and detrimental inflammatory response to commensal fungal colonization of the nasal cavities and sinuses has been suggested. In humans, a role of the bacterial microbiota in the regulation of host immune responsiveness to fungi has been hypothesized. Therefore, the objective of the present study was to identify and characterize the microbiota present in nasal cavities of client-owned dogs diagnosed with SNA compared with healthy age and breed-matched non-affected dogs.

Nine large breed dolichocephalic dogs diagnosed with SNA (6 males, 3 females, mean age 5.5 years) and 10 healthy age-and breed-matched dogs (7 males, 3 females, mean age 5 years) were included. DNA was extracted from a sterile swab introduced in the distal third of the right nasal cavity under general anesthesia. Metagenetic analysis was performed on V1-V3 hypervariable region of 16S rDNA after total bacterial DNA extraction from nasal specimens and sequencing on a MiSeq Illumina sequencer. Taxonomical assignation and microbiota community analysis were done with MOTHUR V1.35 with an OTU clustering distance of 0.03. Differences of population abundance between groups were assessed using multiple t tests with Holm-Sidak multi-test correction (significance < 0.05).

Sequencing revealed that *Proteobacteria* and *Firmicutes* were the two most predominant phyla in both groups; representing together almost 80% of the total bacterial abundance. The remaining 20% were composed of *Bacteroidetes* and *Fusobacteria* in diseased dogs, and of *Actinobacteria* almost exclusively in healthy dogs. At family level, a significantly higher abundance of *Lactobacillaceae* were found in SNA dogs, while *Moraxellaceae* significantly predominated in controls. Analysis of diversity metrics revealed that bacterial species richness and diversity were significantly higher in SNA dogs compared with controls.

In conclusion, results of the present study demonstrated the presence of nasal microbiota alteration in dogs affected with SNA in association with an increased bacterial diversity. However, whether such changes are a cause or a consequence of the disease is unknown and warrants further investigation.

Disclosures: No disclosures to report.

ESVIM – P – 9

RETROSPECTIVE STUDY OF CLINICAL FINDINGS, TREATMENT AND OUTCOME IN DOGS AND CATS DIAGNOSED WITH DYSAUTONOMIA. K.E. Clarke[1], S.M. Lalor[1], C. Breheny[2], S. Adamantos[3], R.E. Jepson[4], E. Milne[2], D.A. Gunn-Moore[2], [1]Willows Veterinary Centre and Referral Service, Shirley, UK, [2]Royal Dick School of Veterinary Studies and the Roslin Institute, Roslin, UK, [3]Langford Vets, University of Bristol, Bristol, UK, [4]Royal Veterinary College, London, UK

Dysautonomia is a disease characterized by degeneration of autonomic neurons. Previous retrospective case series have been small, single center and indicate a grave prognosis. The aim of this study was to perform a retrospective, multicenter review of clinical data relating to dogs and cats diagnosed with dysautonomia and to evaluate the outcome in those patients. Cats and dogs with clinical signs consistent with dysautonomia were included in this retrospective study. A total of 34 cats and 19 dogs were included. Reported clinical signs included esophageal, gastric and intestinal dysmotility and distension, urinary retention and dysuria, reduced or absent tear production, third eyelid protrusion and inappropriate mydriasis. Vomiting and regurgitation were commonly reported in both species (cats $n = 29/34$, dogs $n = 17/19$), while signs consistent with urinary retention were primarily reported in dogs ($n = 14/19$) and third eyelid protrusion was more frequently reported in cats ($n = 20/34$). Diagnostic imaging findings included aspiration pneumonia, megaesophagus, gastrointestinal dilation with either fluid or gas and bladder distension. Esophageal dilation was the most often identified diagnostic imaging finding in cats ($n = 20/34$), while in dogs gastrointestinal distension was most commonly identified ($n = 5/19$). Regularly instituted treatments included gastrointestinal prokinetics such as cisapride and metoclopramide, feeding tube placement (esophageal and percutaneous endoscopic gastrostomy tubes) and medications to treat urinary retention such as bethanechol. The overall survival to discharge was 36%. The mortality rate prior to discharge was 71% in cats and 53% in dogs. Longer term survival (greater than two years) was seen in three dogs and six cats. In this retrospective study clinical signs, diagnostic imaging findings, treatment and prognosis were all similar to previous retrospective publications. This paper has illustrated that some individuals are able to survive this disease and can have a good long-term prognosis. Prospective studies are required to identify risk factors that indicate whether a patient is likely to survive and thus if it is worth embarking upon treatment.

Disclosures: No disclosures to report.

ESVIM – P – 10

RETROSPECTIVE STUDY ON 33 CASES OF CANINE PRIMARY IMHA: CLINICO-PATHOLOGICAL FEATURES, FOLLOW-UP AND PROGNOSTIC FACTORS. A. Gavazza, G. de Feo, S.M. Levi, A.A. Medina Valentin, V. Marchetti, G. Lubas. University of Pisa, San Piero A Grado, Pisa, Italy

Primary immune-mediated hemolytic anemia (pIMHA) is the most common immune-hematological disease in dogs, yet it still represents a prognostic and therapeutic challenge for many veterinarians. So far, only a limited number of prognostic indicators and outcome scores are accepted consistently.

Influence of treatments initiated by referring veterinarians on clinico-pathological features, disease severity, follow-up, and survival time were investigated from time of presentation (T0) to our referral center up to 4 months post presentation. CHAOS and Tokyo severity scores were applied to all cases and compared with the disease outcome. Furthermore, several clinico-pathological signs were studied as prognostic factors at time of discharge from the Veterinary Hospital (TD), at 30 days and 120 days after discharge.

Thirty-three cases of pIMHA (according to standard clinical and clinico-pathological criteria) collected between February 2010–2016 were included. Data regarding history, blood and urine laboratory tests, and immunosuppressive treatments was collected. Patients were divided into two groups (16 patients previously treated by the referring vets, group A, and 17 untreated, group B) and statistically compared.

In group A platelet count ($P = 0.002$) and serum concentrations of alkaline phosphatase ($P = 0.010$) were significantly higher than group B at T0. In group B serum concentrations of total protein ($P = 0.025$), globulins ($P = 0.002$), C-reactive protein ($P = 0.003$), and lactate dehydrogenase ($P = 0.028$), and urinary parameters as pigmenturia ($P = 0.0003$) and bilirubinuria ($P = 0.041$) were significantly higher than group A at T0 (Mann-Whitney test). CHAOS severity score was more predictive of outcome than Tokyo severity score at 30 and 120 days (Odd Ratio, OR, respectively 15.1 and 10.7). In addition, a few clinico-pathological signs were statistically related with a worse prognosis (OR): urea concentration (>55 mg/dL) at TD, hyperbilirubinemia (>1.5 mg/dL) and number of nucleated RBCs (≥30/100 WBC) at T30 and T120, thrombocytopenia ($<150 \times 10^9$/L) at TD, T30 and T120. Group B dogs had higher mortality rate (47%) than group A dogs (13%) after 2 weeks from T0 ($P > 0.05$, Kaplan–Meier curve).

In conclusion, previous immunosuppressive treatments by referring veterinarians may weaken the clinician's ability to properly assess patient's prognosis. This study confirmed some literature information regarding diagnosis, prognosis and survival times of dogs suffering of IMHA and it adds additional prognostic factors such as urea concentration, hyperbilirubinemia, circulating nucleated RBCs and thrombocytopenia.

Disclosures: No disclosures to report.

ESVIM – P – 11

DIAGNOSTIC ACCURACY OF THE MACRO-ENDOSCOPIC BRONCHIAL ASPECT FOR THE DIAGNOSIS OF EOSINOPHILIC BRONCHITIS. E. Bottero[1], E. Benvenuti[1], P. Ruggiero[1], D. Falcioni[1], E. Mavilio[1], N. di Girolamo[2]. [1]Associazione Professionale Endovet, Rome, Italy, [2]Centro Veterinario Specialistico, Rome, Italy

Bronchoscopy is commonly used for to evaluate dogs with acute and chronic coughs. Our aim was to evaluate the diagnostic accuracy of the macroscopic endoscopic exam of the bronchial mucosa for the diagnosis of eosinophilic bronchitis. A retrospective multi-institutional diagnostic accuracy study was performed including all the dogs presenting with acute or chronic coughs and that underwent bronchial endoscopy by the Endovet Italian Group between January 2014 and December 2016. The reference standard was the cytological evaluation of the bronchoalveolar lavage. The primary outcome was sensitivity, specificity, positive predictive value, and negative predictive value of endoscopic visualization of nodules for the diagnosis of eosinophilic bronchitis. Of the 845 cases studied, a total of 781 dogs fulfilled the inclusion criteria with cytological evaluation of the bronchoalveolar lavage. The dogs ranged in age from 0.4 to 16 years (8.0 median, 4.0 SD), in body weight from 1.5 to 45 kg (13.0 median, 9.5 SD), and 325 (41.6%) were females. A final diagnosis of eosinophilic bronchitis was given for 113 (15.6%) cases, and 99 (13.6%) presented nodules during macroscopic endoscopy. In the final logistic regression model, detection of nodules during endoscopy, higher age, and lower body weight were associated with a diagnosis of eosinophilic bronchitis. Odds of having eosinophilic bronchitis were 34.4% (18.9–62.6; $P < 0.001$) greater in dogs presenting nodules during endoscopy. The risk of eosinophilic bronchitis increased by 23% (14–32%; $P < 0.001$) for a one-year increase in age, and by 3% (0–5%; $P = 0.048$) for each kilogram decrease in body weight. Visualization of nodules during endoscopy had a sensitivity of 56.6% (47.0–65.9%), specificity of 94.3% (92.3–95.9%), positive predictive value of 62.7% (54.3–70.5%), and negative predictive value of 92.8% (91.2–94.1%). Based on the high specificity and high negative predictive value, visualization of nodules during endoscopy is highly indicative of eosinophilic bronchitis. However, the lack of visualization of nodules during endoscopy does not exclude the presence of eosinophilic bronchitis.

Disclosures: No disclosures to report.

ESVIM – P – 12

REFLUX ASPIRATION CAN BE DETECTED IN LUNGS OF DOGS WITH RESPIRATORY DISEASE. M. Määttä[1], H.P. Laurila[1], S. Holopainen[1], L.I. Lilja-Maula[1], M. Melamies[1], S.J. Viitanen[1], L.R. Johnson[2], N. Koho[1], M. Neuvonen[1], M. Niemi[1], M.M. Rajamäki[1]. [1]University of Helsinki, Helsinki, Finland, [2]University of California, Davis, USA

Gastroesophageal reflux and microaspiration (MA) of small amounts of gastric juice have been associated with various human respiratory diseases, including idiopathic pulmonary fibrosis and asthma. MA can be documented by measuring proteins originating from the gastrointestinal tract in bronchoalveolar lavage fluid (BALF). In this study, bile acids were measured by mass spectrometry in BALF from West-Highland White Terriers (WHWTs) with canine idiopathic pulmonary fibrosis (CIPF, $n = 33$), healthy WHWTs ($n = 13$), dogs with bacterial pneumonia (BP, $n = 11$), healthy Irish Wolfhounds (IWHs) with previous BPs ($n = 8$), dogs with chronic bronchitis (CB, $n = 13$), dogs with eosinophilic bronchopneumopathy (EBP, $n = 9$), dogs with laryngeal dysfunction (LD, $n = 19$), healthy English Bulldogs (EBs, $n = 26$) and healthy Beagles ($n = 6$).

Concentrations of 17 different bile acids were determined and total bile acid (TBA) concentration was calculated as a sum of these. TBA was above minimum detection limit in 79 % of CIPF (26/33), 45 % of BP (5/11), 54 % of CB (7/13), 44 % of EBP (4/9) and 63 % of LD (12/19) dogs. In healthy dogs, bile acids in BALF were detected less commonly in IWHs (0%, 0/8), EBs (8%, 2/26) and Beagles (0%, 0/6) than in healthy WHWTs (54 %, 7/13). Results suggest that MA occurs in various canine respiratory diseases. In healthy dogs bile acids were detected only in WHWTs which could be associated to the breed predisposition of CIPF.

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ESVIM – P – 13

CLINICAL AND LABORATORY ALTERATIONS IN 37 DOGS DIAGNOSED WITH LUNGWORM INFECTION: A RETROSPECTIVE STUDY (JULY 2010–APRIL 2017). V.G. Greci. Ospedale Veterinario Gregorio VII, Roma, Italy

Lungworm infection is a potentially life-threatening parasitic infection in the canine species. Most common clinical presentation is respiratory distress and coughing; neurological manifestations and DIC have also been reported.

The aim of this study is to report the clinical and laboratory alterations in 37 dogs diagnosed with lungworm infection.

The mean age was 46.7 months (2–156 months); 24 dogs were male (21 intact; 3 neutered) and 13 dogs were female (6 intact; 7 spayed). Seven dogs were mixed-breed; the others belonged to different breeds. Fifteen dogs had a history of risk exposure.

Main duration of clinical signs was 11.4 days (1–60 days) with coughing (23 dogs) and dyspnea (16) the main symptoms. Five dogs had acute occurrence of neurological sign and one dog developed neurological signs few days after diagnosis. Thoracic radiographs were characterized by a mild (4) to diffuse moderate (8) or severe (25) mixed alveolar-bronchial-interstitial pattern.

CBC-count was performed in 33 dogs and showed anemia (15/33), leukocytosis (16/33), neutrophilia (15/33), eosinophilia (16/33), monocytosis (12/33), basophilia (5/33), lymphocytosis (3/33) and low PLT count (14/33). Biochemistry was performed in 29 dogs and showed increase in total protein count (13/29), globulin count (16/29), CPK (17/29), amylase (14/29), C-reactive protein (22/29), phosphorus (11/29) and urea (9/29). Protein serum electrophoresis was available in 14 dogs and showed increased in the β1 fraction and in the β2 fraction in 11 and 13 dogs respectively. Urinalysis was available in four dogs and PU/CU was increased in two dogs. Coagulative profile was performed in 17 dogs and was suggestive of DIC in 13 dogs, eleven of these dogs had a mean hematocrit of 24% (17.1–30.1%)

Twenty dogs were positive on fecal examination and two were negative; one of these dogs was positive for *Angiostrongylus vasorum* (IDEXX Angio-detect-test). Twenty-two dogs were positive on the IDEXX Angio-detect-text and one was negative but positive on fecal examination but lungworm typing was not submitted. One dog was diagnosed on BAL. Three dogs were diagnosed post mortem, two had *A. vasorum* infection and the other dog had a mixed infestation with *A. vasorum* and *Filaroides Osleri*. Overall seven dogs died; the others recovered.

Lungworm infection should be included in the differential diagnosis of dog presenting with respiratory disease and acute onset of neurological signs. Though hematological alteration are non-specific, presence of DIC, increase globulin count with increase in the β fraction should aware the clinician of a possible undergoing lungworm infection.

Disclosures: No disclosures to report.

ESVIM – P – 15

COMPARISON OF THREE DIFFERENT GUIDELINES FOR BLOOD TRANSFUSION APPLIED IN A POPULATION OF ITALIAN FELINE DONORS TO REDUCE THE RISK OF TRANSFUSION TRANSMISSIBLE INFECTIONS. A. Miglio[1], M.L. Marenzoni[1], S. Lauzi[2], M. Coletti[1], S. Paltrinieri[2], M.T. Antognoni[1]. [1]Department of Veterinary Medicine, Perugia, Italy, [2]Department of Health, Animal Science and Food Safety (VESPA), University of Mil, Milan, Italy

The increased demand for blood transfusion in animals causes the need to have an adequate number of donors. At the same time, a high level of blood safety must be guaranteed and different guidelines (GLs) deal with this topic.

Aim of the present study was to evaluate the appropriateness of different GLs in preventing transfusion-transmissible infections (TTI) in Italian feline blood donors.

Blood samples were collected from 31 cats enrolled as blood donors by owner's voluntary choice at an Italian blood bank during approximately 1 year. Possible risk factors for TTI were recorded. Based on Italian, European and American GLs, specific TTI, including hemoplasmas, Feline Leukemia Virus (FeLV), Feline Immunodeficiency virus (FIV), *Anaplasma phagocytophilum, Ehrlichia* spp., *Bartonella* spp., *Babesia* spp., *Theileria* spp., *Cytauxzoon* spp., *Leishmania donovani* sensu lato and Feline Coronavirus (FCoV), were screened. Rapid antigen and serological and biomolecular investigations (PCR) were used. Several PCR protocols were compared to detect hemoplasma and FeLV DNA.

The presence of at least a recognized risk factor for TTI was reported in all cats. They resulted negative for FIV and FeLV, whereas 5 (16.1%) positive for FCoV antibodies using rapid tests. PCR were negative for all tested microorganisms, except 4 cats (12.9%) positive for hemoplasma DNA and one (3.2%) for FeLV provirus. However, this latter resulted positive only with the most sensitive PCR protocol applied, but not with the others.

Since the different GLs recommend different protocols and that they can differently classify a candidate donor as suitable or not, a harmonization of recommendations, especially on the main TTI to screen and on the choice of the best sensitive serological or molecular tests, with possible variations according to the local epidemiological situation, would be advisable to improve the general level of the veterinary blood safety. Moreover, considering the profile at high risk of TTI of blood donors and consequent costs and time of the procedures to guarantee blood safety, tools to select donors at low risk should be developed. Appropriate recruitment strategies, currently not considered in GLs, questionnaire-based risk profile, educational courses for owners and the possibility to establish a permanent group of safe blood donors could improve the identification of suitable donors, reducing the necessity to perform a wide screening.

Disclosures: No disclosures to report.

ESVNU – P – 1

EFFICACY AND SAFETY OF TWO NEW HIGH PROTEIN-LOW CARBOHYDRATE DRY DIETS IN STERILE, FELINE STRUVITE UROLITHIASIS. C. Maurey Guenec[1], G. Chaix[2], I. Leriche[2], S. Fournel[2]. [1]ENVA, Maisons Alfort, France, [2]VIRBAC, Carros, France

Urolithiasis is a common cause of Feline Lower Urinary Tract Disease (FLUTD). The most common feline uroliths are calcium oxalate and struvite. Dietary dissolution is safe and effective for eradication of sterile struvite uroliths in cats. Richness in moisture and/or sodium and/or protein in order to increase water intake and thus to increase diuresis, urinary flow and the frequency of micturition may vary between commercially diets. This prospective, multicenter, randomized, double blinded clinical trial evaluated the efficacy and safety of two new high protein-low carbohydrate dry diets in sterile, struvite urolithiasis in cats with signs of non-obstructive FLUTD.

Cats enrolled in the study were randomly assigned either to diet A,[1] formulated to achieve dissolution and prevention of struvite uroliths, or to diet B,[2] formulated to dissolve struvite uroliths. Cats were followed up to 14 days after the uroliths had been dissolved, latest to D56 ± 2. Physical examination, urinalysis, and abdominal ultrasound were performed weekly. Analyses were performed using the software SAS® version 9.4. The significance threshold was set to α=0.05 two-sided.

Thirty-three cases were recruited and supplied with Diet A (n = 17) or Diet B (N = 16) according to the randomization procedure. The mean time of struvite dissolution was 13.1 days and 14 days respectively for diet A and Diet B (n.s). The mean time to disappearance of at least one urinary sign was 7 days for diet A and 11.4 days for diet B (P = 0.03). On D7, all cats from group A and 75% of cat from group B had no more urinary signs (P = 0.04). Mean urinary pH was decreased in groups A and B at the end of the study (6.1 ± 0.5 and 6 ± 0.6, respectively) compared to D0 (7.2 ± 0.8 and 7.2 ± 0.7, respectively). In group B, urine specific gravity significantly decreased (P = 0.01) from D0 (1.046 ± 9.8) to the end of the study (1.036 ± 12.5). In group A, urine specific gravity decrease was not significant. Two and 4 cats of groups A and B respectively exhibited transitory adverse events, possibly related to the diet (mild diarrhea or mild vomiting). These events resolved spontaneously and did not lead to the exclusion of any cat.

The new high protein – low carbohydrate tested diets were effective for dissolution of feline struvite urolithiasis.

Disclosures: Disclosures to report.

This study was founded by Virbac. Three co-authors are employees of Virbac.

ESVNU – P – 2

THE EFFECT OF STORAGE TEMPERATURE AND BORIC ACID PRESERVATION ON QUANTITATIVE BACTERIAL CULTURE FOR DIAGNOSING CANINE URINARY TRACT INFECTION. T.M. Soerensen, L.R. Jessen, M. Moeller, H. Patsekhina. University of Copenhagen, Frederiksberg C, Denmark

Quantitative bacterial culture (QBC) is the gold standard for diagnosing urinary tract infection (UTI). Current guidelines recommend that QBC is performed within 24 h of collection and that urine, if unpreserved, is stored and transported at refrigeration temperatures. However, temperature-controlled transport is expensive and may not always be feasible in veterinary practice, indicating a need for alternative storage methods.

The aim of this study was to investigate the effect of storage temperature and boric acid preservation on QBC of canine urine.

The hypothesis was that i) urine stored non-preserved by refrigeration (COOL) or preserved in commercially available urine preservation swabs containing boric acid (Copan UriSwab^{TM}) at room-temperature (BA-ROOM) for 24 and 48 h, respectively, would be non-inferior to the reference QBC and that ii) there would be no significant difference in sensitivity and specificity of the two storage methods.

Canine urine samples received at the veterinary microbiology laboratory at UCPH between February 2015 and March 2016 were prospectively included in the study. After initial reference QBC, urine samples were split into three aliquots. Two aliquots were stored at room temperature in Copan UriSwab^{TM}, and one aliquot was stored refrigerated in an unpreserved microfuge tube, for 24 h and 48 h, respectively. Significant bacteriuria was determined with regard to urine collection method according to current recommendations.

Non-inferiority was concluded if the lower limit of the one-sided 95% confidence interval was above 85% (Δ = 0.15). McNemar's χ^2 test was performed to compare sensitivity and specificity for the two storage methods.

A total of 179 samples from 141 dogs were included. Significant bacteriuria was found in 42% of the samples according to reference QBC. With an overall accuracy of 94–97%, all storage conditions were non-inferior to reference QBC, except for BA-ROOM at 48 h which had an inferior sensitivity. However, there was no significant difference between the sensitivity of the two methods at the two time points (P = 0.06–1.00).

The results show that boric acid preservation at room temperature is a valid alternative to refrigeration and that reliable QBC can be obtained after storage of canine urine for 24 h by both methods.

Disclosures: Disclosures to report.

Copan UriSwab(TM) kit kindly donated by Copan Italia.

ESVNU – P – 3

MICROALBUMINURIA IN DOGS INFECTED WITH DIROFILARIA REPENS. F. Manczur[1], F.A. Falus[1], N. Kubik[1], L. Müller[1], Z.S. Vizi[1], Á. Sterczer[1], G.Y. Rabnecz[2], N. Balogh[2]. [1]University of Veterinary Medicine, Budapest, Hungary, [2]Praxislab Kft, Budapest, Hungary

Microalbuminuria (MAU) is associated with underlying renal and systemic diseases in dogs. Glomerular disease and proteinuria is common in dogs naturally or experimentally infected with Dirofilaria immitis. The prevalence of MAU in dogs with experimentally infected heartworm disease is higher than in healthy animals. Dirofilaria repens is the causative agent of subcutaneous canine dirofilariasis and is considered an emerging zoonosis in many parts of Europe. D. repens infection is usually associated with no or only minor clinical signs in dogs. It is not known whether D. repens is capable of producing similar glomerular lesions and proteinuria to those caused by heartworm infection.

The purpose of this study was to determine the prevalence of MAU (urinary albumin to creatinine ratio, UAC >0.03) and proteinuria (urinary protein to creatinine ratio, UPC >0.5) in dogs naturally infected with D. repens.

Blood and urine samples were taken from 70 clinically healthy beagles kept in two closed colonies with similar housing and feeding conditions. Extensive laboratory work up was used to reveal any underlying disease and to distinguish D. repens infection from occult heartworm disease (incl. modified Knott-test, two different Ag-ELISA tests and Dirofilaria species specific real time PCR). Urine was obtained by cystocentesis and albumin was measured with a formerly validated commercial human immunoturbidimetric method. Exclusion criteria were severe laboratory alterations, a positive D. immitis test or positive urine culture. Some older, otherwise eligible, D. repens infected dogs also had to be excluded as there were no older animals without infection to age match the two groups.

After all the exclusions, there remained 29 D. repens infected and 27 non-infected beagles. There were no statistically significant differences between the two groups in respect of their age, weight and sex ratio. There were significantly more dogs with MAU in the D. repens infected group compared to the non-infected beagles (28% vs. 4 %, P = 0.0150). There were also more proteinuric dogs in the infected group (24% vs. 7%), but it did not yield a significant difference (P = 0.0885).

Our study showed that the prevalence of MAU in dogs infected with D repens is higher than that observed in other non-infected dogs kept in the same conditions. Further studies are needed to determine whether dogs infected with D. repens and MAU will progress to develop overt proteinuria and renal failure.

Disclosures: Disclosures to report.

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ESVNU – P – 5
SYMMETRIC DIMETHYLARGININE (SDMA) AND NEPHROPATHY IN DOG: DIAGNOSTIC UTILITY IN CLINICAL PRACTICE. J. Zambarbieri, M. Giraldi, B. Ruggerone, S. Faverzani, P. Scarpa. University of Milan, Milan, Italy

Symmetric dimethylarginine (SDMA) has been proposed as a sensitive and specific renal biomarker whose concentration increases earlier than serum creatinine (SCr) as glomerular filtration rate decreases. SDMA is a promising parameter in the diagnosis and management of chronic kidney disease (CKD) and it is included into the International Renal Interest Society (IRIS) guidelines.

The aim of the study is to assess the usefulness of a single determination of SDMA in the evaluation of renal status in dogs at risk or affected with CKD, and to evaluate its correlation with SCr and other parameters of renal function.

Ninety-five dogs were consecutively selected within the patients referred to the University Veterinary Hospital of Milan. On the first clinical examination, all these dogs underwent to physical examination, hematology and blood chemistry (included serum SDMA and SCr). Urinalysis and urinary protein:creatinine ratio (UPC) were performed in 89 cases while ultrasound examination was done in 60 dogs. All the dogs were staged according to the IRIS guidelines. Statistical analysis was performed by JMP 7 software (SAS Institute Inc., Cary, USA).

SDMA showed, as expected, a significant correlation with SCr, urine specific gravity (USG) and UPC ratio ($P < 0.05$). IRIS staging, according to SCr, resulted as follows: 26 (27.4%) dogs were included in stage 0, 39 (41%) in stage 1, 12 (12.6%) in stage 2, 17 (17.9%) in stage 3 and 1 (1.1%) in stage 4. SDMA evaluation modified IRIS staging in 12 (12.6%) dogs. SDMA was increased in 51 (53.7%) dogs; in 8 (15.7%) of these, SDMA was equal to the cut-off value (14 μg/dL). In 29 (56.9%) of the "high SDMA" cases, SCr was >1.4 mg/dL while in the others 22 (43.1%) there were already one or more alterations: decrease of USG in 14 (63.6% of 22) cases, increase of UPC ratio in 15 (68.2%) cases, ultrasound features suggestive of CKD in 9 (40.1%) cases. SDMA was the only altered parameter in 4 (4.2%) dogs. SDMA was normal and creatinine slightly increased in 1 (1.1%) dog.

SDMA is a useful and reliable parameter for the diagnosis and management of CKD but the evaluation of other markers of renal function and diagnostic imaging are essential in order to correctly approach the patient from the diagnostic and therapeutic point of view, especially at the first clinical presentation. Furthermore, patients with normal SCr and altered SDMA require a further evaluations to confirm the development of CKD.

Disclosures: No disclosures to report.

ESVNU – P – 6
ULTRASOUND-GUIDED RENAL BIOPSY SIGNIFICANTLY INCREASES URINARY N-ACETYL-BETA-D-GLUCOSAMINASE INDEX ACTIVITY IN DOGS WITH DIFFUSE PARENCHYMAL NEPHROPATHIES. A.R. Codea[1], V.M. Mircean[1], O. Sarpataki[1], B. Sevastre[1], A. Bizo[2], C.P. Popovici[1], S.A. Bogdan[1], L.I. Oana[1]. [1]Faculty of Veterinary Medicine Cluj-Napoca, Cluj-Napoca, Romania, [2]University o Medicine and Pharmacy "Iuliu Hatieganu", Cluj-Napoca, Romania

Ultrasound guided renal biopsy is an essential diagnostics method which, by facilitating histopathological examination can increase the accuracy of the differential diagnosis between acute and chronic nephropathies and will help the clinician perform an etiologic diagnosis, issue a prognosis and orient the therapy of the majority of parenchymal nephropathies. Due to the relative invasiveness and potential adverse effects, the use of renal biopsy is limited among practitioners. In this study we evaluate the intensity of renal damage induced by renal cortex sampling and the clinical consequences of such a procedure. We examined 28 dogs, mixed breed and variable ages, 11 (39, 29 %) males and 17 (60, 71 %) females that were referred to our clinic and underwent ultrasound guided renal biopsy in order to establish a definite diagnosis. Patients were presented with a variety of diffuse nephropathies: kidney lymphoma: 1 (3.57%), glomerulonephritis: 13 (46.43%), tubulointerstitial nephritis: 11 (39.29 %) and nephrocalcinosis: 3 (10.71%) of which 18 (64.29 %) were in acute kidney failure and 10 (35.71 %) were chronic renal patients. The type and the severity of renal lesions were correlated with changes in urinary NAG index (iNAG), and specific serum renal damage markers such as urea, creatinine, phosphorus and ionized calcium. To quantify the side effects of percutaneous renal biopsy the magnitude of post biopsy hematuria and changes in urinary iNAG activity were evaluated. The results indicate a significant post biopsy increase in urinary iNAG activity in all patients that underwent this procedure (100.08 ± 34.45 (U/g) pre-biopsy iNAG vs. 147.65 ± 33.26 (U/g) post-biopsy iNAG, $P < 0.001$) suggesting an intensification in renal tubular damage consecutive to kidney puncture and sampling.

Transitory macro- or microhematuria were constant findings in all dogs that underwent ultrasound guided renal biopsy but the magnitude and extent could not be associated with PLT(10^9/L), aPTT (s) and PT (s) levels in our patients, and resolved after 12–24 h without therapeutical interventions.

Percutaneous ultrasound guided renal biopsy is a relatively safe minimal invasive diagnostic procedure which will induce a series deleterious effects on kidney structure and function, but we consider that a correctly obtained tissue sample with a high diagnostic value is of greater importance than the complications associated the sampling procedure.

Disclosures: No disclosures to report.

ESVONC – P – 2
EVALUATION OF INFECTIVE AND REPLICATIVE PROPERTIES OF A REPLICATION-SELECTIVE ONCOLYTIC VACCINIA VIRUS (VVTG17990) ON CANINE, FELINE, PORCINE AND HUMAN CELL LINES. J.S. Béguin[1], C. Maurey[1], V. Nourtier[2], J. Foloppe[2], P. Erbs[2], B. Klonjkowski[1]. [1]Ecole Nationale Vétérinaire d'Alfort, Université Paris Est, Maisons-Alfort, France, [2]Transgene, Illkirch Graffenstaden, France

Oncolytic virotherapy with tumor selective viruses offers a promising treatment modality for cancer. In human medicine, Vaccinia virus (VV) has shown encouraging results on tumor explants. This biotechnology is underused in veterinary oncology.

First objective of this study was to investigate the capacity of various species cell lines to support infection by a replication-selective oncolytic VV (VVTG17990). Our second objective was to assess replication potency of VVTG17990 on those cell lines.

A thymidine kinase and ribonucleotide reductase genes-deleted VV expressing green fluorescent protein (GFP) was designed (VVTG17990).

Non tumoral canine (DKE1), feline (CrFK), porcine (PK-15) and human (293) cell lines were used as well as tumoral canine (A72) and human (HeLa) cell lines.

Susceptibility was evaluated 16 h after infection with VVTG17990 using fluorescence microscopy and flow cytometry. Multiplicity of infection (MOI) of 0.1, 0.01 and 0.001 were tested.

Virus titers were evaluated 4 days after infection at a MOI of 0.0001 and 0.00001, by standard plaque forming assay on culture medium and cell lysate.

All experiments were performed in triplicate.

GFP expression was detected by fluorescence microscopy 16 h after infection for all cell lines even with low infective doses. Flow cytometry allowed an assessment of a dose dependent infection of cells. For all cell lines, more than 88% of cells were infected at a MOI of 0.1. Equivalent percentage of infection was noticed for HeLa, 293 and PK-15 at a MOI of 0.01. On the other hand, lower infection was assessed for DKE1 (55%), A72 (27%) and CrFK (21%). At a MOI of 0.001, higher percentage of infection was observed for 293 (32%) and PK-15 (25%). For the others, less than 13% of cells were infected. Tumoral status of cell lines didn't seem to influence susceptibility to VVTG17990.

Interestingly, 16 h after infection VVTG17990 proved effective lytic potency on cell lines. Lytic potency was more important with higher viral doses.

A replication factor of 10^6 to 10^7 was determined 4 days after infection for all cell lines, except for feline cell lines (about 10^3). Tumoral status of cell lines didn't seem to influence the replication factor.

This study proves that canine, porcine and human cell lines support infection by VVTG17990 with a high replication factor. In

comparison, susceptibility and replication potency were lower for feline cell lines. An *in vitro* lytic potency was also noticed. These promising results support the use of replication-selective oncolytic VV on canine tumors.

Disclosures: Disclosures to report.

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ESVONC – P – 3

MULTIPLE COLORECTAL GRANULAR CELL TUMORS IN A DOG.

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Granular cell tumors are uncommon soft tissue neoplasms believed to arise from Schwann cells. Oral, ocular and neurological forms have been reported in dogs, and various locations including the gastrointestinal tract have been reported in humans. This latter location has not been reported in dogs.

A four-year-old female neutered Jack Russel Terrier presented with one-year history of hematochezia and intermittent diarrhea that did not respond to dietary changes, and antibiotics. On presentation, the dog was bright and alert and in good body condition. Rectal examination revealed multiple (>20) nodular masses (approximately 3–4 mm diameter) in the rectum. The remainder of the examination was unremarkable.

Bloodwork revealed hypocobalaminemia (138 pmol/L, ref. 200–408) and hypofolatemia (6.7 nmol/L, ref. 12–30) consistent with diffuse small intestinal disease. Hematology and biochemistry were unremarkable. A gastrointestinal endoscopy documented multiple small masses in the rectum and the colon (>50 in total). These masses were present on the last 20 cm of the large intestine. The mucosa around the masses appeared irregular and swollen. The ileum appeared mildly irregular. Histopathology of the masses identified a population of large cells with granular cytoplasm multifocally expanding the lamina propria between the glands, consistent with granular cell tumors. There was also a mild aggregation of lymphocytes, plasma cells and sparse eosinophils in the colic mucosa between the masses. There was minimal lacteal dilation in the ileum, with no evidence of inflammation. Additional stains did not yield significant information. Bacterial and fungal cultures of colic biopsies were negative.

Diet change to a hypoallergenic diet (Purina HA) and parenteral cobalamin supplementation led to resolution of the diarrhea. At the most recent follow-up one year after diagnosis, the dog was still clinically well on hypoallergenic diet. The owners reported intermittent hematochezia and very occasional tenesmus. Rectal examination was similar to the initial visit.

Granular cell tumors are uncommon and predominantly benign neoplasms in humans; 10% of the tumors develop in the gastrointestinal tract. Endoscopic surveillance is usually sufficient for small and asymptomatic tumors. Surgical excision is recommended for large, malignant and multifocal tumors. Endoscopic resection has also been recently reported. No surgical excision was attempted in our dog given the multiplicity of the masses and the absence of significant clinical sign. To our knowledge, this is the first description of multiple granular cell tumors affecting the gastrointestinal tract in dogs, and these appeared to have a benign clinical course.

Disclosures: No disclosures to report.

ESVONC – P – 4

SPIROCERCA LUPI INDUCED ESOPHAGEAL NEOPLASIA: PREDICTORS OF SURGICAL OUTCOME.

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Canine spirocercosis is caused by the nematode *Spirocerca lupi*. Esophageal fibro-inflammatory nodules may undergo neoplastic transformation. No studies assessed pre- or post-surgical prognostic indicators in dogs that undergo intervention.

This observational multi-center study aimed to assess the outcome of dogs with neoplastic spirocercosis undergoing endoscopic-guided ablation ($n = 12$) or surgery ($n = 18$), and identify prognostic indicators. Parameters evaluated included: age, weight, body condition score at diagnosis, gender, duration of clinical signs, hematology, biochemistry, tumor size, placement of percutaneous endoscopically-placed gastrostomy tube, histopathological mitotic indices, days to discharge and chemotherapy administration.

Kaplan Meier survival curves showed no difference in survival between ablation and surgery {(median: 68 days (range: 0–1550) vs. 107 days (0–1511), respectively ($P = 0.662$)}. When only dogs surviving the first 21 days (T_{21}) after ablation or surgery were evaluated, the significance in survival was borderline {79 days (45–1550) vs. 250 days (80–1511), respectively, $P = 0.082$}. None of the parameters measured were associated with survival advantage. Intra-treatment-group survival analysis identified survival advantage for chemotherapy within the surgical group ($P = 0.021$), this became insignificant ($P = 0.430$) in T_{21}. When the latter were evaluated, Ht >36% ($P = 0.016$) and white cell count $<15.0 \times 10^9$/L at presentation ($P = 0.021$) were associated with an improved outcome. Ht <36% at presentation for all dogs and T_{21} showed a significant hazard ratio (0.960, $P = 0.037$ and 0.947, $P = 0.022$ respectively).

No clear benefit was identified for surgery, when ablation is technically possible. Prognostic indicators were only useful if the dog survived the first 21 days' post-surgery. Chemotherapy post-intervention made no difference to survival.

Disclosures: No disclosures to report.

ESVONC – P – 5

SURVIVAL OF DOGS DIAGNOSED WITH INFLAMMATORY MAMMARY CANCER TREATED WITH A MULTIMODAL THERAPY.

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Inflammatory mammary cancer (IMC) is a specific type of locally advanced mammary cancer in dogs. It is an uncommon tumor, but the most aggressive type of mammary cancer in female dogs with an extremely poor survival rate. No effective treatment has been reported for dogs with IMC and surgery is not indicated as first option. Based on the different molecular features of these highly angiogenic cancer, new therapies focused on specific targets has been proposed.

The aim of this study was to evaluate the survival time in dogs diagnosed with IMC treated with a multimodal therapy based on an anti-COX2 drug (firocoxib), a tyrosine kinase inhibitor (toceranib) and an androgen receptor inhibitor (flutamide).

Ten dogs diagnosed with IMC presented to the Veterinary Teaching Hospital Complutense of Madrid were included. Diagnosis was based on clinical features (edema, erythema, warmth and firmness in the mammary glands) and histopathological confirmation. Immunohistochemical analysis (Ki-67 index, C-kit, COX-2 and androgen receptor) were performed. Five dogs received palliative treatment (antibiotics, corticoids) (control group or CG) and the other 5 dogs were treated with a combination of firocoxib, flutamide and toceranib (treatment group or TG). One dog of the TG refused treatment with toceranib due to economy matters. Survival time was defined as the time from IMC diagnosis to euthanasia or death of the dog. Age at the time of IMC diagnosis, reproductive status, previous history of mammary tumors and evolution of IMC after treatment were also analyzed. A paired Student's t-test was performed for statistical analysis of parametric variables with an alpha error of 0.05 and Chi Square test for no parametric variables.

The mean survival time of dogs of TG was significantly higher than that of CG (34.6 ± 15.0 and 10.6 ± 13.4 days, respectively. $P = 0.028$). Age at the time of IMC diagnosis (10.8 ± 2.7 years in TG and 11.0 ± 1.9 years in CG), reproductive status and immunohistochemical profile were no significantly different between the 2 groups. In TG, a complete remission was obtained in one case, stable disease in 2/5 dogs and progressive disease in 2/5. In TG Grade 2 ($n = 2$) and grade 3 ($n = 1$) toxicities were observed after 3–4 weeks, but an increase in quality of life was referred in all cases after the initiation of the treatment.

Despite of poor prognosis, the multimodal therapy increases survival time in dogs diagnosed with IMC with an adequate quality of life.

Disclosures: No disclosures to report.

ESVONC – P – 6

EFFECT OF RADIATION THERAPY ON THE TREATMENT OF INTRACRANIAL TUMORS IN DOGS: MENINGIOMA AND GLIOMA. T. Magalhães[1], J. Benoit[2], S. Necova[2], S. North[2], F.L. Queiroga[1]. [1]University of Trás-os-Montes and Alto Douro, Vila Real, Portugal, [2]VRCC - Veterinary Referrals, Laindon, UK

Radiation therapy has been considered the treatment of choice for many brain tumors in dogs, like glioma and intracranial meningioma.

A retrospective study was carried out, with information about patients treated between 2011 and 2015, in a veterinary referral hospital. The goals were set to evaluate the efficacy of this therapeutic approach and to search associations between different epidemiological, clinical, diagnostic and therapeutic features with the tumor type and the survival times. This study included 32 dogs diagnosed with intracranial meningioma and glioma which undergone radiation therapy. The clinical reports were analyzed. Two survival times were calculated: overall (OST) and post-treatment (PTST), from the diagnosis or the end of radiation, respectively, until death or end of the study period.

Sex and contrast enhancement exhibited statistically significant associations ($P < 0.05$) with tumor diagnosis. These results showed a sexual predisposition of males for glial type and females for meningeal type and a greater specificity of contrast enhancement, observed on MRI, for meningioma. It was found that just the breed and the sex are prognostic factors, as they were significantly associated ($P < 0.05$) with survival times. Boxer and labrador retriever breeds and the female sex were considered as a survival benefit in these patients. Median values were 372 days for TSPT and 446.5 days for the TST. The 1- and 2-year survival rates were, respectively, 50% and 23.3%.

Thus, radiation therapy is an effective treatment option for these neoplastic cases, with better results than other therapeutic approaches.

Disclosures: No disclosures to report.

ESVONC – P – 7

ULTRASOUND-GUIDED FINE-NEEDLE ASPIRATION OF THE CANINE PROSTATE - A USEFUL SAMPLING METHOD FOR MOLECULAR BIOLOGICAL ANALYSIS?. H. Thiemeyer[1], J.T. Schille[1], L.K. Harder[1], S.O. Hungerbuehler[1], R. Mischke[1], M. Hewicker-Trautwein[2], B. Brenig[3], J. Beck[4], E. Schütz[4], L. Taher[5], H. Murua Escobar[6], I. Nolte[1]. [1]Small Animal Clinic, University of Veterinary Medicine Hannover, Hannover, Germany, [2]Institute of Pathology, University of Veterinary Medicine Hannover, Hannover, Germany, [3]Institute of Veterinary Medicine, Georg-August-University Göttingen, Göttingen, Germany, [4]Chronix Biomedical, Göttingen, Göttingen, Germany, [5]Department of Biology, Friedrich-Alexander-University of Erlangen-Nürnberg, Erlangen, Germany, [6]Department of Medicine, Clinic III-Hematology/Oncology/Palliative Care, Rostock, Germany

Male dogs with prostate carcinoma are often diagnosed at a late stage and therapeutic approaches are limited. Therefore, new diagnostic strategies for early detection are needed. Whereas prostate specific antigen (PSA) as a biomarker is controversially discussed for early detection in human medicine, potential biomarkers have not yet been established for dogs. Gene expression data sets, generated by *next generation sequencing*, offer new possibilities in cancer research for biomarker discovery, understanding of carcinogenesis and development of therapeutic strategies. Since ultrasound-guided fine-needle aspiration biopsies (US-FNA) of the prostate are routinely used for cytology in dogs, aspirated cells can represent a source for gene expression studies. The aim of the present study was to evaluate US-FNA material for routine cytologic diagnosis and leftover cells for molecular biological analysis. US-FNAs were taken prospectively from 16 male dogs after clinical examination. Collected cells were used for cytological examination as well as molecular biological analysis. Prostate tissue samples were taken from 18 euthanized dogs. All samples were immediately frozen in liquid nitrogen. RNA was extracted from US-FNA samples using the miRNeasy®Micro Kit and RNA concentration was measured with Qubit. Prostate tissue samples were classified histopathologically. RNA isolation from prostate tissue was performed with AllPrep®DNA/RNA/miRNA Universal Kit and quantity was measured with the Synergy system. A bioanalyzer was used to determine RNA-integrity number (RIN). Whole transcriptome *next-generation sequencing* (NGS) was performed on an Illumina NextSeq500 system. Tissue samples were examined histologically: Nine were diagnosed as malignant and nine were classified as non-neoplastic. Cytological examination of US-FNA was possible in 14 cases, eleven being diagnosed as normal to hyperplastic and three specimens being classified as prostate carcinoma. RNA concentration was detectable in all samples ranging from 9 ng/μL to 99 ng/μL. RNA quantity was sufficient as starting material for NGS. Transcriptome analyses from samples with RIN value ≥5.5 were successful. Data sets of differentially expressed genes (DEGs) were summarized in principal component analysis and showed major variances in DEGs between non-neoplastic and malignant samples and minor differences between US-FNA and tissue with comparable diagnosis. Globin genes were identified and significantly upregulated in US-FNA samples. Based on isolated total RNA concentration and integrity, residual cells from diagnostic US-FNA of the canine prostate can be considered as an adequate sample source for gene expression studies, biomarker research and a potential tool for advanced diagnostic of canine prostatic diseases.

Disclosures: No disclosures to report.

ESVONC – P – 8

HISTIOCYTIC SARCOMA IS OVER-REPRESENTED IN MINIATURE SCHNAUZERS IN THE UNITED KINGDOM. J. Elliott, M. Rodriguez Blanco. Willows Referral Service, Solihull, UK

Histiocytic sarcoma (HS) is an aggressive neoplasm of dogs. Over-representation has been documented in several breeds, including Bernese mountain dogs, flat-coated retrievers, golden retrievers, and Rottweilers. The purpose of this retrospective study was to describe a series of miniature schnauzers (MS) diagnosed with HS in the UK and assess whether they were over-represented when compared to the hospital population.

Medical records of MS with a cytological or histopathological diagnosis of HS between January 2010 and March 2017 were reviewed. Breed predisposition was assessed with odds ratios, using the total number of hospital admissions for each breed without HS admitted during the study period as controls. This was also performed where two or more cases with HS were recorded for a particular breed.

Ten MS were diagnosed with HS during the study period, making them over-represented among the hospital population (odds ratio = 8.98 [95% CI 4.64–17.41]). Seven were diagnosed with primary pulmonary HS based on the presence of a large pulmonary mass with or without evidence of intra-thoracic metastasis or abdominal involvement, though only five exhibited overt respiratory signs. No patients had solitary HS. Five patients were treated with chemotherapy (lomustine +/- epirubicin) but an aggressive clinical course was found in all patients. Median survival time of all patients was 54 days (range: 0–232 days). Several other previously reported breeds were also noted to be pre-disposed to HS.

MS, in addition to previously reported breeds, were over-represented amongst dogs with HS in this patient population. Primary pulmonary involvement was common and patients presented with advanced disease though some patients had no overt respiratory signs. The prognosis appears to be poor despite chemotherapy.

Disclosures: No disclosures to report.

ISCAID – P – 1
SEROPREVALENCES TO ANAPLASMA PHAGOCYTOPHILUM, BORRELIA BURGDORFERI AND BABESIA CANIS IN 2948 DOGS FROM GERMANY. D. Breu, J. Guthardt, E. Mueller. Laboklin, Bad Kissingen, Germany

Dogs with exposure to ticks may contract multiple infections simultaneously. Our study aimed (1) to find seroprevalences to *Borrelia*, *Anaplasma* and *Babesia* of the dogs with a suspected history of 'vector-borne diseases' and (2) to evaluate specific seroprevalences in five most common pedigree breeds. Antibodies to *Anaplasma* were assayed by an IFAT-test and antibodies to *Babesia* and *Borrelia* were tested using respective ELISA.

During the study period (2015/2016) involving 2948 dogs, overall seropositivity was 44% to = 1 pathogen(s). Single-positivity accounted for 34.4% and was composed of *Anaplasma* (73.7%), *Borrelia* (22.1%) and *Babesia* (4.1%). Double-positivity was 9.2%; *Anaplasma*/ *Borrelia* (83.8%), *Anaplasma*/*Babesia* (11.8%) and *Borrelia*/*Babesia* (4.4%).

Triple-positivity (*Anaplasma*/*Borrelia*/*Babesia*) was seen in 11 (= 0.4%) dogs.

Regarding the 868 dogs belonging to 5 pedigree breeds, overall seropositivity to = 1 pathogen(s) was 49.5%; Bernese Mountain Dogs (68.1% of 113) > Golden Retrievers (54.3% of 151) > Australian Shepherds (50.5% of 105) > German Shepherds (47.7% of 174) > Labradors (41.5% of 325). For all breeds, single-positivities ranged from 32% (Labradors) to 46% (Golden Retrievers). Except for Bernese Mt-Dogs, the seropositivity to *Anaplasma* accounted for 73–84% while the seropositivity to *Borrelia* accounted for 14–27%. For Bernese Mt-Dogs, seropositivities to *Anaplasma* and *Borrelia* were 36% and 64%, respectively.

Double-positivities were between 7% (Golden Retrievers) and 13% (German Shepherds), whereas they were 28% for Bernese Mt-Dogs. With regard to specific combinations of pathogens, *Anaplasma*/*Borrelia* accounted for near 100% in Bernese Mt-Dogs, Australian Shepherds and Golden Retrievers, whereas German Shepherds and Labradors exhibited somewhat different susceptibilities: *Anaplasma*/*Borrelia* (68% and 80%, respectively) and *Anaplasma*/*Babesia* (27% and 20%), respectively.

Within the scope of this study, our data suggested a certain dichotomy of seropositivity patterns depending on dogs of pedigree breeds. Overall, single-positivities were seen in 32–46% of the dogs and *Anaplasma* was the principal pathogen representing 73–84% cases. Bernese Mt-Dogs were exceptional: *Borrelia* represented 64% and *Anaplasma* 36%. While double-positivities were comparatively low (7–13%), Bernese Mt-Dogs were outstanding with 28%. Furthermore, *Anaplasma*/*Borrelia* accounted for near 100% seropositivities in 3 breeds whereas *Anaplasma*/*Babesia* accounted for 20–27% in 2 other breeds (German Shepherds, Labradors). Under the circumstances where multiple factors - habitats, ectoparasite controls among others - influence the occurrence and prevalence of antibodies, our data showed certain breed-specific patterns of differences in susceptibility/infectivity toward the pathogens.

Disclosures: The authors Breu D and Guthardt J are employed at Laboklin GmbH & Co.Kg Germany. Mueller E is owner/manager of the Laboklin GmbH & Co.Kg, Germany.

ISCAID – P – 2
A PROSPECTIVE STUDY OF URINARY ADVERSE EFFECTS OF ALLOPURINOL TREATMENT FOR CANINE LEISHMANIOSIS. M. Planellas[1], X. Roura[2], Y. Espada[1], R. Novellas[1], C. Anselmi[2], L. Solano-Gallego[1]. [1]Universitat Autònoma de Barcelona, Bellaterra, Spain, [2]Hospital Clinic Veterinari, Universitat Autònoma de Barcelona, Barcelona, Spain

Canine leishmaniosis is a life threatening zoonotic disease with a wide distribution and allopurinol is a parasitostatic drug used in its long-term fashion treatment. Some retrospective reports indicate that xanthinuria deposits can appear secondary to prolonged therapy with allopurinol in dogs. The purpose of this prospective study was to evaluate the incidence, characteristics and the time of appearance of urinary adverse effects in dogs with leishmaniosis treated with allopurinol. Moreover, in dogs with xanthine deposits, clinical response to low purine diet was also evaluated.

This study included 20 dogs with a new diagnosis of leishmaniosis under allopurinol treatment (10 mg/kg/12 h during 12 months). Dogs were evaluated at time of diagnosis, one, six and twelve months after diagnosis and treatment with allopurinol, additionally 11/20 dogs were also evaluated at 3 months. Each clinical evaluation included the following tests (physical exam, abdominal ultrasound, UPC ratio, urinalysis, hematology, biochemical panel and *Leishmania* serology). All dogs had an unremarkable urinary ultrasound without urinary sediment before treatment. At one-month control, 4/20 dogs had xanthinuria, 2/20 mineralization of pelvic recesses (MPR) and 1/20 vesical urolithiasi. At three-month control, 4/11 had xanthinuria, 4/11 bilateral MPR and 2/11 urolithiasis (located in renal pelvis and bladder in 1 dog and the other in bladder). At 6-month control, 4/20 dogs had xanthinuria, 6/20 bilateral MPR, and 4/20 urolithiasis (located in renal pelvis and bladder in 2 dogs and in renal pelvis in the other two). At 12-months control, 7/20 dogs had xanthinuria, 7/20 bilateral MPR, and 6/20 urolithiasis (located in bladder in 3 dogs and in renal pelvis in the other 3). Dogs that suffered from xanthinuria and renal mineralization or urolithiasis were treated with low purine diet. Reduction of xanthinuria and uroliths size was observed in 3 dogs with compliant owners and strict diet treatment but MPR persisted.

In conclusion, the present study describes an elevated and prompt incidence of urinary adverse effects associated with allopurinol treatment. A closer follow-up including urinalysis and abdominal ultrasound is mandatory in dogs treated with allopurinol. Moreover, according our results low purine diet seems to be an option in reducing xanthine deposits. Further studies are required to evaluate the efficacy of dietary treatment. According to authors' knowledge, this is the first prospective study that confirms previous suspicion of urinary adverse effects of allopurinol treatment in dogs with leishmaniosis.

Disclosures: No disclosures to report.

ISCAID – P – 3
DETECTION OF LEISHMANIA IN ARCHIVED CANINE COLONIC INFLAMMATORY BIOPSIES IN AN ENDEMIC AREA FOR CANINE LEISHMANIOSIS. L. Solano-Gallego[1], I. Casanova[2], S. Martin[1], A. Marco[2]. [1]Universitat Autònoma de Barcelona, Bellaterra, Spain, [2]Servei de Diagnostic Patologia, UAB, Bellaterra, Spain

Previous studies have demonstrated *Leishmania infantum* infection in colonic samples with histiocytic or lymphoplasmacytic inflammation from seropositive sick dogs. However, there are no studies that have investigated the presence of *L. infantum* infection in dogs diagnosed with inflammatory bowel disease (IBD) by clinical and histopathological examination. The objectives of this study were to retrospectively investigate the presence of *Leishmania* infection by immunohistochemistry (IHC) in archived canine colonic biopsies previously diagnosed with IBD in an area endemic for canine leishmaniosis as well as to describe the main histopathological findings. A total of 109 cases of canine colitis were retrospectively retrieved from the archived of biopsies of *Servei de Diagnòstic de Patologia* of the *Universitat Autònoma de Barcelona*. Information regarding clinicopathological data including signalment, histological results and further diagnostic testing to detect *Leishmania* infection such as *Leishmania* IHC staining was compiled from the selected cases. Lymphoplasmacytic (n = 101), histiocytic (n = 5), and lymphoplasmacytic with mild eosinophilic/neutrophilic component (n = 3) colitis were diagnosed between January 1997 and September 2015 performed by endoscopic colonic biopsies. Interestingly, *Leishmania* IHC was only carried out in 13 out of 109 (11.9 %) colonic samples to confirm or exclude *Leishmania* infection based on the diagnostic database. From those, 5 were diagnosed as granulomatous and 8 as lymphoplasmacytic colitis. Four biopsies were classified as positive, two as unclear results due to unspecific background staining and the rest were negative for *Leishmania* IHC. *Leishmania* IHC was performed in 56 out of the remaining 96 colonic samples with a diagnosis of lymphoplasmocytic or histiocytic inflammation that were not previously tested to confirm or exclude this infection. Due to economical restrictions, only 56 colonic samples retrieved could be investigated. Only one out of 56 (1.8%) colonic biopsies examined was classified as

positive by IHC. A total of 5 out of 109 (4.6%) dogs were diagnosed with *Leishmania* infection. Two dogs presented intense histiocytic inflammation while three dogs showed mild to intense lymphoplasmacytic inflammation. The number of amastigotes per 5 microscopic fields viewed at 40× assessed by IHC was variable and ranged between 2 to countless. In conclusion, *Leishmania* infection should be included in the list of differentials of inflammatory colonic biopsies. *Leishmania* amastigotes are commonly not visualized by routine histological staining. Therefore, IHC for *Leishmania* should be routinely used as a diagnostic tool in endemic areas of leishmaniosis, to exclude or confirm an infection by this parasite in patients with a diagnosis of IBD.

Disclosures: No disclosures to report.

ISCAID – P – 4

COMPARISON OF THE SEVERITY OF MYOCARDIAL DAMAGE WITH THE QUANTITATIVE ESTIMATION OF THE MYOCARDIAL PARASITIC LOAD BY REAL-TIME PCR IN DOGS WITH CANINE VISCERAL LEISHMANIOSIS.

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It has been previously shown that canine leishmaniasis (CanL) causes severe myocardial damage which leads to elevation of Troponin I (cTnI). It has also been previously shown that this myocardial damage is likely to be primarily associated with the severity of the protozoal disease and not with the degree of azotemia, anemia or systemic arterial hypertension. It remains to be determined however whether this myocardial damage is directly correlated with the cardiac parasitic load or the damage is primarily indirect through other mechanisms such as systemic inflammation.

The aim of this study was to evaluate and compare the concentration of cTnI, histopathology severity and plasma creatinine concentration (Cr) with the parasitic load within cardiac tissue samples in a cohort of dogs with CanL.

Ethical approval was granted by the University of Extremadura committee. Five dogs without previous history of cardiac disease and severe CanL and renal azotemia (Stage IV, LeishVet scheme) were included in the study. All dogs underwent full physical examination hematology, biochemistry, urinalysis including protein-creatinine ratio, ELISA serology for *L. Infantum*, cTnI measurement, blood pressure, abdominal ultrasound, electrocardiography, thoracic radiographs and echocardiographic examination. All dogs were euthanized due to the severity of the disease and underwent post-mortem examination. Myocardial samples were taken for histopathology and were tested for *L. Infantum* by real-time-PCR (RT-PCR) by detection and quantification of Kinetoplast minicircle DNA.

Elevation of cTnI (Dog 1: 0.36 ng/mL; Dog 2: 0.59 ng/mL; Dog 3: 4.56 ng/mL; Dog 4: 7.69 ng/mL; Dog 5: 9.23 ng/mL; Median 4.56 ng/mL; IQR 0.59–7.56 ng/mL; normal <0.06 ng/mL) and Cr (Dog 1: 2.7 mg/dL; Dog 2: 4.3 mg/dL; Dog 3: 15.5 mg/dL; Dog 4: 3.8 mg/dL; Dog 5: 7 mg/dL; Median 4.3 mg/dL; IQR 3.8–7 mg/dL; normal 0.7–1.2 mg/dL;) was detected in all dogs. Severe lymphoplasmacytic myocarditis was observed in all myocardial samples. *L. infantum* DNA was detected in the myocardial tissue of all five dogs and RT-PCR assay was performed in the samples to estimate the parasite load (Dog 1: 20,72 parasites/mg; Dog 2: 25.57 parasites/mg; Dog 3: 146.19 parasites/mg; Dog 4: 284.88 parasites/mg; Dog 5: 290 parasites/mg; Median 146.19 parasites/mg; IQR 25.57–258.88 parasites/mg). A positive strong correlation was observed between cTnI and the parasitic load ($P < 0.001$) but no correlation ($P > 0.05$) was observed between cTnI and Cr concentrations.

The results of this study shows for first time an association between the severity of myocardial damage in canine leishmaniasis and the severity of myocardial parasitic load.

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ISCAID – P – 5

INVESTIGATION OF THE PRESENCE OF BACTEREMIA IN PUPPIES WITH CANINE PARVOVIRAL ENTERITIS.

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The aim of this prospective study was to investigate bacteremia in puppies with enteritis attributed to canine parvovirus 2 (CPV-2) infection.

Blood samples were obtained for culture from 17 puppies with parvoviral enteritis (Group 1), aged 2–10 months, prior to treatment on admission (time 1), 48 hours later (time 2), and on the day of sudden deterioration or discharge (time 3). Thirteen healthy puppies (Group 2), aged 2–6 months, were selected as controls and sampled for blood culture once. Dogs were eligible for inclusion in Group 1 according to clinical and clinicopathological abnormalities, incomplete vaccination against canine parvoviral enteritis, and presence of CPV antigens (rapid immunoassay) and of CPV-2 DNA (real-time PCR) in feces. Group 2 dogs were healthy on physical examination, complete blood count, serum biochemistry, urinalysis, abdominal ultrasonography, buffy coat cytology, and tested negative for CPV antigens and CPV-2 DNA in feces. All animals had not received antimicrobials for 4 weeks prior to inclusion in the study. Blood samples from all dogs were aseptically obtained from both jugular veins at each time-point, placed in pediatric culture bottles and shipped to the laboratory immediately. Blood cultures were performed by BACTEC 9120 blood culture instrument (Becton Dickinson) using pediatrics (PEDS) bottles. Isolates from positive blood cultures were identified to the species level by the VITEK 2 automated system (Biomerieux, France). Standardized treatment included intravenous administration of fluids, maropitant, metoclopramide, ampicillin and enrofloxacin.

In Group 1, 11/17 dogs survived to discharge. *Escherichia coli* was isolated in 4/6 dead dogs, *Klebsiella pneumoniae* in 1/6, and blood cultures were negative in 1/6. Nine out of 11 survivors were blood culture-negative and 2/11 presented asymptomatic bacteremia on the day of discharge (*K. pneumoniae* and *Enterobacter cloacae*, respectively). Repeat blood cultures in the latter 9 days post-discharge, during which no antimicrobials had been administered, were negative. Median duration of hospitalization for group 1 was 7 days (range 1–9 days). All blood cultures from group 2 were negative.

Limited data exist regarding blood culture results in puppies naturally infected with CPV-2. *E. coli, Enterobacter* spp. and *K. pneumoniae* have been previously reported in cultures from intravenous catheters in dogs with parvoviral enteritis, and *E. coli* has also been recovered from blood in 3 cases. To the best of our knowledge, this is the first prospective study to monitor bacterial blood cultures longitudinally in such dogs.

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ISCAID – P – 6

IDENTIFICATION OF SERUM BIOMARKERS IN DOGS NATURALLY INFECTED WITH ANAPLASMA PHAGOCYTOPHILUM AND BORRELIA BURGDORFERI.

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Anaplasmosis caused by *Anaplasma phagocytophilum* and Lyme disease caused by *Borrelia burgdorferi sensu lato* (borreliosis) are the most frequently diagnosed vector (tick)-borne disease (VBD) in humans and dogs. To the authors' knowledge, there are limited

data of serum proteomics on these clinical animals and the modifications in their proteome. Thus, the aim of the present study was to identify the potential serum biomarkers of diagnosis of anaplasmosis and Lyme disease using a proteomic approach.

Pools of serum samples from dogs naturally infected with *A. phagocytophilum, B. burgdorferi*, and infected with both agents were collected before treatment, and compared with a control group. Anaplasmosis and Lyme disease were diagnosed based on specific IgG and IgM antibody titers. Serum C-reactive protein and ferritin levels in infected dogs were higher ($P < 0.05$) than those of controls. Two-dimensional electrophoresis (2DE) of pooled samples was run in triplicate. 2DE image analysis showed 57 differentially expressed spots between infected animals and controls. Compared to healthy controls, vitamin D-binding protein decreased, while haptoglobin and Ig chains with different spots increased in both diseases. Serum apolipoprotein-A1 (Apo-A1) level decreased in dogs with Lyme, but this did not express differentially in dogs with anaplasmosis. In dual infections, concentrations of vitamin D-binding protein and albumin decreased, whereas alpha glycoprotein, haptoglobin and Ig chain increased compared to controls.

These study results showed that many proteins might be changed in the VBDs, and they could be useful biomarkers for diagnosis, pathophysiology and treatment strategies. Understanding the role of these proteins in many biological processes such as acute phase response, immunological reactions, transport, oxidative stress, apoptosis, calcium, iron and lipid metabolism and blood coagulation cascade provide advantages during diagnostic and therapeutic approaches in clinical settings.

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ISCAID – P – 7

AT LEAST THREE YEARS OF PROVEN PROTECTION AGAINST DISTEMPER, INFECTIOUS CANINE HEPATITIS AND PARVOVIROSIS IN DOGS VACCINATED WITH THE MULTIVALENT CANIGENTM DHPPI/L VACCINE. F. Senseby, T. Butaud, P. Schreiber, L. Guegand, C. Fontaine, S. Gueguen. VIRBAC, Carros, France

Distemper, infectious canine hepatitis and parvovirosis are life-threatening diseases due respectively to canine distemper virus (CDV), canine adenovirus virus (CAV)-1 and canine parvovirus (CPV). The maintenance of the serological response post vaccination is often used to evaluate the protective status of a dog. However, as live vaccines stimulate mainly the cell-mediated pathway of the immune system, this method may underestimate the real duration of efficacy of these vaccines. The study aim was to evaluate the efficacy of the attenuated CDV, CAV and CPV strains of the multivalent Canigen^{TM} DHPPi/L vaccine (Virbac, France) after experimental infections performed at three years after the first annual booster.

Forty seven SPF Beagle puppies, males and females, participated in the study. Puppies were allocated to either the vaccinated group (Group 1, $n = 23$) or the unvaccinated group (Group 2, $n = 24$). Puppies of Group 1 received Canigen^{TM} DHPPi/L vaccine, formulated at minimum titer for the live components, for primary vaccination with two injections at a three-week interval (respectively at 9 and 12 weeks of age) and for the first annual booster. Blood samples were taken on several occasions for serological follow-up. CDV, CAV-1, CPV-2 and CPV-2c antibody titers were measured by seroneutralization tests (SN). After vaccination, SN antibody titer $\geq 10^{0.7}$ for both CDV and CAV-1 and $\geq 10^{1.17}$ for CPV-2 variants are considered as positive. At three years after the first annual booster, dogs of both groups were administered either a pathogenic CDV ($n = 10$) or CAV-1 ($n = 12$) or CPV-2c ($n = 12$) strain and followed for the appearance of any typical sign of the related disease for 21 days. Vaccinated dogs with the lowest SN titers were selected to receive the pathogenic agents.

In Group 1, 23/23 puppies seroconverted after the primary vaccination course. At 3 years after the first annual booster, SN antibodies against CAV-1, CPV-2 and CPV-2c were still present in 23/23 dogs and in 21/23 dogs for CDV. After the experimental infections, typical signs of distemper and infectious hepatitis leading to death were observed respectively in 5/5 and 6/6 non-vaccinated dogs and in none of vaccinated dogs (respectively $n = 0/5$, $n = 0/6$). Typical signs of parvovirosis including CPV viral shedding were observed only in the non-vaccinated dogs.

In conclusion, this experimental study demonstrated that the protection against distemper, infectious canine hepatitis and parvovirosis lasts at least three years after any annual vaccination booster with Canigen^{TM} DHPPi/L vaccine.

Disclosures: Disclosures to report.

All authors are employees of Virbac.

ISCAID – P – 8

COMPARATIVE KILLING OF CANINE URINARY PATHOGENS BY CEPHALEXIN (CP), MARBOFLOXACIN (MR), PRADOFLOXACIN (PR) AND TRIMETHOPRIM/SULFAMETHOXAZOLE (TMP/SMX). M. Blondeau, D. Shebelski. Royal University Hospital, Saskatoon, Canada

Urinary tract infections are common in dogs necessitating antimicrobial therapy. In humans, short course therapy is used for uncomplicated cases thereby questioning if shorter courses are possible in dogs. Rapid and complete killing of bacteria by antibiotics affects clinical cure and may influence shorter durations of therapy.

The aim of this study was comparing killing of canine urinary pathogens by 4 antimicrobial agents at clinically relevant drug concentrations. Approximately 100,000 colony forming units/milliliter of canine isolates (3 strains each) of *Escherichia coli* (EC), *Enterobacter faecalis* (EF), *Proteus mirabilis* (PM) and *Staphylococcus pseudintermedius* (SP) were exposed to the maximum serum (C_{max}) and maximum urine (U_{max}) concentrations of each drug and the log10 (LT) and percent (%) kill measured at 5, 10, 15, 20, 25, 30, 60, 120 and 180 minutes after drug exposure. All measurements were in triplicate and averaged such that each data point was based on 9 averaged values, i.e. triplicate and 3 strains. Exposure of EC to the C_{max} of CP, TMX/SMX, MR and PR resulted in 22 (0.22 LT), 3 (0.01 LT), 94 (2.1 LY) and 99 (2.41 LT) % kill following 30 minutes of drug exposure; at the U_{max} 23 (0.11 LT), growth (+0.02 LT), 95 (1.6 LT) and >99 (2.5 LT) % kill following 5 minutes of drug exposure. Following 180 minutes of drug exposure at the U_{max}, 82% kill was seen for CP and growth for TMP/SMX. Exposure of PM to the C_{max} of CP, TMP/SMX, MR, PR resulted in 64%, >99%, 96% kill and growth respectively following 60 min of drug exposure; at the U_{max} 42%, 4%, 96% and >99% kill was observed following 15 min of drug exposure. Exposure of SP to the C_{max} of CP, TMP/SMX, MR, PR resulted in 3, 9, 53 and 93% kill following 30 minutes of drug exposure; at the U_{max} 2, 3, 64 and 94% kill was seen respectively following 15 minutes of drug exposure. Exposure of EF to U_{max} for TMP/SMX, MR, PR resulted in growth, 86 and 96% kill respectively following 120 minutes of drug exposure.

Killing of bacterial pathogens is necessary for clinical cure and rapid and complete killing influence duration of therapy. MR and PR more rapidly and completely killed urinary pathogens than did CP and TMP/SMX. Such observations may be important clinically for empiric antimicrobial treatment of canine urinary tract infections and is consistent with antimicrobial stewardship goals.

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ISCAID – P – 9

SNAP 4DX PLUS CORRELATES WELL WITH IFA FOR DETECTION OF E. CANIS ANTIBODIES. J. Liu, H. Bewsey, J. Drexel, M.G. Vrhovec, R. Chandrashekar. IDEXX Laboratories, Inc., Westbrook, USA

Canine Monocytic Ehrlichiosis (CME) is a major tick-borne disease worldwide. Diagnosis of CME can be challenging, as the patients may present with variable, often non-specific, clinical signs associated with different stages of the infection, or co-infections. *Ehrlichia canis* is the etiological agent. Diagnosis of CME is generally supported by detection of *E. canis* antibodies either by indirect

immunofluorescence assay (IFA) and/or ELISA. Several rapid point-of-care test kits are also available, but their relative accuracies have not been reported. The aim of this study was to evaluate the performance of three point-of-care test kits for detection of *E. canis* antibodies.

Three test kits evaluated included SNAP® 4Dx® Plus (IDEXX), Speed Duo Leish K/Ehrli™ (BVT/Virbac), and *FAST*est® EHRLICHIA canis (MegaCor). Surplus samples were collected from IDEXX Reference Laboratories (IRL) at Ludwigsburg, Germany, and Phoenix, USA after requested diagnostic testing was completed. These were serum samples from suspected CME cases submitted by veterinarians for *E. canis* IFA and other testing. A total of 104 positive (IFA titer ≥ 1:400) and 163 IFA negative samples were included in this study. Samples were blinded and randomized for testing with rapid tests. Each result was interpreted by 3 technicians. A test was considered positive when 2 or 3 technicians called it positive; negative when 2 or 3 technicians called it negative.

Compared to *E. canis* IFA, sensitivity/specificity was 95.2%/100% for SNAP, 84.6%/82.0% for Speed Duo and 82.2%/84.0% for *FAST*est, respectively.

The number of false positive results was surprisingly high on Speed Duo and *FAST*est tests. To further confirm these results, all 163 IFA negative samples were evaluated using a species-specific ELISA (McBride et al. 2007) and they all tested negative. Of these, 118 were sourced from dogs living in Germany, non-endemic for *E. canis*, yet, 21 (17.8%) were tested positive by the Speed Duo test, and 16 (13.6%) positive by the *FAST*est test.

For *E. canis*, which has a reported prevalence rate of 1–5% in the US and many European countries, tests with low specificity could have a very low positive predictive value. Consistent with previously published studies (Miró et al. 2013, Rene-Martellet et al. 2015), results from this study suggest that SNAP 4Dx Plus is an accurate point-of-care test useful for differential diagnosis or screening.

Disclosures: Disclosures to report.

All authors are employees of IDEXX Laboratories, Inc.

ISCAID – P – 10

SEROPREVALENCE OF INFECTIOUS DISEASES IN FERAL CATS IN THE AMERICAN MIDWEST.

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By the nature of their environment and behavior, feral cats have an increased risk of exposure to a wide range of pathogens compared to domestic cats. Consequently, feral cats can act as both a reservoir for possible zoonotic diseases as well as a sentinel species for seroprevalence in other animal populations. We assessed the seroprevalence and risk factors associated with exposure to *Leptospira*, *Toxoplasma* and *Dirofilaria* in a population of feral cats from the American Midwest. Serum samples from a total of 140 cats were available for testing. Twelve cats (8.6%) were seropositive for leptospirosis based on a microscopic agglutination test titer of 1:100 or greater. *Bratislava* was the most commonly reported serovar, accounting for 6/12 positive titers. Forty-two cats (30%) were seropositive for *Toxoplasma* based on competitive ELISA testing and nine cats (5.3%) were seropositive for *Dirofilaria* antibodies based on a lateral flow immunoassay. All of the cats for which a *Dirofilaria* antigen test was performed were negative. Body weight and sexual status was not significantly correlated with seropositivity to any of the studied pathogens. Seropositivity to one pathogen was not found to be a risk factor for seropositivity to other pathogens. Seroprevalence for leptospirosis was significantly greater in spring than in fall ($P = 0.023$) and varied significantly between age groups ($P = 0.014$). Similarly, seroprevalence for *Toxoplasma* varied according to age with cats between 73 and 120 months of age being significantly overrepresented ($P = 0.013$). Compared to previous seroprevalence reports of feline feral populations from the United States and abroad, this population of cats from the American Midwest had a slightly lower seroprevalence of *Toxoplasma* but higher seroprevalence of leptospirosis.

Disclosures: No disclosures to report.

ISCAID – P – 11

SERONEUTRALIZATION OF CANINE PARVOVIRUS BY SERA OF CATS VACCINATED WITH EITHER LEUCOFELIGENTM FELV/RCP OR FELIGENTM CRP VACCINES.

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Canine parvovirus (CPV)-2 has been isolated from cats presenting with signs of panleukopenia. CPV-2c is reported as the most pathogenic genetic variant in this specie. Few efficacy data support the ability of current feline parvovirus containing vaccines to protect cats against parvovirus from canine origin. As canine and feline parvovirus seroneutralizing antibodies correlate with clinical protection in each respective specie, the study objective was to demonstrate the ability of both Leucofeligen™ FeLV/RCP and Feligen™ CPR vaccines (Virbac, Carros, France) to protect cats against parvovirosis due to CPV variants by serology.

In this retrospective study, kitten sera samples obtained within the frame of two studies were used. In study A, sera were obtained from 18 kittens, 9/18 vaccinated with Leucofeligen™ FeLV/RCP and 9/18 unvaccinated kittens. From study B, sera were from twenty-six kittens, vaccinated with either Feligen™ CRP (11/26) or Leucofeligen™ FeLV/RCP (15/26). All vaccinated kittens had received two sub-cutaneous vaccine injections three weeks apart for primary vaccination, starting at 9–10 weeks of age. Sera were taken prior vaccination and four weeks after the last vaccine injection, and used to assess the ability of the vaccines induced antibodies to neutralize CPV-2 and CPV-2c antigens by seroneutralization (SN) assays. SN titer below $10^{1,17}$ was considered as negative. All results are expressed in mean ± standard deviation, in log10 units.

In both studies, none of the cat sera was able to neutralize CPV-2 or CPV-2c antigen prior vaccination. At four weeks after the last vaccine injection for primary vaccination, whatever the study, kittens vaccinated with either Leucofeligen™ FeLV/RCP (9/9 from study A and 15/15 from study B) or Feligen™ CRP (11/11 from study B) were able to neutralize both CPV-2 and CPV-2c antigens. After vaccination, SN titers against CPV-2 were respectively 3.35 ± 0.69, 4.02 ± 0.54 and 4.03 ± 0.86 for sera of kittens vaccinated with Leucofeligen™ FeLV/RCP in study A, study B and kittens vaccinated with Feligen™ CRP from study B. CPV-2c SN titers obtained post vaccination were, for the same groups, 3.35 ± 0.65, 4.03 ± 0.51 and 3.97 ± 0.82. No significant difference could be demonstrated for any CPV-2 variant and for any vaccine ($P > 0.05$).

Cats vaccinated with either Leucofeligen™ FeLV/RCP and Feligen™ CRP vaccines developed an acquired immunity against CPV variants. Based on the correlation between seroneutralizing antibodies and protection for parvovirus, both Leucofeligen™ FeLV/RCP and Feligen™ CRP vaccines protect cats against parvovirosis due to CPV variants.

Disclosures: Disclosures to report.

All authors are employees of Virbac.

ISCAID – P – 12

SEROLOGIC AND MOLECULAR DIAGNOSTIC SURVEY OF BABESIA SPP. INFECTIONS IN HUNTING DOGS FROM SOUTHERN ITALY.

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Canine babesiosis is a potentially serious canine vector-borne disease (CVBD) caused by intraerythrocytic protozoan parasites of the genus *Babesia*. Clinical signs of babesiosis include moderate to severe hemolytic anemia, fever, anorexia, depression, pallor, and splenomegaly. Infections are tick-transmitted and geographic distribution throughout Europe is expanding along with the spread of the tick species *Dermacentor reticulatus* and *Rhipicephalus sanguineus*. The present study aimed to perform a serological and molecular diagnostic survey of *Babesia* spp. infections in hunting dogs from southern Italy.

Blood samples were collected from hunting dogs (n. 1,311) without any specific signs associated to bebesiosis in the Avellino, Napoli, and Salerno provinces of Campania region of southern Italy. Signalment and history of tick infestation was recorded for each dog at the time of blood collection. Serology testing was performed by two enzyme-linked immunosorbant assays (ELISAs), with one designed to detect canine antibodies to *B. canis* and *B. vogeli* and the other designed to detect canine antibodies to *B. gibsoni*. All samples were tested by real time polymerase chain reaction (RT-PCR) assays for the presence of two large-form Babesias, *Babesia canis* and *Babesia vogeli*, and one small-form Babesia, *Babesia gibsoni*.

Nearly half (634/1311, 48.4%) of all hunting dogs had a history of tick infestation. Seropositive rates were 14.0% (184/1311) for *B. canis*/*B. vogeli* and 0.2% (3/1311) for *B. gibsoni*. PCR positives rates for *B. canis*, and *B. vogeli*, were 0.2% (2/1311) and 1.1% (15/1311), respectively. No dog tested positive by RT-PCR for *B. gibsoni*. Salerno had the highest prevalence of *Babesia* spp. infections with 22.5% of dogs testing positive by either PCR or ELISA followed by Avellino (15.7%) and Napoli (8.6%).

The present study represents the first large-scale survey of *Babesia* spp. infections in hunting dogs from southern Europe and demonstrates that hunting dog populations in southern Italy are at risk for babesiosis. Further studies are needed to determine the prevalence of clinical babesiosis in this at-risk population and evaluate the relationship between hunting dogs and sympatric populations of wild animals in the epidemiology of *Babesia* spp.

Disclosures: No disclosures to report.

ISCAID – P – 13

ANTIBODY PRODUCTION AS REACTION TO FELINE PANLEUKOPENIA VIRUS VACCINATION IN CATS WITH FELINE IMMUNODEFICIENCY VIRUS AND FELINE LEUKEMIA VIRUS INFECTION. M. Bergmann[1], S. Schwertler[1], A.L. Proksch[1], S. Reese[2], S. Speck[3], U. Truyen[3], K. Hartmann[1]. [1]Clinic of Small Animal Medicine, München, Germany, [2]Department of Veterinary Science for Anatomy, Histology and Embryology, LMU, Munich, Germany, [3]Institute of Animal Hygiene and Veterinary Public Health, University of Leipzig, Leipzig, Germany

So far, there are a few data, how immunocompromised cats, such as cats infected with feline leukemia (FeLV) and immunodeficiency virus (FIV), react to vaccination. Therefore, this study´s aim was to measure feline panleukopenia virus (FPV) antibodies in FIV- and FeLV-infected cats within a period of 28 days after FPV vaccination, and to compare the titer increase to that of healthy cats.

FIV- ($n = 5$), FeLV-infected ($n = 5$), and healthy cats ($n = 112$) were vaccinated with a commercial FPV modified-live vaccine. Pre- and post-vaccination antibody titers were measured by hemagglutination inhibition (HI) on day 0, 7, and 28. An HI titer ≥1:40 was defined as protective. An adequate immune response to vaccination was defined as a 4-fold titer increase. Differences regarding titer increase between FIV-, FeLV-infected, and healthy cats were analyzed using Chi-squared test.

Protective pre-vaccination FPV antibody titers were present in 80% (8/10; 95% CI: 47.9–95.4) of retrovirus-infected cats and in 64% (72/112; 95% CI: 55.1–72.6) of healthy cats. An adequate titer increase was observed in 30% (3/10; 95% CI: 10.3–60.8) of retrovirus-infected cats and in 48% (54/112; 95% CI: 10.3–60.8) of healthy cats. There was neither a significant difference in presence of protective pre-vaccination titers ($P = 0.491$), nor in titer increase ($P = 0.335$), or vaccination adverse effects ($P = 0.597$).

FIV and FeLV infections did not negatively influence efficacy and safety of MLV FPV vaccination; thus, FPV vaccination can be given to retrovirus-infected cats according to current guidelines. Further studies should be performed involving larger numbers of retrovirus-infected cats.

Disclosures: Disclosures to report.

The study was funded by Merial, Lyon, France. Merial played no role in the interpretation of data, or in the decision to submit the abstract for publication. There is no commercial conflict of interest as the information generated here is solely for scientific dissemination. The authors declare that they have no competing interests.

ISCAID – P – 14

EVALUATION OF RAPID DIAGNOSTIC TEST KITS FOR CANINE VECTOR-BORNE DISEASES. H. Bewsey[1], J. Liu[1], J. Rodon Vernet[2], R. Chandrashekar[1]. [1]IDEXX Inc., Westbrook, USA, [2]IDEXX Laboratories, Inc., Barcelona, Spain

Canine vector-borne diseases (CVBD), including Leishmaniasis (CanL), Canine Monocytic Ehrlichiosis (CME) and Anaplasmosis, are prevalent in Mediterranean countries, South America, parts of Asia and Africa. Diagnosis of CVBD is generally supported by hematologic and serologic findings. Commonly used serological tests include immunofluorescence assay (IFA), and/or ELISA. Rapid in-clinic tests are also available. The aim of this study was to compare the performance of rapid tests with gold standard IFA and/or ELISA for detection of canine antibodies to *Leishmania infantum*, *Ehrlichia canis* and *Anaplasma platys*.

The rapid tests evaluated included SNAP® Leishmania and SNAP® 4Dx® Plus (IDEXX), Uranotest Leishmania and Uranotest Ehrlichia-Anaplasma (Uranovet). Study samples were collected from IDEXX Reference Laboratories from samples remaining after requested diagnostic testing was completed. These samples were originally submitted by attending veterinarians for detection of *Leishmania* antibodies using LEISCAN® *Leishmania* ELISA Test, or for detection of *E. canis* antibodies using *E. canis* IFA. Positive samples for *Leishmania* were defined for this study as those with ≥1/160 equivalent titer (converted from OD ratio per manufacturer's instructions), negatives with ≤ 1/20 equivalent titer. To control for potential cross-reactivity of *E. canis* IFA, a species-specific ELISA (McBride et al. 2007) was used to confirm *E. canis* samples. Another species-specific ELISA (Qurollo et al. 2014) was used to identify *A. platys* samples.

Compared to the respective diagnostic standards, the sensitivities of SNAP and Uranotest were 90.3% and 67.7% respectively for *Leishmania*, 96.2% and 65.4% for *E. canis*, 83.0% and 48.9% for *A. platys*. Specificities were high for all test kits.

This study revealed that the accuracy of in-clinic rapid tests for CVBD varies significantly. Consistent with previously published studies (Ferroglio et al. 2007, Marcondes et al. 2011, Miró et al. 2013, Stillman et al. 2014, Rene-Martellet et al. 2015), this study using clinical samples continued to demonstrate the high sensitivity and specificity of SNAP tests for detection of *Leishmania, E. canis,* and *A. platys* antibodies.

Disclosures: Disclosures to report.

All authors are employees of IDEXX Laboratories, Inc.

ISCAID – P – 15

ANTIMICROBIAL USE IN 44 DUTCH COMPANION ANIMAL CLINICS. N.E.M. Hopman[1], I.M. van Geijlswijk[2], D.J.J. Heederik[3], J.A. Wagenaar[4], E.M. Broens[4]. [1]Faculty of Veterinary Medicine, Utrecht University, Utrecht, the Netherlands, [2]Faculty of Veterinary Medicine, Pharmacy Department, Utrecht University, Utrecht, the Netherlands, [3]Faculty of Veterinary Medicine, Utrecht University, IRAS, Utrecht, the Netherlands, [4]Faculty of Veterinary Medicine, Department I&I, Utrecht University, Utrecht, the Netherlands

Antimicrobial use (AMU) in veterinary medicine is considered a potential threat for public health and animal health as it selects for antimicrobial resistance. Therefore a combination of compulsory and voluntary actions was implemented in the last 5 years to reduce AMU in animals in the Netherlands. In food producing animals, a considerable reduction in AMU has been accomplished over the last years. Previous research in companion animals showed that total AMU in companion animals is relatively low, but large differences between clinics exist and especially in the choice of antimicrobial agents there is room for improvement. Therefore from the end of 2014 onwards, an antimicrobial stewardship program (ASP) was developed and implemented stepwise in 44 Dutch companion animal clinics.

Aims of present study are to calculate Defined Daily Dosages (DDDs) from these 44 clinics before start of the ASP implementation and to identify clinic related factors influencing AMU in these Dutch companion animal clinics.

At the beginning of the ASP implementation, clinics filled in a questionnaire and provided data on AMU from July 2012 till July

2015. Questionnaires were used to study clinic related factors which might influence AMU by companion animal veterinarians. Antimicrobial usage data were converted to the number of Defined Daily Dosages (DDDs) with a standardized Dutch database built for this purpose. A number of DDDs during a specified period (mostly a year) represents the number of days during that period that an average dog, cat or rabbit in a clinic is treated with AM's. DDDs were differentiated in first (not selecting for ESBLs), second (might select for ESBLs) and third choice AM's (critically important to public health; i.e. third- and fourth-generation cephalosporins and fluoroquinolones).

Results show that AMU decreased over the last years. There is a significant decrease in the use of third choice antimicrobials. Further statistical analyses will be performed to explore associations between DDDs and clinic characteristics (e.g. number of veterinarians working in a clinic, rural versus urban clinics and number of dogs, cats and rabbits being treated in a clinic).

Disclosures: Disclosures to report.

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ISCAID – P – 16

PREVALENCE AND RISK FACTOR FOR HARBORING CAMPYLOBACTER JEJUNI IN YOUNG DOGS IN COPENHAGEN. L.R. Jessen, S. Lund, C.K. Vøls, R. Langebæk, C.R. Bjørnvad. University of Copenhagen, Frederiksberg, Denmark

Campylobacter jejuni (*C. jejuni*) is the most common cause of clinical campylobacteriosis in people. In Denmark the incidence of human campylobacteriosis is constant despite a significant reduction in food borne cases over the last couple of years, indicating a role for other sources of infection.

The aims of the study were as follows: 1) to examine the prevalence of *C. jejuni* in family dogs younger than 2 years of age in Copenhagen, Denmark, 2) to identify risk factors associated with carriage of *C. jejuni* and 3) to examine the association between carriage of *C. jejuni* and clinical signs of diarrhea. A Cross-sectional study in dogs younger than 2 years presenting to the University Hospital for Companion Animals, University of Copenhagen, Denmark, was carried out from May to November 2016. Samples were collected by rectal swabs and stored in a charcoal medium at 4°C for a maximum of 32 h before culturing. Positive samples were verified using phase contrast microscopy and Whole Genome Sequencing. All dog owners completed a questionnaire regarding the management of their dogs. Data was analyzed using Chi-square tests, and multivariate analyses in SPSS Statistics 24. $P < 0.05$ was considered significant.

224 dogs were included. The prevalence of *C. jejuni* was 9.4% (21/224). Primary feeding with "Bones and Raw Food" (BARF, $P = 0.008$)) and regular feeding with dried meat ($P = 0.01$) were significant risk factors for Campylobacter carriage. Dogs younger than 1 year of age fed with BARF and/or dried meat were at greater risk of carrying Campylobacter than dogs older than 1 year of age with the same feeding routines. There was no association between a positive *C. jejuni* status and concurrent diarrhea, swimming in sea or lake water, having been abroad or living with other pets or children in the family.

Dogs can act as a reservoir for *C. jejuni* and raw feeding increases the risk. The carriage of *C. jejuni* in dogs may pose a zoonotic risk to humans.

Disclosures: Disclosures to report.

The department of Veterinary Clinical Sciences, University of Copenhagen, was granted 25000 DKr (3300 Euro) by the Danish Food Administration for performing the study.

ISCAID – P – 17

SURVEILLANCE OF BACTERIAL CONTAMINATION IN STETHOSCOPES AND EFFECTIVENESS OF DIFFERENT DISINFECTING PROTOCOLS. P. Sebastian[1], D. Hermes[2], M. Sharman[2]. [1]Hospital Veterinario Universidad de Murcia, Murcia, Spain, [2]Animal Health Trust, Newmarket, UK

Hospital acquired infections (HAIs) can be an important cause or morbidity, and potentially mortality. There is increasing concern for the role of multi-drug resistant (MDR) organisms in HAIs. Surfaces, including stethoscopes, could act as fomites, however there is no current consensus on decontamination protocols. Furthermore, there is increasing concern regarding the development of bacterial resistance to topically applied antiseptic agents, leading to evaluation of innovative decontamination methods.

The purpose of this project was to evaluate the type, of bacterial contamination of stethoscopes in a referral hospital setting, and to compare the effectiveness of three decontamination protocols.

This study was prospective and interventional. Based upon available information, a sample size of thirty stethoscopes per group was calculated to be adequate to determine differences between protocols. Three decontamination protocols were used in a cross-over design across a six week period. Decontamination protocols included 70% isopropyl alcohol, a quaternary ammonium / biguanide disinfectant (Anistel) and exposure to UV light (253.7 nm). For each, the diaphragm membrane of each stethoscope was sampled using a sterile cotton-tipped swab moistened in PBS before and after . Colony numbers were determined, and bacterial identification was performed. Between collection time points stethoscopes were in regular clinical circulation.

For group comparisons, delta-change values in colony counts were determined for each stethoscope. Differences between groups were analyzed using a non-parametric analysis of variance (Kruskal-Wallis test). Where differences were returned between groups, post-hoc analysis with Dunn's multiple comparisons method was performed to identify where differences occurred.

A variety of bacterial types were cultured across the course of the study. No MDR bacteria were isolated. There was no difference between delta change values when comparisons were made between decontamination protocols ($P = 0.07$).

In this referral setting, stethoscope contamination with MDR bacteria was not present. There was no difference between groups regarding expected reductions in bacterial colony counts. UV light appeared equivalent to other topical solutions in reducing contamination rates of stethoscopes.

Disclosures: No disclosures to report.

ISCAID – P – 18

IDENTIFICATION OF ATTACHING AND EFFACING ENTEROPATHOGENIC ESCHERICHIA COLI IN DOGS WITH PARVOVIRAL ENTERITIS. J. Rubin, A. Carr, M. Gaunt. University of Saskatchewan, Saskatoon, Canada

Canine parvovirus is a common cause of severe gastroenteritis in young, incompletely vaccinated dogs. Concurrent infections with gastrointestinal parasites and canine corona virus exacerbate clinical disease, increasing mortality. The ability of bacterial pathogens to potentiate clinical signs has not been thoroughly investigated. Enteropathogenic *E. coli*, defined by the presence of the *eae* gene, produce characteristic attaching and effacing lesions on the enterocyte brush border. These *E. coli* have been identified in up to 36% of dogs with both acute and chronic diarrhea suggesting a pathogenic role. Dogs with severe diarrhea infected with enteropathogenic *E. coli* have clinical signs and gross pathological lesions that are indistinguishable from parvovirus infection. The aim of this study was to identify the prevalence of *eae* positive *E. coli* in dogs with parvoviral enteritis. Twenty five dogs admitted to the Veterinary Medical Centre in Saskatoon, Canada were included in this study if they met the following criteria: 1. Less than two years of age, 2. Acute onset vomiting and/or diarrhea and 3. Incomplete vaccination history. Feces were cultured and *E. coli* identified using standard biochemical methods. Isolates were screened for the *eae* gene by PCR, and amplicon identity was confirmed by DNA sequencing. Feces were evaluated for gastrointestinal

parasites by floatation and for giardia and cryptosporidium by immunofluorescent antibody. Complete blood count, serum biochemical profile or venous blood gas, urinalysis and parvovirus fecal ELISA were performed for each dog to identify other potential causes of gastroenteritis. *E. coli* were cultured from feces of 92% (23/25) of dogs, 8.7% (2/23) were *eae* positive. All dogs were identified as Parvovirus positive including: 22/25 dogs by fecal ELISA, 1/25 by immunohistochemistry and 2/25 by histopathological examination. Fecal culture identified *Clostridium perfringens* in 17/24 and *Campylobacter* in 3/24 dogs. *Salmonella* were not identified. Concurrent gastrointestinal parasitism was identified in 5/20 dogs tested, identifying *Isospora* (2/20), *Sarcocystis* (1/20), and *Toxascaris* (1/20). *Giardia* sp. were identified in 2/20 by flotation or IFA. The role of these organisms as canine intestinal pathogens is poorly defined. The low prevalence of *eae* positive *E. coli* identified among young dogs with parvovirus suggests that these organisms are unlikely to be significant gut pathogens in patients with parvoviral enteritis. Further study is required to define the role of these potential pathogens in canine enteric disease.

Disclosures: No disclosures to report.

ISCAID – P – 19

COMBINED THERAPY WITH CLINDAMYCIN, DOXYCYCLINE AND METRONIDAZOLE INDUCES COMPLETE STERILIZATION OF BABESIA GIBSONI INFECTION IN DOGS - A CASE REPORT. O. Sarpataki, A.R. Codea, M. Mircean, I. Marcus, S. Bogdan, A.A. Daskalaki, B. Sevastre. Faculty of Veterinary Medicine, Cluj Napoca, Romania

Canine babesiosis is a tick-borne protozoal disease, affecting dogs worldwide. According to previous studies, *B. canis* is considered as the main species involved in canine babesiosis, but in recent years more studies show the existence of *Babesia gibsoni* infected dogs both in Europe and Romania. *B. gibsoni* infection in dogs is mainly described in American Pit Bull Terriers, although the significance of this breed predisposition is not yet fully understood, however the possibility of both blood-to-blood transfer and transplacental infection has been considered as a possible modality of host contamination. A 3 year old female, American Staffordshire Terrier was referred to our clinic, previously diagnosed with *Babesia canis* infection and treated with one dose of imidocarb dipropionate three days prior. The dog presented fever, pale mucous membranes and hemoglobinuria. Complete blood count revealed severe anemia (HCT 13%, Hg 4 g/dL, RBC 1.56×10^{12}/L), thrombocytopenia (PLT 32×10^{9}/L) and mild leukocytosis with neutrophilia. Coomb's test (Alvedia) and rapid test for *Dirofilaria immitis* antigen, *Ehlichia canis* antigen, *Borrelia burgdoferi* antigen, *Anaplasma phogocytophilum*/*Anaplasma platys* antibody (Rapid CaniV-4 Test Kit, Bionote) showed negative results. Giemsa-stained blood films were positive for small (1–2.7 μm) pleomorphic inclusions. *Babesia spp*. DNA was detected by polymerase chain reaction (PCR) assay, further molecular characterization of the sample showed the involvement of *Babesia gibsoni* (Macrogen Europe, Amsterdam). Following molecular identification of *Babesia gibsoni,* combination therapy was initiated with Clindamycin (25 mg/kg PO BID), Doxycycline (15 mg/kg PO BID), and Metronidazole (5 mg/kg PO BID). Fourteen days after therapy Hb, HCT, RBC and PLT values increased, but the blood sample tested positive for *B. gibsoni* by PCR. Therapy was ceased after 6 weeks, when HCT reached 40% and PCR showed complete *B.gibsoni* infection sterilization of the patient. Blood samples tested three and six months after the initiation of the treatment remained negative for *B. gibsoni*. Since the female was 5 weeks post-partum at the time of babesiosis diagnostic was established, four samples from two different litter pups were tested and found negative for *B.gibsoni,* although transplancetal transmission is possible in *B.gibsoni* infection. Accurate diagnosis is important in dogs presenting hemolythic anemia, because *B.gibsoni* is resistant to traditional anti-babesial therapy, but combination therapies may be efficient in order to reduce and eliminate parasitemia.

Disclosures: No disclosures to report.

ISCAID – P – 20

FIRST DOCUMENTATION OF CYTOCHROME B GENE MUTATIONS ASSOCIATED WITH ATOVAQUONE AND AZITHROMYCIN TREATMENT IN CYTAUXZOON FELIS. A.N. Hartley, H.S. Marr, A.J. Birkenheuer. College of Veterinary Medicine, North Carolina State University, Raleigh, USA

Cytauxzoon felis is an emerging tick-transmitted protozoan parasite of domestic and wild felids. Cytauxzoonosis is typically fatal in clinical cases without aggressive treatment. Combination treatment with atovaquone and azithromycin (A&A) along with supportive care has improved survival rates to over 60%; in contrast, survival rates with imidocarb dipropionate are 26%. Parasite resistance to atovaquone via a cytochrome b parasite gene (*cytb*) mutation has been identified in other protozoans and is a concern for *C. felis*. Specifically, mutations at the M128 amino acid position of the putative atovaquone binding site on CYTB have been associated with resistance.

We aimed to characterize the atovaquone binding region of *cytb* in samples from a *C. felis*-infected domestic cat that remained parasitemic despite treatment with atovaquone and azithromycin. An approximately nine-year female spayed domestic shorthair was presented for adoption assessment; the cat was anemic which persisted despite fenbendazole and doxycycline treatment. Comprehensive infectious disease testing detected *C. felis* via microscopy and polymerase chain reaction (PCR). Atovaquone (15 mg/kg PO q8 h × 10 days) and azithromycin (10 mg/kg PO q24 h × 10 days) treatment were administered and the PCV improved, but the cat remained persistently infected with *C. felis*. Sequencing of the atovaquone binding region of *cytb* over the course of infection (pre and post-treatment samples) would reveal a transition from wild-type (M128) to isoleucine and valine (M128I and M128V) at two and four months post treatment. A repeat treatment course with A&A using an increased atovaquone dose (25 mg/kg PO q8 h × 10 days) would fail to clear the *C. felis* infection and M128I and M128V mutations persisted. The wild-type M128 cytb was not detected in post-treatment samples up to 210 days.

This is the first documentation of resistance of *C. felis* to atovaquone associated with M128 *cytb* mutations. Additionally, this carrier cat appears to be the first chronically *C. felis*-infected felid with persistent anemia. This case suggests that parasites with mutations of cytb M128 can be selected and impart resistance to A&A treatment even in the face of increased atovaquone dosing.

Disclosures: No disclosures to report.

ISCAID – P – 21

LETHAL POX DISEASE IN A CAT: CLASSICAL COWPOX OR NOVEL ORTHOPOXVIRUS INFECTION?. N. Decaro[1], G. Dowgier[1], F. Albanese[2], G. Lanave[1], E. Brogi[3], A. Parisi[4], M. Losurdo[1], M.L. Colaianni[4], A. Lavazza[5], V. Martella[1], C. Buonavoglia[1]. [1]University of Bari, Valenzano, Italy, [2]Laboratorio Analisi La Vallonea, Aradeo LE, Italy, [3]Centro Veterinario Montarioso, Siena, Italy, [4]Istituto Zooprofilattico Serimentale di Puglia e Basilicata, Putignano, Italy, [5]Istituto Zooprofilattico Serimentale di Lombardia ed Emilia Romagna, Brescia, Italy

Orthopoxvirus (OPXV) is a genus of the family *Poxviridae*, subfamily *Chordopoxvirinae*, that includes several viruses infecting humans and animals. Among these are *Ectromelia virus* (ECTV), which infects only mice, and *Cowpox virus* (CPXV), which recognizes wild rodents as reservoirs, while several species, including humans and cats, are considered incidental hosts. Here, we report a case of lethal infection in a cat that was caused by a putative novel OPXV displaying an intermediate position between CPXV and ECTV at the genomic level.

The cat, a European 6-month-old male, was presented with wide alopecic and erythematous areas on the face and paws. After few days the skin lesions spread to other areas of the body and ulcers appeared on the tongue and palate. After the diagnosis of OPXV infection, the cat was treated with antivirals (famciclovir and subsequently aciclovir), but after an initial improvement the animal rapidly worsened and was euthanized.

Bioptic samples, collected intra-vitam from the skin lesions, were processed for histologic and virological investigations. By histopathology, leukocyte infiltration and eosinophilic cytoplasmic

inclusion bodies were evident in the skin punches. Different PCR approaches for detection and characterization of poxviruses showed that the collected samples contained a poxvirus, but they were unable to assign definitively the virus to a species within the genus *Orthopoxvirus*. The OPXV strain, Italy-09/17, was isolated on African green monkey kidney CV-1 cells and also on embryonated eggs, as demonstrated by the development of the typical pocks in the chorioallantoic membrane. A large amount of typical brick-shaped virions, approximately 320 × 240 nm in size, morphologically related to the genus *Orthopoxvirus*, were observed by negative staining electron microscopy. The nearly full-length genome of the virus was obtained through a next-generation sequencing approach carried out on the isolated virus. By sequence and phylogenetic analysis of selected genomic regions, which are commonly used to classify OPXVs, isolate Italy-09/17 was proven to form a separate cluster from both CPXV and ECTV. Extensive epidemiological surveillance in cats and wild animals, including rodents, will assess whether this feline OPXV circulates in domestic cat populations and whether cats are incidental hosts or represent the main reservoir of the virus.

Disclosures: No disclosures to report.

ISCAID – P – 22

EVIDENCE OF SHARING OF MDR K. PNEUMONIAE BETWEEN INFECTED AND NON-INFECTED CATS FROM SAME HOUSEHOLD. C. Marques[1], A. Belas[1], T.Vet Point[2], C. Pomba[1]. [1]Faculty of Veterinary Medicine, CIISA, University of Lisbon, Lisbon, Portugal, [2]Vetnary point, Instituto veterinário da linha, Oeiras, Portugal

The dissemination of ESBL and Carbapenemase producing *Klebsiella pneumoniae* is a worldwide concern. Multidrug-resistant (MDR) *K. pneumoniae* UTIs in companion animals raise great concerns regarding their role as reservoirs and in the spread of such bacteria. The aim of this study was to evaluate the within-household sharing of ESBL-producing MDR *K. pneumoniae* from a UTI infected cat.

Antimicrobial susceptibility testing of the uropathogenic bacteria was conducted by microdilution methods according to CLSI and screening for the presence of CTX-M ESBL was performed by PCR and sequencing. Fecal samples from the infected cat (ICat) and co-habiting pets (Cat-1, Dog-1, Dog-2) were collected for detection and quantification of colonization by the infection *K. pneumoniae* strain. Environment swabs from the animals food/water bowls and bedding were also collected. Samples were serially diluted and cultured in MacConkey agar plates containing 1.5 μg/mL cefotaxime (CTX). Negative samples were grown in enrichment media prior to plating to detect low levels of colonization. When positive, up to five *K. pneumoniae* colonies were obtained for further analysis. Unique clones were resolved by PFGE-*Xba*I macro-restriction using Dice/UPGMA clustering analysis.

A cat with history of urolithiases underwent a subcutaneous ureteral bypass system (SUB) implantation. During SUB maintenance a UTI by *K. pneumoniae* was diagnosed. The *K. pneumoniae* was a CTX-M-15 producer with MDR phenotype. Fecal samples from the infected cat (ICat) were positive for CTX-resistant *K. pneumoniae*. Samples from Dog-1 and Dog-2 prior and after ICat treatment were all negative, thus no colonization was detected. Regarding Cat-1, only one sample collection was possible (during ICat treatment), yet it revealed a high fecal burden of CTX-resistant *E. coli* and *K. pneumoniae*. PFGE-*Xba*I analysis showed a similarity index of 100% between CTX-resistant *K. pneumoniae* from Cat-1 feces and *K. pneumoniae* from ICat urine, thus proving the colonization/transfer. Furthermore, 100% similar CTX-resistant *K. pneumoniae* was also detected from the cats bedding.

To our best knowledge this is the first study reporting the sharing of MDR *K. pneumoniae* between infected and healthy pets from the same household. Same-species transfer of MDR *K. pneumoniae* was likely due to sharing of litterbox and bedding, thus special control measures should be implemented in these environments. The high colonization with 3GCr Enterobacteriaceae of the co-habiting healthy cat further increases the spread of MDR *K. pneumoniae*.

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SCH – P – 1

VALIDATION OF A BLOOD SCORE FOR NON-INVASIVE DIAGNOSIS OF LIVER FIBROSIS IN DOGS. M. Menard[1], A. Lecoindre[2], M. Destro[3], V. Miette[3], B. Rannou[4], J.L. Cadore[4], A. Pagnon[5], M. Chevallier[6], G. Benchekroun[1], P. Lecoindre[2]. [1]Ecole Nationale Vétérinaire d'Alfort, Maisons Alfort, France, [2]CVC Clinique des Cerisioz, Saint-Priest, France, [3]Echosens, Paris, France, [4]Vetagro Sup Campus Vétérinaire de Lyon, Marcy L'Étoile, France, [5]Novotec, Bron, France, [6]Laboratoire Biomnis, Lyon, France

The assessment of liver fibrosis is of major importance for treatment and prognosis of canine chronic liver diseases. A panel of blood scores are currently used in human medicine and combine several biochemical parameters in proprietary algorithms. These tests help the clinician to stage and monitor liver diseases, thereby decreasing the need for liver biopsy.

We already built a blood score using a training set of 58 dogs. This score uses alanine aminotransferase, alkaline phosphatase, total bilirubin, potassium, and gamma glutamyl transferase. This blood score had a sensitivity and specificity of 81% and 68 %, respectively (AUROC [95% CI] = 0.80 [0.67–0.92]).

The aim of the present study was to validate the blood score performance in a new population.

Following Ethical committee approval and informed owner consent, client-owned dogs ≥ 2 years old that underwent liver biopsy to investigate abnormal liver enzyme activity were included. Exclusion criteria were: focal liver lesion and/or extrahepatic cholestasis on abdominal ultrasound, previous medications or extrahepatic comorbid diseases that could have influence liver enzymes activity, or diagnosis of neoplasia on histologic examination.

Fasting blood sample were collected on the day of liver biopsy. Liver fibrosis was evaluated according to the criteria of the World Small Animal Veterinary Association guidelines on canine liver pathology. Dogs were classified as follow: no or only portal fibrosis (group 1) and bridging fibrosis or cirrhosis (group 2).

Thirty-eight dogs were recruited (53 % female, 47 % male): 20 in group 1 and 18 in group 2.

In this validation population, the blood score discriminates dogs with significant fibrosis, with an AUROC curve of 0.83 [0.69–0.96] (sensitivity 83 %, specificity 70 %) versus 0.68 [0.50–0.86] for ALT and 0.59 [0.41–0.78] for ALKP.

The validation protocol demonstrated similar performances between the training and the validation population. The blood score developed in this study was designed to help clinicians to screen for dogs with liver fibrosis in order to guide further investigations. This test provides accurate and reliable results in a fast, simple and cost-effective manner. An external validation protocol is needed for further assessment of the robustness of the test.

Disclosures: Disclosures to report.

The authors declare a potential conflict of interest with the company Echosens that developed the blood score described in this study. Echosens supports part of the residency funding of the presenting author.

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DIAGNOSTIC VALUE OF PAIRED SERUM BILE ACIDS IN CLINICAL PRACTICE IN 484 SAMPLES. M.D. Tabar[1], C. Bertolani[2], A. Esparza[1], N. Giulià[2], M.D. Queijo[2]. [1]Hospital Veterinario San Vicente, San Vicente Del Raspeig, Alicante, Spain, [2]hospital Veterinario Canis, Mallorca, Spain

Increased serum bile acids (SBA) can be expected with hepatic, biliary or portal disorders that limit hepatic portal blood flow or

hepatocellular uptake. Best clinicopathologic tests detecting those disorders remain controversial.

Results of paired SBA (pre- and 2-h post-feeding) were retrospectively reviewed from samples obtained from animals undergoing bile acid(BA) testing because of suspected liver disease from two Veterinary Hospitals. The aim was to determine the frequency of altered values of fasting, post-prandial and paired SBA, to evaluate if the clinical approach would be different depending on the selected test. SBA were sent off to an outside laboratory (Idexx Barcelona) and measured by spectrophotometry with normal fasting value <10 μmol/L (a different cut-off of 25 μmol/L was also evaluated) and postprandial value <25 μmol/L.

The study included 484 samples from 392 dogs and 12 cats (178 females and 226 males). Median age was 5.4 years (0.17–13). Three feline breeds and 60 canine breeds were included.

Two-hundred fifty-two paired SBA tests were considered as abnormal; among them, 175(69.4%) fasting samples showed values >10 μmol/L (70 samples were 10–25 μmol and 105 samples were >25 μmol/L) and 201(79.8%) postprandial samples were >25 μmol/L. In 131 tests (52.4%) only one BA value was altered; abnormal value was detected only with fasting value in 51 tests (20.4%) and only with postprandial value in 80 tests (32%). In 121 patients (48.4%) both fasting and postprandial values were increased. Among 70 animals with fasting value in 10–25 range, 37 had increased postprandial value. In 380 tests fasting value was lower than postprandial value, but 101 tests showed higher fasting BA value.

Some authors have recently suggested that fasting BA can be a useful screening test (Straten 2015), but this study corroborates the higher value of paired SBA for this purpose, previously confirmed by others (Center 2011). If only fasting BA had been performed, and a higher cut off had been selected (<20–25 μmol/L) as suggested by some authors, 52.8% of cases with fasting values in 10–25 range and abnormal postprandial values would have been missed: therefore, normal fasting value <10 μmol/L seems appropriate. Moreover, post-prandial values were increased more often than fasting values; therefore, if just one BA can be performed, post-feeding could be the preferred test.

Fasting value exceeding the postprandial sample can occur, as shown in 1 out of 5 tests of this study. Although spontaneous gall bladder contraction may be responsible for it, if any value is abnormal an hepatic abnormality is suggested (Lawrence 2017).

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