J Vet Intern Med 2009;23:1319–1350

European College of Veterinary Internal Medicine-Companion Animals

Oral Research Communications of the 19th ECVIM-CA Congress
Porto, Portugal, 8 to 10 September 2009

Abstr. No	Day Date	Time	Presenting author	Title
ESCG EUROPEAN SOCIETY OF VETERINARY INTERNAL MEDICINE				
1	Tue 8.9.	14:00	Lindquist	Sonographic Criteria for the Diagnosis of Gastrointestinal Obstruction in 39 Dogs and Cats
2	Tue 8.9.	14:15	Kuehner	Prevalence of and Risk Factors for Feline *Tritrichomonas foetus* in Purebred Cats in Germany
3	Tue 8.9.	14:30	Boillat	Assessment of the Relationship between Body Size and Gastrointestinal Transit Times Using a Wireless Capsule in Dogs
4	Tue 8.9.	14:55	Mansfield	Early Enteral Feeding in Canine Acute Pancreatitis
5	Tue 8.9.	15:10	Steiner	Evidence of Pancreatic Inflammation in Dogs with Hypercalcemia
6	Tue 8.9.	15:25	Stuart	Evaluation of Intestinal Epithelial Cell Apoptosis in Canine Idiopathic Inflammatory Bowel Disease
7	Tue 8.9.	16:10	Schnyder	Expression of Tlr5 and 9 in Dogs with Chronic Enteropathies
8	Tue 8.9.	16:25	Jergens	Differential Expression of Mucosal Genes Associated with Canine Inflammatory Bowel Disease (ESCG Presentation)
9	Tue 8.9.	16:40	Kathrani	Analysis of Single Nucleotide Polymorphisms in the Toll-Like Receptor Four Gene in German Shepherd Dogs with and without Inflammatory Bowel Disease
9a	Tue 8.9.	17:05	Suchodolski	The Effect of Tylosin on Small Intestinal Microbiota in Healthy Dogs
ESVNU EUROPEAN SOCIETY OF VETERINARY NEPHROLOGY AND UROLOGY				
10	Tue 8.9.	14:00	Suemanotham	Urinary Prostanoids in Feline Chronic Kidney Disease
11	Tue 8.9.	14:15	Chakrabarti	Relationship between Histopathological Lesions and Renal Function in Cats with Chronic Kidney Disease
12	Tue 8.9.	14:30	Finch	Parathyroid Hormone (PTH) Concentration is Elevated in Non-Azotaemic Stages of Feline Chronic Kidney Disease (CKD)
13	Tue 8.9.	14:55	Segev	A Retrospective Study of Renal Amyloidosis in Chinese Shar-Pei and Non-Shar-Pei Dogs
14	Tue 8.9.	15:10	Brovida	Evaluation of Nephrotoxic Effects of Miltefosine and Meglumine Antimonate in 8 Healthy Beagles
15	Wed 9.9.	12:00	Lemberger	Detection of Three Novel Proteins in the Urine of Cats with Feline Idiopathic Cystitis
16	Thu 10.9.	10:50	Keele	Adrenocortical Morphology in Cats with Chronic Kidney Disease (CKD) and Systemic Hypertension
17	Thu 10.9.	11:05	Pelligand	Effect of Selective in Vivo Cycloxygenase Inhibition on Acute Saluretic Response to Furosemide, Renin Activity and Urinary Prostanoid Excretion in the Cat
18	Thu 10.9.	11:20	Scarpa	Reticulocyte Hemoglobin Content Evaluation in Cats Affected with Chronic Kidney Disease (CKD)
ESVC EUROPEAN SOCIETY OF VETERINARY CARDIOLOGY				
19	Tue 8.9.	17:05	Oliveira	Percutaneous Closure of Patent Ductus Arteriosus with Amplatz®Canine Duct Occluder in 46 Dogs: Outcome and Prognostic Survival Factors
20	Tue 8.9.	17:20	Silva	Echocardiographic and Angiographic Comparison of Patent Ductus Arteriosus Measurements and Their Role on Device Size Selection in 46 Dogs
21	Tue 8.9.	17:35	Jones	Comparison of Flow Mediated Dilation Using the Brachial or Femoral Artery in a Population of Healthy Dogs
22	Wed 9.9.	08:45	Matos	Evaluation of Right Ventricular Function by Tissue Doppler Imaging and Contrast Echocardiography in Beagles Experimentally Infected with *Angiostrongylus vasorum*
23	Wed 9.9.	09:00	Wenger	Effect of Respiratory Acidosis on Pulmonary Arterial Pressure in Dogs Experimentally Infested with Angiostrongylus Vasorum
24	Wed 9.9.	09:15	Glaus	Computed Tomographic Characterization of Pulmonary Lesions in Beagles Experimentally Infected with *Angiostrongylus vasorum*

25	Wed 9.9.	09:40	Zoia	Primary Hyperfibrinolysis in Dogs with Ascites Due to Right-Sided Congestive Heart Failure
26	Wed 9.9.	09:55	Eriksson	Pulmonary Blood Flow Increase in Naturally Occurring Chronic Mitral Valve Regurgitation
27	Wed 9.9.	10:10	Kresken	Echocardiogaphical Estimation of Pulmonary Transit Time (PTT, N-PTT) in Dogs Using the Echocardiographic Contrast Media Sonovue®
28	Wed 9.9.	14:00	Van Israël	Ramipril as a First Line Monotherapy for the Control of Feline Hypertension and Associated Clinical Signs
29	Wed 9.9.	14:15	Wagner	Association between Cardiac Murmurs and Left Ventricular Hypertrophy in 199 Healthy Adult Cats
30	Wed 9.9.	14:30	Smith	A Cross Sectional Study of 140 Cats to Evaluate the Cardiac Troponin I Assay in the Diagnosis and Staging of Heart Disease in General Practice
31	Wed 9.9.	14:55	Wess	Prevalence of Dilated Cardiomyopathy in Doberman Pinschers in Various Age Groups
32	Wed 9.9.	15:10	Ohad	Congenital Subaortic Stenosis and Tricuspid Valve Dysplasias in a Cohort of 13 Dogue De Bordeaux Dogs in Israel
33	Wed 9.9.	15:25	Lobo	Echocardiographic Evaluation of Maternal CARDIAC Function in THE Saint Bernard Dog
34	Wed 9.9.	16:10	Rasmussen	High Maximum Heart Rate in Dogs with Syncope and Heart Failure Caused by Myxomatous Mitral Valve Disease
35	Wed 9.9.	16:25	Noomanova	External Cardiac Event Recorder (R-TEST) – A Useful Tool in the Diagnosis of Neurocardiogenic Syncope in the Dog
36	Wed 9.9.	16:40	Tidholm	Three-Dimensional Echocardiography: Assessment of Left Ventricular Volumes and Synchrony in Dogs with and without Heart Disease
37	Wed 9.9.	17:05	Orvalho	Applications of Real Time Three-Dimentional Echocardiography in Dogs and Cats with Congenital Heart Disease
37a	Wed 9.9.	17.20	Santilli	Mapping of Focal Atrial Tachycardia in the Dog

ESVIM EUROPEAN SOCIETY OF VETERINARY INTERNAL MEDICINE

38	Wed 9.9.	16:10	Stuetzer	Role of Latent Feline Leukemia Virus Infection in Myelosuppression of Cats
39	Wed 9.9.	16:25	Sand	Association of Provirus and Virus Load with the Health Status of Cats Naturally Infected with Feline Immunodeficiency Virus
40	Wed 9.9.	16:40	Tasker	Description of Outcomes of Infection with Feline Haemoplasmas: Haematology, Coombs' Testing and Blood Glucose Concentrations
41	Wed 9.9.	17:05	Galke	An Epidemiological Study About Infections with *Anaplasma phagocytophilum* in Dogs
42	Wed 9.9.	17:20	Paes	Red Blood Cell Osmotic Fragility in Healthy Dogs and Dogs with Hyperlipidemia, Microcytosis, Multicentric Lymphoma and Infectious Diseases
43	Wed 9.9.	17:35	Shearer	ACVIM Award Winning Abstract: EFFECTS OF ASPIRIN AND CLOPIDOGREL ON PLATELET FUNCTION IN NORMAL DOGS
44	Thu 10.9.	14:00	Lavoué	Factors Influencing Total Cell Count in Bronchoalveolar Lavage Fluid Obtained in Healthy Dogs and Dogs with Respiratory Conditions
45	Thu 10.9.	14:15	Manens	Activity OF Metalloproteinases MMP2 and MMP9 in Matched Serum and Bronchoalveoar Lavage Fluid Samples in a Dog Model of Airway Inflammation
46	Thu 10.9.	14:30	Peyron	Concentration of Allergen-Specific IgE in Serum and Bronchoalveolar Lavage Fluid in Dogs with Eosinophilic Bronchopneumopathy and Dogs with Chronic Bronchitis
47	Thu 10.9.	14:55	Pinto da Cunha	Role of Brush Cytology in the Diagnosis of Canine Chronic Intranasal Disease
48	Thu 10.9.	15:10	Billen	Comparison of the Value of Fungal Culture and Galactomannan Detection in Nasal Secretions Obtained by Three Non-Invasive Sampling Methods in the Diagnosis of Canine Sino-Nasal Aspergillosis
49	Thu 10.9.	15:25	Merveille	Detection of a New Mutation Responsible for Primary Ciliary Dyskinesia in a Pedigree of Old English Sheepdogs
50	Thu 10.9.	16:10	Schulz	Feline Bronchial Disease: Clinical Findings and Predisposing Factors – A Prospective Study in 27 Cats
51	Thu 10.9.	16:25	Hirt	Airway Hyperresponsiveness to Inhaled Adenosine 5́-Monophosphate in Feline Chronic Airway Disease
52	Thu 10.9.	16:40	Dossin	Hypocholesterolemia in Dogs: A Retrospective Study of 105 Cases
53	Thu 10.9.	17:05	Dircks	Characterization of Clinical and Laboratory Features of Dogs with Primary Immune-Mediated Thrombocytopenia: 21 Dogs
54	Thu 10.9.	17:20	Augusto	The use of Human Intravenous Immunoglobulin in Dogs with Imumme Mediated Haematological Conditions
55	Thu 10.9.	17:35	Himelstein	Diagnostic and Prognostic Significance of Peripheral Nucleated Red Blood Cells: A Retrospective Case-Controlled Study of 355 Dogs

ESVONC EUROPEAN SOCIETY OF VETERINARY ONCOLOGY*

56*	Wed 9.9.	12:15	Sato	Comparison of Cytoreductive Efficacy Among Vincristine, Cyclophosphamide and Doxorubicine in Dogs with Lymphoma that Received a Multidrug Chemotherapy Protocol by Mesuring Minimal Residual Disease

57*	Wed 9.9.	16:10	Santos	Immunohistochemical Expression of Vefg in Canine Mammary Gland Tumours and in Regional and Distant Metastasis
58*	Wed 9.9.	16:25	Kleiter	Liposomal Doxorubicin and Daily Fractionated Palliative Radiotherapy in Advanced Feline Fibrosarcomas
59*	Wed 9.9.	16:40	Willmann	Immunohistochemical Detection of Vascular Endothelial Growth Factor (vEGf) and C-kit (CD117) in Canine Melanoma
60*	Wed 9.9.	17:05	Peter	The BH3 Mimetic Obatoclax Induces Apoptosis and Growth Inhibition in Human and Canine Neoplastic Mast Cells
61*	Wed 9.9.	17:20	Gerou-Ferriani	Use of Lomustine in Suspected Intracranial Non Resectable Tumors in Dogs
62*	Thu 10.9.	08:45	Wolfesberger	Evaluation of Angiogenesis Markers and Clinical Outcome in Lymphoma Bearing Dogs
63*	Thu 10.9.	09:00	Simon	High Mobility Group B1 (HMGB1) Proteins in Dogs with Lymphoma: Analysis of Serum Levels and Association to Outcome Following Combination Chemotherapy
64*	Thu 10.9.	09:15	Lubas	The use of a Vaccine Targeting Telomerase Reverse Transcriptase (TERT) in Healthy Dogs and in Dogs Affected by Malignant Lymphoma

***published elsewhere**

ESCH EUROPEAN SOCIETY OF COMPARATIVE HEPATOLOGY

65	Wed 9.9.	16:10	Jaillardon	IGF1 Secretion in Dogs with Hepatic Vascular Diseases
66	Wed 9.9.	16:25	Rieder	Visualisation of Portosystemic Shunts (PSS) by Helical Computed Tomography (CT) Angiography in 33 Dogs
67	Wed 9.9.	16:40	Gabriel	Vacuolar Hepatopathy in Scottish Terriers: Clinical, Biochemical, Ultrasonographic and Histological Findings in 13 Cases
68	Wed 9.9.	17:05	Lindquist	Clinical Parameters in Dogs with Sonographically Diagnosed Surgical Biliary Disease
69	Wed 9.9.	17:20	Dyggve	Linkage of Doberman Hepatitis to the Canine Major Histocompatibility Complex

ESVE EUROPEAN SOCIETY OF VETERINARY ENDOCRINOLOGY

70	Wed 9.9.	11:45	Niessen	Development of a Measure of Quality of Life for Cats with Diabetes Mellitus and Their Owners: The Diaqol-Pet
71	Thu 10.9.	08:45	Martin	Low Dose Trilostane Treatment in Dogs: A Retrospective Study of 1416 Cases (2006-2009)
72	Thu 10.9.	09:00	Lien	Incidence of Hypertension is Lower in Canine Pituitary-Dependent Hyperadrenocorticism Compared to Adrenal Tumor
73	Thu 10.9.	09:15	Rodriguez Pineiro	CT Scan Characterization of Adrenal Glands in 52 Dogs with Hyperadrenocorticism
74	Thu 10.9.	09:40	Benchekroun	Pro-Opiomelanocortin (POMC) Processing and Prohormone Convertase 1 (PC1/3) Level in Dogs with Pituitary Corticotroph Tumors
75	Thu 10.9.	09:55	Williams	Factors Associated with the Development of Azotaemia Following Treatment of Hyperthyroidism (HTH)
76	Thu 10.9.	10:10	Williams	Factors Associated with Survival of Hyperthyroid Cats
77	Thu 10.9.	10:50	Campos	Effect of Recombinant Human TSH on the Uptake of Radioactive Iodine (^{123}I) by the Thyroid Gland in Healthy Beagles
78	Thu 10.9.	11:05	Siliart	Antithyroglobulin Antibodies in Canine Primary Hypothyroidism
80	Thu 10.9.	11:45	Weber	Role of Vitamin D Receptor Gene Polymorphisms and Vitamin D in Canine Diabetes Mellitus
81	Thu 10.9.	12:00	Zini	Evaluation of a Novel Continuous Glucose-Monitoring System Adopted for Use in Cats
82	Thu 10.9.	12:15	Osto	Endotoxin Downregulates Expression of Insulin Sensitivity-Related Genes Despite Normal Whole-Body Insulin Sensitivity in Cats

ESVCN EUROPEAN SOCIETY OF CLINICAL NUTRITION

83	Thu 10.9.	09:40	Van Hoek	Acidic Urine Does Not Promote Urinary Calcium Oxalate Supersaturation in Healthy Cats
84	Thu 10.9.	09:55	Van de Velde	Effect of Weight Gain on Immunological Parameters in Healthy Dogs

VBPS VETERINARY BLOOD PRESSURE SOCIETY

85	Thu 10.9.	10:10	Stepien	Repeatability of Oscillometric Systolic Blood Pressure Measurement in Normotensive and Hypertensive Dogs

ESFM EUROPEAN SOCIETY OF FELINE MEDICINE

86	Thu 10.9.	16:10	Juvet	Prevalence of Selected Infectious Agents in Cats from Ireland
87	Thu 10.9.	16:25	Gowan	Retrospective Analysis of Long-Term Use of Meloxicam in Aged Cats with Musculoskeletal Disorders and the Effect on Renal Function
88	Thu 10.9.	16:40	Boland	Incidence of Comorbid Disease in Cats Referred for Radioiodine Treatment

ESVCP EUROPEAN SOCIETY OF VETERINARY CLINICAL PATHOLOGY

89	Thu 10.9.	16:10	Aroch	A Retrospective Study of Plasma Antithrombin Activity in 149 Dogs: Diagnostic and Prognostic Implications
90	Thu 10.9.	16:25	Aroch	A Retrospective Case-Controlled Study of Serum Betahydroxybutyric Acid in 215 Ill Cats: Clinical and Clinical-Pathological Findings, Diagnoses, Morbidity and Mortaliy
91	Thu 10.9.	16:40	Giunti	Acute Phase Proteins Evaluation in Dogs with Parvovirus: Preliminary Study
92	Thu 10.9.	17:05	Mukorera	Alp as a Possible Screening Test for Neoplastic Transformation in Canine Spirocercosis
93	Thu 10.9.	17:20	Collings	Serum Thymidine Kinase Concentrations Are Not Elevated in Dogs with Mast Cell Tumours
94	Thu 10.9.	17:35	Delgado	Antimicrobial Resistance and Detection of High-Level Aminoglycoside Resistance among Enterococci Isolated from Pets in Portugal
95	Wed 9.9	17:35	Rishniw	Accuracy and Reproducibility of In-House Chemistry Analyzers in Veterinary Practices

ABSTRACT #1

SONOGRAPHIC CRITERIA FOR THE DIAGNOSIS OF GASTROINTESTINAL OBSTRUCTION IN 39 DOGS AND CATS. E Lindquist[1], D Casey[2], J Frank[1]. [1]SonoPath.com and Sound Technologies New Jersey Mobile Associates, Sparta, NJ, USA, [2]SonoPath.com, Sparta, NJ, USA.

Retrospective analysis was performed on sonograms in 39 cases of dogs and cats that were found to have gastrointestinal obstruction upon surgical laparotomy. The following sonographic parameters were analyzed:

1) Proximal luminal gastrointestinal dilation
2) Proximal gastrointestinal hyperperistalsis
3) Presence of a foreign object at the end of the dilation
4) Type of acoustic shadow at obstruction site
5) Empty post obstruction intestinal lumen

Small intestinal luminal dilation and shadowing was differentiated from colonic dilation and colonic "dirty shadow" by following the colon from the pelvic inlet cranially into the ileocecal valve in retrograde fashion. Obstructive pathology was found to largely be owing to foreign objects with variable degrees of acoustic shadowing with 2 exceptions that lacked shadowing by the foreign object. The degree of luminal dilatation varied greatly and was somewhat dependent on the physical character of the foreign object, primarily that of its absorptive capabilities such as that of a corn cob, fabric, or wood products. Some cases presented echogenic, ill-defined serosal inflammation and/or overt peritonitis in the region of obstruction. Some cases also presented with obstruction with concurrent ileus. Periserosal fat inflammation and loss of serosal detail was found to be consistent with inflammation noted at surgery and was used as an urgency factor during the sonogram to recommend imminent surgical intervention.

1) Proximal luminal gastrointestinal dilation was present in 39/39 cases.
2) Proximal gastrointestinal hyperperistalsis was present in 34/39 cases. The remaining 5 cases were determined to possess mechanical ileus owing to "exhausted bowel."
3) An obstructive foreign object was discovered at surgery in 39/39 cases.
4) Acoustic shadowing was strongly present in 30 cases. Mild acoustic shadowing or "dirty shadow" similar to colonic content was present in 7 cases. Two cases did not present with an acoustic shadow on ultrasound.
5) Empty post obstruction intestinal lumen was definitively evident in 27/39 cases. Post obstruction fluid was present in 2 cases, and undecided in 10 cases.

From this study group of 39 cases, a consistent set of sonographic criteria for gastrointestinal obstruction can be utilized and combined with clinical signs and other testing in order to select medical versus surgical therapy for the patient presenting with gastrointestinal signs.

ABSTRACT #2

PREVALENCE OF AND RISK FACTORS FOR FELINE *TRITRICHOMONAS FOETUS* IN PUREBRED CATS IN GERMANY. K.A. Kuehner[1], S.L. Marks[2], P.H. Kass[3], D. Barutzki[4], R. Grahn[3], K. Hartmann[1]. [1]Clinic of Small Animal Medicine, University of Munich, Germany, [2]Department of Medicine and Epidemiology and [3]Department of Population, Health, and Reproduction, School of Veterinary Medicine, University of California, Davis, CA, USA, and [4]Veterinary Laboratory Freiburg, Freiburg, Germany.

Tritrichomonas foetus, the flagellated protozoon causing bovine venereal trichomoniasis, has recently been recognised as an important feline enteric pathogen associated with chronic large bowel diarrhoea in domestic cats.While true prevalence and geographic range of *T. foetus* are unknown, cases of *T. foetus* have been reported in cats with diarrhoea in several European countries including Germany. The purpose of this prospective study was to determine the prevalence of *T. foetus* in purebred cats in catteries throughout Germany, to evaluate frequency and severity of clinical symptoms, and to identify environmental risk factors associated with *T. foetus* infection. Freshly voided faecal samples of 233 cats, representing 121 catteries, were collected at five regional cat shows throughout Germany. Upon collection, all faecal specimens were scored numerically using a continuous modified faecal scoring system based on faecal consistency, with a score of 1 representing liquid diarrhoea, and a score of 4 representing firm faeces. The cats' owners were asked to fill out a detailed questionnaire to provide epidemiological information about their cats. Faecal samples were examined for *T. foetus* via culture in InPouch medium and PCR amplification using conserved trichomonad primers specific for *T. foetus* diagnostic size fragments. Faeces were also analyzed for other enteric parasites using zinc sulphate centrifugation flotation and a monoclonal microplate immunoassay for *Giardia* and *Cryptosporidium*. Data was analyzed using STATA statistical software. Outcome variables were compared to faecal score using mixed-effects logistic regression controlling for catteries as a random effect. A P value of < 0.05 was considered statistically significant. The prevalence of *T. foetus* infection was 15.5% (36/233) among individual cats and 19.0% (23/121) among catteries. The age of infected cats ranged from 3 weeks to 7.2 years (median age: 1.0 year). Infection with *T. foetus* correlated significantly with young age ($P = 0.005$). Most commonly affected breeds included British Shorthair and Norwegian Forest cats. An abnormal faecal score (median score = 2) was significantly associated with the detection of *T. foetus* via faecal culture ($P = 0.000$) and PCR ($P = 0.002$). *Giardia* and *Cryptosporidium* were not associated with a significant change in faecal score. No association was found between *T. foetus* infection and any environmental factors, including proximity to livestock, type of diet, and water source. In conclusion, this study demonstrates a high prevalence of *T. foetus* in catteries throughout Germany and confirms that *T. foetus* should be considered an important differential diagnosis for diarrhoea in young purebred cats.

ABSTRACT #3

ASSESSMENT OF THE RELATIONSHIP BETWEEN BODY SIZE AND GASTROINTESTINAL TRANSIT TIMES USING A WIRELESS CAPSULE IN DOGS. C.S. Boillat[1,2], F.P. Gaschen[2], G. Hosgood[2]. [1]School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA, USA; [2]Department of Clinical Veterinary Medicine, Vetsuisse Faculty, University of Bern, Switzerland.

There is conflicting evidence about the effect of body size (BSZ) on gastric emptying. This study assessed the relationship between BSZ and gastrointestinal transit times in healthy pet dogs using the SmartPill pHp wireless capsule system.

Thirty-one healthy adult dogs weighing from 19.6 to 81.2 kg (equivalent to 0.73 to 1.89 m^2 body surface area) with body condition scores between 4/9 and 6/9 were used. Each dog was fed a morning test meal providing 1/4 of its daily energy requirement immediately after per oral administration of the capsule. A vest was fitted to hold a receiver collecting and storing data from the capsule. Measurements were made in each dog's home environment. Regression analysis was used to assess the relationship between body size and gastrointestinal transit times.

Gastric emptying time (GET) ranged from 405 to 897 minutes, small bowel transit time (SBTT) from 96 to 224 minutes, large bowel transit time (LBTT) from 427 to 2573 minutes, and total transit time (TTT) from 1294 to 3443 minutes. When exploring the relationship between BSZ and transit times, the exponential decay model appeared to be a better fit than simple linear regression for all transit times. However, only GET and SBTT data could be explained by this model with a reasonable fit.

Across the range of BSZ in this study, there was a non-linear inverse relationship between body size and GET, resp. SBTT measured with a wireless capsule system. However, no such relationship could be shown for LBTT and TTT.

ABSTRACT #4

EARLY ENTERAL FEEDING IN CANINE ACUTE PANCREATITIS. C. Mansfield[1], F. James[1], J.M. Steiner[2], JS. Suchdolski[2] & I. Robertson[1]. [1]Department of Veterinary Clinical Sciences, Murdoch University, Western Australia, [2]GI Laboratory, Texas A&M University, Texas USA.

In human gastroenterology interventional enteral feeding is now accepted as the preferable route of alimentation in patients with

acute pancreatitis, and no longer bypasses the duodenum. Traditionally, a period of nothing *per os* has been advocated in canine pancreatitis, despite a lack of clinical evidence supporting this recommendation. The goal of this study was to compare the impact of total parenteral nutrition (TPN) and oesophagostomy (O tube) feeding in dogs with acute pancreatitis. Materials & Methods: 10 dogs with naturally occurring acute pancreatitis judged to be severe (as based on a published clinical severity index) were recruited into the study and admitted for treatment at Murdoch University Veterinary Hospital. All dogs received baseline treatment (tailored IV fluids, plasma transfusions and naso-oesophageal trickle feeding of an electrolyte solution). Analgesia, antibiotics and anti-emetics were administered on an individual basis as required. Patients were then sequentially assigned to receive either TPN or O tube feeding of a low-fat diet supplemented with MCT oil and oral pancreatic enzymes within 24–36 hours of admission. Daily assessments of clinical severity index, vomiting/regurgitation episodes, serum parameters (Specific canine pancreatic lipase, cTLI, gastrin, C-reactive protein and haptoglobin) were done from Day 0 (admission) to Day 3, then treatment was continued as considered appropriate. Mortality (adjusted for initial presenting severity), days hospitalisation, reduction in clinical severity score and serum parameters were compared between the two groups. Results: The survival rate was 90%, with no significant difference between the groups. There was a trend towards fewer days hospitalisation in the O group (mean 5.2) vs. TPN group (mean 6.6), but this did not reach statistical significance. There were no difference in serum parameters over time between the groups. The change in clinical severity index from day 0–3 was significantly different in the O group (−3.2) compared to the TPN group (+ 1.2) [Mann Whitney, $p = 0.032$]. There were significantly less vomiting/regurgitation events in the O tube group (3 in 1 dog) compared to the TPN group (33 in 3 dogs). Complications occurred in 3/5 O tube dogs, but were considered mild, and in 4/5 of the TPN dogs, 2 of which were severe. Conclusion: O tube feeding within 24–36 hours of admission for treatment of canine acute pancreatitis is well tolerated, and has fewer side effects than TPN. Dogs fed via an O tube had a significantly quicker reduction in clinical severity of the disease and tended to have shorter hospitalisation.

ABSTRACT #5

EVIDENCE OF PANCREATIC INFLAMMATION IN DOGS WITH HYPERCALCEMIA. A.K. Cook[1], J.M. Steiner[2], J.S. Suchodolski[2], J.E. Robertson[3]. [1]Department of Small Animal Clinical Sciences and [2]Gastrointestinal Laboratory College of Veterinary Medicine and Biomedical Sciences, Texas A&M University, College Station, Texas USA, [3]IDEXX Laboratories, West Sacramento, California, USA.

Hypercalcemia (HC) has been reported in association with acute pancreatitis in dogs, but there is little supportive clinical data. The study compared serum pancreas-specific lipase (Spec cPL®) concentrations in dogs with naturally occurring HC (serum calcium > 3.1 mmol/L) against a control group with normal serum calcium concentrations.

Samples used were initially submitted to a commercial laboratory for measurement of various biochemical parameters, including total calcium. Left-over serum was submitted to the GI Lab at Texas A&M for measurement of Spec cPL. The previously established reference range is 0–200 µg/L.

Samples were available from 70 dogs with HC. Total serum calcium concentrations ranged from 3.13–5.50 mmol/L, with a median of 3.73 mmol/L. Spec cPL concentrations in the HC group ranged from 29 to 1001 µg/L, with a median of 157 µg/L. Twenty seven of 70 (39%) HC dogs had a Spec cPL above the upper limit of the reference range. Total serum calcium concentrations in the control group (n = 57) ranged from 2.23–2.95 mmol/L, with a median of 2.68 mmol/L. Median Spec cPL concentration for the control group was 52 µg/L (range 29 to 1001 µg/L); this was significantly different to the HC group ($P < 0.01$). Eleven of 57 (19%) control samples had a Spec cPL concentration above the upper limit of the reference range, which was significantly different to the rate in the HC group ($P < 0.03$).

These results suggest that naturally occurring hypercalcemia may be a risk factor for canine pancreatitis. Further studies are needed to clarify the clinical importance of these findings.

ABSTRACT #6

EVALUATION OF INTESTINAL EPITHELIAL CELL APOPTOSIS IN CANINE IDIOPATHIC INFLAMMATORY BOWEL DISEASE. APG Stuart, JK Brown, RE Else, DJ Shaw, JW Simpson, AE Ridyard. R(D)SVS Division of Veterinary Clinical Sciences, University of Edinburgh, Edinburgh, Scotland.

Exaggerated intestinal epithelial cell apoptosis has been demonstrated in human IBD where it is thought to result in villus atrophy and epithelial apoptotic leaks which contribute to leak-flux diarrhoea and mucosal inflammation secondary to luminal antigen uptake. As, in addition to infiltration of the intestinal mucosa with inflammatory cells, canine idiopathic inflammatory bowel disease (IBD) is associated with a number of architectural abnormalities including villus atrophy, we hypothesise that canine IBD is also associated with exaggerated epithelial cell apoptosis. The aim of the study was to evaluate intestinal epithelial cell apoptosis in canine IBD by assessing the expression of active caspase-3, an enzyme required for DNA fragmentation in apoptosis. Following antigen-retrieval, duodenal sections from 11 dogs with IBD and 6 dogs with no history or clinical signs of intestinal disease were subjected to immunofluorescent staining using antisera specific for active caspase-3. For each dog, the total number of columnar epithelial cells (ECs) and goblet cells (GCs) for 10 villus and 10 crypt units were counted. Caspase-3 expression was subjectively graded as negative, positive or strongly positive. An apoptotic index (AI), defined as the number of caspase-3 positive cells divided by the total number of cells, for each cell type, was calculated. The data were analysed using logistic regression. When comparing the 2 groups, there were no significant differences in overall AI for the villus epithelium (VE) (mean IBD = 2.0%, control = 2.6%), overall crypt AI (mean IBD = 0.8%, control = 0.5%), the EC AI of the VE (mean IBD = 0.1%, control = 0.2%) or crypts (mean IBD = 0.2%, control = 0.3%). In contrast, the AI of GCs from the VE in dogs with IBD was significantly greater than control dogs (mean IBD = 57.1%, control = 30.3%, P = 0.018). The was no significant difference in GC AI in the crypts (mean IBD = 8.8%, control = 8.9%). Only one control dog had any strongly positive GCs in the VE, compared to 8/10 of the IBD dogs, and this difference was statistically significant (Fisher's Exact P = 0.035). The proportion of GCs in the VE was significantly different between the two groups (mean IBD = 3.8%, control = 6.4%, P = 0.026), although not in the crypt epithelium (mean IBD = 3.4%, control = 6.3%, P = 0.192). The results demonstrate that dogs with IBD have significantly lower proportions of GCs along the villus epithelium and that those GCs exhibit higher levels of active caspase-3 expression than normal dogs. No significant differences were observed in levels of apoptosis in ECs in dogs with IBD compared with control dogs.

ABSTRACT #7

EXPRESSION OF TLR5 AND 9 IN DOGS WITH CHRONIC ENTEROPATHIES. M. Schnyder[1], A. Oevermann[2], M. Doherr[2], A. Zurbriggen[2], I.A. Burgener[1]. [1]Department of Clinical Veterinary Medicine, and [2]Department of Clinical Research and Veterinary Public Health, Vetsuisse Faculty, University of Bern, Switzerland.

Inflammatory Bowel Disease (IBD) is characterized by persistent or recurrent clinical signs of gastrointestinal disease associated with histologic evidence of inflammation. Genetic susceptibility, dysregulation of the immune response, breakdown of tolerance to luminal antigens, and environmental triggers are thought to be critical in the pathogenesis of IBD. Toll like receptors (TLR) recognize microbe associated molecular patterns and are supposed to play an important role in the regulation of inflammation in the gastrointestinal tract. TLR5 detects flagellin, whereas TLR9 recognizes unmethylated CpG-oligonucleotides. The aim of this study was to determine the expression of TLR5 and 9 in dogs with IBD and food responsive diarrhea (FRD) in comparison to healthy control dogs (HCD).

Biopsies from duodenum and colon were taken from 20 HCD and 40 dogs with chronic enteropathies (CE; 20 IBD, 20 FRD) before and after standard therapy. The formalin-fixed biopsies were incubated overnight with the primary antibody (purified polyclonal rabbit-anti-canine TLR5 or 9) followed by a secondary biotinylated mouse anti-rabbit IgG and amino-9-ethyl-carbazole as chromogen. The staining was interpreted in the epithelium itself and in mucosal cells with a scoring system published elsewhere (Frolova et al 2008). Comparison between IBD, FRD and HCD were made with a

Kruskal-Wallis one-way ANOVA with Bonferroni test and correlation was tested with Spearman rank. $P < 0.05$ was considered significant.

TLR5 + cells were upregulated in the colon in IBD and FRD compared to HCD before therapy ($p = 0.005$) and in FRD after therapy ($p = 0.020$). TLR9 + cells were significantly higher in duodenum and colon of HCD compared to IBD and FRD before and after therapy (all $p < 0.0001$). In regard to the epithelium, the expression of TLR9 was higher in HCD compared to FRD before therapy (duodenum $p = 0.009$; colon $p = 0.036$) and to FRD and IBD after therapy (duodenum $p = 0.023$; colon $p = 0.013$). The expression of TLR5 in cells and epithelium correlated within the intestinal segment, whereas TLR9 correlated within cells or epithelium in duodenum and colon before and after therapy ($r > 0.5$ and $p < 0.0001$ for all). The CIBDAI was significantly higher in IBD compared to FRD before and after therapy ($p = 0.022$ and 0.011, respectively).

In conclusion, TLR5 is upregulated in invading cells in the colon of dogs with CE and may lead to an increased inflammation. The downregulation of TLR9 in cells and epithelium in dogs with CE points towards the important role that TLR9 seems to play in gut homeostasis in mice and men.

ABSTRACT #8

DIFFERENTIAL EXPRESSION OF MUCOSAL GENES ASSOCIATED WITH CANINE INFLAMMATORY BOWEL DISEASE. AE Jergens[1], V Wilki[2], D Nettleton[1], M Wymore[1], MJ Wannemuehler[1]. [1]Iowa State University and [2]University of Minnesota Colleges of Veterinary Medicine.

Canine inflammatory bowel disease (IBD) is a common cause for chronic vomiting and diarrhea in dogs. Current theories suggest that IBD is a multi-factorial disorder conditioned by genetic, environmental, and immunological factors. A better understanding of disease mechanisms requires the identification of genes that are adversely dysregulated and are involved in mucosal defense and inflammation contributing to the development of enteritis/colitis in dogs. To evaluate global gene expression in intestinal tissue samples of dogs with IBD and compare these to healthy control samples using Affymetrix DNA microarrays and real-time PCR.

18 dogs diagnosed with moderate-to-severe IBD (CIBDAI > 5) and 6 healthy dogs. Samples of intestinal mucosal were collected by endoscopy or surgery from each dog, total RNA extracted, and then utilized for microarray analysis using the Affymetrix GeneChip® Canine Genome 2.0 Array. Fluorescence intensity values (.CEL files) generated from the 24 arrays (18 diseased dogs and 6 normal dogs) were normalized using the Robust Multi-array Average (RMA) normalization method.

Permutation testing yielded over 1850 genes significantly differentially expressed (FDR $\leq$ 1%, expression change 2 fold or greater) between the IBD and control samples, suggesting that each canine group had a distinctive gene expression pattern. Subsequent analysis facilitated grouping of terms by ontology into biologic process, cellular component, and metabolic function categories based on q-values for each group. Here we showed that 42 biological process terms, 30 cellular components, and 18 molecular function terms were found to be significantly overrepresented among the genes declared to be differentially expressed. Altered expression of genes regulating mitosis, cell cycle/replication, and the activation of inflammatory and innate immune pathways were observed in dogs with IBD. Quantitative real-time RT-PCR detected the similar change of select differentially expressed genes as Genechip®. These data are the first report characterizing mucosal gene expression profiles in canine IBD. Transcriptional profiling documented differential gene expression signatures in intestinal tissues of dogs with IBD, complemented the histopathologic diagnosis, and suggests potential molecular targets for the diagnostic monitoring and therapeutic intervention of disease prior to the onset of chronic mucosal inflammation.

ABSTRACT #9

ANALYSIS OF SINGLE NUCLEOTIDE POLYMORPHISMS IN THE TOLL-LIKE RECEPTOR FOUR GENE IN GERMAN SHEPHERD DOGS WITH AND WITHOUT INFLAMMATORY BOWEL DISEASE. A Kathrani[1], A House[1], D Werling[2], B Catchpole[2], H Trojer[3], N Grützner[4], K Allenspach[1]. [1]Department of Veterinary Clinical Sciences, [2]Department of Pathology and Infectious Diseases and [3]Department of Veterinary Basic Sciences, [4]Royal Veterinary College, University of London, UK and the Gastrointestinal Laboratory, Department of Small Animal Clinical Science, College of Veterinary Medicine, Texas A&M University, College Station, Texas, USA.

Toll-like receptor 4 (TLR4) is an important pattern recognition receptor, recognizing lipopolysaccharide (LPS) from gram negative bacteria. The association of single nucleotide polymorphisms (SNPs) in *tlr4* with human Inflammatory Bowel Disease (IBD) demonstrates the importance of this gene and its role in innate immune function for the pathogenesis of IBD. Previous studies have shown up-regulation of TLR4 expression in the duodenum and colon of dogs with chronic enteropathies, thus elucidating a potential role for this receptor in the pathogenesis of canine IBD. However, to date no studies have been performed to investigate the potential role of *tlr4* SNPs in canine IBD. The aim of this study was to investigate whether SNPs in the canine *tlr4* are associated with IBD in German Shepherd dogs (GSDs).

Four non-synonymous SNPs in *tlr4*; T23C, G1039A, A1572T and G1807A, previously identified in a mutational analysis were evaluated further in a case-control study using a SNapSHOT multiplex reaction. Sequencing information from 27 GSDs with IBD from the UK were compared to two control groups consisting of 77 healthy GSDs recruited from the USA and 47 GSDs from patients treated for non-inflammatory disease at the Queen Mother Hospital for Animals referral hospital, Royal Veterinary College, University of London (UK). All four SNPs were found to be in Hardy-Weinberg equilibrium. When the case population was compared to both control-groups none of the SNPs were significantly associated with IBD.

Our study suggests that SNPs in the coding region of TLR4 may not play a role in the pathogenesis of IBD in GSDs. Further studies would be needed to ascertain whether SNPs in the promoter region of the TLR4 gene play a role.

ABSTRACT #9a

THE EFFECT OF TYLOSIN ON SMALL INTESTINAL MICROBIOTA IN HEALTHY DOGS. JS Suchodolski[1], SE Dowd[2], JM Steiner[1], E Westermarck[3], T Spillmann[3], JA Harmoinen[3]. [1]GI Laboratory, Texas A&M University, College Station, TX, USA; [2]Pathogen Research Lab, Lubbock, TX, USA; [3]Department of Equine and Small Animal Medicine, Helsinki University, Helsinki, Finland.

The antibiotic tylosin is commonly used for the treatment of chronic diarrhea in dogs. However, only few data about the effect of tylosin on the small intestinal microbiota are available. The aim of this study was to evaluate the effect of tylosin on the jejunal microbiota by massive parallel 16S rDNA pyrosequencing.

Five healthy dogs, each with a pre-existing jejunal fistula were used for this study. Tylosin was administered at 20 to 22 mg/kg q 24 hr for a period of 14 consecutive days. Jejunal brush samples were collected through the fistula on days 0 (before tylosin administration), 14, and 28 (14 days after withdrawal of tylosin). Bacterial diversity was characterized using bacterial tag encoded FLX amplicon 16S rDNA pyrosequencing (bTEFAP). Changes in bacterial taxa and diversity between the treatment periods were evaluated using multivariate analysis.

A total of 44,069 pyrosequencing tags were evaluated. Ten different bacterial phyla were identified: *Proteobacteria* (46.7% of sequences), *Firmicutes* (15.0%), *Actinobacteria* (11.2%), *Bacteroidetes* (6.2%), *Spirochaetes* (14.2%), *Fusobacteria* (5.4%), and *Tenericutes, Verrucomicrobia, Cyanobacteria*, and *Chloroflexi* (each < 0.1%). Tylosin led to a significant shift in microbial populations with a progressive decrease in diversity ($p < 0.01$), which was lowest on day 28. Principal component analysis revealed that microbial populations were phylogenetically more similar during tylosin treatment. A high inter-individual response to tylosin was observed. *Spirochaetes, Fusobacteria, Bacteroidales*, and *Bacilli* tended to decrease during tylosin administration. Sequences of *Escherichia coli*-like organisms increased significantly by day 28 ($p = 0.04$). The proportion of *Enterococcus*-like organisms increased significantly during tylosin administration ($p < 0.01$).

Tylosin administration led to significant changes in bacterial diversity, but a high degree of inter-individual response was observed. Bacterial groups not commonly associated with beneficial effects in gastrointestinal health, such as *Enterobacteriaceae*, increased significantly by day 28, probably due to the known lack of antibacterial activity of tylosin. However, no negative clinical effects were observed. Sequences of *Enterococcus*-like organisms, commonly used in probiotic formulations, increased significantly during tylosin administration. Future clinical studies are warranted to investigate if this increase may, at least in part, explain the beneficial effect of tylosin in dogs with chronic diarrhea.

ABSTRACT #10

URINARY PROSTANOIDS IN FELINE CHRONIC KIDNEY DISEASE. N. Suemanotham[1], Y. Berhane[1], H. Syme[2], J. Elliott[1]. [1]Department of Veterinary Basic Science and [2]Veterinary Clinical Sciences, The Royal Veterinary College, University of London, London, UK.

Chronic kidney disease (CKD) is a common cause of death in cats. Some cats have rapid progression of CKD whereas others show little evidence of progression and die of other causes. Proteinuria and hypertension are associated with CKD progression. Prostacyclin (PGI_2) and prostaglandin E (PGE_2) production increases when blood pressure is elevated. Enhanced thromboxane A (TxA_2) receptor expression has also been shown to induce hypertension and thromboxane antagonists reduce proteinuria in mice. This study aimed to test the hypothesis that in cats with CKD, upregulation of PGI_2 and PGE_2 will limit proteinuria and hypertension while upregulation of TxA_2 will be associated with CKD progression.

Cats were selected for inclusion in the study if they were > 9 years and diagnosed with persistent azotaemia (creatinine > 177 μmol/L) then categorized as follows: proteinuric (P; UPC > 0.2), non-proteinuric (NP; UPC < 0.2), normotensive (NT) and hypertensive (HT) (systolic blood pressure; SBP < 170 mmHg and > 170 mmHg, respectively). Cats that were diagnosed with hyperthyroidism were excluded. Normal cats were used as a control group (creatinine < 140 μmol/L, UPC < 0.2 and SBP < 150 mmHg). Urine samples were taken by cystocentesis with the owner's informed consent and were collected prior to treatment with renal diet or antihypertensive / anti-proteinuric medications. 6-keto $PGF_{1\alpha}$, PGE_2 and TxB_2 were measured as an index of urinary PGI_2, PGE_2 and TxA_2 production, respectively, in extracted samples using commercially available enzyme immunoassay test kits according to the manufacturer's protocol. All assays were validated and were shown to have good reproducibility and precision. All prostanoid concentrations in urine were corrected and reported as urine prostanoid:urine creatinine ratios. Statistical significance ($P < 0.05$) between groups was assessed by ANOVA followed by the Bonferroni *post hoc* test.

Urinary 6-keto $PGF1_\alpha$ and TxB_2 were significantly lower in cats with CKD regardless of their sub-categorization [NP (5.10 ± 0.36; 4.99 ± 0.32; $n = 13$), P (5.94 ± 0.21; 5.12 ± 0.32; $n = 15$), NT (6.04 ± 0.31; 5.12 ± 0.30; $n = 15$) and HT (5.88 ± 0.24; 5.01 ± 0.35; $n = 13$)] when compared to normal (6.43 ± 0.29; 5.63 ± 0.38; $n = 22$) cats. However, there was no statistical difference in urinary PGE_2 concentration among the groups.

Cats with CKD had reduced urinary excretion of $PGI_2$and TxA_2 suggesting diseased nephrons produce less of these prostanoids but PGE_2 urinary excretion does not appear to be altered by this disease. Longitudinal studies are warranted to determine whether there is an association between reduced urinary PGI_2/TxA_2 excretion and risk of developing CKD.

ABSTRACT #11

RELATIONSHIP BETWEEN HISTOPATHOLOGICAL LESIONS AND RENAL FUNCTION IN CATS WITH CHRONIC KIDNEY DISEASE. S Chakrabarti[1], H Syme[2], C Brown[3] and J Elliott[1]. [1]Veterinary Basic Sciences, [2]Veterinary Clinical Sciences Royal Veterinary College, London, UK, [3]GADA Diagnostic Lab, University of Georgia, Georgia, USA.

Chronic Kidney Disease (CKD) is common in geriatric domestic cats, with most cases demonstrating idiopathic tubulointerstitial fibrosis on histopathology, yet there are few studies which have related the histopathological lesions to renal function. Seventy feline renal histological samples were scored by a pathologist, masked to all clinical data. These samples were from cases seen at geriatric cat clinics run at the PDSA Bow and Beaumont Animal Hospital, Camden and were obtained at post-mortem examinations undertaken between 1995 and 2004. These cases had varying amounts of historical data available. Interstitial fibrosis, interstitial inflammation and glomerulosclerosis were assessed on a scale of 0–3 with intervals of 0.5 for the interstitial scores. For glomerular scores, only integers were used. Twenty-five glomeruli were scored individually with a total score recorded. Cases were divided into two groups based on clinical assessment of their renal function: 1) cats which reached end stage CKD that were either euthanased after presenting in a uremic crisis or which were assumed to have a renal cause of death having reached IRIS stage 4 at the time of their last blood samples, 2) cats with CKD which had not progressed beyond IRIS stage 3 at their final blood samples, taken less than two months prior to death. These cats were assumed to have a non-renal cause of death. All data were compared with the Mann Whitney U test and are presented as median values with interquartile ranges in parentheses. Forty-two cats met the inclusion criteria, with 21 cats in each group. Ten cats in Group 2 had concurrent illnesses affecting the decision for euthanasia. One cat in Group 2 had no interstitial inflammation score available. Group 1 had a significantly higher median interstitial fibrosis score than Group 2: 2.5[2.0–3.0] vs. 2[0.6–2.0]; $p < 0.05$. However, there were no significant differences in median interstitial inflammation (1.5[1.0–2.0] for Group 1 vs. 1.0[1.0–2.0] for Group 2: $p = 0.51$) and glomerular scores (31.0[22.5–39.0] for Group 1 vs. 33.5[27.0–43.5] for Group 2: $p = 0.41$). The results of this study suggest that in cats with CKD, progressive interstitial fibrosis rather than glomerulosclerosis is the histopathological lesion more closely associated with renal function.

ABSTRACT #12

PARATHYROID HORMONE (PTH) CONCENTRATION IS ELEVATED IN NON-AZOTAEMIC STAGES OF FELINE CHRONIC KIDNEY DISEASE (CKD). N.C Finch, H. Syme, J. Elliott. Royal Veterinary College, London, UK.

Renal secondary hyperparathyroidism has been investigated in cats with azotaemic CKD, however PTH concentrations in non-azotaemic stages of CKD have not been explored.

Healthy client-owned geriatric cats (> 9 yrs old) with plasma creatinine concentration (PCr) < 177 μmol/l (2.0 mg/dl) were recruited into a prospective longitudinal study. Any cats with concurrent medical disorders such as hyperthyroidism were excluded. The cats were fed maintenance diets throughout the study period. They were followed for 12 months and at the study endpoint were classified according to a modified IRIS staging system: - Group 1 stage I (PCr < 140 μmol/l), group 2 stage IIa (PCr 140 - 177 μmol/l), group 3 ≥ stage IIb (PCr > 177 μmol/l). EDTA and heparinised plasma samples were collected at baseline and at the 12 month follow up visit. The samples were stored at −80 °C until analysis. Plasma samples were sent to a reference laboratory (IDEXX Laboratories, Inc). Routine biochemistry analysis was performed on the heparinised plasma samples. EDTA plasma was analysed for PTH using an intact radioimmunometric assay (Diagnostic Systems Laboratories, Inc). The data were compared between the 3 groups using the Kruskal-Wallis test. Significance was set at $P < 0.05$. Post hoc testing was performed to identify where differences lay using the Mann-Whitney test. A Bonferroni correction was applied and significance set at $P < 0.017$. Additionally a reference range was derived from the mean PTH concentrations in the cats in group 1 by taking the 2.5^{th} to 97.5^{th} percentiles.

A total of 95 cats were recruited into the study (30 group 1, 41 group 2, 23 group 3). The median (range) PTH concentration in groups 1, 2 and 3 were 3.65 (0.5–16.3) pmol/l, 5.5 (1–39.1) pmol/l and 7.5 (1.4–344.3) pmol/l respectively. The reference range was calculated to be 0.7–12.8pmol/l (6.6–121.3pg/ml). At baseline PTH differed significantly between the groups of cats ($P = 0.013$). Post hoc testing identified a difference between group 1 and group 3 ($P = 0.008$) and group 1 and 2 tended towards but were not significantly different ($P = 0.020$). Eight/23 cats (35%) in group 3 had PTH concentrations above the derived reference range at baseline and 9/41 cats (22%) in group 2 had elevated PTH. Phosphorous ($P = 0.105$) and total calcium ($P = 0.073$) did not significantly differ between the groups.

These data suggests PTH is elevated in the non-azotaemic stages of feline CKD before changes in plasma phosphorous are detectable.

ABSTRACT #13

A RETROSPECTIVE STUDY OF RENAL AMYLOIDOSIS IN CHINESE SHAR-PEI AND NON-SHAR-PEI DOGS. G. Segev[1], L.D. Cowgill[2], S. Jessen[1], A. Berkowitz[1], C. Mohr[2] and I. Aroch[1]. [1]Schools of Veterinary Medicine, Hebrew University of Jerusalem, Israel, [2]University of Davis, California.

Renal amyloidosis (RA) is a heterogeneous spectrum of fibrillar diseases, characterized by extracellular deposits of insoluble β-pleated sheet proteins in the kidney, designated as amyloid. This retrospective study aimed to characterize the clinical and clinicopathologic signs and mortality of dogs with a light microscopy diagnosis of RA; we further compared these parameters between Chinese Shar Pei (CSP) and non Shar Pei (NSP) dogs. Data were retrieved from medical records of dogs presented to the teaching hospitals of UC Davis and the Hebrew University (1986–2007). Ninety dogs including 40 males and 50 females, and 15 CSP and 75 NSP were studied. Shar Peis [4.5 y, (range, 3.6–17 y)] were younger *vs* NSP [9.0 y, (range, 2.4–10 y); $P < 0.001$]. Fifty-eight dogs (64%), of which 7 CSPs (47%), and 51 NSPs (68%) had predisposing neoplastic or inflammatory (infectious and non-infectious) disease. Five CSPs (33%) had historical familial shar pei fever. Infectious diseases were more prevalent in NSPs *vs* CSPs (75% *vs* 27%, respectively, $P < 0.001$). Proteinuria was detected in 96% of all dogs, and the urine protein to creatinine ratio was greater in CSPs [15.9, (range, 0–75)] than NSP [6.9, (range, 0.4–23); $P = 0.04$]. Correspondingly, hypoalbuminemia was more prevalent in CSPs (98%) than NSPs (71%, $P = 0.004$), and the median serum albumin, was lower in CSPs [1.4 g/dL, (range, 0.5–3.1) *vs* NSPs [2.0 mg/dl, (range, 1.0–3.8); $P < 0.001$]. Median serum creatinine was 4.9 mg/dL (range, 0.6–27 mg/dL) for all dogs, but was 2-fold higher in CSPs [9.8 mg/dL, (range, 1–27.1)] *vs* NSPs [4 mg/dL, (range, 0.6–23.5); $P = 0.03$]. Increased serum ALT ($P = 0.004$) and ALP ($P = 0.037$) activities were more prevalent in CSPs *vs* NSPs. Hyperbilirubinemia was documented in 44% of all dogs, and was more prevalent in CSPs (80%) *vs* NSPs (36%; $P = 0.012$). Median serum bilirubin was 0.2 mg/dL (range, 0–5.5) in NSPs vs. 0.7 mg/dL (range, 0–9.7) in NSPs ($P = 0.005$). Histoapthology revealed glomerular amyloid deposition in 95% of all dogs (95% in NSPs and 90% in CSPs). Medullary RA was more common in CSP (73%) *vs*. NSP (35%; $P = 0.02$), as was extra RA which was detected mostly in liver (36%), pancreas (27%), and spleen (15%). Median survival time was 5 and 2 days in CSPs and NSPs, respectively, mainly due to euthanasia, with no difference between groups. In conclusion, RA is a fatal disease. CSP with RA are younger and have more severe azotemia and a more generalized disease *vs*. NSP. Although renal medullary involvement was more common in CSP, as described, glomerular involvement and proteinuria are invariably present in CSPs in late stages of the disease.

ABSTRACT #14

EVALUATION OF NEPHROTOXIC EFFECTS OF MILTEFOSINE AND MEGLUMINE ANTIMONATE IN 8 HEALTHY BEAGLES. C. Brovida[1], P. Bianciardi[2], M. Valente[3], L. Aresu[4], L. Cavicchioli[4], C. Vischer[5], L. Giroud[5], M. Castagnaro[4]. [1]ANUBI Companion Animal Hospital, Moncalieri, Italy, [2]Via dell'Usignolo, Milano, Italy, [3]Medical School and [4]Department of Pathology, University of Padua, Italy, [5]Virbac SA, Carros, France.

Canine leishmaniosis(CanL) is a multi-systemic disease, where the kidneys are usually affected. Glomerular lesions with immune complex deposition is common, however tubulointerstitial lesions may also be present. The current standard treatment of CanL is with the antimony meglumine antimoniate(AMA), alone or in combination with allopurinol. In spite of paucity of scientific documentation, AMA is suspected to have nephrotoxic potential and is thus rarely used in severely azotemic dogs. Recently the phosphocholine, miltefosine(MF), has become available for the treatment of CanL. AMA is mainly excreted through the kidneys, while MF undergoes a slow hepatic metabolic break-down into choline. Anecdotal evidence indicates that dogs with CanL and severe azotemia may tolerate MF better than AMA, supporting a hypothesis that MF may be less nephrotoxic than AMA. The aim of this study was to consider the effects of treatment with MF and AMA in healthy dogs by evaluating hepatic and renal clinicopathological, and nephropathological findings. Eight healthy beagles were randomized and allocated to a treatment with MF(MF group) or AMA(AMA group), using recommended treatment protocols. Clinical examination was performed 10 times; haematological and biochemical examination, and urinalysis, were performed at 3 time-points from day-4 (d-4) to d55 days after treatment. Kidney biopsies were collected at d-1 and d55. The biopsies contained an average of 17,4 glomeruli and were processed for light microscopy(LM), immunofluorescence(IF) staining and transmission electron microscopy(EM) examinations. All animals remained clinically healthy throughout the study period. Laboratory analyses were normal in all dogs at all time-points. Pre-renal biopsies were normal in all dogs. At d55, glomeruli were normal in all dogs and IF staining were negative in all dogs. In the MF group, LM showed minimal vacuolization of proximal tubule(PT) cells and no abnormalities on EM. In the AMA group, diffuse PT cell vacuolization and multifocal areas with coagulative necrosis were observed in LM, and EM showed reduced organellar content, loss or attenuation of brush border, cellular detachment from the basement membrane, apical blebbing and individual cell necrosis.

To conclude, all dogs receiving AMA developed severe proximal tubular damage. In comparison, none of the dogs receiving MF developed tubular damage. The use of MF in azotemic dogs with CanL should be evaluated in future research.

ABSTRACT #15

DETECTION OF THREE NOVEL PROTEINS IN THE URINE OF CATS WITH FELINE IDIOPATHIC CYSTITIS. S. Lemberger[1], C. Deeg[2], B. Amann[2], S. Hauck[3], K. Hartmann[1], R. Dorsch[1]. [1]Clinic for Small Animal Internal Medicine and [2]Institute for Veterinary Physiology, Departement of Veterinary Sciences, Ludwig Maximilians University of Munich, Germany and [3]Institute for Protein Sciences, Helmholtz Center Munich, Germany.

Feline idiopathic cystitis (FIC) is a very common disease in domestic cats. So far, no etiology has been identified, and the diagnosis is still made by exclusion of other diseases of the lower urinary tract.

The aim of this study was to examine the quality of the proteinuria in cats with FIC, in order to get information about possible etiologies and to search for diagnostic markers.

Protein quantification using the Bradford method was performed in 20 urine samples from cats with FIC and 20 cats with no evidence of urinary tract disease. Subsequently, a defined amount of protein out of each sample was separated according to molecular mass by one- and two-dimensional gel electrophoresis. After staining of the gels with Kang's Coomasie Blue, bands of cats with FIC which seemed to be different from the bands in healthy cats were excised and proteins identified by tandem mass-spectrometry (MALDI-TOF-TOF). Validation of the candidates was performed with candidate-specific antibodies using Western Blots and Immunohistochemistry.

In the Western Blots, a quantification of band densities was performed with Image Quant Program.

Results showed that cats with FIC had a much higher quantity of protein in their urine with an average of 1.93 mg/ml than healthy cats with an average of 0.45 mg/ml ($p < 0.001$). Three differentially expressed candidates were detected in the urine of cats with FIC. For two candidates, monoclonal antibodies were available for validation. For these candidates, a significant difference in their quantity could be identified between cats with FIC and healthy controls ($p < 0.001$). One of these candidates could also be validated on Immunohistochemistry. The third identified protein was the Methyionyl-tRNA-Formyltransferase (Met-tRNA-FT). This is an enzyme which is produced by several bacteria, such as *Mykoplasma genitalium*, *Escherichia coli*, *Pseudomonas aeruginosa* and by fungi such as *Saccharomyces cerevisiae*, but also by mammalian cells. The aminoacid sequence of this enzyme on MALDI-TOF-TOF was identical to that produced by a bacteria called *Rhizobium loti*. This result supports the idea of the involvement of an infectious agent in the etiology of FIC. Met-tRNA-FT may derive from bacteria that cannot be identified *via* normal bacterial culture such as *Mykoplasma spp*. A more extensive search for the presence of bacteria with newer technologies may be warranted.

ABSTRACT #16

ADRENOCORTICAL MORPHOLOGY IN CATS WITH CHRONIC KIDNEY DISEASE (CKD) AND SYSTEMIC HYPERTENSION. SJ Keele, KC Smith, J Elliott, HM Syme. Royal Veterinary College, University of London, London, UK.

Systemic hypertension is a common disorder of aged cats. It is most often diagnosed in cats with CKD. Hypertensive (HT) cats have significantly lower plasma potassium compared with normotensive (NT) cats with CKD which may be due to hypersecretion of aldosterone. The objective of this study was to determine the incidence of adrenocortical hyperplasia (AH) and test the hypothesis that HT cats have more frequent and severe adrenocortical pathological changes than NT cats.

Adrenal glands removed at *post-mortem* from cats ($n = 67$) were examined histologically and scored for AH, area affected by vacuolation and area affected by mineralisation. Hypertension was diagnosed if systolic blood pressure (SBP; Doppler method) exceeded 170 mmHg at 2 consecutive clinic visits or at a single visit if hypertensive ocular lesions were also present. All HT cats were treated with amlodipine. Time-averaged SBP (TASBP) was calculated from the area under the time versus (*vs*) SBP curve for all available observations in NT cats and from the time SBP was medically controlled (< 160 mmHg; 424 visits; $n = 37$) until death in HT cats. NT cats were divided into two groups by TASBP < 136 mmHg (lowNT group; 247 visits, n = 15) or > 136 mmHg (highNT group; 96 visits, n = 15). Plasma creatinine concentration was measured at the time of diagnosis of CKD in NT cats or hypertension in HT cats. Groups were compared by Kruskal-Wallis test followed by Mann-Whitney test with *post-hoc* Bonferroni correction. Data is presented as median [25th, 75th percentile].

TASBP did not differ between HT and highNT groups (152 [140, 160] mmHg *vs* 149 [146, 175] mmHg). TASBP was lower in the lowNT group (122 [113, 130] mmHg) than either of the other groups ($P < 0.0003$). Creatinine was higher in the lowNT group (257 [199, 293] µmol/L) than the HT group (171 [139, 223] µmol/L; $P < 0.0003$); the highNT group had intermediate values (208 [179, 447] µmol/L). Age at death was not significantly different among groups (lowNT; 15.1 [8.6, 17.5], highNT; 15.0 [12.1, 19.4] and HT; 17.2 [15.3, 19.2] years). AH was present in 61/65 cats. Glands from two cats with unilateral adrenocortical adenomas were not scored. AH score did not differ among groups (lowNT: 2 [1, 2] *vs* highNT: 2 [1, 2] *vs* HT: 2 [1, 2]). Scores for vacuolation and mineralization also did not differ significantly among groups.

AH was a frequent finding, but there is no evidence from the present study of an association between the presence or severity of adrenocortical pathology and long-term elevated SBP. Further work is necessary to determine whether hypertension is associated with inappropriate hyperaldosteronism in the cat.

ABSTRACT #17

EFFECT OF SELECTIVE IN VIVO CYCLOXYGENASE INHIBITION ON ACUTE SALURETIC RESPONSE TO FUROSEMIDE, RENIN ACTIVITY AND URINARY PROSTANOID EXCRETION IN THE CAT. L. Pelligand[1], J. Elliott[1]. [1]Royal Veterinary College, Hatfield, Herts, UK.

Furosemide administration can elicit a renin response for which determinants are not well characterised in the cat. We hypothesised that cyclooxygenase isoforms involvement, in the cat, could be unravelled by using selective Non Steroidal Anti Inflammatory drugs (NSAIDs) in a furosemide stimulation model.

This study was a four period cross-over, in which treatment order was randomised. Seven healthy sterilised cats (4 males, 3 females, 3.7 ± 0.34 kg) were enrolled in the study. The study was approved by the local ethics committee. The washout interval was 10 days. The intervention consisted in of initiating an oral course of furosemide 2 mg/kg twice a day (48 h) administered concomitantly with each of four dosing regimens: placebo (PLC), ketoprofen 1 mg/kg (KET, COX-1 selective), robenacoxib (COX-2 selective) 1 mg/kg once a day (SID) or twice a day (BID). Urine was collected for 48 h before (baseline) and after the intervention. Blood was collected before (baseline) and 26 h after the first furosemide dose. Plasma creatinine, plasma renin activity (PRA), 24 h urinary volumes, electrolytes, creatinine and prostanoids (PGE_2, 6keto-$PGF1_\alpha$, TxB_2) excretions were measured before and after furosemide. Glomerular filtration rate (GFR) was estimated by endogenous urinary creatinine clearance. Results are presented as mean ± SD. Group means before and after furosemide were compared using a two way repeated measures ANOVA with Bonferroni post hoc test to compare the effects of the different NSAIDs regimens.

There were significant increases in 24 h urine volume (25.2 ± 1.5 vs 12.7 ± 1.1 ml kg^{-1} day^{-1} baseline) and 24 h urinary sodium (2.3 ± 0.1 vs 1.4 ± 0.1 mmol kg^{-1} day^{-1} baseline) and chloride (4.0 ± 0.1 vs 2.8 ± 0.1 mmol kg^{-1} day^{-1} baseline) excretions after furosemide. However, no significant effect of co-administration of the different NSAIDs treatments could be detected on this diuretic response. Plasma creatinine was significantly higher (184 ± 6.4 vs 158 ± 3.4 µmol L^{-1} baseline) after furosemide regardless of NSAIDs used, whereas GFR was unchanged. PRA was significantly increased after furosemide (10.1 ± 1.53 vs 1.9 ± 0.82ng ml^{-1} h^{-1} baseline) and PRA after KET was significantly lower than after PLC (7.9 ± 3.85ng ml^{-1} h^{-1} vs 11.7 ± 4.73ng ml^{-1} h^{-1}). Daily urinary excretion of PGE_2 was lower after furosemide (23.2 ± 6.25 vs. 45.9 ± 5.52ng kg^{-1} day^{-1} baseline) and with KET when compared to PLC (14.7 ± 6.89 vs 29.0 ± 16.5ng kg^{-1} day^{-1}). 24 h urinary TxB_2 was higher after furosemide (4.9 ± 0.50 vs 3.2 ± 0.30ng kg^{-1} day^{-1} baseline) whereas 6-keto$PGF1_\alpha$ was unchanged.

In conclusion, the natriuretic response to furosemide was not blunted by NSAIDs. Nevertheless PRA and urinary PGE_2 were decreased with ketoprofen but not with robenacoxib SID or BID when compared to placebo, suggesting that COX-1 contributes to the measured renin response to furosemide administration.

ABSTRACT #18

RETICULOCYTE HEMOGLOBIN CONTENT EVALUATION IN CATS AFFECTED WITH CHRONIC KIDNEY DISEASE (CKD). P. Scarpa, C. Ramirez Sanchez, F. Toniolo, T. Vitiello, V. Palermo, P.G. Brambilla. Department of Veterinary Clinical Sciences, University of Milan, Italy.

Reticulocyte hemoglobin content (CHr) is considered a sensitive and specific measure of the iron status, with regard to erythrocytopoiesis in human patients affected by CKD. Several publications pointed out anaemia among the factors causing the progression of CKD by the vicious circle of the cardio-renal syndrome. The aim of this study was to evaluate the relationship between CHr and other haematological parameters, in cats affected by CKD staged according to the International Renal Interest Society. One hundred ninety one cats in stages II, III and IV were tested and twenty clinical healthy cats were enrolled as control group. CBC and reticulocyte indices were assessed using an ADVIA 120 Hematology System (Siemens Diagnostics Inc). Statistic analysis (one-way ANOVA and bivariate fit) was performed by JMP7 (SAS Inc). Anaemia was found in 33% of the cats in stage II, 51% in stage III, 74% in stage IV. The ANOVA showed a significant variance between CHr in the different stages of CKD ($p = 0{,}009$). The linear regression showed that CHr and CHr/CHm ratio decrease with serum creatinine (SCr) increasing ($p = 0{,}03$; $p = 0{,}01$). MCVr, % Macro-r and %High-CHr showed an analogue significative trend too. CHr and CHr/CHm ratio tend to decrease with RBC, HCT and HGB decreasing ($p < 0{,}0001$). Sideraemia wasn't related with SCr, RBC, HCT and HGB. These findings may indicate that worsening nephropathy adversely affects the erytrocyte hemoglobin content, particularly those parameters that are used for the early assessment of iron deficiency anemia. Futhermore they may indicate that, with the progression of nephropathy, smaller reticulocytes with a lower content of hemoglobin are released (due to lower availability of iron). It was observed that CHr increases with increasing of reticulocyte count ($p = 0{,}02$), reticulocyte percentage ($p = 0{,}03$) and corrected reticulocyte percentage ($p = 0{,}002$). These findings suggest that a greater regenerative response corresponds to major reserves of iron for eritropoiesis. As CHr and the CHr/CHm ratio decrese, a significant increase of leukocytes was shown by linear regression. A significant increase of neutrophils, decrease of lymphocytes and eosinophils were also observed. Although these results are consistent with a stress leucogram which is well known in patients affected with CKD, in human it is referred that low CHr could be associated with inammatory process (that could contribute to the progression of nephropathy) and erythropoietin resistance, but not necessarily with iron-deciency. These findings suggest that CHr trend has to be carefully examined also in feline patients affected by CKD.

ABSTRACT #19

PERCUTANEOUS CLOSURE OF PATENT DUCTUS ARTERIOSUS WITH AMPLATZ® CANINE DUCT OCCLUDER IN 46 DOGS: OUTCOME AND PROGNOSTIC SURVIVAL FACTORS. P. Oliveira[1], O. Domenech[1], J. Silva[1], E. Laynez[1], C. Bussadori[1]. [1]Clinica Veterinaria Gran Sasso, Milano, Italia.

Amplatz® Canine Duct Occluder (ACDO) has been specifically designed for percutaneous closure of patent ductus arteriosus (PDA) in dogs, with good results. The aim of this retrospective study was to assess the immediate and long term outcome of PDA closure with ACDO in 46 client owned dogs. Records were reviewed for signalment, clinical presentation, radiographic, electrocardiographic and echocardiographic information; ACDO deployment and PDA closure success were analyzed, as well as survival up to the submission date of this abstract. Prognostic survival factors were assessed. A median age of 12 (3–120) months at the time of the procedure was observed. Most dogs were asymptomatic (n = 35). Exercise intolerance (n = 8) and cough (n = 5) were the most common complaints in symptomatic dogs. Pulmonary edema was observed in 3 dogs and ascites in 2. Atrial fibrillation was present in 3 dogs, ventricular bigeminism in 2, and another 2 dogs presented both. Device size selection was performed based on PDA dimension assessment with angiography (ANGIO) in 24 cases (group A), and transesophageal echocardiography (TEE) in 22 cases (group B). Oversize factors (OF) ranged from 0.86 to 2.5 (median, 1.5) in group A, and 1.4 to 2.5 (median, 1.8) in group B. ''Cobra'' shaped conformation was observed in two cases of group A. The device returned to its native shape 1 month later in one case, while on the other a trivial residual shunt was observed; in both cases an OF > 2 was used. PDA closure was not achieved in one dog due to a large type III PDA detected properly by TEE. Eleven dogs (23%) presented a progressive systolic dysfunction hemodynamically and clinically relevant. At the time of submission of this abstract, 41 dogs were alive (89% survival rate); 2 dogs died due to non cardiac causes; and 3 dogs died from sudden death at 4, 210 and 240 days after procedure, all of which presented ventricular arrhythmias before and after the procedure. None of these 3 cases presented significant systolic dysfunction. A statistically significant ($p = 0.0020$) odds ratio of 0.0016 suggested that ventricular arrhythmias were a negative survival prognostic factor. Other factors tested were: breed, age, pulmonary edema, ascitis, EDVI, ESVI, FS, EF and atrial fibrillation. None of these showed sufficient statistical relevance. ACDO procedure is effective, and OF > 2 may lead to an oversized device selection. Ventricular arrhythmias may be a negative survival prognostic indicator, and progressive systolic dysfunction may develop in some dogs. Further studies are necessary to assess these preliminary results.

ABSTRACT #20

ECHOCARDIOGRAPHIC AND ANGIOGRAPHIC COMPARISON OF PATENT DUCTUS ARTERIOSUS MEASUREMENTS AND THEIR ROLE ON DEVICE SIZE SELECTION IN 46 DOGS. O. Domenech[1], J. Silva[1], E. Laynez[1], P. Oliveira[1], C. Bussadori[1]. [1]Clinica Veterinaria Gran Sasso, Milano, Italia.

Patent ductus arteriosus (PDA) is a common congenital cardiac anomaly in dogs, associated with considerable hemodynamic consequences. Increasingly available percutaneous procedures are attaining an important role in the treatment of this condition. This procedure's success depends largely on an accurate ductal evaluation, influencing appropriate device size selection. Angiography (ANGIO) has been classically used for this purpose. In two previous studies in dogs, both transthoracic (TTE) and transesophageal (TEE) echocardiographic measurements of minimum ductal diameter demonstrated a good correlation with ANGIO. The aims of this prospective study were to assess the accuracy of minimum ductal and ampulla diameter measurements obtained by two-dimensional TTE and TEE, in comparison to ANGIO; and to evaluate correct device size selection based only on TEE measurements. The hypothesis that TEE could provide the same information and replace ANGIO for appropriate device size selection during percutaneous closure of PDA was formulated. A total of 46 client owned dogs, undergoing percutaneous closure of PDA with Amplatz® Canine Duct Occluder, were included in this study. Minimum ductal and ampulla dimensions were determined concurrently with TTE, TEE and ANGIO in 24 dogs (group A), and the remaining 22 dogs were evaluated only with TTE and TEE (group B). Device size selection was based on ANGIO on group A and TEE on group B. Mean results for minimum and ampulla ductal diameter in group A were, respectively: 6.9 ± 2.5 mm and 14.2 ± 6.4 mm for TTE; 5.8 ± 1.9 mm and 10 ± 3.8 mm for TEE; and 6.1 ± 1.6 mm and 11.1 ± 4.1 mm for ANGIO. Minimum ductal measurements obtained with the three methods did not differ significantly (ANOVA, $p = 0.15$) in contrast to ductal ampulla measurements (ANOVA, $p = 0.015$). A TUKEY-KRAMER test revealed a statistical difference only between TTE and TEE ampulla measurements ($p = 0.016$), and not between TTE and ANGIO ($p = 0.071$) or TEE and ANGIO ($p = 0.82$). Close analysis of mean results and standard deviation, however, reveals a smaller result dispersion and mean difference between TEE and ANGIO, relative to TTE. Correct device deployment and complete closure of PDA were successfully achieved in 21 dogs (87%) in group A, and in all dogs (100%) in group B. Based on these results, acceptable minimum ductal measurements may be obtained with any one of the three methods tested, but only TEE and ANGIO provide accurate ampulla ductal measurements. Finally, TEE may be used as a valid alternative to angiography in the evaluation of PDA dimensions in dogs, providing correct device size selection.

ABSTRACT #21

COMPARISON OF FLOW MEDIATED DILATION USING THE BRACHIAL OR FEMORAL ARTERY IN A POPULATION OF HEALTHY DOGS. I.D. Jones*, V. Luis Fuentes*, D. Wrigglesworth+, E. Mort+, J Elliott*. *Royal Veterinary College, University of London. U.K. +WALTHAM Centre for Pet Nutrition, Leicestershire. UK.

Brachial artery flow-mediated dilation (FMD) is the most widely used non-invasive method for measuring human vascular endothelial function. The brachial artery has been used for measuring FMD in dogs; however the femoral artery is larger and more accessible. The aim of this study was to compare brachial FMD to femoral FMD in a group of healthy dogs.

A 13 MHz linear probe was used to obtain 2D ultrasound and spectral Doppler blood flow recordings prior to and immediately after cuff occlusion of distal limb blood flow in 11 dogs habituated to the procedure. Peak luminal diameter during reactive hyperaemia was compared to baseline diameter to calculate the percentage change in diameter (FMD). Measurements were made on two occasions, one week apart.

Data are reported as median (range). Femoral artery diameter was greater [3.18 mm (2.86–3.46 mm)] than brachial diameter [1.75 mm (1.41–2.08 mm), $p < 0.05$]. Increase in flow during reactive hyperaemia was greater in the brachial versus the femoral artery [time velocity integral 159% (127–473%) vs. 13% (−37–58%), $p < 0.05$]. Brachial FMD [10.2% (6.9–16.8%)] was greater than femoral [3.4% (−3.9–8.0%), $p < 0.05$]. Brachial FMD within-dog coefficient of variation (CV) was 12.4% (9.6–36.9%) vs. femoral 54.4% (0–142.7%). Brachial FMD between-dog CV was 36.4% vs. femoral 96.7%.

Measurement of FMD in dogs using the femoral artery is feasible, but less repeatable than brachial FMD and values are not interchangeable.

ABSTRACT #22

EVALUATION OF RIGHT VENTRICULAR FUNCTION BY TISSUE DOPPLER IMAGING AND CONTRAST ECHOCARDIOGRAPHY IN BEAGLES EXPERIMENTALLY INFECTED WITH *ANGIOSTRONGYLUS VASORUM*. J.M. Matos[1], R. Bektas[2], M. Schnyder[3], M. Makara[4], A. Kutter[2], P. Deplazes[3], T. Glaus[1]. [1]Division of Cardiology, [2]Division of Anesthesiology, [3]Institute of Parasitology, [4]Division of Diagnostic Imaging, Vetsuisse Faculty, University of Zurich, Switzerland.

Dogs infected with *Angiostrongylus vasorum* develop severe pulmonary parenchymal and thrombotic vascular lesions at the time of patency due to an intense immune response to eggs and larvae. Nevertheless, reports of secondary pulmonary hypertension (PH) are scarce, and no right ventricular abnormalities are detected using conventional echo in experimentally infected dogs. The goal of this study was to evaluate right ventricular (RV) function by conventional, Tissue Doppler Imaging (TDI) and contrast echo as well as

the development of pulmonary hypertension and arterio-venous shunts during experimental infection and during therapy.

Six healthy Beagles were infected with 200 L_3 larvae. TDI (pulsed wave, RV longitudinal myocardial velocity basal segment), contrast echo with agitated saline and pulmonary transit time with SonoVue^R, as well as invasive pulmonary arterial pressure (PAP) measurement were performed pre infection (T0), once 7 to 12 weeks post infection (T1) and once during the first five days after parasiticide therapy (T2).

Tei and Tei_{TDI} indexes did not change over time. In the TDI variables analysed there was a decrease in peak myocardial velocity in systole (S_{TDI}) and an increase in time to peak systolic contraction (T_{peak}) with a median S_{TDI} of 0.130 m/s (0.123–0.194), 0.128 m/s (0.087–0.173) and 0.117 m/s (0.083–0.152), and a median T_{peak} of 0.097 ms (0.074–0.149), 0.109 ms (0.102–0.196) and 0.149 ms (0.104–0.234) at T0, T1, and T2, respectively. The E/A_{TDI} ratio decreased from T0 1.13 (0.94–1.55) to T2 0.91 (0.54–1.38). At T0 all dogs showed negative, and at T1 and T2 5 of 6 dogs showed positive contrast studies for shunts. Median pulmonary transit time was 4 beats respectively 2.3 seconds at T0 and no change was observed at T1 and T2. Invasively measured PAP slightly increased over time with median sPAP of 24, 25 and 29 mmHg and dPAP of 10, 11 and 18 mmHg, respectively. Two dogs showed mild PH at T2 (sPAP 33 and 30, and dPAP 20 and 25 mmHg); both had $E/A_{TDI} < 1$.

In conclusion, in dogs with marked pulmonary vascular disease and mild increase in PAP, effects on RV function were detectable using TDI but not conventional echo.

In face of severe pulmonary disease the majority of dogs developed intrapulmonary arterio-venous shunts in the absence of relevant PH. Parasiticidal therapy did cause an increase in PAP, but not to a clinically relevant degree.

ABSTRACT #23

EFFECT OF RESPIRATORY ACIDOSIS ON PULMONARY ARTERIAL PRESSURE IN DOGS EXPERIMENTALLY INFECTED WITH *ANGIOSTRONGYLUS VASORUM*.

M. Wenger[1], J.M. Matos[2], R.N. Bektas[3], A.P. Kutter[3], M. Schnyder[4], P. Deplazes[4], T.M. Glaus[2]. [1]Clinic for Small Animal Internal Medicine, [2]Division of Cardiology, [3]Section of Anaesthesiology, [4]Institute of Parasitology, Vetsuisse Faculty, University of Zurich, Switzerland.

Angiostrongylus (A.) vasorum infection in dogs causes severe pulmonary vascular lesions which sometimes result in pulmonary hypertension (PH). In diseases with chronic pulmonary vascular injury, a vasomotor dysfunction causing an exaggerated response to vasoconstricting agents has been postulated. Increased hydrogen ion concentration in the blood and alveolar hypoxia are two chemical stimuli for pulmonary vasoconstriction. Based on this, we hypothesised that in dogs with experimental *A. vasorum* infection and confirmed pulmonary thromboembolism, PH could be elicited or worsened by respiratory acidosis, even though we could not document relevant PH in the past.

Eight adult beagles underwent general anaesthesia between 50 to 83 days after infection (T1) with 200 *A. vasorum* L_3 larvae, as well as 1 to 5 days after treatment (T2). At these time points, arterial blood gas, and invasive measurements of systemic and pulmonary arterial pressure, pulmonary capillary wedge pressure (PCWP), central venous pressure (CVP) and cardiac output (CO) were recorded at an end-tidal CO_2 of 30 mmHg ($ETCO_2$30). The $ETCO_2$ was then increased to 50 mmHg ($ETCO_2$50) by reducing the ventilation while the oxygen saturation on the pulse oximeter was kept at $\geq$ 95%; when steady state was reached, the measurements were repeated. The pulmonary vascular resistance (PVR) at $ETCO_2$30 and $ETCO_2$50 was calculated.

The median pH was significantly lower at $ETCO_2$50 (7.25 at T1 and 7.17 at T2) than at $ETCO_2$30 (7.41 at T1 and 7.36 at T2). At T1 the mean pulmonary arterial pressure (MPAP) was 15 mmHg ($ETCO_2$30) and 17.5 mmHg ($ETCO_2$50), while at T2 it was 16.5 mmHg ($ETCO_2$30) and 20 mmHg ($ETCO_2$50). No significant changes were recorded at any time in the PaO_2, the MPAP, the mean systemic arterial pressure, the PCWP, and the CVP. The CO (l/min) was significantly higher at $ETCO_2$50 (2.90 at T1 and 2.12 at T2) compared to $ETCO_2$30 (1.81 at T1 and 1.77 at T2). The PVR ($dyn \times s/cm^5$) was 354 (T1), and 429 (T2) at $ETCO_2$30 while it was 269 (T1), and 353 (T2) at $ETCO_2$50. These changes were not significant.

Although hypercapnia has been described to increase the PVR, in our beagles the trend was towards a decrease in PVR with increasing $ETCO_2$, probably secondary to the increase in CO. In summary, although the MPAP was always higher at $ETCO_2$50 than at $ETCO_2$30 (not significant), no PH could be elicited by respiratory acidosis in our beagles.

ABSTRACT #24

COMPUTED TOMOGRAPHIC CHARACTERIZATION OF PULMONARY LESIONS IN BEAGLES EXPERIMENTALLY INFECTED WITH *ANGIOSTRONGYLUS VASORUM*.

M. Dennler[1], M. Makara[1], A. Kranjc[2], M. Schnyder[3], P. Deplazes[3], Stephanie Ohlerth[1], T. Glaus[2]. [1]Divisions of Diagnostic Imaging and [2]Cardiology, [3]Institute of Parasitology, Vetsuisse Faculty, University of Zurich, Switzerland.

Dogs infected with *A. vasorum* develop severe pulmonary lesions due to an intense immune response to eggs and larvae. These inflammatory, hemorrhagic and thrombotic lesions translate into various degrees of radiological changes, typically a broncho-alveolar pattern with multifocal and/or peripheral distribution, sometimes mild pleural effusion and pneumothorax. Arterial thrombosis, however, is only rarely documented. Computed tomography (CT) is receiving increasing attention for thoracic imaging in small animal medicine. The cross-sectional image eliminates superimposition enabling superior evaluation of pulmonary structures, and post contrast CT should be useful to identify thrombosis. The aim of the present study was to characterize by pre and post contrast CT the thoracic, pulmonary parenchymal and vascular changes in 6 Beagles experimentally infected with L_3 larvae.

A first CT was done 13 weeks post infection (wpi) in all, and a second 9 weeks after treatment (wpt) in 4 dogs. CareDose was used to choose mA automatically as low as possible. Scanning parameters were 120 kV and a pitch of 1.2. Rotation time was 1 second. The images were reconstructed in 1.5 mm slices. The post contrast scan was done 20 seconds after administration of Telebrix®35 (2.5 ml/s, 2 ml/kg BW).

At 13 wpi, severe consolidations with airbronchograms, large nodules and extensive areas of ground glass opacifications were found in the periphery of all lung lobes. Bronchi and lymph nodes were normal. Mild pleural effusion was found in five dogs. Post contrast CT revealed abruptly stopping vessels. At 9 wpt the consolidations, large nodules, pleural effusion and vascular abnormalities had resolved. Mild interstitial opacifications, subpleural interstitial thickening, subpleural lines and interface signs could still be observed, independent of the severity of the infection. In the very periphery of the airways slight bronchial dilatation could now be identified.

In conclusion, experimental *A. vasorum* infection induces marked pulmonary changes that are mostly reversible after treatment. CT allows a much better and more exact judgment of lesion distribution and severity, as well as identification of vessels suspicious for thrombosis. Nevertheless, our image quality using CareDose is not considered optimal and post contrast CT does not fulfill the requirements for angio CT. Additional studies are necessary to optimize the imaging protocols and to establish objective schemes to quantify pulmonary changes and bronchial and vascular sizes.

ABSTRACT #25

PRIMARY HYPERFIBRINOLYSIS IN DOGS WITH ASCITES DUE TO RIGHT-SIDED CONGESTIVE HEART FAILURE.

A. Zoia[1], M. Augusto[2], M. Drigo[3] and M. Caldin[4]. [1]UCD School of Agriculture, Food Science and Veterinary Medicine, Dublin, Ireland; [2]Faculty of Veterinary Medicine, Glasgow University, UK; [3]Sanità Pubblica Veterinaria, Padua University, Italy; [4]San Marco Veterinary Clinic, Padua, Italy.

Primary Hyperfibrinolysis (PHF) occurs independently of intravascular activation of the coagulative process and can lead to spontaneous bleeding. It is associated with generation of plasmin/plasmin-like enzymes without concurrent thrombin production. It causes degradation of fibrinogen and soluble fibrin with production of FDPs and prolongation of PT and APPT. D-dimers are not produced and consequently increased FDPs and reference range D-dimers have been suggested as a strong indicator of PHF. Based upon the identification of a bleeding tendency in one dog with

ascites secondary to right-sided congestive heart failure (CHF) and a coagulation profile consistent with PHF, a study was carried out to ascertain if PHF is commonly present in dogs with right-sided CHF. A search of the medical record database (2005–2008) of the "San Marco" Veterinary Clinic identified 20 dogs (Group 1) affected only by ascites secondary to cardiac diseases. Two control populations were also selected. Group 2 included 40 age-, sex- and breed-matched sick dogs, but without cardiac diseases extracted randomly from the medical record database. Group 3 included 20 dogs with left sided-CHF. APTT, PT, fibrinogen, FDPs, D-dimers and platelet count were measured using commercial available assays validated in dogs (Laboratorio d'Analisi Veterinarie "San Marco", Italy). Significant differences in liver function between the three groups were ruled out by urinary bile acids normalized to urine creatinine. Differences between the 3 groups were analyzed using ANOVA (Least Square Difference for comparison between groups) or Mann-Whitney test. Categorical variables were analyzed with Pearson Chi-Square test. FDPs were significantly increased in Group 1 ($\chi^2 = 47.077$; $p < 0.001$). APTT and PT were significantly increased in Group 1 compared to Group 2 ($U = 85.5$, $p < 0.001$; $U = 129.5$, $p < 0.001$) and to group 3 ($U = 73.00$, $p < 0.001$; $U = 18.5$, $p < 0.001$). Fibrinogen was significantly decreased in Group 1 compared to Groups 2 ($U = 109,5$; $p < 0,001$) and 3 ($U = 41,5$; $p < 0,001$). D-dimers were significantly lower in group 3 compared to group 1 ($U = 123$; $p = 0.034$) and to group 2 ($U = 278.5$, $p = 0.045$). Platelet count was significantly higher ($F = 4.28$; $p < 0.017$) in group 3 compared to group 1 and to group 2. Increased FDPs and reference range D-dimers were present in Group 1 in 18/20 cases, 9 of which had concurrent decreased fibrinogen concentration and 3 of which had clinical evidence of bleeding. Only 10/60 of group 2 and 3 combined dogs had increased FDPs and reference range D-dimers, but none had a decreased fibrinogen concentration or clinical bleeding. The results of this study support that PHF occurs in dogs particularly in those with right-sided CHF and can be associated with a bleeding tendency.

ABSTRACT #26

PULMONARY BLOOD FLOW INCREASE IN NATURALLY OCCURRING CHRONIC MITRAL VALVE REGURGITATION.

A.S. Eriksson[1,3], P.F. Lord[2], K. Hansson[2], J. Häggström[2], A-K. Järvinen[3]. [1]Minerva Institute for Medical Research, Helsinki, Finland, [2]Dept of Clin Sci, Swedish University of Agricultural Sciences, Uppsala, Sweden. [3]Dept of Clin Sci, Faculty of Veterinary Medicine, Helsinki University, Finland.

Congestive heart failure (CHF) caused by chronic mitral regurgitation (MR) is common in dogs. Signs of CHF can be identified on thoracic radiographs as venous congestion and pulmonary edema. These findings suggest an increase in pulmonary blood volume (PBV). However, to date no studies have measured PBV in MR. PBV can be calculated from previously validated formulas: PBV = nPTT x SV, where SV is (forward) stroke volume and nPTT is pulmonary transit time normalized for heart rate The objective, therefore, was to evaluate the relationships of PBV, SV and blood pulmonary transit time in dogs with chronic MR.

Thirty-three privately owned Cavalier King Charles spaniels underwent first-pass radionuclide angiocardiography (FPRNA), thoracic radiography and echocardiography. Normalized left ventricular end diastolic (nLVEDd) and systolic (nLVEDs) diameters, and aortic cardiac output (CO) were measured by echocardiography. Ventricular diameters were measured in M-mode and cardiac output from aortic Doppler flow. Cardiac output was calculated using the validated formula CO = A x VTI x HR, where A is the cross-sectional area of the aortic root, VTI is Doppler velocity time (flow) integral, and HR is heart rate. Forward SV is calculated as CO over heart rate. Pulmonary transit time was measured from the FPRNA and electrocardiogram. PBV was calculated from the above formulae and indexed to body surface area (PBVI).

Mean PBVI was 34 ml/m^2 for normal dogs, 29 ml/m^2 in dogs with MR and normal heart size, 38 ml/m^2 in dogs with MR with cardiomegaly but without CHF, 57 ml/m^2 in dogs with MR and CHF, and 93 ml/m^2 in dogs with MR and refractory CHF ($P < 0.0001$, for whole model). Dogs in failure had a mean PBVI of 61.9 vs 34.9 ml/m^2 for dogs not in failure ($P < 0.0001$). Dogs with cardiomegaly had a higher PBVI than dogs with a normal nLVEDd (50 ml/m^2 and 32 ml/m^2, respectively; $P = 0.0017$). Regression analyses indicated that nPTT not stroke volume, is the predictor of PBV ($R^2 = 0.81$, $P < 0.0001$ and $R^2 = 0.03$, $P = 0.97$, respectively).

This study shows that increase in nPTT caused by MR is a key factor for increased PBV. Forward SV remains comparably stable while total SV increases.

ABSTRACT #27

ECHOCARDIOGAPHICAL ESTIMATION OF PULMONARY TRANSIT TIME (PTT, N-PTT) IN DOGS USING THE ECHOCARDIOGRAPHIC CONTRAST MEDIA SONOVUE®.

J.G. Kresken[1], R.T. Wendt[2], J. Häggström[3]. [1]Clinic for Small Animals Kaiserberg, Duisburg, Germany, [2]Referral centre for Cardiology and Ophthalmology Wetzlar, Germany, [3]Department of Small Animal Medicine and Surgery, Faculty of Veterinary Medicine, Swedish University of Agricultural Science, Uppsala, Sweden.

Pulmonary transit time (PTT) is an index of cardiac performance and is the time required for a unit of blood to pass through the lung circulation. PTT is usually normalized for heart rate (nPTT) according to the formula nPTT = PTT/mRR, where mRR is the mean RR interval duration. The nPTT is equal to the number of stroke volumes that the pulmonary vascular bed holds at any given moment and it is a measurement which is unaffected by heart rate and body size, but changes with reduced cardiac pump function. Previous studies have measured nPTT using other methods and report a normal range of 3.6–5.3 in dogs. The objective of the present study was to measure the PTT and nPTT in normal dogs using the echocardiographic bloodpool contrast media SonoVue®, which is able to transit the lungs, and to assess if reference points for measurement influence PTT and nPTT.

A 0.015–0.03 ml/kg bolus dose of SonoVue® followed by 5 ml saline was administered into the cephalic vein in 35 normal dogs of different breeds and sizes (range 3–50 kg). Two methods were used to measure PTT echocardiographically under ECG monitoring: in 21 dogs, contrast transit time from the pulmonary artery to left atrium in the right parasternal short axis view (PA-LA), in 14 dogs, contrast transit time from the tricuspid to the mitral valve in the left apical 4 chamber view (TV-MV). Statistical methods include Kruskal-Wallis test and linear regression analysis. Values are reported as median and interquartile range IQR. Level of significance was set at $P < 0.05$.

Dogs examined using the PA- LA method ($n = 21$) had a heart rate of 114 (111–124) BPM, PTT was 2.3 (2.2–2.6) sec, and nPTT was 4.3 (4.1–4.5). Dogs examined using the TV-MV method ($n = 14$ dogs) had a heart rate of 103 (100–108) BPM, PTT was: 3.0 (2.7–3.3) sec and nPTT was 5.2 (5.0–5.4). The PTT and nPTT was significantly higher in the TV-MV group ($P < 0.001$). No effect of age, gender, body weight or heart rate on nPTT could be identified. No adverse side reaction to the contrast media was observed.

Values of nPPT in normal dogs in this study are similar to those previously reported, which indicates that nPPT may be estimated under clinical conditions using SonoVue® and echocardiography. Reference points for measurement influence the estimates of PTT and nPTT.

ABSTRACT #28

RAMIPRIL AS A FIRST LINE MONOTHERAPY FOR THE CONTROL OF FELINE HYPERTENSION AND ASSOCIATED CLINICAL SIGNS.

N. Van Israël[1], P.O. Desmoulins[2], B. Huyghe[2], S. Burgaud[2], L.J.I. Horspool[3]. [1]ACAPULCO (Animal CardioPulmonary Consultancy), Masta, Belgium, [2]Intervet Pharma R&D, Beaucouzé, France, and [3]Intervet International, Boxmeer, The Netherlands.

Systemic hypertension (idiopathic or secondary to another condition e.g. hyperthyroidism) is common in old cats. Left untreated, it leads to target organ damage (TOD) such as blindness or decreased renal function. Hypertension is currently staged according to systolic blood pressure (SBP) and future risk of TOD from category I (SBP < 150 mm Hg, minimal risk) to IV (SBP ≥ 180 mm Hg, severe risk). This clinical trial addressed the efficacy and safety of the vasodilator ramipril for the reduction of elevated blood pressure and the control of associated clinical signs in cats.

Seventy-six client-owned cats with SBP ranging from 160 to 230 mm Hg (measured by Doppler) were enrolled of which 64 completed the trial. The cats were started on ramipril treatment orally at

a dose of 0.125 mg/kg once daily. In cats where SBP was still above 160 mm Hg on day 14 the dose was increased to 0.25 mg ramipril/kg once daily up to the end of the trial (day 63). Clinical signs, SBP and clinical chemistry were monitored in each cat on day 0, 14, 28 and day 63. Changes in SBP, risk category and clinical signs were analysed using parametric (ANOVA) or non-parametric (logistic regression) analysis for repeated measurements with time as the main factor. Post-hoc multiple comparison tests were run as appropriate.

SBP rapidly declined over time ($p = 0.0001$). At the end of the trial, there was a decrease in SBP of 20 mm Hg or more in 62% of the cats. Of these cats, 69% had had a final SBP below 160 mm Hg. In addition, 57% of the cats ended up in a lower TOD risk category on day 63: 75% of cats initially in risk category III were in risk category I (55%) or II (20%). Similarly, 48% of cats initially in risk category IV ended up in risk category III (16%), II (9%) or I (23%) ($p = 0.0508$). The proportion of cats with clinical signs decreased from 82% (inclusion) to 68%, 63% and 54% on days 14, 28 and 63, respectively ($p < 0.0001$). This improvement was similar irrespective of the risk category (III or IV) at inclusion ($p = 0.6300$). Treatment was well tolerated even after dose increase (62% of cats). The only treatment-related adverse effect reported was acute decompensation of pre-existing kidney disease in one cat.

To our knowledge, this is the first prospective clinical trial using ramipril as a first line monotherapy for the management of feline hypertension. The present study demonstrates that ramipril at dose rates starting from 0.125 mg/kg once daily effectively and safely reduces SBP and associated clinical signs in cats with SBP up to 230 mm Hg.

ABSTRACT #29

ASSOCIATION BETWEEN CARDIAC MURMURS AND LEFT VENTRICULAR HYPERTROPHY IN 199 HEALTHY ADULT CATS.

T. Wagner, V. Luis Fuentes, N. McDermott, R. Payne. Queen Mother Hospital for Animals, Royal Veterinary College, University of London, United Kingdom.

The relationship between feline heart murmurs and left ventricular hypertrophy (LVH) has not been reported in apparently healthy adult cats. The goal of this pilot study was to screen adult healthy shelter cats using auscultation and echocardiography (echo).

Methods: Cats in 4 shelters were screened by auscultation (VLF & TW) and echo (VLF). Inclusion criteria were age > 6 months and no known systemic disease. 57 cats were auscultated by both observers on consecutive days. Echo without sedation was attempted in cats with murmurs only for the first 140 cats, and in all 60 subsequent cats. LVH was defined as maximal diastolic left ventricular (LV) wall thickness ≥ 6 mm with M-mode or two-dimensional echocardiography.

Results: Of 199 cats auscultated, 67 cats (34%) had a murmur on at least one occasion. There was only moderate agreement (kappa 0.47) on presence of a murmur between observers. 63 cats with murmurs and 30 cats without murmurs underwent both auscultation and echo. LVH was present in 31/62 (50%) of cats with a murmur, but present only in 7/55 (25%) of cats with low intensity murmurs (≤ 2/6). 26/31 of cats (84%) without a murmur were normal on echo compared to only 31/62 cats (50%) that had a murmur (p 0.002). **Conclusion:** Heart murmurs are common in the general cat population, and frequently unassociated with LVH.

ABSTRACT #30

A CROSS SECTIONAL STUDY OF 140 CATS TO EVALUATE THE CARDIAC TROPONIN I ASSAY IN THE DIAGNOSIS AND STAGING OF HEART DISEASE IN GENERAL PRACTICE.

S.G.W. Smith[1], J. Dukes-McEwan[2]. [1]The Old Vicarage, Sutton on the Hill, Derbyshire, U.K. [2]University of Liverpool Small Animal Teaching Hospital, UK

Cardiac Troponin I (cTnI) is a sensitive and specific marker of myocardial damage in cats, and being stable in serum and plasma at room temperature for up to 5 days, provides an opportunity for analysis to assist diagnosis in general practice. Human assays accurately analyse feline cTnI and commercially available tests are inexpensive. Non-cardiac causes of myocardial damage may cause elevation of cTnI levels, and cardiac disease that does not lead to myocyte death may not elevate levels. This study assesses cTnI levels in a heterogeneous population of cats with cardiac or respiratory disease. All cats were privately owned and presented in the normal course of general practice work. Thorough clinical examination, routine blood screening and diagnostic tests including blood pressure, ECG, full echocardiography and radiology enabled definitive diagnosis and scoring of heart failure. Results analysed by ANOVA on Ranks (Kruskal-Wallis) and rank sum tests (Mann-Whitney) identified significant differences between disease groups and heart failure classes. Regression analysis investigated correlation between cTnI and Urea, Creatinine and T4. ROC analysis was performed to evaluate sensitivity, specificity and accuracy of the cTnI test in three situations: to identify severe heart failure, to identify heart disease and to distinguish cats with cardiogenic dyspnoea ($n = 52$) from those with dyspnoea due to respiratory disease ($n = 29$).

Significant differences ($p = < 0.05$) were found between the most severe heart failure class and all other classes, and between the moderately severe class and the normal group. There was also significant difference between cats with cardiomyopathy and both normal cats and cats with congenital heart disease. There was weak correlation with urea ($p = 0.01$, R 0.256) and creatinine ($p = < 0.001$, R 0.352), but no correlation with T4. In all three diagnostic test situations there were significant differences ($p = < 0.001$) between positive and negative groups with respect to cTnI levels. ROC analysis showed reasonable accuracy of the cTnI test in all three situations, with areas under curve being 0.81, 0.72 and 0.78, with sensitivity 78%, 69% and 74% and specificity 78%, 57% and 68% respectively. Cut off levels obtained were comparable with those from commercial laboratories: 0.19 ng/ml, 0.13ng/ml and 0.15 ng/ml. The study suggests that cTnI may be useful to aid diagnosis of heart failure and disease in cats in general practice, and to assist the distinction of cats with cardiogenic dyspnoea from those with dyspnoea due to respiratory disease.

ABSTRACT #31

PREVALENCE OF DILATED CARDIOMYOPATHY IN DOBERMAN PINSCHERS IN VARIOUS AGE GROUPS.

G. Wess, A. Schulze, V. Butz, J. Maeurer, K. Hartmann. Clinic of Small Animal Internal Medicine, LMU University of Munich, Germany.

Dilated cardiomyopathy (DCM) in Doberman pinschers is an autosomal dominant inherited disease. It is characterized by a protracted, slowly progressive occult phase during which first ventricular and occasionally atrial premature contractions appear, followed by progressive left ventricular dysfunction and more severe ventricular tachyarrhythmias. The incidence of sudden death, caused by ventricular tachycardia fibrillation, during the occult phase of the disease is at least 30%. Diagnosis of the occult phase is based upon detection of more than 100 VPCs in a 24-hour ECG (Holter). The prevalence of DCM in Doberman Pinschers in Europe in various age groups is currently unknown, but this information is necessary to develop useful recommendations for screening programs. The purpose of this study therefore was to evaluate the prevalence of Doberman cardiomyopathy in various age groups in a prospective study.

A total of 456 examinations from 372 Doberman pinschers (57,5% female, 41,9% male) were included. Each dog was assessed by a 5-minute ECG, Holter examination, and echocardiography at each visit. Each dog was only once evaluated in each age group. A cut-off value of > 100 VPCs/24-hours on Holter examination and/or abnormal echocardiography were considered diagnostic for cardiomyopathy. The cumulative incidence included all dogs with DCM, independent of when the disease developed, and healthy dogs over 8 years (as the chance is low that a healthy dog at that age will develop the disease).

The cumulative incidence of Doberman pinscher cardiomyopathy was 63%. Prevalence in various age groups was as follows:

Age group 1– < 2 years: 3,9%
Age group 2– < 4 years: 15,5%
Age group 4– < 6 years: 18,3%
Age group 6– < 8 years: 46,8%
Age group > 8 years: 50,7%

This study shows that the prevalence of Doberman cardiomyopathy is very high in Europe. Many of the dogs in this study were in the occult phase of the disease and would have been missed without thorough screening. Those dogs, however, have a high risk to die suddenly without treatment. Yearly screening for DCM using Holter examination and echocardiography is recommend in this breed, starting at an age of 2 years.

ABSTRACT #32

CONGENITAL SUBAORTIC STENOSIS AND TRICUSPID VALVE DYSPLASIAS IN A COHORT OF 13 DOGUE DE BORDEAUX DOGS IN ISRAEL. D.G. Ohad[1], A. Avrahami[1], L. David[2]. [1]The Koret School of Veterinary Medicine, the Robert H. Smith Faculty of Agriculture, Food and Environment of the Hebrew University of Jerusalem, Rehovot, Israel. [2]Department of Animal Sciences, the Robert H. Smith Faculty of Agriculture, Food and Environment of the Hebrew University of Jerusalem, Rehovot, Israel.

The Dogue de Bordeaux (DdB) breed has historically gone through several bottle neck effects and its population is relatively small. Furthermore, Israel's basis for importing new DdB breeding animals is limited to only a handful of European breeders, further compromising the already limited local gene pool. These circumstances likely promote frequent, unaccounted for inbreeding. It is therefore quite possible that inherited congenital defects in the local DdB population are particularly prevalent. Twenty one DdB dogs have been diagnosed with subaortic stenosis (SAS) and/or tricuspid valve dysplasia (TVD) between 2004 and 2007, reflecting an overrepresentation relative to DdB dogs presenting to our hospital over that same period of time with non-cardiac pathologies. The aim of this study was to identify a probable mode of inheritance of congenital cardiac disease in the local DdB population using pedigree analyses. Assuming that a mutation in at least one candidate gene may trigger SAS and/or TVD, we also performed a comprehensive literature search to identify potential candidate genes that can be involved in canine cardiomorphogenesis. The most probable mode of inheritance appeared to be autosomal recessive. Thirteen patients with a valid pedigree documentation descended from at least one of 3 registered sires. Thus, pedigree analyses helped identify specific ancestors which directly introduced these two genetic defects to the Israeli DdB population. This information can be used to 1) recommend which individual dogs should be avoided for breeding purposes and 2) recommend which offspring dogs are potential carriers or actually affected and should be directly screened, accordingly, for cardiovascular defects that may exclude them from further breeding. These two activities may reduce the frequency of congenital SAS and/or TVD in the local DdB population. A literature search revealed several genes that were postulated as contributing to normal cardiomorphogenesis. The NKX2-5 and GATA4 genes appeared as potentially important role players in the pathogenesis of SAS, TVD, and/or other congenital heart defects. As evidence of involvement of genes in congenital heart disease is rapidly accumulating, future use of DNA samples from these as well as from prospective DdB patients may assist in identifying genetic differences between control and sick DdB dogs. A key factor for fruitful future research in this field is tight collaboration and cooperation between owners, breeders, clinicians, and molecular biologists.

ABSTRACT #33

ECHOCARDIOGRAPHIC EVALUATION OF MATERNAL CARDIAC FUNCTION IN THE SAINT BERNARD DOG. L. Lobo[1], L. Salazar[1,2], P. Oliveira[3], A. Pereira[1], A.P. Fontes-Sousa[2,4]. [1]Hospital Veterinário do Porto, Porto, Portugal; [2]Department of Veterinary Sciences, University of Trás-os-Montes e Alto Douro (UTAD), Vila Real, Portugal; [3]Clínica Veterinária Gran Sasso, Milan, Italy; [4]Current Address: Laboratory of Pharmacology and Neurobiology-UMIB, Institute of Biomedical Sciences Abel Salazar, University of Porto (ICBAS-UP), Porto, Portugal.

Echocardiographic changes during normal pregnancy are well documented in women. In contrast, sparse information is available regarding cardiac function during pregnancy in dogs. In the present study, an echocardiographic examination (2D, M-mode, Doppler and TDI) was carried out in 7 healthy pregnant female Saint Bernard dog, three times during their pregnancy (21–28th, 40th and 60th days) and one time 4–8 weeks postpartum. The exam was performed from right and left parasternal location, using an ultrasound unit equipped with a variable-frequency (3.5–7.5 MHz) phased-array transducer, and a simultaneous 1-lead ECG was obtained during all measurements. Three to five representative cycles were measured and averaged for each animal.

Heart rate increased maximally at day 60th, and cardiac output also increased significantly at late-pregnancy. Hypertension was observed throughout pregnancy, reaching a maximum in early-pregnancy (day 21–28th). Compared with postpartum values, at day 40th there was an increase in left ventricle (LV) end-systolic diameter (8%), and a decrease of fractional shortening (14%) and ejection fraction (6%). Both transmitral E and A velocities decreased at day 21–28th of pregnancy (14% and 17%, respectively) and increased until the end of pregnancy to values similar to postpartum. No differences were observed between E/A ratio during pregnancy and postpartum. Systolic function assessed by TDI S' velocity was unaltered at the septal margin and increased at the lateral margin (day 60th), as compared with postpartum evaluation. Diastolic function assessed by TDI A' velocity increased during pregnancy at the septal and lateral margins of mitral annulus, resulting in a decrease of E′/A′, especially at day 60th.

Pregnancy, a chronic, natural volume-overload state, has important effects on hemodynamic and echocardiographic variables. In the present work we demonstrated an increase of blood pressure, a decrease of LV systolic function during mid-pregnancy, an increase of cardiac output during late-pregnancy, and a decline throughout pregnancy of diastolic function, as demonstrated by TDI A′ velocity. This study gives normal ranges for several echocardiographic indices in pregnant Saint Bernard dogs, although it deserves further investigation with a larger and heterogeneous sample.

ABSTRACT #34

HIGH MAXIMUM HEART RATE IN DOGS WITH SYNCOPE AND HEART FAILURE CAUSED BY MYXOMATOUS MITRAL VALVE DISEASE. C.E. Rasmussen[1], T. Falk[1], A. Domanjko-Petrič[2], M. Schaldemose[1], J. Häggström[3], H.D. Pedersen[4], S.G. Moesgaard[1] and L.H. Olsen[1]. [1]Department of Basic Animal and Veterinary Sciences, University of Copenhagen, Frederiksberg, Denmark, [2]Clinic for Small Animal Medicine and Surgery, University of Ljubljana, Ljubljana, Slovenia, [3]Department of Physiology, Swedish University of Agricultural sciences, Uppsala, Sweden, [4]Zealand Pharma, Glostrup, Denmark.

Syncope is a cerebral hypoperfusion, which results in temporary collapse or loss of consciousness. Syncope can be seen in both humans and dogs with congestive heart failure (CHF) due to structural heart disease. In these patients, syncope may be a sign of poor prognosis. It is unknown why some dogs in CHF due to myxomatous mitral valve disease (MMVD) develop syncope while others do not. The aim of this study was to examine 24-hour electrocardiographic (ECG) (Holter) characteristics of dogs with and without syncope but with CHF due to MMVD. The study included 31 privately owned dogs of different breeds in CHF caused by MMVD. Owners had noted episodes of syncope in ten dogs. Twenty-five dogs were in CHF therapy. The case history was ascertained and dogs were subjected to clinical examination, Holter monitoring and echocardiography. Arrhythmia analyses were preformed under blinded conditions using Pathfinder digital Holter analysis system with manual review and editing. Three dogs had syncope during the Holter recording. Two dogs had no remarkable ECG changes during the syncopal episode, but the third dog had asystole for 11.3 seconds followed by ventricular escape rhythm. No difference was found between dogs with syncope and dogs without syncope in number of isolated ventricular premature contractions, R on Ts, couplets, triplets, salvos, ventricular tachycardia, atrioventricular blocks, atrial premature complexes, atrial fibrillation, supraventricular tachycardia, bradycardia or sinus pauses. Heart rate (HR) measured at the beginning of the clinical examination was significantly higher in dogs with syncope (172.5 $\pm$ 12.5 beats pr. minute (bpm)) compared to dogs without syncope (134.5 $\pm$ 3.9 bpm) (P = 0.001). Dogs with syncope also had a significantly higher maximum HR (205.5 $\pm$ 4.5 bpm) during the Holter recording compared to dogs without syncope (191.0 $\pm$ 3.5 bpm) (P = 0.026). Otherwise, no statistical differences were found between the two groups. In conclusion, it seems unlikely that syncope in dogs with MMVD and CHF is frequently caused by arrhythmias, because this was not a consistent finding and only observed in one of the three dogs with syncope during the Holter recording. The study shows that dogs with syncope have higher maximum HR than dogs without syncope.

ABSTRACT #35

EXTERNAL CARDIAC EVENT RECORDER (R-TEST)—A USEFUL TOOL IN THE DIAGNOSIS OF NEUROCARDIOGENIC SYNCOPE IN THE DOG. M. Perego[1], N. Noomanová[1], R. A. Santilli[1]. [1]Clinica Veterinaria Malpensa, Samarate (VA), Italy.

Vasovagal syncope is the most frequent cause of fainting in human patients. It is self-limiting episode of loss of consciousness characterized by cardio-inhibition and/ or vaso-depression leading to bradycardia and hypotension, respectively. There are only few reports on this condition in dogs and its prevalence in small animals is unknown. Dynamic monitoring of blood pressure and tilt testing are not applicable in dogs, thus long-term cardiac rhythm recording can be the only way of evaluating neurocardiogenic syncope in this species. External cardiac event recording (R-test) is an effective device allowing extended monitoring of cardiac rhythm with usual duration of 7–10 days.

The aim of this study was to evaluate retrospectively the clinical utility of R-test in the diagnosis of increased vagal tone with cardio-inhibitory component in the dog.

Event recorder was applied in 61 dogs suffering from syncope (n = 38), and episodic weakness (n = 23). Owners manually activated all recorders when event appeared, or loops were saved automatically when pre-established arrhythmia occurred.

Increased vagal tone was identified in 15 dogs of different breeds. Nine dogs were males, 6 were females. The median age and body weight was 9.0 years and 5.0 kg, respectively. Fainting occurred in 7/15 dogs after coughing episode (n = 2), during the physical activity (n = 1), and the emotional stress (n = 1), after changing of the body position (n = 1), and during the unknown condition (n = 2). Increased vagal tone caused general weakness without loss of consciousness in 2 dogs (proceded by coughing in 1 case), and was not clinically evident in remaining 6 dogs. Maximum asystolic pause duration with no obvious symptoms was 8.52 sec.

Increased vagal tone was characterized by asystolic pauses with a mean duration of 5.7 ± 2.5 sec (range 3.0–10.0 sec) proceeded by sinus tachycardia (n = 9), sinus bradycardia (n = 3), and atrial fibrillation (n = 2). In one case, a paroxysmal atrioventricular block with an atrial rate of 50 bpm was noted during asystole. Asystolic pauses were followed by sinus rhythm (n = 5), sinus tachycardia (n = 4), ventricular escape beats (n = 5), or junctional escape beats (n = 1).

Despite the small sample of our study, occurrence of neurocardiogenic episodes during recording was relatively high. Seven out of 10 syncopal episodes experienced during registration were vasovagal and 50% of diagnostic recordings detected a vasovagal response. These events were not addressed in any of previous studies on R-test in the dog.

According to our results external cardiac event recorder can be considered a valid tool in the diagnosis of syncope and episodic weakness of neurocardiogenic origin in the dog.

ABSTRACT #36

THREE-DIMENSIONAL ECHOCARDIOGRAPHY: ASSESSMENT OF LEFT VENTRICULAR VOLUMES AND SYNCHRONY IN DOGS WITH AND WITHOUT HEART DISEASE. A. Tidholm[1], A. Bodegård-Westling[1], K. Höglund[2], I. Ljungvall[3], J. Häggström[3]. [1]Albano Animal Hospital, Danderyd, Sweden. [2]Dept. of Anatomy, Physiology and Biochemistry, and [3]Dept. of Clinical Sciences, Faculty of Veterinary Medicine, Swedish University of Agricultural Sciences, Uppsala, Sweden.

Forty-four dogs of 23 different breeds were examined with 2D and real-time three-dimensional (RT3D) echocardiography. Left ventricular (LV) end-diastolic (EDV) and end-systolic (ESV) volume and ejection fraction (EF) were determined using RT3D and 2D (Simpson's method). Dyssynchrony index (16-SD%) was determined for 16 LV segments using RT3D estimation of the time from end of diastole to minimal systolic volume for each segment, expressed as % R-R interval to account for differences in heart rate. Statistical analysis include Wilcoxon sign rank test, Kruskal-Wallis test and linear regression. Values are expressed as median and interquartile ranges (IQR).

According to findings on physical examination and 2D/Doppler echocardiography, dogs were classified with heart disease (n = 20; 16 MMVD, 4 DCM) or without heart disease (n = 24). Eight dogs were receiving heart failure therapy. There were 26 females and 18 males. Age ranged from 8 weeks to 12.5 years (7 years, IQR 2.4–9). Body weight ranged from 4.5 to 60.5 kg (12.5 kg, IQR 9.4–23.5). Heart rate ranged from 61 to 188 beats per minute (118 beats per minute, IQR 95–147). The R-R interval ranged from 319 to 984 ms (510 ms, IQR 410–630). There were no statistically significant differences between groups concerning breed, gender, body weight or heart rate. Median age was significantly higher ($P < 0.0001$) in dogs with heart disease compared to dogs without heart disease, 9 (IQR: 7.3–11.6) and 2.8 (IQR: 0.3–6.59) years, respectively. RT3D EDV ranged from 0.9 to 4.4 ml/kg (median 1.73 ml/kg), ESV ranged from 0.3 to 2.1 ml/kg (median 0.8 ml/kg). RT3D-EF ranged from 40 to 75.6% (median 63%) and 2D-EF ranged from 31 to 80% (median 63%). Overall, there were no significant differences between RT3D and 2D estimations of LV systolic volumes and EF. Dogs with heart disease had significantly higher RT3D and 2D EDV volumes per body weight ($P < 0.05$), but estimates of ESD volumes and EF were not different between the groups. Dyssynchrony index, 16-SD%, ranged from 0.5 to 5.8 (median 2.2; IQR 1.5–3.3), and there was no statistically significant difference between dogs with and without heart disease.

Conclusions: Assessment of LV volumes using RT3D showed good agreement with 2D methods. Dyssynchrony index did not reveal any significant differences between dogs with and without heart disease.

ABSTRACT #37

APPLICATIONS OF REAL TIME THREE-DIMENTIONAL ECHOCARDIOGRAPHY IN DOGS AND CATS WITH CONGENITAL HEART DISEASE. J.S. Orvalho[1], S.J. Miller[2]. [1]Veterinary Medical Center - San Diego, University of California, San Diego, USA; [2]Advanced Veterinary Care Center, Lawndale, California, USA.

Real time three-dimensional echocardiography (RT3DE) is a new ultrasound modality that has been shown to yield comprehensive views of cardiac valves and congenital heart defects. This technique potentially provides a more accurate echocardiographic means of evaluating cardiac chamber volumes and a more precise pre and postoperative tool.

Real time three-dimensional echocardiography was used in combination with the previously established 2D echocardiographic standard imaging protocol to diagnose and evaluate congenital heart disease in dogs and cats, before and after transvascular intervention, surgery or medical therapy. Specific defects evaluated over a twelve month period were patent ductus arteriosus, infundibular and valvular pulmonic stenosis, cor triatriatum dexter, peritoneal-pericardial diaphragmatic hernia, and other complex congenital heart defects. All 3D images were obtained with a Phillips IE33 cardiac ultrasound system using a 3–1 MHz or a 7–2 MHz xMATRIX probe. Standard cardiac 5–1 MHz, 8–3 MHz and 12–4 MHz sector array probes were used to acquire 2D images. Echocardiographic studies were then transferred to a Phillips Xcelera workstation.

Diagnostic images were obtained in all examined patients. RT3DE provided additional views, detailed images of cardiac structures, and possibly more precise measurements when compared to those obtained with 2D echo. Repeatable artifacts occurred with patient movement and respiratory excursions, due to the inability to completely restrain patients and control respiratory patterns in awake animals. A smaller probe footprint and enhanced technology eliminated some of the previously documented problems with this technique.

This study demonstrated that RT3DE was a useful modality that aided in the diagnosis, treatment planning and follow up care in this group of animals with congenital heart disease. Real time three-dimensional echocardiography may eventually be used as part of the standard imaging protocol in similar cases.

ABSTRACT #37a

ENDOCARDIAL MAPPING OF FOCAL ATRIAL TACHYCARDIA IN THE DOG. R.A. Santilli[1], M. Perego[1], P. Moretti[2], G. Spadacini[2]. [1]Clinica Veterinaria Malpensa, Samarate, Varese, Italy, [2]Istituto Clinico Mater Domini – Castellanza, Varese, Italy.

Focal atrial tachycardias (FAT) are narrow QRS complex tachycardias characterized by regular atrial activation from atrial

areas with centrifugal spread. In people FATs tend to cluster over certain anatomical sites within the right and the left atrial chambers (crista terminalis, tricuspid annulus, Koch's triangle, coronary sinus, mitral annulus, right and left interatrial septum, right and left appendages) and venous structures (coronary sinus, venae cave and pulmonary veins). Since to the best of our knowledge no clinical studies described the anatomical distribution of ectopic foci in dog with FAT, it was the aim of the study to report the electrophysiologic (EP) findings of detailed endocardial mapping of 18 FATs in 16 dogs.

Eighteen dogs of different breeds were referred for an EP evaluation because of the occurrence of narrow QRS complex tachycardia (14/18) and persistent atrial fibrillation (AF) (4/18). Fifteen out of 18 dogs were males, with a median age of 51 months, and a mean weight of 36,15 ± 19,72. Each dog underwent an EP study under general anaesthesia with the technique previously described. Transeptal puncture was performed to map left atrial wall and pulmonary veins. Focal ATs were induced under isoproterenol infusion and with rapid atrial pacing. FAT were differentiated from reciprocating tachycardias according to the response to entrainment. The atrial ectopic foci were localized as the site of earliest presystolic activity relative to the onset of the P wave during tachycardia where sharp and negative unipolar recording appeared. Focal AT were induced in 12 out of 14 dogs with narrow QRS complex tachycardia and in all dogs with AF after electrical cardioversion. In one dog three different forms of AT were obtain arising from three different atrial foci. Mean atrial cycle length during tachycardia was 253,75 ± 71,39 ms, different degree of atrioventricular block were noted resulting in a mean ventricular cycle length of 274,25 ± 73,43 ms. Eleven out of 18 FAT arose from the right atrium (5/11 crista terminalis, 2/11 Koch's triangle, 2/11 posterior tricuspid annulus, 1/11 right auricle, 1/11 interatrial septum), 7 out of 18 FAT arose from the pulmonary veins. All dogs with AF had pulmonary veins tachycardia as trigger factor.

Anatomical distribution of ectopic foci within the atrial chambers and tributary veins found in the dog of our study appeared similar to what reported in people. Programmed atrial stimulation and endocardial mapping resulted useful tools to induce FAT and localize their site of origin. Despite the low number of animals studied, pulmonary veins could be considered a trigger for AF also in the dog.

In conclusion in our group of dogs FAT arose more commonly from the right atrium, although pulmonary veins resulted an important site of origin particularly in dogs with persistent atrial fibrillation.

ABSTRACT #38

ROLE OF LATENT FELINE LEUKEMIA VIRUS INFECTION IN MYELOSUPPRESSION OF CATS.

B. Stützer[1], F. Müller[2], M. Majzoub[3], H. Lutz[4], C.E. Greene[2], W. Hermanns[3], K. Hartmann[1]. [1]Clinic of Small Animal Medicine, LMU University of Munich, Germany, [2]Departement of Small Animal Medicine and Surgery, The University of Georgia, Athens, USA, [3]Institute of Veterinary Pathology, LMU University of Munich, Germany, [4]Clinical Laboratory, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland.

Myelosuppression, such as non-regenerative anemia, neutropenia, and thrombocytopenia in cats with a positive feline leukemia virus (FeLV) antigen test is assumed to be caused by the underlying FeLV infection. In addition, cats with negative FeLV antigen test results that have cytopenias of unknown etiology are often suspected to suffer from latent FeLV infection that is responsible for myelosuppression. The purpose of this study was to assess the role of latent FeLV infection using a polymerase chain reaction (PCR) in bone marrow of cats with myelosuppression that had negative FeLV antigen test results in blood. Thirty-seven cats were included in the patient group. Including criteria were (1) myelosuppression of unknown origin and (2) a negative FeLV antigen test result. Antigenemia was determined by detection of free FeLV p27 antigen by an enzyme-linked immunosorbent assay (ELISA) in serum. Furthermore, seven cats with positive antigen tests with myelosuppression were included as control group I, and 30 cats with negative antigen test results without myelosuppression were included as control group II. Whole blood and bone marrow samples were tested by two different PCR assays detecting sequences of the envelope (*env*) and long terminal repeat (*LTR*) genes. FeLV immunohistochemistry (IHC) was performed in bone marrow samples. Two of the 37 cats (5.4%) in the patient group were positive in the bone marrow PCR and thus, were latently infected with FeLV. Latency was not detected in blood samples of the patient group. In both control groups, results of PCR matched the results of the serum FeLV p27 antigen ELISA. Also, all results of IHC fully matched the results of the serum FeLV p27 antigen ELISA. Comparing all diagnostic tools used in this study, PCR from bone marrow seems to be the most sensitive method to detect FeLV latency. The results of this study suggest that FeLV latency is less common than expected in cats with myelosuppression.

ABSTRACT #39

ASSOCIATION OF PROVIRUS AND VIRUS LOAD WITH THE HEALTH STATUS OF CATS NATURALLY INFECTED WITH FELINE IMMUNODEFICIENCY VIRUS.

C. Sand[1], C. Stengel[2], D. Klein[3,4], C. Sauter-Louis[5], K. Hartmann[1]. [1]Clinic of Small Animal Medicine, LMU University of Munich, Germany, [2]Hofheim Veterinary Hospital, Hofheim am Taunus, Germany, [3,4]Institute of Virology and VetOmics Core Facility for Research, University of Veterinary Medicine, Vienna, Austria, [5]Clinic for Ruminants, LMU University of Munich, Germany.

Kinetics of plasma virus loads during feline immunodeficiency virus (FIV) infection resembles that of human immunodeficiency virus (HIV) infection, and a correlation between virus load and health status was found in experimentally FIV-infected cats. The aim of this study was to evaluate the association of provirus (DNA) and virus (RNA) load with the health status in naturally FIV-infected cats. Forty-nine privately owned FIV-infected cats from Southern Germany were included in the study. The modified Karnofsky's score (Hartmann and Kuffer, 1998) that evaluates well-being and quality of life in cats was determined at the time when blood samples were obtained. Provirus and virus load were measured using a real-time polymerase chain reaction (PCR) as described by Klein et al. (1999). In order to detect provirus and virus in all cats potentially infected with different FIV subtypes and to overcome genetic diversity, three different probes (FIV 1416p, FIV 1010p, FIV 1372p; Klein et al. 2001) were used. The mean Karnofsky's score of the cats at time of presentation was 87%. Mean virus load in the cats was 88,588 virions/ml plasma, and a mean of 2.8% blood lymphocytes were infected. Provirus as well as virus load showed a significant (virus load: $p = 0.023$; provirus load: $p = 0.036$) but only weak correlation with the Karnofsky's score (logit Karnofsky and ln virus load: -0.324, ln provirus load: -0.301). A high percentage of the cats (69.4%) were asymptomatic and had a high Karnofsky's score between 90 and 100% at time of presentation. This is caused by the long survival of FIV-infected cats and the long asymptomatic stage. The weak correlation between provirus and virus load with the Karnofsky's score suggests that DNA and RNA levels are highly variable in the asymptomatic phase in naturally infected cats, and that, other than in HIV-infected humans, clinical status is not predictive of virus concentrations.

ABSTRACT #40

DESCRIPTION OF OUTCOMES OF INFECTION WITH FELINE HAEMOPLASMAS: HAEMATOLOGY, COOMBS' TESTING AND BLOOD GLUCOSE CONCENTRATIONS.

S. Tasker[1], I. R. Peters[1], K. Papasoulotis[1], S. M. Cue[1], B. Willi[2,3], R. Hofmann-Lehmann[2], T. J. Gruffydd-Jones[1], M. J. Day[1] and C. R. Helps[1]. [1]School of Clinical Veterinary Science, University of Bristol, Langford, Bristol, United Kingdom, [2]Clinical Laboratory, University of Zurich, Zurich, Switzerland, [3]Clinic for Small Animal Internal Medicine, University of Zurich, Zurich, Switzerland.

The aim of this study was to describe haematological changes, including Coombs' testing, and blood glucose concentrations following experimental infection of cats with either *Mycoplasma haemofelis* (Group HF), '*Candidatus* Mycoplasma haemominutum' (Group HM) or '*Candidatus* Mycoplasma turicensis' (Group TU). Sixteen seven month old barrier-maintained domestic-shorthaired cats were used; ten cats in Group HF, three in Group HM, and three in Group TU. Cats were inoculated intravenously at Day 0 with the respective haemoplasma species, obtained from barrier-maintained carrier cats. Blood samples were collected from all cats three times weekly from 2 to 85 days post-infection (DPI): twice weekly, 0.3 ml

blood was used for packed cell volume (PCV), haemoplasma quantitative real-time PCR (qPCR) and blood glucose measurement, and once weekly, 1 ml blood was used for haematological examination, Coombs' testing, PCV, haemoplasma qPCR and blood glucose measurement. None of the cats in Groups HM or TU became anaemic or Coombs' test positive. However all cats in Group HF developed anaemia (PCV < 25%), and this was often severe (PCV < 15% in 8 of the 10 HF cats). Individual HF cats had their lowest PCV value between 15 to 26 DPI, with the mean lowest PCV value for the whole HF group recorded on 15 DPI. All HF cats also developed macrocytosis and persistent erythrocyte autoagglutination or a positive Coombs' test at various time points. Erythrocyte-bound antibodies reactive at 4 °C (both IgM and IgG, or persistent erythrocyte autoagglutination at 4 °C) appeared between 8 and 22 DPI and persisted for two to four weeks, whereas those reactive at 37 °C (primarily IgG or persistent erythrocyte autoagglutination at 37 °C) appeared between 22 and 29 DPI and persisted for one to five weeks. In most cats erythrocyte-bound antibodies appeared after the fall in haemoglobin started, suggesting that they were not directly responsible for the haemolysis. Mean blood glucose concentrations remained within the reference range in all three groups during the study. This study demonstrates that *M. haemofelis* infection, in contrast to '*Candidatus* M. haemominutum' and '*Candidatus* M. turicensis' infection, results in a severe macrocytic anaemia that can be accompanied by the development of cold and warm reactive erythrocyte-bound antibodies.

ABSTRACT #41

AN EPIDEMIOLOGICAL STUDY ABOUT INFECTIONS WITH *ANAPLASMA PHAGOCYTOPHILUM* IN DOGS. D. Galke[1], G. Arndt[2], K. Pfister[3], B. Kohn[1]. [1]Small Animal Clinic, Faculty of Veterinary Medicine, Freie Universität Berlin; [2]Department for Biometry and Information Processing, Faculty of Veterinary Medicine, Freie Universität Berlin; [3]Institute of Comparative Tropical Medicine and Parasitology, LM-University Munich, Germany.

Anaplasma phagocytophilum (A. phag.), the causative agent of canine granulocytic anaplasmosis (CGA), is transmitted by ticks of the genus *Ixodes*. Objectives of this study were 1) to establish the prevalence and seasonality of *A. phag*. infections in dogs living in Northeast Germany; 2) to examine whether sero- or PCR-positive clinically healthy dogs have CBC abnormalities. Between 06/05 and 12/06 522 dogs were tested for infections with *A. phag*. (group 1: 258 sick dogs with clinical or laboratory abnormalities suspicious for CGA, group 2: 264 healthy dogs). CBC, *A. phag*. serology (IFAT) and Real-Time-PCR assays were performed, blood smears were examined for morulae in neutrophils. The overall seroprevalence was 43.3%. There was no significant difference between group 1 (121 seropositive dogs, 46.9%) and group 2 (105 seropositive dogs, 39.8%) ($p = 0.100$). By PCR, DNA of *A. phag*. was detected in 30 of 522 dogs (5.7%; group 1: 20 dogs, group 2: 10 dogs, $p = 0.052$). Morulae were found in 12 of 522 dogs (2.3%; group 1: 10 dogs, group 2: 2 dogs, $p = 0.081$). All dogs displaying morulae also had positive PCR results ($p < 0.001$). PCR-positive dogs were more often seropositive than dogs with negative PCR results ($p = 0.001$). Of the 509 dogs with known age, 43.2% were seropositive and 56.8% seronegative. Older dogs tested positive more often than younger dogs ($p < 0.001$). However, there was no correlation between detection of *A. phag*. DNA by PCR and increasing age ($p = 0.060$). In respect to seasonality 26 dogs were *A. phag*. PCR-positive between May and September. Only 4 dogs tested positive during the other months ($p = 0.021$). Results of antibody titers did not show seasonality ($p = 0.474$). CBC abnormalities were not found significantly more often in clinically healthy seropositive than in seronegative dogs (for each CBC parameter $p > 0.05$). The CBC was within reference ranges in all 10 clinically healthy dogs with positive PCR results. Seroprevalence was high in Northeast Germany and comparable to other studies from Germany. In regard to age there was a significant difference between seropositive and seronegative dogs. Seasonality was shown for PCR results but not for antibody titers. A diagnosis of CGA cannot be based on serology since dogs can be seronegative and clinically ill. PCR- and morulae positive dogs can be clinically and hematologically normal and therefore, blood products should be screened for *A. phag*. by PCR testing prior to transfusion.

ABSTRACT #42

RED BLOOD CELL OSMOTIC FRAGILITY IN HEALTHY DOGS AND DOGS WITH HYPERLIPIDEMIA, MICROCYTOSIS, MULTICENTRIC LYMPHOMA AND INFECTIOUS DISEASES. G. Paes, D. Paepe, L. Duchateau, E. Meyer, S. Daminet. University of Ghent, Belgium.

An increased red blood cell (RBC) osmotic fragility (OF) is seen in dogs with spherocytosis and has recently been shown to be of diagnostic value in dogs with immune-mediated hemolytic anemia (IMHA). However, OF can also be increased in dogs with other conditions, such as hypercholesterolemia and microcytosis. Therefore it is important to evaluate which diseases other than anemia influence OF.

This prospective study aimed to evaluate OF in healthy dogs and in dogs with microcytosis, lymphoma, hyperlipidemia and various infectious diseases.

Five groups of dogs ($n = 50$ in total) were included. Group 1 ($n = 14$) were healthy dogs, group 2 ($n = 8$) were dogs with microcytosis (MCV < 61fl) caused by various diseases, group 3 were dogs with multicentric lymphoma, diagnosed by cytology and/or histopathology, group 4 ($n = 13$) were dogs with hyperlipidemia (cholesterol (Chol) > 10 mmol/l and/or triglyceride (TG) > 2 mmol/l) caused by various diseases) and group 5 ($n = 5$) were dogs with various infectious diseases. All dogs were starved for 12 hours and a CBC, serum biochemistry profile (including Chol and TG), evaluation for spherocytosis and a direct Coombs' test were performed. Furthermore, OF was tested by using the classic OF test (COFT) as described by Jain (1986) and the rapid OF test (ROFT), described by Slappendel (1986). In the COFT OF5, OF50 and OF90 were determined as respectively the NaCl-concentration at which 5, 50 and 90% of RBCs were hemolysed. In the ROFT OF was estimated semi-quantitatively by adding heparinized blood to 2 NaCl-concentrations (0.9%; 0.6%) and was positive if a visible colour change, due to hemolysis, was seen in the 0.6% NaCl solution.

Mean OF5, OF50 and OF90 were respectively 0.51%, 0.44% and 0.34% for group 1; 0.53%, 0.39% and 0.26% for group 2; 0.52%, 0.42% and 0.36% for group 3; 0.64%, 0.45% and 0.34% for group 4 and 0.48%, 0.40% and 0.26% for group 5. When compared with group 1, no statistically significant differences were detected for OF5, OF50, OF90 for group 2, 3 and 5. For group 4, no significant difference was present for OF50 and OF90, but OF5 was significantly higher compared to group 1. The ROFT was positive in 7 (55%) group 4 dogs and negative in all other dogs. Of dogs with a positive ROFT, 5 had a hypercholesterolemia, 6 had a hypertrigliceridemia and 4 dogs had an increase in both Chol and TG. None of the dogs with a positive ROFT had spherocytes on their blood smear.

In this prospective study, an increased OF was present in 55% of dogs with hyperlipidemia. This increased OF in dogs with hyperlipidemia should be taken into account when using the COFT or ROFT for diagnosing IMHA in dogs.

ABSTRACT #43

EFFECTS OF ASPIRIN AND CLOPIDOGREL ON PLATELET FUNCTION IN HEALTHY DOGS. L Shearer, SA Kruth, D Wood. Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada.

Aspirin has been widely used in both human and veterinary patients for its anti-thrombotic properties. Several studies have evaluated the effect of aspirin on platelet function in dogs, with conflicting results. Clopidogrel is an effective anti-thrombotic therapy in humans, but has been minimally evaluated in dogs. The objective of this study was to assess the effect of various doses of aspirin and clopidogrel on platelet function in healthy dogs. Results were correlated with plasma drug metabolite concentrations.

Six healthy dogs were randomized to six treatment groups (aspirin: 0.5, 1.0, 2.0 and 10.0 mg/kg/d; clopidogrel: 2.0 and 4.0 mg/kg/d). Blood samples were collected on days 0, 3, and 7 and evaluated using optical aggregometry (ADP and PAF as agonists) and the PFA-100 analyzer (collagen-ADP and collagen-EPI cartridges). Day 7 plasma drug metabolite levels were measured using high performance liquid chromatography.

No statistically significant effect on platelet function was identified for the currently recommended anti-thrombotic aspirin dose

(0.5 mg/kg/d) with either aggregometry or the PFA-100. ADP-induced aggregometry detected inhibition of platelet function by day 7 for the 1.0 and 2.0 mg/kg/d aspirin doses. No effect on platelet aggregation was detected for the 10 mg/kg/d aspirin dose. The PFA-100 detected significant inhibition of platelet function for all aspirin doses, except the 0.5 mg/kg/d dose, on both day 3 and 7 using the collagen-EPI cartridge. Inhibition of platelet function was also detected with the PFA-100 for the 2 and 10 mg/kg/d aspirin doses using the collagen-ADP cartridge. Both doses of clopidogrel yielded significant inhibition of platelet function with both methodologies (ADP agonist) on day 3 and 7.

Plasma drug metabolite levels for aspirin yielded variable results (0.5 mg/kg/d: 0.17–0.68 ug/mL; 1.0 mg/kg/d: 0.74–2.95 ug/mL; 2.0 mg/kg/d: 1.52–5.37 ug/mL; 10 mg/kg/d: 13.50–30.74). Some dogs had consistently low or high plasma metabolite levels regardless of the dose administered, suggesting variability in individual absorption. Measurement of drug metabolite levels for clopidogrel were less variable (2.0 mg/kg/d: 0.043–0.519 ug/mL; 4.0 mg/kg/d: 0.303–0.489 ug/mL), but displayed considerable overlap in the range of values between the two dose groups.

Currently recommended anti-thrombotic dosing of aspirin (0.5 mg/kg/d) is ineffective as measured by optical aggregometry and the PFA-100 analyzer in healthy dogs. Treatment with 1 mg/kg/d of aspirin was the lowest dosage to inhibit platelet function by both methodologies. Clopidogrel may be a reasonable anti-platelet therapy alternative. The anti-platelet effect of aspirin and clopidogrel was readily documented using the PFA-100. Ineffective anti-platelet therapy may be correlated with inadequate plasma drug metabolite concentrations. Plasma metabolite concentrations may subsequently be used to tailor anti-platelet therapy.

ABSTRACT #44

FACTORS INFLUENCING TOTAL CELL COUNT IN BRONCHOALVEOLAR LAVAGE FLUID OBTAINED IN HEALTHY DOGS AND DOGS WITH RESPIRATORY CONDITIONS.

R. Lavoue[1], F. Delvaux[1], L. Massart[1], Clercx C[1]. [1]Clinic for Small Animals Internal Medicine, University of Liège, Belgium.

Bronchoalveolar Lavage (BAL) is safe and provides important information through BAL Fluid (BALF) analysis. One interesting cytological criterion is total cell count (TCC), although wide variations in TCC have been reported, reflecting variation in sampling or processing methods. It is commonly accepted that manual counting, rather than automated, should be done to correctly evaluate TCC. Another concern is the presence of mucus and erythrocytes within the specimen, as both can interfere with accurate cell analysis. The purposes of the present study were to compare TCC obtained either with immediate manual counting or with various automated methods in healthy dogs and in dogs with respiratory conditions and to assess influence of mucus and blood on TCC. A standardized BALF procedure was performed in seven healthy beagle dogs as well as in twenty three client owned dogs with respiratory conditions. Aliquots of BALF were directly collected in EDTA-treated tubes, and either directly analyzed, or stored at 4 °C until analysis 6 to 8 hours later. Macroscopical blood or mucus within the BALF was directly estimated (present or absent). BALF from diseased dogs were treated with a specific mucolytic, dithiothreitol (DTT), at a concentration of 0.01 M. TCC obtained by Thoma hemocytometer; by electroimpedance (EI) and laser light scattering (L) from the analyzer *Abbott Cell-Dyn 3500* and by laser-based flow cytometry (LFC) from the analyzer *COULTER® Gen.S* were compared. A General Linear Model (GLM) procedure was used to assess influence of mucus or blood on TCC, to compare TCC obtained with or without DTT and to compare TCC obtained by different counting methods. Pearson's correlations were used to compare overall agreement of TCC among methods of counting. Values are expressed as mean ± SEM, in cells/μL. $P < 0.05$ was considered significant. In healthy dogs, TCC obtained by manual counting were significantly lower (316 ± 71) than by EI (455 ± 58) and LFC (549 ± 59), and lower but not significantly than by L technique (358 ± 54). In diseased dogs (TCC range = 60–22475), no significant difference was found, whatever the counting method used (4442 ± 1435, 3886 ± 1167, 3661 ± 1094, 2903 ± 1182, for manual counting, EI, L and LFC, respectively). Blood did not influence TCC. A significant mucus effect was found; in mucous BALF: TCC was significantly higher than in non mucous BALF using both manual and automated counting. DTT treatment did not significantly affect TCC. This study shows that (1)automated analyzers significantly overestimate TCC in healthy dogs but are reliable enough to estimate TCC in BALF from dogs with respiratory conditions; (2)BALF containing mucus are associated with higher TCC and (3)treatment of mucous BALF specimens with 0.01 M DTT solution does not significantly affect TCC.

ABSTRACT #45

ACTIVITY OF METALLOPROTEINASES MMP2 AND MMP9 IN MATCHED SERUM AND BRONCHOALVEOAR LAVAGE FLUID SAMPLES IN A DOG MODEL OF AIRWAY INFLAMMATION.

J. Manens[1], M. Bolognin[1], J. Leemans[2], L. Wiggers[3], N. Kirschvink[3], C. Clercx[1]. [1]Department of Clinical Sciences, [2]Department for Functional Sciences, University of Liège, [3]Animal Physiology, University of Namur, Belgium.

Proteolytic enzymes, including matrix metalloproteinases (MMPs), are believed to be among the key mediators of structural changes both in physiological and pathological conditions. In human pulmonology, the involvement of MMPs has been studied for several years while in dogs, fewer studies exist. Therefore, the aim of the present study was to assess MMP2 and MMP9 activity in the bronchoalveolar lavage fluid (BALF) and serum from 12 beagles with experimentally induced airway inflammation. Dogs were nebulised at weekly interval with bacterial toxin lipopolysaccharide (LPS) to induce a subclinical but sustained bronchial inflammation. Matched blood and bronchoalveolar lavage fluid (BALF) samples were collected before the first LPS nebulisation (prechallenge) and 24 to 48 h after the first (LPS1) and the third nebulisation (LPS3). MMPs total activities were determined by semi-quantitative gelatin zymography on serum and BALF, and expressed as a normalised mean value (compared with known amounts of standards). BALFs were analyzed for total (TCC) and differential cell counts, including the percentages of neutrophils (%N), macrophages (%M) and eosinophils (%E). One-way ANOVA or alternatively Friedman Repeated Measures Analysis of Variance on Ranks for non-normally distributed data were used to test for differences between prechallenged, LPS1 and LPS3 values. $P \leq 0.05$ was chosen as level of significance. Values are given as mean ± SEM. LPS nebulisations did not induce any hematological changes, but induced significant increases in BALF TCC and %N at LPS1 and LPS3 compared to prechallenge values, together with a significant decrease in %M. LPS nebulisations did not induce any significant differences in MMP-2 and MMP-9 activities in the serum (1.14 ± 0.24 at prechallenge, 1.29 ± 0.33 at LPS1, 1.19 ± 0.32 at LPS3 and 1.3 ± 0.1 at prechallenge, 1.1 ± 0.1 at LPS1,1.0 ± 0.1 at LPS3, for MMP2 and MMP9 respectively). BALF MMP-9 activity was significantly increased at LPS1 (0.6 ± 0.1 at prechallenge, 1.0 ± 0.2 at LPS1, 0.7 ± 0,.1 at LPS3) while no significant differences in MMP-2 activity were noted (0.75 ± 0,11 at prechallenge, 0.73 ± 0.09 at LPS1, 0.62 ± 0.13 at LPS3). These findings suggest that, in the present LPS experimental model (1) enzymatic degradation of the extracellular matrix might contribute to bronchial inflammation;(2) MMP-9 activity could be an early local marker of bronchial inflammation; (3) neutrophils are a probable direct or indirect source of MMP-9 in the airways; (4) measurement of MMP activities in the BALF could be appropriate to assess the effects of therapeutic protocols on the inflammatory response.

ABSTRACT #46

CONCENTRATION OF ALLERGEN-SPECIFIC IGE IN SERUM AND BRONCHOALVEOLAR LAVAGE FLUID IN DOGS WITH EOSINOPHILIC BRONCHOPNEUMOPATHY AND DOGS WITH CHRONIC BRONCHITIS.

C Peyron, M Derer[1], MJ Day[2], L Massart, C Clercx, D Peeters. Small Animal Internal Medicine, Liège University, Belgium; [1]Heska, Fribourg, Switzerland; [2]School of Clinical Veterinary Science, Bristol University, UK.

Chronic bronchitis (CB) and eosinophilic bronchopneumopathy (EBP) are the most common bronchial diseases in dogs and are characterized by distinct inflammatory infiltrates (neutrophils in CB, eosinophils in EBP) of the bronchial mucosa. The cause of canine CB is unknown but the pathogenesis of EBP is suspected to

involve hypersensitivity to aeroallergens. The aim of this study was to quantify allergen-specific IgE (ASIgE) in serum and bronchoalveolar lavage fluid (BALF) collected from control dogs and dogs with EBP or CB.

Ten dogs with EBP, 3 dogs with CB and 5 healthy beagles (CTRL) entered the study. In each dog, the concentration of IgE specific for a panel of 36 allergens was determined in serum and BALF by Allercept™, a non-competitive, solid-phase ELISA (Heska). Results were expressed in ELISA absorption (EA) units. For serum, a cut-off value of 150 EA units was defined. The values obtained from analysis of BALF were defined relative to the total protein concentration of the individual samples. Correlation coefficients between serum and BALF ASIgE were determined. Mixed model procedures were performed, using random (dog within group) and fixed effects. For serum and BALF, the concentration of ASIgE was compared between the 3 groups. For these analyses, least square means contrasts were used. For all analyses, $p < 0.05$ was considered significant. There was overall correlation between the concentration of ASIgE measured in serum and BALF but no correlation was found between BALF and serum in terms of the number of allergens to which the dogs reacted serologically. In the serum, there was significantly more ASIgE in dogs with CB than in CTRL and significantly more in CTRL dogs than in dogs with EBP. In the BALF, there was significantly more ASIgE in CTRL dogs than in those with EBP, but more in dogs with EBP than CB. No significant difference was found between groups regarding the number of allergens for which the dogs tested positive. There were significantly more reactions with allergens in BALF than in serum.

The results of this study are consistent with a role for ASIgE in the pathogenesis of EBP as more ASIgE were produced in the airway of dogs with EBP than dogs with CB. Quantification of serum ASIgE does not predict the production of ASIgE in the BALF, so measurement of ASIgE in the BALF from dogs with chronic cough may be useful diagnostically. The beagles used as CTRL in the study appear to be high IgE responders, so further studies are required of CTRL dogs of other breeds.

ABSTRACT #47

ROLE OF BRUSH CYTOLOGY IN THE DIAGNOSIS OF CANINE CHRONIC INTRANASAL DISEASE.

N. Pinto da Cunha[1], G. Ghisleni[1], C.M. Mortellaro[2], M. Caniatti[1]. [1]Department of Animal Pathology, Hygiene and Veterinary Public Health, and [2]Department of Veterinary Clinical Sciences, University of Milan, Italy.

Most cases of canine chronic nasal disease, either inflammatory or neoplastic, can not be differentiated based on clinical examination alone. Radiological exam and rhinoscopy can be precious aid. However, biopsy is often mandatory for a definitive diagnosis. Non-surgical biopsy techniques should represent a desirable diagnostic approach. The aim of this study was to assess the efficacy of brush cytology in dogs with chronic nasal disease, with special regard on the differential diagnosis between inflammatory and neoplastic conditions.

Over a thirteen-year period (1992–2004), brush cytology was used in 138 dogs with chronic nasal disease. All dogs underwent full clinical examination, which included radiographs, rhinoscopy and nasal brush cytology. Brush samples were smeared on glass slides, air dried and stained with May-Grünwald Giemsa. Histopathology was made on pinch endoscopic or excisional biopsy samples. On one-year follow-up, dogs free of disease or without disease progression were considered negative for neoplasia. Diagnostic accuracy indices were used to evaluate the reliability of this technique.

Ninety-three brush samples were classified by cytology as inflammatory. In 75/93 cases the cytologic diagnosis was in agreement with histology and follow-up data (true negatives). In 19 cases, an etiologic diagnosis was achieved (9 mycoses, 9 rhinosporidiosis, 1 leishmaniosis). A false negative diagnosis of neoplasia was made in 18/93 cases, all with malignant tumors (12 carcinomas, 5 sarcomas and 1 round cell tumor).

Forty-five cases were classified by cytology as neoplastic. Only one false positive diagnosis of neoplasia was made (mast cell tumor). Interestingly, in 3 out of the 44 true positive diagnosis, initial histological examination did not allow the detection of a neoplastic condition, which was later identified by histology during the follow-up period (2 squamous cell carcinomas and 1 sarcoma).

This procedure had an overall accuracy of 86.2% (119/138) for the diagnosis of inflammatory condition versus neoplasia, with a sensitivity of 70.9%, a specificity of 98.6%, a positive predictive value of 97.8% and a negative predictive value of 80.6%.

In conclusion, this study depicts the efficacy of brush cytology in providing an accurate diagnosis for canine chronic nasal disease, with special reference in making a differential diagnosis between inflammatory and neoplastic conditions.

ABSTRACT #48

COMPARISON OF THE VALUE OF FUNGAL CULTURE AND GALACTOMANNAN DETECTION IN NASAL SECRETIONS OBTAINED BY THREE NON-INVASIVE SAMPLING METHODS IN THE DIAGNOSIS OF CANINE SINO-NASAL ASPERGILLOSIS.

F. Billen, D. Peeters, P. Huynen[a], P. De Mol[a], C. Clercx. Department of Clinical Sciences, Veterinary Faculty, [a]Department of Biomedical Sciences, Faculty of Medicine, University of Liège, Belgium.

Fungal culture of nasal secretions sampled with traditional cotton swabs (CS) is unreliable for the diagnosis of canine sino-nasal aspergillosis (SNA). Recently, a new nylon flocked swab (NFS) with increased recovery and release capacities has been commercialized. Nasal lavage (NL) is commonly used in human patients with rhinosinusitis and collects material that is considered to be more representative of nasal secretions than CS. The aim of the present study was to compare the diagnostic value of fungal culture and galactomannan (GM) detection in nasal secretions obtained by CS, NFS, and nasal lavage fluid (NLF). GM, a soluble cell wall antigen of *Aspergillus* spp. released during fungal growth, can be measured using an ELISA test (Platelia™ *Aspergillus* EIA). Eight dogs with SNA, 17 dogs with non-fungal nasal disease (NFND) and 14 control beagle dogs (CTRL) entered the study. In each dog, nasal secretions were blindly sampled by CS and NFS before a NL was performed. In dogs with SNA, fungal plaques, sampled under rhinoscopic guidance, were used as internal control for both tests. Fungal plaques, CS, NFS and the pelletal cells obtained after centrifugation of the NLF were cultured on Sabouraud-chloramphenicol-actidione medium at 37 °C. CS, NFS and fungal plaques were also suspended in NaCl 0.9%; a Platelia™ test was performed on the supernatant obtained after centrifugation of these suspensions as well as on NLF. No positive fungal culture was obtained from any sample in NFND and CTRL dogs. In dogs with SNA, *Aspergillus fumigatus* was cultured from CS, NFS and NLF from 1, 2 and 3 dogs respectively, which was not significantly different from each other, and from fungal plaque in 7 dogs. Large quantities of GM were detected in fungal plaques from all dogs with SNA. Mean ODI results obtained from CS, NFS and NLF were 0.26, 1.09 and 1.08 in dogs with SNA, 0.08, 0.17 and 0.25 in dogs with NFND, and 0.17, 0.52 and 0.68 in CTRL dogs, respectively. No significant difference was obtained between results of the Platelia™ test on CS, NFS and NLF.

These preliminary results suggest that (1) the use of NFS and NLF does not improve significantly the value of fungal culture and GM detection in the diagnosis of SNA as compared to CS, (2) GM detection is not more sensitive than fungal culture in detecting *Aspergillus* in nasal secretions from dogs with SNA, and (3) GM detection occurs in nasal secretions from NFND and CTRL dogs, although less frequently and in lower quantity than in secretions from dogs with SNA, and therefore is an unreliable diagnostic test.

ABSTRACT #49

DETECTION OF A NEW MUTATION RESPONSIBLE FOR PRIMARY CILIARY DYSKINESIA IN A PEDIGREE OF OLD ENGLISH SHEEPDOGS.

A.C. Merveille[1], G. Battaille[1], E. Davis[3], F. Billen[2], C. Clercx[2], M. Georges[1], A.S. Lequarré[1]. [1]Unit of Animal Genomics, [2]Department of Small Animal Clinical Sciences-Section of Internal Medicine, University of Liège, Belgium. [3]McKusick-Nathans Institute of Genetic Medicine, Johns Hopkins University School of Medicine, Baltimore.

Primary ciliary dyskinesia (PCD) is a diverse group of inherited structural abnormalities of the cilia resulting in abnormal ciliary motion within different organs. This multisystem disease is mostly characterized by recurrent respiratory tract infections, male subfertility and situs-inversus in half of the cases. PCD has been described

in several dog breeds. A few cases of PCD segregating in a pedigree of Old English Sheepdogs were referred to our University. Clinical signs together with transmission electron microscopy (TEM) pictures concluded to an inherited primary structural abnormality of the cilia, with displacement of the central pairs of microtubules. Moreover three out of eight examined affected animals harboured a situs inversus. TEM from ciliogenesis shows the central pair of microtubules eccentric located with transposition of one of the peripheral doublets. This would suggest defects of the radial spokes of the axoneme. A similar TEM picture is described in several human PCD cases without associated known mutation. The segregation of the disease within the dog's pedigree first suggested a dominant disease with incomplete penetrance. To solve it the DNA of five affected dogs and fifteen controls have been genotyped using the 50 K array from Affymetrix. The genotyping results showed one and only one 15 millions base pairs homozygous region on all affected dogs and absent in the others animals demonstrating a simple recessive genetic inheritance of the disease. The statistical analysis using two home made program (Asshom and Assist) and a whole genome association analysis program (Plink) demonstrate a significant score. This region is situated on chromosome 34 and encompasses more than 150 predicted genes with 105 of them with known function. Simultaneously around twelve candidate genes out of the 105 described were selected according to the cilioma database (http://www.igm.jhmi.edu/~agherman/cgi-bin/index.php). Those genes should be implied in one way or another in the structure of the cilium. Amplification and sequencing of the different exons of the corresponding genes were undertaken. A non-sense mutation in an exon of one of those genes is only seen in affected old English sheepdogs and could effectively be responsible for the TEM picture. This gene has not been implied yet in human cases of PCD. Functional tests are currently undertaken to check if this gene is responsible for the pathology.

ABSTRACT #50

FELINE BRONCHIAL DISEASE: CLINICAL FINDINGS AND PREDISPOSING FACTORS – A PROSPECTIVE STUDY IN 27 CATS.

B. Schulz[1], U. Stursberg[1], C. Werckenthin[2], S. Hecht[3], I. Zenker[1], K. Hartmann[1]. [1]Clinic of Small Animal Medicine, LMU University of Munich, Germany; [2]Institute for Medical Microbiology, Infectious and Epidemic Diseases, LMU University of Munich, Germany; [3]University of Tennessee, Knoxville, TN, USA.

Feline bronchial disease (FBD) is a clinical condition characterized by chronic cough, wheezing, and/or episodes of dyspnoea. So far, not much information regarding predisposing factors and clinical features is available on patients with naturally occurring FBD. This study prospectively describes history and clinical data, including bronchoalveolar lavage (BAL) cytology and bacterial culture, and radiographic findings in 27 cats with FBD. Data concerning the patients' histories were compared to a control group without FBD, and correlations between different parameters of history and clinical findings were investigated. Inclusion criteria for the cats with FBD were a history of cough, wheezing and/or episodes of dyspnoea. Excluded were patients with upper respiratory tract disease, neoplasia, as well as cardiovascular, pleural, and mediastinal disease. All cats underwent a clinical, laboratory, and cardiologic examination, and thoracic radiographs were taken. Chronic cough was the problem most frequently reported by owners (81.5%). There was no significant difference in exposition to cigarette smoke between cats with FBD and control group. Laboratory and BAL cytology findings were highly variable with 33.3% of the cats showing peripheral blood eosinophilia, and 74.1% of the cats having abnormal cellular pattern of BAL inflammatory cells. There was a moderate correlation between radiographic bronchial markings score and blood eosinophil count ($p = 0.024$) or percentage of eosinophils in BAL cytology ($p = 0.037$), respectively. Except for three cats with positive cultures for *Mycoplasma* spp., all cats had negative culture results or only low quantities of bacterial growth considered physiologic micro flora. Cats with FBD are a very heterogeneous group of patients. None of the data collected or tests performed in this study identified a predominant predisposing factor, pathognomonic clinical sign, or diagnostic test result. As long as a diagnostic gold standard is lacking, FBD will remain a diagnosis of exclusion.

ABSTRACT #51

AIRWAY HYPERRESPONSIVENESS TO INHALED ADENOSINE 5′-MONOPHOSPHATE IN FELINE CHRONIC AIRWAY DISEASE.

R.A. Hirt, A. Galler, S. Shibly, A. Bilek. Clinic of Internal medicine and Infectious diseases, VU Vienna, Austria.

Feline asthma (FA) and chronic bronchitis (CB) are inflammatory diseases characterised by chronic coughing, wheezing and, at least in asthma, intermittent respiratory distress due to bronchoconstriction. Airway hyperresponsiveness, a key feature of human asthma, is believed to exist in these cats as well. Airway responsiveness testing in humans is commonly performed by inhalation of histamine or cholinergic agonists (e.g. carbachol). In feline airways, histamine has unpredictable effects, and responsiveness to carbachol decreases significantly with increasing age, requiring age-matched cut-off values not yet established. Responsiveness to indirect agonists such as adenosine 5′-monophosphate (AMP) relies on presence of inflammatory cells, and may correlate more closely with underlying airway inflammation. The purpose of the study was to investigate the suitability of AMP for airway responsiveness testing using barometric whole body plethysmography (BWBP). We hypothesised, that AMP would cause airflow limitation in cats with airway inflammation, but not in healthy cats.

24 cats (9 with FA, 6 with CB, 1–13 y; 9 controls, 4–6 y) underwent airway responsiveness testing with AMP by use of BWBP. AMP was nebulised into the plethysmography box in concentrations of 0.1, 1, 10, 100 and 500 mg/mL for 1 min each, followed by a 7-min period of data acquisition. The endpoint was defined as enhanced pause (PENH), a surrogate of airflow limitation, exceeding 300% of the post-saline value (vehicle), and the provocative concentration (PCPENH 300) of AMP was obtained by interpolation of the concentration-response curve.

The endpoint was reached in 9 out of 15 patients (7 FA, 2 CB), but in none of the controls even to the highest AMP concentration (500 mg/mL). Mean PENH ($\pm$ $\pm$ SD) at baseline was 0.49 ± 0.16 for cases, and 0.54 ± 0.16 for control cats. After AMP challenge, the mean PENH significantly increased in cases (2.62 ± 2.20), whereas there was no significant change in control cats (0.63 ± 0.30, $p < 0.05$). When dividing cases into reponders (R) and non-responders (NR), again no difference in PENH at baseline (R 0.50 ± 0.21, NR 0.47 ± 0.09) but after challenge (R 3.96 ± 1.84, NR 0.6 ± 0.21, $p < 0.001$) was detected. The PCPENH 300 in R cases (52.98 ± 48.04 mg/mL) was significantly different from NR and controls ($p < 0.01$). Age had no influence on the responder status or PCPENH 300 in clinical cases.

Airway responsiveness testing with AMP may provide a method for identification and monitoring of cats with lower inflammatory airway disease, allowing changes in the degree of inflammation to be assessed, such as could occur due to disease progression or in response to therapeutic intervention.

ABSTRACT #52

HYPOCHOLESTEROLEMIA IN DOGS: A RETROSPECTIVE STUDY OF 105 CASES.

K. Banajee[1], A. Barger[2] and O. Dossin[1]. [1]Department of Veterinary Clinical Medicine, [2]Department of Pathobiology, University of Illinois at Urbana-Champaign, USA.

Blood cholesterol is frequently measured in routine chemistry panels in canine medicine. Hypocholesterolemia is an unfrequent finding and has been reported in association with severe liver disease especially porto-systemic shunts, protein losing enteropathies, severe malnutrition and malassimilation. The aim of the study was to document signalement, clinico-pathological and diagnostic findings in dogs with hypocholesterolemia.

The medical records were screened for canine patients with serum cholesterol below 109 mg/dL the lower end of the reference range of the serum cholesterol at the Veterinary Diagnostic Laboratory of the College of Veterinary Medicine at the University of Illinois. Depending on their serum cholesterol values the dogs were divided in 3 groups: severe hypocholesterolemia ($\leq$ 70 mg/dL, group 1), moderate hypocholesterolemia ($>$ 70 and $\leq$ 87 mg/dL, group 2) and mild hypocholesterolemia ($>$ 87 and 109 mg/dL, group 3). Serum cholesterol concentations were measured with a Hitachi 917, Roche Diagnostics using a colorometric assay also provided by Roche Diagnostics.

A total of 110 cases were included in the study: 18 dogs in group 1, 22 dogs in group 2 and 65 dogs in group 3. The most frequently represented breeds in the hypocholesterolemic dogs were mixed-

breed dogs (25 dogs); Cocker Spaniel, Yorkshire terrier and Labrador Retriever (9 dogs for each breed) and miniature Schnauzer and Golden Retriever (4 dogs in each breed). Ten dogs (9.5%) were intact females, 47 (44.8%) spayed females, 37 (35.2%) castrated males and 11 (10.5%) intact males. The ages were 4.6 ± 1.7, 4. ± 1.8 and 4.5 ± 1.7 for group 1, 2 and 3 respectively and were not different between the 3 groups. Six dogs (33%) in group 1, 4 dogs (18%) in group 2 and 20 dogs (30.7%) in group 3 died within one week after diagnosis. The conditions most frequently associated with hypocholesterolemia were neoplasia 27 cases including 11 lymphoma and 4 acute leukemia; liver disease 26 cases including 8 porto-systemic shunts and intestinal diseases 22 cases including 7 protein losing enteropathies. Two dogs had Addison's disease and 3 dogs had sepsis. No correlation was observed between serum cholesterol concentration and the serum concentrations of albumin, bilirubin, bile acids and urea.

In conclusion, the most frequent disease conditions associated with hypocholesterolemia were neoplasia especially lymphoma and leukaemia, liver disease and gastro-intestinal disease. The severity of hypocholesterolemia is not a good predictor of outcome in dogs.

ABSTRACT #53

CHARACTERIZATION OF CLINICAL AND LABORATORY FEATURES OF DOGS WITH PRIMARY IMMUNE-MEDIATED THROMBOCYTOPENIA: 21 DOGS. B. Dircks[1], H.J. Schuberth[2], R. Mischke[1]. [1]Small Animal Clinic and [2]Institute of Immunology, Hannover School of Veterinary Medicine, Hannover, Germany.

Platelet-Bound-Antibody (PBA)-test performed by a flow cytometric assay is considered to be a sensitive but not a specific tool to identify primary immune-mediated thrombocytopenia (pIMT) in dogs. Differentiation of dogs having pIMT from dogs with secondary immune-mediated thrombocytopenia (sIMT) is often difficult. Therefore medical records of thrombocytopenic dogs with a positive PBA-test performed between 2003 and 2008 were evaluated retrospectively and dogs were classified as having either pIMT or sIMT.

During this time period 21 dogs were suspicious for having pIMT due to exclusion of other diseases and a positive response to immunesuppressive therapy. Thirty-six dogs with a positive PBA-test were considered to have sIMT due to the existence of an associated disease. Dogs with an incomplete follow-up were excluded from the study.

There was no significant difference regarding age and sex distribution between dogs with pIMT and sIMT. Spontaneous bleeding was observed in a higher percentage of dogs with pIMT (81%; 17/21) compared to those with sIMT (56%; 20/36) ($P = 0.08$).

Platelet counts were significantly lower in dogs with pIMT (median 13×10^3/µl; 2×10^3–44×10^3/µl) than in dogs with sIMT (median 32×10^3/µl, 3×10^3–119×10^3/µl). Platelet counts of less than 20×10^3/µl were found significantly more often in dogs suspicious for having pIMT (95%; 19/21) than dogs with immune-mediated thrombocytopenia due to other diseases (39%; 14/36).

Platelet volume analyses were available for 15 dogs with pIMT and 28 dogs with sIMT. Significantly more dogs with pIMT had a mean platelet volume below the reference range (MPV < 8,1fl) compared to dogs with sIMT (47%; 7/15 versus 4%; 1/28). Eleven of 28 dogs (39%) with sIMT and none of the dogs suspicious for having pIMT had an increased MPV.

Bone marrow aspiration was performed in 15 dogs suspicious for having pIMT and in 21 dogs with sIMT. While almost all dogs with pIMT (93%; 14/15) had an increased megakaryopoesis, this finding was detected in a significantly lower percentage of dogs with sIMT (38%; 8/21). Decreased megakaryocytosis was observed in none of the dogs classified as pIMT and in 10 of 21 dogs (48%) with sIMT.

In conclusion, platelet counts as well as MPV values and megakaryopoietic activity seem to be helpful parameters for the differentiation of pIMT from IMT due to an associated disease.

ABSTRACT #54

THE USE OF HUMAN INTRAVENOUS IMMUNOGLOBULIN IN DOGS WITH IMUMME MEDIATED HAEMATOLOGICAL CONDITIONS. M. Augusto, R. Bell. Faculty of Veterinary Medicine, University of Glasgow, United Kingdom.

Human intravenous immunoglobulin (hIVIG) is primarily composed of IgG. It has a variety of mechanisms of action, which ultimately results in the down-regulation of the immune response. Over the past decade, hIVIG has been successfully used in a variety of canine immune-mediated conditions but documentation of its use in a large cohort of dogs is lacking. This retrospective study reviewed the clinical records of dogs that received a single dose infusion of hIVIG over the past five years, aiming to assess efficacy, side-effects and short-term outcome. Case records were scrutinised for clinical history, physical examination, clinicopathologic findings, imaging and other relevant diagnostic tests (including tick-borne disease, bone marrow biopsies). Differences between groups were tested by use of Mann-Whitney test (significant $p < 0.05$). Twenty two dogs were included in the study. Five dogs had primary immune-mediate haemolytic anaemia (IMHA), 13 dogs had primary or secondary immune-mediated thrombocytopenia (IMT), three dogs had anaemia caused by bone marrow (BM) disease (2 dogs BM hypoplasia and 1 dog BM dysplasia) and one dog had Evan's syndrome. In each case, hIVIG was administered due to failure of more conventional drugs to control the disease, hence all dogs were treated with immunosuppressive dose of glucocorticoids, along with other immunosuppressive, as well as symptomatic treatment and multiple blood product transfusions, based on individual clinical judgement. The administration of blood products (packed red cells or whole blood) to six dogs within 48 hours of hIVIG infusion meant that short term response to hIVIG in terms of rise in haematocrit could not be assessed. Median duration of clinical signs from presentation to hIVIG treatment was 3 days (range 0–11) and median dose used was 0.54g/kg (range 0.36–1.1). Of those dogs whose response could be assessed 6/14 showed a clinical improvement in haematological parameters within 48 hours of hIVIG treatment. Overall 14/22 dogs survived to discharge. Their mean duration of hospitalisation was 9 days (range 4–16). Of the dogs that did not survive 4/8 were euthanized due to progression of their haematological disease. Within the IMT group, 3/13 cases were found to have secondary IMT. Those 3 dogs had a poor response to hIVIG and did not survive. There was no statistical difference in duration of hospitalisation ($p = 0.07$), dose of hIVIG received ($p = 0.14$) or when hIVIG was administered ($p = 0.16$) between survivals and non-survival dogs. Adverse reactions attributed to the hIVIG were only observed in one dog (with primary IMT) that developed transient facial swelling and pruritus. This study suggests that hIVIG is relatively safe in dogs, capable of improving disease status in some dogs with immune mediated haematological conditions and potentially more useful in primary IMT.

ABSTRACT #55

DIAGNOSTIC AND PROGNOSTIC SIGNIFICANCE OF PERIPHERAL NUCLEATED RED BLOOD CELLS: A RETROSPECTIVE CASE-CONTROLLED STUDY OF 355 DOGS. A. Himelstein, G. Segev, M. Tovi-Mazaki and I. Aroch. Koret School of Veterinary Medicine, Hebrew University of Jerusalem, Israel.

Peripheral nucleated red blood cells (pNRBC) are commonly observed in dogs in hematological and other disorders. In humans, presence of pNRBC is associated with high morbidity and poor prognosis. The clinical significance of pNRBC in dogs and their association with prognosis have never been assessed in a large scale study. This retrospective study aimed to characterize the clinicopathologic findings, diagnoses and prognosis of dogs with pNRBC, and included 828 dogs admitted to the Hebrew University Teaching Hospital, of which 439 had pNRBC and 389 were negative controls. Wright-stained blood smears of all dogs were examined and differential leukocyte and pNRBC counts were assessed manually. Data retrieved from the medical records included the signalment, laboratory tests results, diagnoses and 30-day survival. The two groups were compared using appropriate statistical methods. Dogs with pNRBC were older (median age 90 *vs.* 70 mo, $P < 0.001$) and had higher ($P < 0.05$) leukocyte, segmented and band neutrophil counts, mean corpuscular volume, activities of ALP, AST, ALT, Amylase, GGT, LDH and higher concentrations of bilirubin, globulin, phosphorus, sodium, triglycerides, creatinine and urea, and lower hematocrit, hemoglobin concentration, RBC count, and mean corpuscular hemoglobin concentration *vs.* controls. Leukocytosis, anemia, decreased hemoglobin concentration, macrocytosis, hypochromia, hyperbilirubinemia ($P < 0.001$) and increased urea concentration ($P = 0.03$) were significantly more

common in dogs with pNRBC *vs*. negative controls. The prevalence of heatstroke, immune mediated hemolytic anemia (IMHA), lymphoma, hemangiosarcoma, anticoagulant poisoning, bite wounds and mast cell tumor was higher ($P \leq 0.02$) in dogs with pNRBC *vs*. controls. Death rate was higher ($P = 0.00008$) in dogs with pNRBC *vs*. controls. Logistic regression, using absolute pNRNC as a categorical variable showed increased mortality in the 4th quartile *vs*. controls (48 *vs*. 14%, respectively), indicating that pNRBC magnitude, not merely their presence, is a poor prognostic indicator. Nevertheless, absolute pNRBC was not an accurate outcome predictor (area under the receiver operator characteristic curve 0.65). In conclusion, presence of pNRBC in dogs is associated with multiple hematologic and serum biochemistry abnormalities and with mortality. Most hematologic abnormalities associated with presence of pNRBC are suggestive of a regenerative anemia, probably because IMHA and blood loss were more prevalent in this group. In dogs, as in humans, presence of pNRBC is a poor prognostic indicator.

ABSTRACT #65

IGF1 SECRETION IN DOGS WITH HEPATIC VASCULAR DISEASES. L. Jaillardon[1], L.Martin[2], B. Siliart[2]. [1]Hospital Clin. Laboratory, Department of Biology and Pathology, National Veterinary School, Nantes, France.[2]Endocrinology and Nutrition.

Various liver diseases are known to influence the IGF1 production in Human and Dog (Neumann 2007). To our knowledge, the relationship between IGF1 and hepatic vascular disease has never been documented. We therefore aimed to assess IGF1 secretion in dogs with hepatic vascular disease (including portosystemic shunting PSS and microvascular dysplasia MVD) and evaluate the usefulness of IGF1 assay for the diagnosis.

Our objective was to correlate variations in serum IGF1 with fasting and postprandial levels of serum bile acid in hepatic vascular diseases.

The study was performed on 99 dogs including 50 females (15 neutered) and 49 males (2 castrated) from 30 different breeds. Criteria for inclusion were based on confirmed diagnosis of PSS (surgery and/or medical imaging) and for the unconfirmed cases, neurological signs at the physical examination, significant increase of serum bile acid (i.e., postprandial level greater than 25 µmol/l) with absence of increase in the other liver parameters (alanine transferase and alkaline phosphatase mainly). In order to interpret IGF1 value, the animals were divided into 2 groups based on body weight : ≤ 10 kg (Group A, n = 81); > 10 kg (Group B, n = 18). The assays were performed by radioimmunoassay (IGF1:Mediagnost IGFR22) and spectrophotometry (Bile acid :Bio-Stat Bile Acid 1500).

The diagnosis of PSS was confirmed in 28 dogs. Age at presentation varied from 1.5 month to 11 years (median 1.3 yrs) with no significant difference between dogs with PSS and the other ones. Yorkshire Terriers were most commonly represented (n = 38) and 82% of the dogs weighed less than 10 kg.Fasting and postprandial bile acid were significantly higher ($p < 0.01$ for both) in dogs with PSS than in the other ones. The mean serum IGF1 concentration (ng/ml) in group A was significantly lower ($p < 0{,}001$) ($m = 65 \pm 72$) than our reference value for dogs < 10 kg ($m = 125 \pm 73$). Serum fasting and postprandial bile acid were negatively correlated with IGF1 values in group A. No significant difference was apparent in group B, probably due to the small number and heterogeneity of the dogs in this group.

IGF1 level is decreased and negatively correlated with bile acid in small breed dogs with hepatic vascular diseases. Decrease in IGF1 secretion could be use to assess liver function in addition to bile acid assay. It could be interesting to evaluate the variation of IGF1 values in a long-term study of dogs with hepatic vascular diseases.

ABSTRACT #66

VISUALISATION OF PORTOSYSTEMIC SHUNTS (PSS) BY HELICAL COMPUTED TOMOGRAPHY (CT) ANGIOGRAPHY IN 33 DOGS. J. Rieder[1], D. Simon[1], I. Nolte[1]. [1]Small Animal Hospital, Hannover University of Veterinary Medicine, Hannover, Germany.

The diagnosis of PSS is mainly based on contrast portography. A newer and safer method is the visualisation of PSS by helical computed tomography. This method has been previously described, but only in a small number of dogs. The aim of this study was the evaluation of helical CT for the diagnosis of PSS in dogs. This retrospective study analyzed dogs that were presented at the Small Animal Hospital, Hannover University of Veterinary Medicine, between 2003 and 2008 and with clinical signs suspicious of PSS and an elevated plasma ammonia level. Inclusion criteria were the performance of CT angiography and confirmation of CT results by laparotomy. Angiography was either performed by a double slice CT (Somatom AR, Siemens) or a multislice CT (Brilliance^{TM}, Philips). Animals were placed in ventral recumbency. Iodhexol (755 mg/dl; Omnipaque©) was used as contrast medium and was injected at a dosage of 2–3 ml/kg. Due to CT type the flowing rate varied between 15 and 30 seconds. Measurement with double-slice CT was started 30 seconds after injection whereas measurement with multislice CT was timed with bolus tracking. Subsequently, CT images were analyzed by multiplanar reconstruction (MPR) or 3-dimensional reconstruction. Laparotomy was used for the confirmation of CT diagnosis. 54 dogs were suspicious of PSS with increased plasma ammonia level but only 33 dogs underwent CT imaging and following laparotomy. Angiography was performed in 25 dogs with double-slice CT and in 8 dogs with multi-slice CT. Age ranged from 2 months to 3 years with a median of 6 months. 20 dogs had an extrahepatic, whereas 13 dogs had an intrahepatic shunt. Each CT diagnosis was assessed to be correct by laparotomy and no side effects were reported after contrast medium injection. Anasthesia was well tolerated by affected patients.

CT angiography is a valuable and safe diagnostic method for diagnosis of PSS and planning of surgery. This study provides information that CT scanning in veterinary medicine allows accurate and fast diagnostic approaches of PSS. CT may result in a shorter PSS surgery duration due to detailed information on individual patient anatomy. This study gives further data on multislice CT in PSS in veterinary medicine.

ABSTRACT #67

VACUOLAR HEPATOPATHY IN SCOTTISH TERRIERS: CLINICAL, BIOCHEMICAL, ULTRASONOGRAPHIC AND HISTOLOGICAL FINDINGS IN 13 CASES. P. Lecoindre[1], O. toulza[2], J. Hernandez[3], A. Gabriel[3], M. Chevallier[4]. [1]Clin Vet Cerisioz, [2]CHVAquivet, [3]CHV fregis, [4]Biomnis laboratory, France.

Previous studies have suggested that Scottish terriers have higher serum ALP activities than other breeds. Publications have suggested that Scottish terriers are predisposed to primary vacuolar hepatopathy. The aim of the present study is to describe clinical, ultrasonographic and histopathologic findings of vacuolar hepatopathy in Scottish terriers.

A retrospective analysis was performed on records from Scottish terriers that underwent liver biopsy. Inclusion criteria were limited to cases where clinical, biochemical, ACTH stimulation test and ultrasonographic findings were available. Liver histological analyses were assessed semi-quantitatively following the Metavir score* (cell necrosis, hepatocellular swelling, portal and lobular inflammation and grade of fibrosis).

Fifteen Scottish terriers were included in the study. The age of the dogs ranged from 4 to 12 years (median = 8.4 years). Female dogs represented 73 p.cent (11/15) of cases and male dogs 27 p.cent (4/15). Four dogs were related. Serum alkaline phosphatase activity was increased in all dogs (1209 ± 1080 UI/L, reference values = 10–50 UI/L). ACTH stimulation test was normal in 13 dogs and compatible with hyperadrenocorticism in 2 dogs. Ultrasonographic findings included: normal aspect (4/15), hepatomegaly (6/15), mild diffuse heterogeneity (6/15), diffuse trabecular aspect (5/15), nodular aspect (2/15), isolated mass (1/15). Liver biopsies were performed under ultrasonographic guidance in 8 dogs (true cut) and were wedge biopsies in 7 dogs. Histological findings included: normal aspect (1/15), idiopathic primary chronic hepatitis (1/15), vacuolar hepatopathy (13/15). Focal hepatocarcinoma was associated with vacuolar hepatopathy in 1 dog. In the group of vacuolar hepatopathy dogs, hepatocellular swelling was graded as G1: n = 2, G2: n = 5, G3: n = 6. Fibrosis was graded as F0: n = 6, F1: n = 3, F2: n = 1, F3: n = 2, F4: n = 1. Inflammation activity was graded as 0 = 4, + = 6, ++ = 3, +++ = 0. All dogs (3) in F3/F4 groups were older than 9. No correlation was found between hepatocyte swelling neither with the stage of fibrosis nor the inflammation activity. Intracytoplasmic cholestasis without ductular proliferation or biliary thrombi was found in 2 cases.

This series describes a breed associated liver disease. Scottish terriers'liver disease is characterized by hepatocyte swelling (so-called vacuolar hepatopathy) at different stages associated with variable inflammatory activity and fibrosis. Further studies are mandatory to know if this breed associated vacuolar hepatopathy can lead to steatohepatitis and hepatic cirrhosis. Hepatology 1996;24: 289–296

ABSTRACT #68

CLINICAL PARAMETERS IN DOGS WITH SONOGRAPHICALLY DIAGNOSED SURGICAL BILIARY DISEASE.

E Lindquist[1], A Brown[2], J Bush[1], J Frank[1]. [1]SonoPath.com & Sound Technologies New Jersey Mobile Associates, Sparta, NJ USA, [2]Dongan Hills Veterinary Hospital, Staten Island, NY, USA.

The purpose of this study was to quantify the most reliable clinical parameters that are consistent with surgical biliary disease in the dog. Retrospective analysis was performed on clinical parameters in 42 dogs that were found to have signs consistent with hepatobiliary disease and a sonographic diagnosis of surgical biliary disease. Entry criteria included 1) surgical resolution of clinical signs via cholecystectomy and/or biliary diversion, 2) euthanasia owing to lack of medical treatment response and owner's decline for surgical management, or 3) natural death shortly after diagnosis of surgical biliary disease. Twenty-nine dogs were treated surgically. Thirteen dogs were managed medically. Twelve/13 medically treated patients were euthanized or died without surgery within 4 months of clinical presentation or sonographic diagnosis. One patient survived 11 months with medical therapy alone.

The following clinical parameters were evaluated: vomiting 24/42(57%), anorexia 22/42(52%), lethargy 14/42(33%), visible icterus 11/42 (26%), diarrhea 4/42 (9%), & fever 1/42(2%). Five/42 patients had no overt clinical signs but were sonographically investigated for hepatic enzyme elevations. These 5 patients did have sonographic/surgical diagnoses of gall bladder mucocele or biliary calculi with evidence of complicating factors that warranted surgical treatment.

Complete blood counts revealed: leukocytosis 18/42 & anaemia 10/42.

Blood chemistry analyses revealed: Alanine transferase (ALT) normal 8/42, elevated $<$ 500 U/L 18/42, elevated $>$ 500 U/L 16/42; Alkaline phosphatase (SAP) normal 4/42, elevated $<$ 500 U/L 10/42, elevated $>$ 500 U/L 28/42; Bilirubinemia 22/42. One patient that underwent cholecystectomy, and diagnosed with moderate chronic fibrosing lymphoplasmacytic cholecystitis, had normal blood analysis and presented only for progressive anorexia.

Causes of biliary obstruction included gall bladder mucocele and/or cholecystitis/cholangiohepatitis (37/42), biliary calculi with partial or complete obstruction (3/42), and hepatic masses obstructing biliary flow/mucocele (2/42). Eleven patients had evidence of biliary rupture, localized peritonitis and adhesions, or full peritonitis at surgery.

Only 42% of patients in our group had leukocytosis even though histopathological analyses revealed significant levels of inflammation in most samples. Moreover, even though 52% of patients had serum bilirubin elevations only 26% revealed clinical icterus. Abdominal sonography was the key diagnostic tool utilized in all 42 cases to select surgery intervention as the recommended therapy.

ABSTRACT #69

LINKAGE OF DOBERMAN HEPATITIS TO THE CANINE MAJOR HISTOCOMPATIBILITY COMPLEX.

H Dyggve[1], LJ Kennedy[2], S Meri[3], T Spillmann[1], H Lohi[4], M Speeti[1]. [1]Department of Equine and Small Animal Medicine, University of Helsinki, Finland [2]Centre for Integrated Genomic Research, University of Manchester, UK[3]Department of Bacteriology and Immunology, Haartman Institute, University of Helsinki, Finland [4]Department of Basic Veterinary Sciences, Department of Medical Genetics, Program in Molecular Medicine, Haartman Institute, University of Helsinki, Folkhälsan Institute of Genetics, Biomedicum Helsinki, Finland.

Doberman hepatitis (DH) is a chronic and progressive inflammatory liver disease that mainly affects female dogs. The high incidence of chronic hepatitis in Dobermans is strongly suggestive for a genetic predisposition. The disease is characterized by lymphocyte infiltration, copper accumulation and major histocompatibility complex (MHC) class II antigen expression in the hepatocytes. Usually, MHC class II expression is restricted to professional antigen-presenting cells, but ectopic expression can be induced by cytokines in the target organs of autoimmune diseases. In dogs, the MHC is referred to as dog leukocyte antigen (DLA).

In this study, the potential role of DLA genes in DH was investigated by genotyping the polymorphic exon 2 of DLA-DRB1, DQA1 and DQB1. The case group comprised 37 Dobermans with subclinical or clinical DH. The control group consisted of 37 healthy Dobermans that were over 10 years old and had normal liver values. Elderly dogs were chosen as controls to gain the lowest possible genetic risk of getting DH.

A strong association of the homozygous DLA haplotype DRB1×00601/DQA1×00401/DQB1×01303 with the presence of DH was observed (OR 14.9, CL = 3.1–71.7, $p < 0.00005$). Overall there was greater haplotype variation in the control group compared with the case group. Interestingly, the heterodimer DLA-DQA1×00901/DQB1×00101 appears to confer resistance to DH ($p < 0.001$).

The background of the disease is unknown but DLA genes seem to have an important contribution to disease susceptibility and tolerance. Our results suggest an immune origin for DH.

ABSTRACT #70

DEVELOPMENT OF A MEASURE OF QUALITY OF LIFE FOR CATS WITH DIABETES MELLITUS AND THEIR OWNERS: THE DIAQOL-PET.

S. Niessen[1,2], S. Powney[1], J. Guitian[1], A. Niessen[3], P. Pion[4], J. Shaw[2], D. Church[1]. [1]Veterinary Clinical Sciences, Royal Veterinary College, Hatfield, UK, [2]Diabetes Research Group, Medical School, Newcastle, UK, [3]Twan, Tilburg, Netherlands, [4]VIN, Davis, USA.

Defining treatment success in veterinary diabetes mellitus (DM) is generally limited to diminishing DM related clinical signs as well as demonstrating reductions in average blood glucose values. This study reports the design and application of a novel individualised, patient and owner-centred survey measuring perceived impact of DM on quality of life (QoL) of diabetic cats and their owners. Discussions and pilot-surveys were conducted with veterinarians, diabetic cat owners and human DM QoL survey designers, leading to the design of 29 specific DM-associated QoL questions (DIAQoL-pet). Each item was scored according to frequency with which it impacts upon lives of owners and their cat (range: all the time ... never) and perceived importance (range: very important ... not at all important). The Item-Weighted-Impact-Score (IWIS) for each item was calculated by multiplying frequency and importance ratings; the Average-Weighted-Impact-Score (AWIS) by averaging all IWISs. Two overview questions measured overall QoL and diabetes-dependent-QoL. 221 owners of insulin-treated diabetic cats completed the survey. 87% of respondents originated from the UK and USA. The cats' average age was 12.4+/−3.1years (mean+/−standard deviation); body weight 5.7+/−1.9 kg; 64% were domestic short or long hair. Average insulin dose was 0.47+/−0.5iu/kg and 82% received insulin 12 hourly. The 29-item DIAQoL-pet had high internal consistency reliability (Cronbach $\alpha = 0.89$) and could be summarised into an AWIS of -1.76+/−2.4. Areas reported as most negatively impacting on QoL (based on IWIS) included: 'boarding difficulties' (−4.67+/−5.3), 'owner wanting more control over DM' (−4.34+/−4.7), 'difficulties leaving cat with friends/family' (−4.21+/−4.7), 'worry about cat's DM' (−4.10+/−3.9), 'hypoglycaemia worry' (−3.67+/−3.5), 'adapting social life' (−3.48+/−3.9), 'DM-related costs' (−3.04+/−3.8), 'adapting work life' (−3.03+/−3.7), 'pet's moods' (−2.87+/−2.9) and 'limiting activities like holidays' (−2.81+/−3.9). 51% considered their cat's present QoL 'as good as it could possibly be'; 49% felt their cat's life would be 'a little better' without DM. The DIAQoL-pet showed high internal consistency reliability and identified specific areas most negatively impacting on the QoL of a group of diabetic cats and their owners. This tool may prove useful for clinical use and whilst testing new diabetic treatment options.

ABSTRACT #71

LOW DOSE TRILOSTANE TREATMENT IN DOGS: A RETROSPECTIVE STUDY OF 1416 CASES (2006–2009). L. Martin[1], B. Siliart[1], L. Jaillardon[2], H. Dumon[1]. [1]Endocrinology and nutrition, [2]Hospital Clin. Laboratory, Department of Biology and Pathology, National Veterinary School, Nantes, France.

Trilostane (T), an inhibitor of 3β-HSD, is a medical treatment of hyperadrenocorticism (HAC) in dogs. After the recommended initial dose of 3–10 mg/kg/d, the dosage and frequency of administration need to be adjusted An ACTH stimulation test should be performed about 10, 30 and 90 days after starting therapy. This test is performed 4 hours after T administration and interpreted along with clinical findings (Church, 2008). We determined the clinical and biological effects of a low dose of T (2 mg/kg/d) in a large cohort of dogs. Diagnosis of HAC was based on clinical (PUPD, dermatologic signs, bodyweight redistribution) and biological signs (increased ALP and cholesterol, post-ACTH cortisol > 550 nmol/L). Dogs with signs of any other disease were excluded. 1678 dogs (mean age 12 yr) consisting of 1043 females (574 spayed) and 634 males (190 castrated) from 109 breeds were included just after HAC diagnosis. Mean basal cortisol was 210 ± 166 nmol/L and 1170 ± 532 nmol/L post-ACTH at diagnosis. The starting treatment was 2 mg/kg/d. After 10 days, post-ACTH cortisol (Ct) was 251 ± 213 nmol/L. The same dose was maintained. After 30d, Ct was 308 ± 316 nmol/L (74% in the normal range), 70% of the dogs had a good clinical improvement (GCI), 5% required a higher dose and 9% a lower dose. After 90d, Ct was 347 ± 410 nmol/L L (61% in the normal range) and 75% of the dogs had GCI, 20% required a higher dose and 19% a lower dose. The mean dose was 3.9 ± 2.0 mg/kg/d. After 6mo, Ct was 496 ± 465 nmol/L (55% in the normal range), 69% of the dogs had GCI, 14% needed a higher dose and 31% a lower dose. The mean dose was 3.0 ± 1.4 mg/kg/d. After 1 yr, Ct was 556 ± 550 nmol/L (58% in the normal range), 76% of the dogs had GCI, 33% required a higher dose and 9% a lower dose. The mean dose was 2.9 ± 1.8 mg/kg/d. Cortisol secretion remained within the normal range for about 161d. The treatment was stopped in 42 dogs and one dog died unexpectedly after 319d of treatment: 33 with diabetes, 3 after 21d (acute renal failure, cutaneous rash and hemorrhagic diarrhoea – this dog died), 1 after 44d (persistent hematuria), 2 after 80d (renal failure and persistent lethargy) and 3 within 300d on T (persistent epitaxis, 2 Addison's). Ten of the dogs with diabetes showed initial signs within 15d of treatment, 9 dogs within 3 mo (one died a week later), 6 within 6 mo and 9 within 1 yr.When the dose was unchanged, follow-up showed a progressive resistance against T after 6 mo. This study showed that T at a dose between 2 to 3 mg/kg/d was efficient for long term treatment of more than 60% of dogs with resolution of the clinical signs (decreased PUPD, normal hair growth) despite high ALP in more than 40%. Less than 3% of dogs developed adverse reactions and less than 2% died.

ABSTRACT #72

INCIDENCE OF HYPERTENSION IS LOWER IN CANINE PITUITARY-DEPENDENT HYPERADRENOCORTICISM COMPARED TO ADRENAL TUMOR. YH Lien, H.P Huang. Graduate Institute of Veterinary Medicine, Veterinary School, National Taiwan University, Taipei, Taiwan.

Hyperadrenocorticism is characterized by chronically elevated levels of circulating cortisol produced by the adrenal cortex. This chronic cortisol overproduction commonly causes hypertension. This study aimed to determine if the severity of hypertension differed depending on the cause of hyperadrenocorticism. Thus, systemic arterial pressure was compared in dogs affected with pituitary-dependent hyperadrenocorticism (PDH) or adrenal tumor (AT). Forty dogs affected with PDH (16 spayed females, 6 intact females, 12 intact males and 6 castrated males, mean age: 10.7 ± 2.7 years, mean body weight: 9.9 ± 8.6 Kg) and 30 dogs affected with AT (11 spayed females, 5 intact females, 9 intact males, 5 castrated males, mean age: 12.9 ± 2.2 years, mean body weight: 7.9 ± 5.6 Kg) were included in this study. The criteria for PDH diagnosis and study inclusion were clinical signs and routine biochemical test results consistent with canine hyperadrenocorticism, positive results of an ACTH stimulation test, and adrenal ultrasonographic findings. Dogs with inconclusive ACTH stimulation test results were excluded from the study. Signalment and pre-treatment systemic arterial pressure, as measured using Doppler sphygmomanometry, were recorded. Hypertension (> 160 mmHg) was identified in 20.0% (8/40) of dogs affected with PDH; a much higher percentage, 46.7% (14/30), of dogs with AT were hypertensive. The mean systemic arterial pressure in dogs affected with PDH and AT was 142.2 ± 24.9 mmHg and 164.1 ± 36.7 mmHg, respectively ($P < 0.05$). Furthermore, heart rate was higher in dogs with AT compared to PDH (133.7 ± 21.9 versus 122.3 ± 21.8 bpm, respectively; $P < 0.05$). No sex predilection or body weight was found in the development of PDH, AT, or hypertension. This study indicated that age of diagnosis, basal systemic arterial pressure and heart rate were significantly lower in dogs with PDH compared to those with AT. Further studies comparing aldosterone concentrations and hypertension consequences between PDH and AT dogs are warranted.

ABSTRACT #73

CT SCAN CHARACTERIZATION OF ADRENAL GLANDS IN 52 DOGS WITH HYPERADRENOCORTICISM. MI Rodríguez Piñeiro[1,2,3], P de Fornel-Thibaud[1,2], G Benchekroun[1], F Garnier[4], C Maurey-Guenec[1], F Delisle[1,2], and D Rosenberg[1]. [1]Internal Medicine Unit, National Veterinary School of Alfort, Maisons-Alfort, France. [2]Veterinary Anticancer Center, Maisons-Alfort, France. [3]Department of Veterinary Clinical Sciences, Veterinary Faculty of Lugo, Spain. [4]Biochimistry Unit, National Veterinary School of Lyon, Marcy l'Etoile, France.

Adrenal gland CT scan has been proposed in the etiological diagnosis of dogs with hyperadrenocorticism (HAC). Both adrenal gland symmetry/asymmetry and the size of the 2 glands, generally standardized by aorta diameter (AD), are considered for the differentiation between ACTH-dependent HAC (ADHAC) and ACTH-independent HAC (AIHAC). However, no-objective criteria have been validated for this differentiation.

The purpose of this study is to compare adrenal CT scan findings in ADHAC and AIHAC cases, and to validate criteria for their distinction on a large cohort of dogs.

Adrenal CT scans of dogs with HAC were retrospectively analyzed. Inclusion criteria were: 1/ clinical data consistent with HAC confirmed by ACTH stimulation test, low-dose dexamethasone suppression test or both. 2/ An univocal characterization of the cause of HAC: for AIHAC by an unquantifiable plasma ACTH concentration combined with histopathological confirmation on the removed adrenal gland; for ADHAC, by an unsuppressed ACTH concentration (Rodríguez Piñeiro *et al*., J Vet Int Med, In press). Maximal thickness of the larger (LT) and of the smaller gland (ST), maximal length of the larger (LL) and of the smaller gland (SL), and AD were recorded on reformatted images. The LT/AD, ST/AD, LT/ST and (LT-ST)/((LT + ST)/2) ratios were calculated.

Fifty-two dogs met the inclusion criteria: 41 with ADHAC, and 11 with AIHAC. Median (range) for ADHAC and AIHAC were respectively 11.7(5.1–28.8) and 23.3(13.8–31.9) for LT, 10(4.8–19.8) and 6.9(3.9–8.8) for ST, 24.3(13.4–39.7) and 30.4(16.3–43.3) for LL, 21.6(11.0–38.9) and 18.5(10.5–25.4) for SL, 1.30(0.78–2.46) and 2.14(1.43–3.80) for LT/AD, 1.08(0.66–1.57) and 0.68(0.39–0.84) for ST/AD, 1.14(1.00–2.42) and 3.19(2.39–8.18) for LT/ST, 0.13(0.00–0.91) and 1.23(0.90–2.51) for (LT-ST)/1/2(LT + ST). Only 1 dog in the ADHAC group had a (LT-ST)/((LT + ST)/2) ratio overlapping the AIHAC range. The 95% Confidence Intervals for estimated sensitivity and specificity of (LT-ST)/((LT + ST)/2) ratio > 0.90 in the diagnosis of AIHAC were 0.76–1.00 and 0.87–1.00 respectively.

This study suggests that maximal thickness and length of both the larger and the smaller adrenal glands, standardized or not by AD, are not reliable for ADHAC and AIHAC distinction. Difference between the maximal gland thicknesses with respect to the mean appears to be the most accurate tested criteria.

ABSTRACT #74

PRO-OPIOMELANOCORTIN (POMC) PROCESSING AND PROHORMONE CONVERTASE 1 (PC1/3) LEVEL IN DOGS WITH PITUITARY CORTICOTROPH TUMORS. G. Benchekroun[1], P. de Fornel Thibaud[1,2], C. Maurey-Guenec[1], and D. Rosenberg[1]. [1]Internal Medicine Unit, National Veterinary School of Alfort, Maisons Alfort, France [2]Veterinary Anticancer Center, Maisons Alfort, France.

Pituitary corticotroph cells express the adrenocorticotropin hormone (ACTH) precursor known as pro-opiomelanocortin (POMC)

and the prohormone convertase 1 (PC1/3) enzyme. This co-expression allows the multistep proteolytic maturation of POMC into pro-ACTH and then into ACTH before ACTH secretion. High ACTH precursors plasma levels have been measured in dogs with Cushing's disease associated with large corticotroph tumors (J Vet Intern Med 2005; 19:23–28). The data invite to consider alteration of PC1/3 protein level and POMC processing within these tumors. The aim of this study was to characterize in dogs ACTH precursors and PC1/3 protein levels within small and large corticotroph tumors.

Pituitary tumors of dogs with Cushing's disease were *post-mortem* collected 30 minutes to 12 hours after natural death or euthanasia. Pituitary tumors were arbitrarily classified as small tumors (pituitary height < 6 mm) or large tumors (pituitary height $\geq$ 6 mm). Pro-opiomelanocortin, pro-ACTH and PC1/3 were analysed by Western Blotting. After extraction, 3 µg of total protein from each pituitary sample were loaded, resolved by SDS-PAGE, transferred and revealed with adapted positive controls. Standardization of loading was controlled by β-actine Western Blotting after membranes stripping.

Seven small corticotroph tumors and 5 large corticotroph tumors were collected. POMC and pro-ACTH signals were visualized in 5/5 large tumors and in 5/7 small tumors. The strongest signal intensity was observed in 2 large tumors. Pro-opiomelanocortin signal was higher than pro-ACTH signal in 5/5 large tumors whereas it was equal or lower than pro-ACTH signal in 5/7 small tumors. Prohormone convertase 1 signal was weak to undetectable in 5/5 large tumors whereas signal was strong in 5/7 small tumors.

Taken together, the results suggest difference of PC1/3 protein levels and patterns of POMC processing between large and small corticotroph tumors. In case of confirmation on larger groups of tumors, they invite to further characterize the mechanism involved in these differences.

ABSTRACT #75

FACTORS ASSOCIATED WITH THE DEVELOPMENT OF AZOTAEMIA FOLLOWING TREATMENT OF HYPERTHYROIDISM (HTH). TL Williams, KJ Peak, D Brodbelt, J Elliott, HM Syme. Royal Veterinary College, London, UK.

Previous studies have identified potential biomarkers for pre-existing chronic kidney disease (CKD) in uncontrolled HTH, although the results of these studies are conflicting. This study aimed to identify biomarkers associated with the development of azotaemia within 6 months of initiating treatment for HTH.

Records from 2 London-based first opinion practices between 1999 and 2007 were reviewed to identify cats diagnosed with HTH without azotaemia.

Mann-Whitney U or Fisher's exact tests were used to determine if the following variables assayed at diagnosis were related to the subsequent development of azotaemia: age, hypertensive status, sex, total T_4 (TT4) concentration, routine plasma biochemical parameters, packed cell volume (PCV), urine specific gravity (USG), urine protein:creatinine ratio (UPC) and urine albumin:creatinine ratio (UAC). If an association was evident at the 20% level, these data were recoded into categorical variables, including a category for missing data, and entered into a backward, stepwise, multivariable logistic regression model ($P < 0.05$).

Three hundred and fourteen cats were diagnosed with HTH, though 45 cats were excluded from the analysis for the following reasons: previous treatment for HTH (33), no treatment for HTH (6), furosemide therapy (3), diabetes (2), and concurrent diagnosis of hepatocellular carcinoma (1), leaving 269 cats eligible for inclusion. The median age at diagnosis was 14.1 years ($n = 253$, range 6.2–24.0 years). There were 151 female cats (2 entire) and 118 male cats (3 entire). Forty-one cats (15.2%) developed azotaemia within 240 days of diagnosis of HTH. Variables that were related to development of azotaemia ($P < 0.2$) were hypertension, TT4, urea, creatinine, USG, total protein (TP), globulin, alanine aminotransferase, alkaline phosphatase and UPC. The missing data category was not significantly associated with development of azotaemia for any factor ($P \geq 0.05$). The development of azotaemia had a significant positive association with urea ($P = 0.047$) and a significant negative association with USG ($P = 0.014$), TP ($P = 0.003$) and TT4 ($P = 0.012$). Creatinine and globulin were not included in the model as they were highly correlated with urea and TP respectively, however, creatinine was not associated with the development of azotaemia ($P = 0.122$) when substituted for urea in the model.

Urea, USG, TP and TT4 could aid in identifying those cats which require additional treatment for underlying CKD. Given the association between proteinuria and the development and progression of azotaemia in aged cats, the lack of predictive value of UPC is an unexpected result.

ABSTRACT #76

FACTORS ASSOCIATED WITH SURVIVAL OF HYPERTHYROID CATS. TL Williams, KJ Peak, D Brodbelt, J Elliott, HM Syme. Royal Veterinary College, London, UK.

Previous studies have associated age at diagnosis, sex and the presence of chronic kidney disease (CKD) with survival of cats with hyperthyroidism (HTH). This study aimed to determine if proteinuria is an additional prognostic indicator in cats with HTH.

Cats diagnosed with HTH at 2 London-based first opinion practices between 1999 and 2007 were included in the study.

The following variables were entered into a univariable Cox Regression analysis to determine if they were associated with survival: age and hypertensive status at diagnosis, sex, baseline total T_4 (TT4) concentration, routine plasma biochemical parameters, packed cell volume (PCV), urine specific gravity (USG), urine protein:creatinine ratio (UPC) and urine albumin:creatinine ratio (UAC). Those that showed possible association ($P < 0.2$) were then included in a backward, stepwise multivariable Cox regression analysis. Statistical significance was set at the 5% level. Where a substantial number of missing values were present an additional category 'missing' was added.

Three hundred and one cats were eligible for inclusion after 45 cats were excluded from the analysis for the following reasons: previous (33) or lack of (6) treatment for HTH, furosemide therapy (3), diabetes (2), and concurrent diagnosis of hepatocellular carcinoma (1). The median age at diagnosis was 14.3 years ($n = 285$, range 6.2–25.0 years). There were 167 female cats (2 entire) and 134 male cats (3 entire). At the end of the follow up period, 241 cats had been euthanased or had died (median survival time 415 days, range 0–2541 days) and 60 cats were alive or lost to follow up (median follow up time 55 days, range 0–2312 days). Variables univariably related to survival ($P < 0.2$) were age, hypertension, TT4, urea, creatinine, USG, total protein (TP), globulin, phosphate, PCV, and UPC. The missing data category was not significantly associated with survival for any factor ($P < 0.05$). In the multivariable model reduced survival was positively associated with presence of hypertension ($P = 0.024$), urea ($P = 0.028$) and age ($P < 0.001$) and negatively associated with PCV ($P = 0.038$) and USG ($P = 0.003$). UPC tended towards but was not significantly associated with survival ($P = 0.052$). Creatinine and globulin could not be included in the model as they were highly correlated with urea and TP respectively. Creatinine was positively associated with reduced survival ($P = 0.019$) when substituted for urea in the multivariable analysis.

Hypertension, urea, creatinine, age, USG and PCV appear to be of prognostic importance in cats with HTH. UPC and UAC appear unrelated to survival in hyperthyroidism, unlike in cats with CKD, despite the marked proteinuria associated with this condition.

ABSTRACT #77

EFFECT OF RECOMBINANT HUMAN TSH ON THE UPTAKE OF RADIOACTIVE IODINE (^{123}I) BY THE THYROID GLAND IN HEALTHY BEAGLES. M. Campos[1], K. Peremans[2], L. Duchateau[3], A. Dobbeleir[2], E. Vandermeulen[2], G. Paes[1], S. Daminet[1]. [1]Dept. of Med. and Clin. Biology of Small Animals, [2]Dept. of Vet. Med. Imaging and Small Animal Orthopaedics, [3]Dept. of Physiology and Biometrics, Ghent University, Belgium.

In human medicine recombinant human TSH (rhTSH) increases the thyroid radioactive iodine uptake (RAIU) allowing radioiodine (^{131}I) dose reduction and higher efficacy in the treatment of differentiated thyroid cancer and multinodular goiter. It can be expected that rhTSH has a similar effect in dogs. The goal of this study was to evaluate the effect of rhTSH, administered 24 h and 48 h before radioiodine (^{123}I), on the thyroid RAIU in healthy dogs.

7 euthyroid healthy beagles were randomly divided in 3 groups in a prospective, double-blinded, cross-over study. On week 1, one group received ^{123}I for a baseline RAIU, one group received 100 µg of rhTSH IV 24 h before ^{123}I and one group received 100 µg of rhTSH IV 48 h before ^{123}I. All dogs received 37 MBq of radioactive

^{123}I IV and thyroid RAIU was determined 8 h, 24 h and 48 h thereafter. The study was designed in such a manner that each dog received the 3 treatments and a wash-out period of 3 weeks was respected between them. Blood samples were taken for measurement of serum total thyroxine (TT4) concentration at baseline, 6 h, 12 h, 24 h and 48 h after rhTSH administration.

rhTSH caused no significant change on thyroid RAIU. The overall mean thyroid RAIU significantly decreased during the study independent of the treatment. rhTSH significantly increased serum TT4 concentration, which peaked 6 h after rhTSH administration. No adverse effects of rhTSH were observed during the study.

Results suggest that 100 μg of rhTSH administered IV 24 h or 48 h before radioiodine have no influence on thyroid RAIU in healthy dogs. Further studies are needed to determine the best timing and dosage of administration of rhTSH in healthy and thyroid carcinoma dogs.

ABSTRACT #78

ANTITHYROGLOBULIN ANTIBODIES IN CANINE PRIMARY HYPOTHYROIDISM. B. Siliart[1], L. Jaillardon[1], L.Martin[1], J-M. Person[2]. [1]Endocrinology and nutrition, [2]general pathology microbiology and virology, [1,2]Hospital Clin. Laboratory, Department of Biology and Pathology, National Veterinary School, Nantes, France.

At least 50% of primary thyroid failures result from immune-mediated thyroiditis. Recent research has focused on the genetics and immunology of canine thyroid disease (Graham PA 2007). Routine vaccination, for example, may result in increased anti-canine thyroglobulin antibodies (TgAb) (Scott-Moncrieff 2002). Whether these have a deleterious effect on canine thyroid function is unknown. We assessed the role of TgAb in canine primary hypothyroidism by EIA assay method. Canine thyroglobulin (cTg) was purified by chromatography and coated on Nunc-Maxisorp microplates. After binding and rinsing, TgAb were revealed by peroxidase-labelled anti-dog IG G antibody (Jackson laboratory). The positive control was a pool of highly positive dog sera (arbitrarily fixed at 1000 U/mL). The positivity threshold was 15 U/mL. 109 dogs (47 breeds) were included just after the primary hypothyroidism diagnosis: 61 females (18 spayed), 45 males (3 castrated), aged 1 to 15 years (66.1%: 3 to 7 years). Diagnosis was based on clinical and biological signs of hypothyroidism i.e. fatigability, body weight increase, dermatologic signs, high cholesterol ($>$ 7.5 mmol/L), high c-TSH DPC ($>$ 0.5 ng/mL), and low RIA FT4 Beckman-coulter ($<$ 12 pmol/L), the test specificity being 97.0% (Martin 2006). Results: 48 dogs (44%) were TgAb positive. No significant difference in sex, breed or age was observed between positive (P) and negative dogs (N). Clinical and biological signs were significantly ($p < 0.05$) less severe in P: obesity (P 43.3%, N 52.1%), abnormal behaviour (P 15.2%, N 25.0%), alopecia (P 62.5%, N 77.3%), mean cholesterol (P 10.6 mmol/L, N 14.2 mmol/L). Clinical signs were less ancient in P (P 4 months, N 8.5 months). Mean FT4 was lower ($p < 0.05$) in P (4.2 pmol/L) than in N (6.7 pmol/L), mean cTSH was higher ($p < 0.01$) in P (2.6 ng/mL) than in N (1.4 ng/mL). The levothyroxine dose required to obtain good clinical improvement after 2 months of treatment, was higher in P (22.4 μg/kg) than in N (9.2 μg/kg). The TgAb in 18 of the 44 P were measured every 6 months: 17 dogs became negative: 2 after 6 months, 2 after 12, 5 after 24, 1 after 30, 4 after 36, and 3 after 42, and one was still positive after 54 months. cTSH stayed high during treatment of P, but decreased in 15 of the 17 dogs when they became negative. This study confirms that primary hypothyroidism is frequently due to an immune process, lasting from 6 months to 4 years. After negativity, the thyroid atrophies, cTSH secretion decreases (as demonstrated in thyroidectomized dogs by Diaz-Espiñeira, 2008) and the clinical signs get worse. Systematic use of the TgAb assay when cTSH is high at hypothyroidism diagnosis or remains high after several weeks of treatment, could be of interest.

ABSTRACT #80

ROLE OF VITAMIN D RECEPTOR GENE POLYMORPHISMS AND VITAMIN D IN CANINE DIABETES MELLITUS. K. Weber[1], C. Palm[1], M. Dolezal[2], L. J. Kennedy[3], K. Hartmann[1]. [1]Clinic of Small Animal Internal Medicine, LMU University of Munich, Germany, [2]Institut für Populationsgenetik, Veterinaermedizinische Universitaet Vienna, Austria, [3]Centre for Integrated Genomic Medical Research, School of Translational Medicine, Stopford Building, The University of Manchester, UK.

Canine insulin deficiency diabetes is a slowly progressive disease with a suspected underlying autoimmune component and as such resembles human latent autoimmune diabetes of adults (LADA). In humans, some forms of insulin-dependent diabetes have been found to be associated with allelic variants of the vitamin D receptor (VDR) and with vitamin D deficiency. The activated form of vitamin D, 1,25-dihydroxyvitamin D3 (calcitriol) is considered a potent modulator of the immune system and down regulates autoimmune responses mediated by T-helper1 cells. Therefore, the aim of this study was to assess whether polymorphisms in the VDR gene contribute to susceptibility for diabetes in dogs. Since little is known about the vitamin D status of dogs, serum calcitriol and 25-hydroxyvitamin D3 levels were evaluated in a group of diabetic dogs and an age-matched control group. Single nucleotide polymorphisms (SNPs) of the VDR were screened using a Sequenom MassARRAY Compact system and analyzed using the whole genome association analysis toolset PLINK. Genotyping of 609 diabetic and 1237 control dogs revealed 44 SNPs in the canine VDR gene. Case:control analysis was performed for 16 breeds classified according to Fédération Cynologique Internationale (FCI) nomenclature as well as for crossbreeds. Only breeds with at least 10 cases and 10 controls were analyzed for SNPs with a minor allele frequency $>$ 1%. Stratified analysis corrected for multiple testing demonstrated a significant association for a single SNP in Labrador Retrievers but no association in any other breed. No difference in serum levels of vitamin D metabolites (calcitriol and 25-cholecalciferol) could be detected between dogs with diabetes mellitus ($n = 25$) and the control group of healthy dogs ($n = 18$). Polymorphisms of VDR are probably not of major importance as a risk factor for diabetes mellitus in dogs. In humans, vitamin D supplementation is discussed as prevention for autoimmune diseases including insulin-dependent diabetes. No overt vitamin D deficiency could be detected in diabetic dogs in this study, but vitamin D requirements in the dog are not well established and further investigations regarding its effects on canine health are indicated.

ABSTRACT #81

EVALUATION OF A NOVEL CONTINUOUS GLUCOSE-MONITORING SYSTEM ADOPTED FOR USE IN CATS. E Zini[1], S Moretti[1], F Tschuor[1], M Osto[2], M Franchini[3], M Ackermann[3], TA Lutz[2], CE Reusch[1]. [1]Clinic for Small Animal Internal Medicine; [2]Institute of Veterinary Physiology; [3]Institute of Virology, Vetsuisse Faculty, University of Zurich, Switzerland.

Measurement of blood glucose and generation of blood glucose curves are integral part of monitoring diabetes in cats. However, even if portable glucose meters are used to facilitate blood sampling several limitations are present, including the fact that reliable curves are difficult with uncooperative cats or if stress-induced hyperglycemia occurs, and that even with numerous sampling the glucose nadir or peak may be missed. To assess glycemia more frequently the continuous glucose monitoring system (CGMS) has been recently adopted in diabetic cats. A novel CGMS that provides glucose levels in real-time and does not require placing the monitor on the cat has been developed. The aim here was to assess performance of this new CGMS, the Guardian REAL-Time® (Medtronic, Switzerland), for use in cats.

The CGMS consists of a disposable sensor placed subcutaneously through skin puncture. Glucose in the interstitial fluid is measured by an electrochemical reaction every 10 sec and average values are recorded on the monitor every 5 min.Accuracy of the CGMS was calculated against our reference glucose meter (AlphaTRAK®, Abbott, England) at normal, high and low glucose levels using error grid analysis, with a total of 250 paired cat samples. The grid assigns predicted glucose values (CGMS) versus actual glucose values (glucose meter) to five zones (A through E). Measurements in zones A and B are accurate as they lead to clinically correct treatment decisions, whereas those in zones C, D and E cause treatment errors. In addition, the time delay between a rise of glucose in capillary blood and interstitial fluid, as measured with the reference glucose meter and CGMS respectively, was assessed in 5 healthy cats injected intravenously with a glucose bolus (1 g/kg). Second derivative of the curves were calculated.

Based on error grid analysis the CGMS provided readings in zones A and B in 100%, 97.0% and 90.0% of cases at normal, high and low glucose levels, respectively. Readings of the CGMS deviated from reference of ± 2.1 mmol/l at normal, ± 2.6 mmol/l at high, and ± 1.1 mmol/l at low glucose levels. The median time delay to observe an increase of interstitial glucose after a rise in the capillary blood was 14.2 min (range: 8.8–19.7 min).

The use of the CGMS is reliable in cats with hyperglycemia and normoglycemia but may lead to wrong therapeutic decisions if glucose levels are low. Usefulness of the CGMS in cats with hypoglycemia needs to be further explored before the device can be safely used in clinical practice.

ABSTRACT #82

ENDOTOXIN DOWNREGULATES EXPRESSION OF INSULIN SENSITIVITY-RELATED GENES DESPITE NORMAL WHOLE-BODY INSULIN SENSITIVITY IN CATS. M Osto[1], E Zini[2], M Franchini[3], Karin Kaufmann[1], M Ackermann[3], CE Reusch[2], TA Lutz[1]. [1]Inst. Vet. Physiol.; [2]Clin. Small An. Intern. Med.; [3]Inst. Virol., Vetsuisse Faculty, University of Zurich, Switzerland.

Insulin resistance in human type 2 diabetes mellitus (T2DM) has been partly associated with low-grade systemic inflammation that is characterized by elevated levels of cytokines. The relationship between activation of inflammatory signaling pathways and insulin resistance remains poorly understood. Given the similar pathophysiology of T2DM and feline diabetes mellitus, we studied some of the functional effects and molecular aspects of lipopolysaccharide (LPS)-induced inflammation as a potential primary cause of insulin resistance in cats.

Healthy cats were infused via the jugular vein with increasing doses (10, 200, 500 and 1000 ng/kg/h) of LPS (n = 5) or saline (n = 5) for 10 days. Plasma levels of adiponectin were assessed on day 0 and 10. On day 10, circulating levels of α_1-acid glycoprotein (AGP), monocyte chemotactic protein-1 (MCP-1) and serum amyloid A (SAA) were measured. An intravenous glucose tolerance test (iv-GTT) was performed and whole-body insulin sensitivity was calculated. Specimens were collected from subcutaneous and omental fat, liver and skeletal muscles. Tissue mRNAs of insulin sensitivity-related and inflammation-related genes were quantified. Results were compared between groups with non parametric tests.

Whole-body insulin sensitivity and plasma adiponectin did not differ between LPS- and saline-infused cats at any time point. Compared to controls, LPS-infused cats had highly increased circulating levels of AGP, MCP-1 and SAA on day 10. In the LPS group, expression of MCP-1 and neutrophil elastase mRNA was increased in subcutaneous fat and transcripts of the macrophage marker F4/80 were augmented in all tissues except omental fat. Interleukin-8 mRNA was increased in liver and toll-like receptor 4 (TLR4) was decreased in skeletal muscle. LPS-infused animals had decreased GLUT4 mRNA in omental fat and reduced PPARγ1 and 2 in liver. Insulin receptor substrate-1 mRNA was decreased and resistin augmented in skeletal muscle.

LPS-infusion in cats induced an expected increase in circulating as well as tissue markers of inflammation, and downregulates genes important to prevent insulin resistance, such as GLUT4 and PPARã2. Despite these findings, whole-body insulin sensitivity was kept normal. Because TLR-4 expression was decreased in skeletal muscle, it may be possible that desensitization to LPS, at least in some tissues, partly explains the preserved insulin sensitivity.

ABSTRACT #83

ACIDIC URINE DOES NOT PROMOTE URINARY CALCIUM OXALATE SUPERSATURATION IN HEALTHY CATS. I. van Hoek, C. Tournier, F. Garnier, C. Venet, Y. Soulard, S. Vialle, V. Biourge. Royal Canin Research Center, Aimargues, France.

Acidifying diets for the dietary treatment of struvite uroliths is regarded a risk factor for formation of calcium oxalate (CaOx) uroliths, by increasing urinary calcium concentration and excretion. This study investigated the relationship between urinary pH and CaOx relative supersaturation (CaOX-RSS) in healthy cats.

A dry expanded control diet served as basis for 12 diets inducing different urinary pH. Diets differed only in acidifying agents and their concentration. Diets were fed in random order for 2 weeks to 7 adult DSH cats (4 neutered males, 3 females [1 sterilized]). Urinary CaOx-RSS was calculated using SUPERSAT^{TM} software after measurement of pH, Ca, Mg, Na, K, NH_4^+, phosphate, citrate, sulfate, oxalate and uric acid in pooled urine of each cat from the last 5 days of each study period. Results were analyzed with simple regression (5% significance level) and expressed as mean ± SD (range).

Urinary pH was 6.1 ± 0.2 (5.7–6.9) and CaOx-RSS was 5.6 ± 2.0 (1.8–12.6). A significant ($P = 0.01$) however negligible correlation ($R^2 = 0.06$) was found between urinary pH and CaOx-RSS.

This study showed no evidence of acidic urine promoting increased CaOx-RSS. These findings support the hypothesis that an acidifying diet can be formulated to reduce both struvite and CaOx urine saturation.

ABSTRACT #84

EFFECT OF WEIGHT GAIN ON IMMUNOLOGICAL PARAMETERS IN HEALTHY DOGS. H. Van de Velde[1], G. Janssens[1], E. Stuyven[2], E. Cox[2], S. Lesperoy[3], S. Sys[3], A. Verbrugghe[1], M. Hesta[1]. [1]Laboratory of Animal Nutrition, [2]Laboratory of Immunology, [3]Department of Internal Medicine and Clinical Biology of Large Animals, Faculty of Veterinary Medicine, Ghent University, Belgium.

Due to a prevalence of 22–40%, overweight and obesity are the most common nutritional disorders in dogs and cats. Adipose tissue synthesizes many adipocytokines, such as leptin and adiponectin. These bioactive peptides cause in obese humans a low grade inflammatory reaction. The aim of this study was to investigate the effect of short-term obesity on immunity in dogs.

Sixteen adult beagle dogs with a mean body condition score (BCS) of 3/5 (using a 5-point score system) were randomly assigned to a control and test group. The control group was fed at maintenance energy requirement (MER), whereas the test group was fed 2 x MER. After 13 weeks, blood samples were taken from all dogs. A hematologic examination and flowcytometric analysis of peripheral blood mononuclear cells (PBMC) was performed to determine subpopulations of lymphocytes. Also, mitogen-induced proliferation of PBMC was investigated. Furthermore, the production of oxygen radicals by neutrophils and serum concentration of immunoglobulins IgA, IgG and IgM was determined. Significance was set at $P < 0.05$.

In the test group, a mean weight gain of 17% and BCS of 3.9 was reached after 13 weeks. The control group maintained a BCS of 3. Increased BCS and weight gain stimulated leukocytes. As the immunological parameters were correlated with weight gain, the number of lymphocytes increased significantly (r: 0.627), whereas CD3 T-lymphocytes decreased (r: −0.521). Also, there was a trend ($P < 0.1$) to a higher number of leukocytes (r: 0.414), lower % of CD8 T-lymphocytes (r: −0.352) and a decreased production of oxygen radicals by neutrophils (r: −0.435), in correlation to weight gain. Furthermore, serum concentrations of IgA (r: 0.579) and IgM (r: 0.492) increased significantly with weight gain. The BCS was positively correlated with CD8 T-lymphocytes (r: 0.469). Furthermore, proliferation of both T- and B-lymphocytes increased with BCS. In contrast, several human studies agree that chronic obesity causes a reduced proliferation of PBMC. The stimulation of the immune response might be due to the short-term induction of obesity in dogs. Also, a higher BCS tended to decrease the production of oxygen radicals by neutrophils (r: −0.365) and increase the number of CD4 T-lymphocytes (r: 0.369).

This study showed clearly that weight gain and increased BCS alter immunity in healthy dogs. It seems that short-term obesity triggers and stimulates immunological parameters and it would be interesting to investigate long-term obesity to follow up these effects.

ABSTRACT #85

REPEATABILITY OF OSCILLOMETRIC SYSTOLIC BLOOD PRESSURE MEASUREMENT IN NORMOTENSIVE AND HYPERTENSIVE DOGS. R. L. Stepien, E. J. Thomovsky, M.K. Dolson. Department of Medical Sciences, University of Wisconsin School of Veterinary Medicine, Madison, WI, USA.

Within-session variability of oscillometrically-measured systolic blood pressure (SBP) was determined and results of two consecutive

closely-timed measurement sessions were compared in canine clinical patients.

42 dogs (52% male) had oscillometric SBP (metatarsal cuff) measured twice (Session 1: S-1, Session 2: S-2) within a 0.5–2.0 hour period as part of their diagnostic medical testing. Mean value of 5 consecutive measurements was used as the session value.

30 dogs had S-1 SBP of $\leq$ 160 mmHg (''normal''); 12 dogs had SBP $\geq$ 160 mmHg (''elevated''). The median [range] within-session coefficient of variation (CoV) of individual SBP (84 sessions) was 5.0% [1.5%-22%]. Median CoV for all dogs did not differ between S-1 (5.1% [1.5–22%]) and S-2 (4.9% [1.5–14.6]) or based on SBP category ($p < 0.05$). 92% of 84 sessions had within-session SBP CoV of $\leq$ 10%; one patient had CoV $\geq$ 10% at both sessions. Median S-1 SBP was not different from S-2 SBP for any dog but 52% of dogs had an absolute difference between session results $>$ 10 mmHg. 34/42 dogs (83%) remained in their S-1 diagnostic category at S-2. When dogs with S-1 results between 150–170 mmHg (n = 16) were removed from analysis, 24 of the remaining 26 dogs (92%) remained in their diagnostic category at S-2.

Within-session oscillometric SBP variability was acceptable. Most dogs with initial SBP measurements $\leq$ 150 mmHg or $>$ 170 mmHg remained in their original diagnostic category. Confirmatory second SBP measurement sessions may be helpful to discern SBP status of dogs with original SBP values between 150–170 mmHg.

ABSTRACT #86

PREVALENCE OF SELECTED INFECTIOUS AGENTS IN CATS FROM IRELAND. F Juvet[1], S Brennan[1], CT Mooney[1], MR Lappin[2]. [1]UCD Veterinary Sciences Centre, University College Dublin, Belfield, Dublin, Ireland, [2]College of Veterinary medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO.

Cats are carriers of many infectious agents that can induce significant disease in cats. Vector borne bacteria and rickettsia and the enteric agent, *T. gondii*, are among the most common organisms in cats of other countries and some are zoonotic. The vector borne agents can be transmitted via blood transfusion and so are important to blood donor programs. The purpose of this study is to investigate the prevalence of a selected group of vector borne organisms as well as *T. gondii* in cats from Dublin, Ireland, a region for which no published data exists.

Blood in EDTA (n = 116) and sera (n = 83) were obtained from 121 cats (111 healthy, 10 sick), stored at $-20\,^{\circ}C$, shipped to Colorado State University, and assayed using published protocols. DNA was extracted from blood and assayed using PCR assays for *Anaplasma* spp., *Bartonella* spp., *Ehrlichia* spp., *Mycoplasma haemofelis*, '*Candidatus* M. haemominutum', '*Candidatus* M. turicensis', and *Rickettsia* spp. *Bartonella* spp. IgG and *T. gondii* IgG and IgM antibodies in serum were detected by ELISA.

DNA consistent with *B. clarridgeae* (0.8%), *B. henselae* (3.4%), both *Bartonella* spp. (0.8%), '*Candidatus* M. haemominutum' (12.9%), or *M. haemofelis* (2.5%) was amplified from 24 of 116 blood samples (20.6%). Antibodies to *T. gondii* and *Bartonella spp* were detected in 28 (33.7%) and 22 (26.5%) of 83 sera, respectively.

Results indicate that cats from Dublin, Ireland are commonly exposed to these infectious agents. Larger prevalence studies are required to extend this regional data to the greater Irish cat population.

ABSTRACT #87

RETROSPECTIVE ANALYSIS OF LONG-TERM USE OF MELOXICAM IN AGED CATS WITH MUSCULOSKELETAL DISORDERS AND THE EFFECT ON RENAL FUNCTION. R Gowan. The Cat Clinic, Melbourne, Australia.

Meloxicam is the only molecule licensed for treatment of chronic musculoskeletal disorders in the cat. These conditions affect the quality of life of cats and often require treatment. Impaired renal function is currently listed as a contraindication on NSAID data sheets. However, chronic renal disease and chronic musculoskeletal disorders, such as osteoarthritis (OA) are common in the elderly cat and often coexist. The objective of this study was to investigate the long-term use of meloxicam to treat musculoskeletal disorders in aged cats and to determine the effects on renal function in aged cats with and without pre-existing renal disease.

The medical records of a feline-only practice were searched for cats with OA being treated with meloxicam during a 4 year period. A diagnosis of OA was based upon any two of the following: owner noted mobility changes, physical examination findings or radiographic changes. Cats included were greater than 7 years old with meloxicam duration of treatment greater than 6 months, and complete medical records available for review. Biochemistry, urinalysis and body weight were regularly monitored. The progression of renal disease in the aged non-renal and renal group treated was compared to age matched and IRIS matched untreated controls from the same clinic.

Out of 214 cats which had been treated with Metacam oral suspension, 38 cats met the inclusion criteria. 22 cats (58%) had IRIS stages 1–3 stable renal disease at the start of treatment (8 cats IRIS stage 1, 13 cats stage 2, 1 cat stage 3) The median age of the renal and non-renal treated group was 15.5 years and 13.4 years respectively. The median treatment duration was 527 days in the renal group and 400 days in the non-renal group. After dose titration to the lowest effective dose, the median maintenance dose was 0.02 mg/kg daily in both groups. There were no differences in the progression of renal parameters in the renal group treated with meloxicam versus the age and IRIS matched untreated renal group or the non-renal group treated with meloxicam versus the non- renal group not treated with meloxicam.

These results suggest that a maintenance dose of 0.02 mg/kg meloxicam does not hasten progression of renal disease in aged cats or aged cats with pre-existent stable IRIS stage 1–3 renal disease. Therefore meloxicam can be considered as a treatment for aged cats with painful musculoskeletal disorders and concurrent renal disease. Careful monitoring of aged cats treated with NSAID therapy is essential.

ABSTRACT #88

INCIDENCE OF COMORBID DISEASE IN CATS REFERRED FOR RADIOIODINE TREATMENT. L. Boland, A. Hibbert, A.M. Harvey. Department of Clinical Veterinary Science, University of Bristol, Bristol, UK.

Radioiodine is a safe, non-invasive and curative treatment for hyperthyroidism. The major disadvantage, due to radiation safety regulations, is the requirement for cats to be hospitalised in isolation for 3–4 weeks following treatment, during which time minimal intervention is possible if any clinical problems arise. The presence of comorbid disease is therefore an important consideration when deciding on the most appropriate treatment option for a hyperthyroid cat.

The aim of this study was to retrospectively review the clinical findings of all cats referred to the University of Bristol Veterinary School for radioiodine treatment between 2002 and 2009, in order to evaluate the incidence of comorbid disease. Only cats referred for radioiodine were included; any hyperthyroid cats that were referred for investigation of a concurrent disease were excluded. Routinely performed investigations consisted of haematology, biochemistry, urinalysis, systolic blood pressure (SBP) measurement, thyroxine, FeLV/FIV ELISA, thoracic and abdominal radiographs, abdominal ultrasound, echocardiography and scintigraphy. Comorbid disease was classified as 'major' (severe enough to influence treatment choice) or 'minor' (mild abnormality that would not influence treatment choice). Cardiac disease was excluded unless congestive heart failure was present. Hypertension was classified as 'major' if SBP exceeded 190 mmHg, or if hypertensive retinopathy was present. Renal disease was classified as 'major' if azotaemia was present.

One hundred and nineteen cats were included in the study. Forty eight cats (40%) had 'minor' co-morbid diseases consisting of dental disease (25), renal insufficiency (14), osteoarthritis (6), ocular (5), lower urinary tract (3), asymptomatic FIV (1) and miscellaneous (9). Thirty six cats (30%) had 'major' co-morbid diseases consisting of hypertension (6), congestive heart failure (4), airway disease (4), lung mass (4), liver mass (3), other liver diseases (4), gastrointestinal neoplasia (3), FIV-with concurrent disease (3), renal disease (2), other neoplasia (2) and miscellaneous (11). Seven cats (6%) had $>$ 1 'major' comorbid disease. 'Major' comorbid disease had only been identified prior to referral in 10/36 cats, and three of these had

additional 'major' diseases identified after referral. Twenty-two of 119 cats (19%) were not considered suitable patients for radioiodine treatment due to their comorbid disease.

Subclinical comorbid disease is very common in hyperthyroid cats referred for radioiodine treatment. Thorough clinical assessment is required to reduce the risk of significant clinical problems arising during the post-radioiodine treatment isolation period.

ABSTRACT #89
A RETROSPECTIVE STUDY OF PLASMA ANTITHROMBIN ACTIVITY IN 149 DOGS: DIAGNOSTIC AND PROGNOSTIC IMPLICATIONS. I. Aroch, S. Kuzi, E. Haruvi and G. Segev. Koret School of Veterinary Medicine, the Hebrew University of Jerusalem, Israel.

Antithrombin (AT), produced by the liver, irreversibly binds and inactivates thrombin and factor X, accounting for 80% of total plasma inhibitory effect of plasma on coagulation. Decreased AT activity (ATA) deflects the hemostatic balance towards increased coagulability, and has been identified in people as a marker of hypercoagulability, thrombosis, organ failure and poor prognosis and was recorded in a variety of diseases in dogs. It is associated with poor prognosis in sepsis and liver disease; however ATA has never been assessed as the exposure measure or as a prognostic indicator in dogs, in general. Thus, ATA in dogs is currently interpreted based on human medicine guidelines. We hypothesized that ATA can serve as a prognostic marker in dogs, as has been shown in people. This retrospective study included 149 dogs in which ATA was measured during their disease course, as part of their overall assessment. Dogs with normal and decreased ATA were compared. Dogs with decreased ATA had a significantly ($P < 0.05$) higher prevalence of leukocytosis, haemostatic abnormalities (thrombocytopenia, prolonged prothrombin and activated partial thromboplastin times and hyperfibrinogenemia), hypoalbuminemia, hypoglycemia, hypercholesterolemia, hypokalemia and hyperbilirubinemia *vs.* dogs with normal ATA. Disseminated intravascular coagulation (DIC) was present in 24% of the hypoantithrombinemic dogs (median ATA 42%, range 14–86%). The proportions of DIC, liver disease and pancreatitis were higher ($P < 0.05$) among dogs with decreased *vs.* normal ATA. Decreased ATA was commonly present in pancreatitis (87%), hepatopathy (86%) immune mediated hemolytic anemia (IMHA, 76%) and neoplasia (48%). The hospitalization period was longer ($P = 0.016$) (median 3 days, range 0-14) in dogs with decreased *vs.* normal ATA (median 2 days, range 0–9).Decreased ATA was associated with higher risk for mortality in the entire study population and within specific diseases (e.g., IMHA, neoplasia). The odds ratio for mortality significantly and progressively increased when ATA was < 60% and < 30% (10.33, 14.66 respectively). A receiver operating characteristics analysis of ATA as a predictor of mortality showed an area under the curve of 0.7, and an optimal cutoff point of 60% corresponded to sensitivity and specificity of 58% and 85%, respectively. In conclusion, hypoantithrombinemic dogs presented higher morbidity and more laboratory abnormalities *vs.* dogs with normal ATA. ATA < 60% in dogs indicates increased risk for mortality, similarly to human patients; however, ATA has a limited value as an accurate discriminating factor of the outcome.

ABSTRACT #90
A RETROSPECTIVE CASE-CONTROLLED STUDY OF SERUM BETAHYDROXYBUTYRIC ACID IN 215 ILL CATS: CLINICAL AND CLINICAL-PATHOLOGICAL FINDINGS, DIAGNOSES, MORBIDITY AND MORTALIY. I. Aroch, M. Shechter AND G. Segev. Koret School of Veterinary Medicine, Hebrew University of Jerusalem, Israel.

Betahydroxybutyric acid (BHBA) is a ketone body produced from free fatty acids beta oxidation, mostly in the liver, and is increased in catabolic states and negative energy balance. Its serum concentration is considered more specific and sensitive compared to urinary ketones measurement for diagnosing ketosis. Cats with hepatic lipidosis (HL) have significantly higher serum BHBA vs. normal cats. There are no large-scale studies evaluating BHBA as a diagnostic and prognostic marker in cats. This retrospective study aimed to assess the clinical usefulness of serum BHBA in ill cats by characterizing the clinical and laboratory signs, diagnoses and prognosis in cats with increased vs. normal serum BHBA. Cats presented to the Hebrew University Hospital for which full serum biochemistry analysis, including BHBA, at presentation were consecutively enrolled. Survival was defined as being alive at discharge. BHBA was within and above reference interval in 158 and 57 cats, respectively (median 0.27 [range 0–0.49] vs. 0.87 [range 0.51–21.45] mmol/L, respectively). Ketonemic cats had a higher leukocyte count ($P = 0.046$, 17.2 vs.11.8×10^9/L), higher serum concentrations of triglycerides ($P < 0.001$, 3.13 vs. 1.13 mmol/L) and total bilirubin ($P < 0.001$, 39.3 vs. 10.3 μmol/L), lower serum concentrations of total protein ($P = 0.035$, 77 vs. 82 g/L) and potassium ($P = 0.026$, 3.9 vs. 4.2 mmol/L), and higher urinary concentration of glucose ($P = 0.0002$) and bilirubin ($P = 0.011$) but not urinary ketones ($P = 0.38$). In the ketonemic group, diabetes mellitus (DM, including diabetic ketoacidosis, $P < 0.0001$, 14 vs. 0%), HL ($P < 0.00001$, 30 vs. 2%) pancreatitis ($P = 0.001$, 25 vs. 6%) and metabolic diseases ($P = 0.001$, 53 vs. 26%) were significantly more prevalent vs. the normoketonemic group. In the ketonemic group, 9/24 cats with pancreatitis had concurrent HL. BHBA was high in 8/8, 16/20 and 14/24 cats with DM, HL and pancreatitis, respectively. Ketonemic cats had longer mean hospitalization ($P = 0.002$, 5.5 vs. 3 days) and higher mean treatment cost vs. cats normal BHBA ($P = 0.008$, 653 vs.487 EUR). The mortality rate of ketonemic cats (euthanized cases excluded) was significantly higher vs. cats with normal BHBA (21 vs. 7%). Non survivors had a higher mean serum BHBA ($P = 0.013$, 1.06 vs. 0.55 mmol/l) vs. survivors, however, BHBA was not a good predictor of the outcome (area under receiver operator characteristics curve 0.6). In conclusion, serum BHBA is commonly increased in HL and DM and is a clinically useful measure in cats, especially, and can add prognostic information concerning hospitalization, cost and mortality.

ABSTRACT #91
ACUTE PHASE PROTEINS EVALUATION IN DOGS WITH PARVOVIRUS: PRELIMINARY STUDY. M. Giunti[1], F. Dondi[1], E. Sala Gutierrez[1], F. Frilli[1], M. Battilani[2], P. Famigli Bergamini[1], A. Peli[1]. [1]Veterinary Clinical Dept. and [2]Dept. of Veterinary Public Health and Animal Pathology, University of Bologna, Italy.

Canine parvovirus is a severe viral infection commonly affecting puppies. Clinical presentation typically involves expression of a Systemic Inflammatory Response Syndrome (SIRS). Acute phase proteins (APPs) are reliable circulating biomarkers of inflammation and infection in humans and their potential use in dogs is supported by former studies. The aim of this study was to evaluate the prognostic value of a panel of APPs, comprehensive of C-Reactive Protein (CRP), Haptoglobin (Hp), Transferrin (TIBC), Fibrinogen (Fib), Albumin (Alb), in dogs affected by parvovirus. Dogs with a confirmed diagnosis of parvovirus admitted at the University of Bologna - Veterinary Teaching Hospital (April 2006 - December 2008) were included. Upon admission blood samples were collected by jugular venipuncture. At least one aliquot of serum and plasma citrate were stored at - 80° C upon analysis. Blood samples from 8 healthy puppies (N) and 7 puppies with different diseases meeting SIRS criteria (S) were also available as controls. APPs were assayed on serum or plasma using specific methods on an automated chemistry analyzer. Results were analyzed using Mann-Whitney U test and linear regression analysis. A group of 18 dogs with parvovirus (P), 9 males and 9 females, median age 2 months (range 1.5–25), median weight 3.5 kg (1.5–20) was preliminarily selected: 9 survivors (Ps) and 9 nonsurvivors (Pn). Mean hospitalization was 10 days for Ps and 4.8 days for Pn. APPs concentrations in P (n = 18) were all significantly different from normal ones found in N (n = 8) and showed the following median values: CRP 7.4 mg/dl (range 0.7–23.5), Hp 317 mg/dl (117–374), TIBC 216 μg/dl (140–348), Fib 3.8 g/l (1.9–6.5, n = 16), Alb 1.8 g/dl (0.9–2.7). Median APPs concentrations in S (n = 7) were: CRP 5.6 mg/dl (range 3.7–16.1), Hp 212 mg/dl (68–298), TIBC 411 μg/dl (345–527), Fib 2.9 g/l (2.4–3.6, n = 4), Alb 2.8 g/dl (2.3–2.9). Statistically significant differences between P and S were found for Hp, TIBC and Alb ($p < 0,05$). CRP, Fib ($p < 0,05$) and Alb ($p < 0,001$) values were significantly lower in Pn than in Ps. Lower TIBC values in Pn than in Ps were borderline significant ($p = 0,05$). No correlation was found between CRP values and WBC count in P. Concentrations of positive and negative APPs reported in this preliminary study confirmed the expression of a SIRS

in dogs affected by parvovirus. Lower CRP values found in Pn could indicate a weaker ability of mounting a defensive response to a foreign insult in these subjects. Alb and TIBC concentrations seem to predict outcome in this group of dogs affected by canine parvovirus. Further studies including a serial evaluation of these APPs in a wider population of SIRS dogs with parvovirus are warranted to confirm their potential prognostic significance in course of this disease.

ABSTRACT #92
ALP AS A POSSIBLE SCREENING TEST FOR NEOPLASTIC TRANSFORMATION IN CANINE SPIROCERCOSIS. V. Mukorera[1], L.L. van der Merwe, E Dvir[1]. [1]Department of Companion Animal Clinical Studies, Faculty of Veterinary Science, University of Pretoria, South Africa.

Spirocerca lupi is a nematode of canidae, which infests the oesophagus, forming a nodule that can undergo neoplastic transformation into a sarcoma. The diagnosis of malignant transformation is based on histopathology. Histopathology samples obtained by endoscopy, however, showed a high degree of false negative results, therefore, there is a need for a reliable and convenient way to predict neoplastic transformation. Alkaline phosphatase (ALP) has been found to be elevated in a variety of neoplastic conditions, especially appendicular osteosarcoma, where the bone-specific ALP isoenzyme is elevated. Certain malignancies in humans excrete a tumour derived ALP, identical to the placental ALP isoenzyme, that has been used for diagnostic and prognostic purposes. The purpose of this study was to determine if total serum ALP could be used as a screening tool for neoplastic transformation in spirocercosis.

Medical records of dogs diagnosed with spirocercosis at the University of Pretoria, from 1998 to 2008 were reviewed and 24 benign cases and 20 malignant cases were selected. Serum total ALP activity was determined on day of admission. Because the samples were collected in two time periods with two different normal ranges, the results for the ALP were analysed as a ratio between the case result and the mean reference range. The mean ratio was compared between the malignant and benign groups using the T-test. Of the 20 malignant cases, 10 were osteosarcomas, 8 fibrosarcomas and 2 anaplastic sarcomas. There was a significant age difference between the two groups ($p = 0.018$) with 4.5 ± 2.66 years in the benign and 6.2 ± 2.26 years in the malignant group. The mean ratio of ALP activity/referance range in the benign group was 0.51 ± 0.47 (0.1–1.7). The mean ratio of ALP activity/referance range for the malignant group was 1.01 ± 1.02 (0.13–3.99), significantly higher ($p = 0.048$) compared to the benign group. There were no differences in serum ALP levels between the tumour types, however, the number of cases was too small for meaningful analysis. Despite being significantly higher in the malignant group, ALP activity is a poor indicator for neoplastic transformation in dogs with spirocercosis, as there was a marked overlap between benign and malignant cases. The mean ALP ratio was also not clinically different from the normal range in either group. Possible reasons for the wide range of ALP levels in malignant spirocercosis are the variety of sarcoma types and the fact that the osteosarcomas are also not appendicular. Further identification of serum ALP isoenzymes activity expressed in spirocercosis in its various stages is warranted.

ABSTRACT #93
SERUM THYMIDINE KINASE CONCENTRATIONS ARE NOT ELEVATED IN DOGS WITH MAST CELL TUMOURS. A.J. Collings[1], S.L. Putwain[1], H. Evans[2], A. Van Gelderen[3], M. Brearley[1] and J. Archer[1]. [1]Department of Clinical Veterinary Medicine, University of Cambridge, and [2]Cambridge Specialist Laboratory Services Ltd, Cambridge, UK and [3]North Kent Referrals, UK.

The cytosolic isoform of thymidine kinase (TK1), an enzyme involved in the salvage pathway of DNA synthesis, is elevated in neoplastic cells. The serum TK1 concentration correlates with tumour cell proliferation. It is used as a biomarker for malignant lymphoma in dogs and cats where elevated concentrations have been shown to correlate with tumour stage and prognosis. TK1 concentrations in humans are elevated in patients with mammary and colorectal carcinomas and so is not specific for lymphoma. A previous study indicated that TK1 was not increased in other canine tumours but studied few dogs and limited tumour types. We hypothesized that concentrations of TK1 are elevated in dogs with other tumours. In this retrospective study, TK1 concentrations were measured in the sera of dogs with a histological diagnosis of mast cell tumour (MCT) and no evidence of lymphoma and compared to healthy dogs.

TK1 was measured in archived serum samples from 68 client-owned dogs with cutaneous MCTs (grades I-III) presented for mass removal and 10 control dogs presented for ovariohysterectomy. Informed owner consent was given to use excess blood for research. Serum TK1 concentrations were measured using a radioenzymatic assay (Prolifigen TK REA immunoassay; Diasorin AB, Sweden) which has been validated for use in dogs. Samples were stored at $-80\,^{\circ}C$ prior to single batch-analysis. Each test was repeated where possible. Statistical analysis was performed using a t-test to evaluate the difference between means and Pearson's rank correlation to determine the relationship between TK1 concentration and MCT grade, with $p < 0.05$ considered significant.

Serum TK1 concentrations in dogs with MCTs (mean $\pm$ SD, $1.16\,U/l \pm 0.632$) were significantly lower than in the control dogs ($2.05\,U/l \pm 0.572$; $p < 0.001$) although all concentrations measured were within the reference range for normal dogs ($< 7.0\,U/l$).

In addition, there was no significant correlation between TK1 concentrations and MCT grade ($p = 0.462$).

This study suggests that serum TK1 concentrations are not elevated in dogs with MCTs. The mean TK1 concentrations were slightly lower in the MCT group than the control group. Further studies are required to determine if serum TK1 is elevated in dogs diagnosed with other neoplasms, as in humans, or if TK1 is specific for canine lymphoma.

ABSTRACT #94
ANTIMICROBIAL RESISTANCE AND DETECTION OF HIGH-LEVEL AMINOGLYCOSIDE RESISTANCE AMONG ENTEROCOCCI ISOLATED FROM PETS IN PORTUGAL. M. Delgado[1], B. Coelho Baptista[1], J.H. Duarte Correia[1], C. Pomba[1]. [1]CIISA, Faculty of Veterinary Medicine, Technical University of Lisbon, Portugal.

Enterococci are important pathogens in which multidrug resistance is common and often presents a treatment problem. They are intrinsically resistant to cephalosporins, penicillinase-resistant penicillins, polymyxins, low concentration of aminoglycosides, clindamycin, fluoroquinolones, streptogramins (*E. faecalis*) and trimethoprim/sulfamethoxazole. Furthermore, penicillin, vancomycin, erythromycin, chloramphenicol, tetracycline and high-level aminoglycoside resistance has been increasingly reported (Delgado *et al*. 2007). For this reason, antimicrobial resistance in enterococci is now a major concern. The aim of this study was to characterize the antimicrobial susceptibility patterns of pathogenic enterococci isolated from pets, in Portugal, and to detect high-level aminoglycoside resistance (HLAR). Sixty-eight enterococci were isolated from dogs ($n = 42$) and cats ($n = 26$), between January 1998 and December 2008, at the Veterinary Teaching Hospital of the Faculty of Veterinary Medicine and at veterinary private practices in the Lisbon area. Isolates were identified at species level using BBL Crystal Gram Positive System®. Susceptibility testing was performed using disc diffusion method and DADE MicroScan® panels. CLSI breakpoints were applied. *Enterococcus faecalis* was the predominant species isolated (86.8%), followed in frequency by *Enterococcus faecium* (8.8%). None of the isolates was resistant to vancomycin, teicoplanin or linezolid, drugs of choice in the treatment of enterococcal human nosocomial infections. Our isolates remain highly susceptible to penicillin (92.6%) and ampicillin (95.6%). Susceptibility was also high towards nitrofurantoin (79.5%). One *E. faecium* was susceptible to quinupristin-dalfopristin. Resistance was important to tetracycline (72.1%) and fluoroquinolones (44.1% for ciprofloxacin and 45.6% for enrofloxacin). Eight high-level gentamicin resistant isolates (11.8%) and twenty-three high-level streptomycin resistant isolates (33.8%) were detected. Seven (10.3%) presented combined streptomycin and gentamicin resistance. HLAR is a concerning problem that may compromise combined synergic antimicrobial therapy efficacy (β-lactam in association with an aminoglycoside). However, in our experience, these infections may be controlled with high ampicillin

dosing regimen modifications (interval shortening and higher dosage). This is of relevant importance in avoiding the extra-label use of human licensed drugs. Furthermore, the location of genes encoding resistance to antibiotics on mobile elements and the use of the same antimicrobial substances in human and companion animals might favor the transfer of resistance genes from animal to human microbiota. These facts and the close contact between pets and their owners strengthen the need to promote further studies and regular epidemiological surveillance.

ABSTRACT #95

ACCURACY AND REPRODUCIBILITY OF IN-HOUSE CHEMISTRY ANALYZERS IN VETERINARY PRACTICES. M. Rishniw[1], K. Freeman[2], P. Pion[1], T. Maher[1]. [1]Veterinary Information Network, Davis, CA, USA, [2]Rynachulaig Farm, Killin, Scotland.

Benchtop biochemistry analyzers are common in veterinary practice, allowing rapid and cheap biochemical profiling of patients. However, many clinical pathologists express concern regarding the appropriate use of quality control in general practice. Additionally, clinicians do not routinely examine reproducibility of results, and may attribute meaning to small changes. We conducted a pilot study of benchtop analyzer performance in general practice prior to a larger-scale study.

Three quality-control materials (QCM) were delivered to 5 practices with benchtop analyzers. All analyzers were maintained according to manufacturer's instructions and were operating without known problems. An aliquot of each QCM was run through each analyzer daily for 5 days. The 3 QCM provided low, medium, and high values for commonly evaluated analytes. Results from each practice were compared against a reference value obtained using equivalent methodology on the same QCM at a reference laboratory. We calculated reproducibility on a per-clinic basis for each analyte as a coefficient of variation, and plotted absolute and normalized bias and reproducibility against the reference value for each analyte.

Reproducibility and accuracy varied substantially by analyte and analyzer type. Analytes with the best average intra-clinic reproducibility and/or accuracy included Na (bias $< 2\%$, CV $= 1\%$), Ca (bias $< 4\%$, CV $< 1.5\%$), TP (bias $< 5\%$, CV $< 2\%$), glucose (bias $< 6\%$, CV $< 2\%$), BUN (bias $< 6\%$, CV $< 4\%$). Analytes with poor average intra-clinic reproducibility and/or accuracy included Creatinine (bias $> 15\%$, CV $< 4\%$), bilirubin (bias $> 10\%$, CV $< 6\%$), ALP (bias $> 30\%$, CV $< 7\%$), ALT (bias $> 18\%$, CV $< 5\%$), albumin (bias $> 9\%$, CV $< 5\%$), chloride (bias $> 7\%$, CV $< 1\%$), phosphorus (bias $> 15\%$, CV $< 3\%$) and potassium (bias $> 7\%$, CV $< 3\%$). One clinic had markedly erroneous measurements for 2 QCM on one day, with results approximately double the reference mean. Patterns were observed for types of in-house analyzers for specific analytes, and general trends across in-house analyzers.

Our findings indicate that benchtop analyzers can produce measurements on the same sample that vary by as much as 80% from the reference value, and vary substantially between each other. Clinicians using benchtop analyzers need to recognize the limitations of their equipment when comparing serial measurements in patients, and potentially develop instrument-specific algorithms for correcting measurements obtained. Standard protocols for initial and ongoing assessment of benchtop analyzers are needed to help clinicians better assess the performance capability of individual analyzers in practice.