| No | Day Date | Time  | Presenting author | Title                                                                 |
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| 1  | Thur 4.9 | 10:50 | Wieland B.        | Prevalence of Perinuclear Anti-Neutrophil Cytoplasmatic Antibodies in Healthy Soft Coated Wheaten Terriers in The UK |
| 2  | Thur 4.9 | 11:05 | Gajanayake I.     | Accuracy of Polymerase Chain Reaction Analysis for Lymphocyte Receptor Rearrangement (Parr) for Detection of Canine Gastrointestinal Lymphoma in Endoscopic Biopsies |
| 3  | Thur 4.9 | 11:20 | Gru¨tzner N.       | Sequencing of the Myc_Canfa Gene in Chinese Shar Peis with Cobalamin Deficiency |
| 4  | Thur 4.9 | 11:45 | Becuwe            | Gastrointestinal Disease in Dogs with Excessive Licking of Surfaces |
| 5  | Thur 4.9 | 12:00 | Schmitz S.        | Three in-House Tests for The Detection of Fecal Canine Parvoviral Antigen in Comparison with Electron Microscopy and Polymerase Chain Reaction |
| 6  | Thur 4.9 | 12:15 | Unterer S.        | New Aspects of Acute Haemorrhagic Diarrhoea in Dogs |
| 7  | Thur 4.9 | 16:10 | Willard M.        | Correlation between Pathologists Assessing Endoscopic Gastric And Intestinal Biopsies Using Waava Guidelines |
| 8  | Thur 4.9 | 16:25 | Neiger R.         | Maropitant Has No Effect on Gastric Emptying |
| 9  | Thur 4.9 | 14:00 | Reineroa CR.      | Bronchoalveolar Lavage Fluid Inflammatory Markers in Cats with Asthma and Chronic Bronchitis |
| 10 | Thur 4.9 | 14:15 | Lee-Fowlera TM.    | Interleukin-10 Producing Cells from Cats with Experimental Asthma Receiving Allergen Specific Immunotherapy |
| 11 | Thur 4.9 | 14:30 | Billen F.         | Comparison of Three Serological Tests for the Diagnosis of Canine Sino-Nasal Aspergillosis |
| 12 | Thur 4.9 | 14:55 | Bernaerts F.      | Clinical and Functional Responses to Inhaled Salmeterol in Experimentally Asthmatic Cats with Allergen-Induced Bronchospasim |
| 13 | Thur 4.9 | 15:10 | Bolognin M.       | Cellular Composition of Bronchial Brushings Obtained from Dogs with Experimental Chronic Bronchitis |
| 14 | Thur 4.9 | 15:25 | Ferasin L.        | Variations in Blood Lactate, Heart Rate and Body Temperature in Labrador Retrievers During Exercise |
| 15 | Thur 4.9 | 16:10 | Sanchez N.        | Effects of Probiotic Administration on Racing Sled Dogs |
| 16 | Thur 4.9 | 16:25 | Paes G.           | Evaluation and Comparison of the Classic and Rapid Osmotic Fragility Test in Healthy and Anemic Dogs |
| 17 | Thur 4.9 | 16:40 | Hugonnard M.      | Evaluation of Catheter-Associated Urinary Tract Infections in Feline Obstructive Lower Urinary Tract Disease (Lutd): A Prospective Study of 13 Cats |
| 18 | Fri 5.9  | 11:30 | Lee-Fowlera TM.    | Comparison of Intradermal Skin Testing and Allergen-Specific Serum Immunoglobulin E (Ige) in Experimental Feline Asthma |
| 19 | Fri 5.9  | 16:10 | Willi B.          | Development and Application of a Universal Haemoplasma Screening Assay Based on the Sybr Green Per Principle |
| 20 | Fri 5.9  | 16:25 | Barker EN.        | Development and Use of Novel Real-Time Per Assays for Canine Haemotropic Mycoplasmas |
| 21 | Fri 5.9  | 16:40 | Marschall J.      | Prevalence of Influenza A H5n1 Virus in Cats from Areas with Occurrence of Highly Pathogenic Avian Influenza in Birds |
| 22 | Sat 6.9  | 14:00 | Schoeman JP.      | The Acute Phase Response in Canine Babesiosis as a Sirs Model |
| 23 | Sat 6.9  | 14:15 | Mylonakis M.E.    | Blood Serum Nested Per Evaluation as a Diagnostic Tool in the Non-Myelosuppressive Canine Monocytic Ehrlichiosis (Ehrlichia Canis): A Retrospective Analysis |
| 24 | Thur 4.9 | 14:00 | Jones ID.         | Flow Mediated Dilation in Healthy Dogs |
| 25 | Thur 4.9 | 14:15 | Tidholmn A.       | Tissue Doppler, Strain and Strain Rate in Dogs with Chronic Mitral Valve Disease with and without Congestive Heart Failure |
| Day   | Time  | Author            | Title                                                                                           |
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| Thur 4.9 | 14:30 | Ljungvall I.     | Assessing Mitral Regurgitation Attributable to Myxomatous Mitral Valve Disease in Dogs         |
|       |       |                   | Using Signal Analysis of Heart Sounds and Murmurs                                              |
| Thur 4.9 | 14:55 | Kranjc A.        | Blood Gas, Radiographic and Echocardiographic Changes in Beagles Experimentally Infected with  |
|       |       |                   | Angiostrongylus Vasorum                                                                         |
| Thur 4.9 | 15:10 | Pelander L.      | Myocardial Cell Damage in 24 Snake (Vipera berus) Envenomed Dogs                                |
| Thur 4.9 | 15:25 | Rodriguez N.     | Accuracy of Echocardiographic Criteria for Right Ventricular Enlargement in Dogs with         |
|       |       |                   | Congenital Pulmonic Stenosis                                                                   |
| Thur 4.9 | 16:10 | Santilli RA.      | Focal Junctional Tachycardia in the Dog                                                         |
| Thur 4.9 | 16:25 | Ohad D.G.        | Chronic Vagal Stimulation for Ventricular Rate Control in a Dog with Atrial Fibrillation      |
| Thur 4.9 | 16:40 | Dijkstra M.      | The T-Wave in the V10 Pre-Cordial Electocardiographic Lead is Negative in Healthy Chihuahuas   |
| Sat 6.9 | 08:45 | Rishiwi M.       | Methylprednisolone Acetate Fails to Alter Echocardiographic Variables in Healthy Cats          |
| Sat 6.9 | 09:00 | Schober K.E.     | Left Ventricular Diastolic Dysfunction and Diastolic Heart Failure in Cats with Hypertrophic   |
|       |       |                   | Cardiomyopathy: Value of Doppler Echocardiography in Disease Staging                           |
| Sat 6.9 | 09:15 | Roland R.M.      | The Use of Pimobendan in Feline Heart Failure Secondary to Spontaneous Heart Disease            |
| Sat 6.9 | 09:40 | Zimmering T.     | Prognostic Significance of Nt-Pro-Anp Concentration on Overall Survival in Cats with           |
|       |       |                   | Cardiomyopathy: Evaluation of 56 Cases                                                          |
| Sat 6.9 | 09:55 | Van Israël N.    | Evaluation of a Commercial Pro-Anp Assay in a Canine Cardiorespiratory Referral Population in   |
|       |       |                   | Belgium                                                                                         |
| Sat 6.9 | 10:10 | Serres F.        | The Diagnostic Value of Niproxbnp in Small-Breed Dogs with Degenerative Mitral Valve Disease:  |
|       |       |                   | Prospective Comparison with Clinical and Echo-Doppler Markers (91 Cases)                        |
| Sat 6.9 | 11:05 | Wess G.          | The Utility of Cardiac Troponin I to Diagnose Dcm in Doberman Pinschers                         |
| Sat 6.9 | 11:20 | Connolly DJ.     | Circulating Cardiac Troponin I Concentrations in Cats with Respiratory Distress                |
| Sat 6.9 | 11:45 | Farace G.        | Effect of Arrhythmias on Natriuretic Peptide Levels in Dogs with Either Valve Disease or with  |
|       |       |                   | Structurally Normal Hearts                                                                      |
| Sat 6.9 | 12:00 | Elliott J.       | Experimental Studies of the Pharmacology of Spironolactone in Dogs                              |
| Sat 6.9 | 12:15 | Hogan D.F.       | The Pharmacodynamics of Enoxaparin in the Healthy Cat                                          |

**ESVNU European Society of Veterinary Nephrology and Urology**

| Day   | Time  | Author          | Title                                                                                           |
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| Thur 4.9 | 17:05 | Tournier C.    | Relative Supersaturation: A Better Predictor of Struvite Uroliths Dissolution Kinetic Than     |
|       |       |                 | Urinary Ph                                                                                     |
| Thur 4.9 | 17:20 | Schellenberg S.| Effect of High Dose Oral Hydrocortisone Over 84 Days on Urinary Calcium Excretion in Young    |
|       |       |                 | Healthy Beagle Dogs                                                                             |
| Thur 4.9 | 17:35 | Pelligand L.   | Effect of Acute Dietary Sodium Enrichment on Renin Angiotensin System and Urinary Electrolytes |
|       |       |                 | and Prostanoid Excretion                                                                        |
| Fri 5.9 | 11:50 | Maddens BEJ.   | Urinary Immunoglobulin G, C-Reactive Protein and Retinol Binding Protein as Candidate Early    |
|       |       |                 | Biomarkers for Renal Dysfunction in Dogs with Pyometra                                          |
| Fri 5.9 | 16:10 | Francey T.     | Pulmonary Hemorrhage as an Emerging Complication of Acute Kidney Injury Due to Canine          |
|       |       |                 | Leptospirosis                                                                                   |
| Fri 5.9 | 16:25 | Schweighauser A. | Treatment of Pulmonary Hemorrhage in Canine Leptospirosis with Desmopressin and Dexamethasone |
| Fri 5.9 | 16:40 | Francey T.     | Renal and Extrarenal Disposition of Urea in Dogs with Spontaneous Chronic Kidney Disease      |
| Fri 5.9 | 17:05 | Lavoue R.      | Familial Glomerulopathy in Seven French Mastiff Dogs                                            |
| Fri 5.9 | 17:20 | Smets P.       | Glomerular and Tubular Urinary Markers and Glomerular Filtration Rate in Clinically Healthy     |
|       |       |                 | Young and Aged Dogs                                                                             |
| Fri 5.9 | 17:35 | Maurey-Guenec C.| Urinary Tract Infections Caused by Corynebacterium Urealicyun in Eight Dogs and Eight Cats    |

**ESYE European Society of Veterinary Endocrinology**

| Day   | Time  | Author              | Title                                                                                           |
|-------|-------|---------------------|-------------------------------------------------------------------------------------------------|
| Fri 5.9 | 12:10 | Osto M.             | HyperglycemiaInduces an Inflammatory Response in Healthy Cats                                   |
| Fri 5.9 | 16:10 | Diaz-Espíñal MM.  | Functional and Morphological Changes in the Adenohypophysis of Dogs with Primary Hypothyroidism |
| Fri 5.9 | 16:25 | Veger AR.          | Cardiac Changes Induced by Exogenous Growth Hormone Excess in Juvenile Miniature Poodles      |
| Fri 5.9 | 16:40 | Schellenberg S.    | Course of Hematological and Biochemical Changes During and After Long-Term Hydrocortisone     |
|       |       |                     | Treatment in Healthy Beagles                                                                  |
| Fri 5.9 | 17:05 | Panciera DL.      | Glomerular Filtration Rate in Dogs with Experimental Hypothyroidism                           |
| Fri 5.9 | 17:20 | Wenger-Riggenbach B.| Salivary Cortisol Measurements in Healthy Dogs and Dogs with Hypercortisolism               |
| Fri 5.9 | 17:35 | Rodriguez Piñeiro I.| Accuracy of an Acth Immuno Luminometric Assay for Differentiating between Adrenal and         |
|       |       |                     | Pituitary-Dependent Hyperadrenocorticism in Dogs                                             |
| Page | Time     | Presenter    | Title                                                                 |
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| 61   | Sat 6.9. | 14:00        | Augusto M. | Retrospective Study Comparing the Use of Trilostane Once or Twice Daily for Treatment of Canine Hyperadrenocorticism |
| 62   | Sat 6.9. | 14:15        | Galac S.   | Usefulness of Measuring the Urinary Corticoid-Creatinine Ratio in Dogs with Pituitary-Dependent Hypercortisolism During Trilostane Treatment |
| 63   | Sat 6.9. | 14:30        | Benchekroun G. | Plasma Acth Precursors (Pro-Opiomelanocortin and Pro-Adrenocorticotropin) in Cats with Hyperadrenocorticism |
| 64   | Sat 6.9. | 14:55        | Zini E.    | Role of Hyperglycemia and Hyperlipidemia in the Pathophysiology of Beta-Cell Dysfunction in Cats |
| 65   | Sat 6.9. | 15:10        | Bouwman M. | Infusion of Glucose or Lipids Does Not Impair Insulin Sensitivity in Healthy Cats |
| 66   | Sat 6.9. | 15:25        | van Hoek I. | Putative Risk Factors Associated with Feline Hyperthyroidism in Cats from Belgium and The Netherlands |
| 67   | Sat 6.9. | 16:10        | Jaillardon L. | Igf1 Secretion in Hyperthyroid Cats: Effect of Methimazole |
| 68   | Sat 6.9. | 16:25        | Schoemaker NJ. | Effect of a Deslorelin Implant on Adrenal Size and Lh-Receptor Activity in Ferrets with Hyperadrenocorticism |
| 69   | Sat 6.9. | 16:40        | Quante S. | Urinary Catecholamine and Metanephrine to Creatinine Ratios in Dogs with Pdh, Pheochromocytoma, and Healthy Dogs |
| 70   | Sat 6.9. | 16:10        | Schulz B.  | Side Effects of Doxycycline in Cats |
| 71   | Sat 6.9. | 16:25        | Siebeck N. | Effect of Thyroid Gland Palpation on Serum Thyroid Hormone Concentrations in Hyperthyroid and Euthyroid Cats |

**ESFM EUROPEAN SOCIETY OF FELINE MEDICINE**

| Page | Time     | Presenter    | Title                                                                 |
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| 72   | Sat 6.9. | 17:05        | Fieten H.   | Copper Associated hepatitis in Labrador Retrievers: A Worldwide Disease? |
| 73   | Thur 4.9.| 17:20        | Raffan E.   | Severity of Histological Findings Affects Survival in Canine Chronic Hepatitis When Assessed Using Wsava Histological Criteria |
| 74   | Sat 6.9. | 17:20        | van Sprundel RGHM. | Expression of The Progenitor Cell Marker K19 in Canine Hepatocellular Neoplasia |

**ESCH EUROPEAN SOCIETY OF COMPARATIVE HEPATOLOGY**

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| 75   | Fri 5.9. | 08:45        | Proot S.    | Soy-Based Diet for Canine Portosystemic Shunt Patients, a Double-Blind Cross-Over Study |
| 76   | Fri 5.9. | 09:00        | German AJ.  | Use of Starting Condition Score to Predict Changes in Body Weight and Composition During Weight Loss in Obese Dogs |
| 77   | Fri 5.9. | 09:15        | German AJ.  | A High Protein High Fibre Diet Improves Rate of Weight Loss and Promotes Body Fat Loss in Obese Dogs |
| 78   | Fri 5.9. | 09:40        | Servet E.   | Ability of Diets to Generate “Satiety” in Cats |
| 79   | Fri 5.9. | 09:55        | Hall JA.    | Dietary Polyunsaturated Fatty Acids Reduce Airway Mucin Production in Ova-Sensitized/Challenged Mice |
| 80   | Fri 5.9. | 10:10        | Verbrugghea A. | Effect of Colonic Propionate on Glucose and Insulin Metabolism in Normal Weight And Obese Cats |
ABSTRACT #1

PREVALENCE OF PERINUCLEAR ANTI-NEUTROPHIL CYTOPLASMATIC ANTIBODIES IN HEALTHY SOFT COATED WHEATEN TERRIERS IN THE UK. Barbara Wieland 1, Carolina Malmberg 2, Barbara Häsler1, Amanda Craig1, Mellersh3, Karin Allesspach1. 1Dept. of Veterinary Clinical Sciences, Royal Veterinary College, London, UK. 2Cats and Horses Veterinary Clinics Group, Madrid, Spain. 3Animal Health Trust, Newmarket, UK.

Soft Coated Wheaton Terriers (SCWT) are predisposed to developing protein-losing enteropathies (PLE) and protein-losing nephropathies (PLN) at an average age of 4–6 years. It is estimated that up to 10–15% of SCWT in the US are affected by the syndrome, and a pattern of inheritance has been suspected. In the UK, single case reports have emerged over the last few years, but no representative information on the situation in the whole population is available even though pedigrees in the US and the UK are closely linked. In a recent longitudinal study in a colony of SCWT affected with PLE and/or PLN in the US, the detection of perinuclear anti-neutrophil cytoplasmic antibodies (pANCA) in the serum proved to be a useful non-invasive early marker of disease.

The objectives of this study were to estimate the prevalence of pANCA positive SCWT in the UK and to provide data to assess the future use of this test to predict later onset of PLE/PLN. We used a cross sectional study design and sampled a total of 189 healthy dogs from an estimated population of about 3000 dogs. Samples were tested for pANCA by immunofluorescence and albumin and total protein concentrations were determined simultaneously to identify any occult disease. The age of the dogs ranged from 20 months to 14 years (mean 5.7 years, median 5 years, SD 3.07 years). For each dog information on current and past health problems, diet, and pedigree were collected.

In total 39 dogs tested positive for pANCA, resulting in a prevalence of 20.6% (95% confidence interval: 15.26–25.2%). Serum albumin and total protein concentrations were normal in all dogs. No significant age differences were found between pANCA positive and negative dogs (mean positive 5.6, SD 2.9, mean negatives 6.3, SD 3.6).

In conclusion, if a positive pANCA test result is a valid predictor for PLE/PLN in this breed, then this syndrome may be an emerging problem in the SCWT population in the UK. In order to investigate the true sensitivity and specificity of pANCA for the detection of PLE/PLN in the breed of SCWT, further studies are necessary. Over the next 2 years, all pANCA positive dogs and approximately 80 of the pANCA negative dogs will be enrolled in a longitudinal study to determine which dogs will develop evidence of protein-losing disease. Data collected in this study will also allow us to investigate potential heritability patterns.

ABSTRACT #2

ACCURACY OF POLYMERASE CHAIN REACTION ANALYSIS FOR LYMPHOCYTE RECEPTOR REARRANGEMENT (PARR) FOR DETECTION OF CANINE GASTROINTESTINAL LYMPHOMA IN ENDOCOSCOPIC BIOPSY. I. Gajanayake1, A. Avery1, J. Eastwood1, A. Stell1, K. Allesspach1. 1Department of Veterinary Clinical Sciences, Royal Veterinary College, Hatfield, UK. 2Colorado State University, Department of Microbiology, Immunology and Pathology, Fort Collins, USA.

Polymerase chain reaction for antigen receptor rearrangement (PARR) amplifies the highly variable T or B cell antigen receptor genes, and is used to detect the presence of a clonally expanded population of lymphocytes. PARR could provide a sensitive and specific test to improve the diagnostic accuracy of gastrointestinal (GI) lymphoma from endoscopic biopsies. The objective of this study was to evaluate the accuracy of PARR in diagnosing lymphoma from biopsies obtained endoscopically, compared to the gold standard of histopathology and clinical outcome (determined by follow-up information of at least 5 months).

Samples were collected prospectively from dogs undergoing endoscopy to investigate gastrointestinal disease. One endoscopic intestinal biopsy was collected from either the small and/or large intestine into a plain tube and frozen immediately at –20°C until analysis. DNA was extracted and published primers were used in the PCR analysis to amplify the genes of the B and T cell antigen receptor variable regions. A minimum of 10 biopsies were submitted concurrently from each site for histopathological evaluation.

Samples from 39 dogs were included in the study. Five dogs had a diagnosis of lymphoma, of which 4 were positive on PARR. One dog was diagnosed with an intestinal carcinoma, 3 with a gastric carcinoma (with concurrent inflammation in the intestine) and 30 were diagnosed with inflammatory bowel disease (IBD). Five dogs with IBD and 2 dogs with carcinoma were positive on PARR. Of the five dogs with IBD that were positive for PARR, four were clinically well on follow up but one had been euthanased due to the development of jaundice. This indicated a sensitivity and specificity of 80% and 79%, respectively for PARR to correctly identify cases of canine GI lymphoma, when compared to histopathology and clinical outcome as a gold standard.

In conclusion, the data in this pilot study indicate a noteworthy false positive rate (7/36 cases) for PARR when used on endoscopic biopsy to diagnose cases of intestinal lymphoma. Increasing the number of GI lymphoma cases and longer follow up times to assess survival would be helpful to better evaluate the clinical utility of PARR in this setting.

ABSTRACT #3

SEQUENCING OF THE MYC_CANFA GENE IN CHINESE SHAR PEIS WITH COBALAMIN DEFICIENCY. N. Grüttnzer, M.A. Bishop, J.S. Suchodolski, and J.M. Steiner. Gastrointestinal Laboratory, Texas A&M University, College Station, USA.

It has been reported that Chinese Shar Peis (CSPs) have a high prevalence of cobalamin deficiency. Using a genome wide scan with the canine minimal screening set 2 (MSS 2) we have previously shown that cobalamin deficiency appears to be hereditary in CSPs and linked to chromosome 13. Microsatellite markers DTR13.6 (part of the MSS-2) and REN13N11 (an additional marker, not part of the MSS-2) showed significant linkage disequilibrium with serum cobalamin deficiency in CSPs. Thus, the goal of this study was to evaluate the only known gene located on chromosome 13 in the same area as these two microsatellite markers, MYC_CANFA, for any mutations in this breed.

The database of the canine Ensembl Genomic map was used to identify genes that are located in close proximity to those microsatellite markers on chromosome 13. Only the MYC_CANFA gene, at location 28,400,103–28,422,545, with a distance of approximately 0.06 Mb to the microsatellite marker DTR13.6 was identified. Primers for the MYC_CANFA gene were chosen to amplify exons I and II, respectively. Two primer pairs were used (Forward [F]: GCC GTAATCTAAGTCCGGC, TCCAGACTGCAAGTGGAAG GGCT; Reverse [R]: TCCAGACTCAAGTCATTCCCTGTCCTTACG CGCCTCCACATGCAGTCCTGGA, respectively) for sequencing of exon I, and one primer pair (F: TCTCTGTGGTCATGTTGGC TTGAA; R: TTCAGCTTCCCTCCATCTAAGGT) for sequencing of exon II. Additional primer pairs were designed to reach into the intron/exon boundary area of both borders of exon I (F: TACC GCTCTAATGAGCACAGCTCG; R: ATTCCTGGCTGGGCCG CGCGGCTG) and exon II (F: CGTGAATCAGATCCCGG AGT TGGAA; R: TGGGTTGCAACATGGCATCTCTTAA), respectively. The identity of the product was verified by direct sequencing. The DNA sequencing results were compared between cobalamin deficient CSPs, CSPs with normal serum cobalamin concentrations and the published DNA sequences as part of the Ensemble Genomic map. Also, sequencing results were compared to the published cDNA sequence for this gene.

DNA samples from three CSPs with undetectable serum cobalamin concentrations and three CSPs with serum cobalamin concentrations within the reference range were used for sequencing. No difference in the entire DNA sequence of the MYC_CANFA gene was found between any of the dogs belonging to either of the two groups, the published canine sequence, or the cDNA sequence.

In conclusion, cobalamin deficiency in CSPs does not appear to be due to a mutation of the MYC_CANFA gene. Further investigations are necessary to find another genomic locus in proximity to microsatellite markers DTR13.6 and REN13N11 on canine chromosome 13 that shows mutations in CSPs with cobalamin deficiency.
**ABSTRACT #4**

**GASTROINTESTINAL DISEASE IN DOGS WITH EXCESSIVE LICKING OF SURFACES.** V. Béchuwe, M.C. Bélanger, D. Frank, J. Parent, P. Hélic. Department of Clinical Sciences, School of Veterinary Medicine, University of Montreal, Canada.

Dogs presented with excessive licking of surfaces (e.g. floor, carpet, sofa) are often diagnosed with obsessive-compulsive disorders and treated with anti-depressants. However, most of these cases respond poorly to this therapy. Our hypothesis was that this behaviour is a manifestation of nausea or discomfort, resulting from an underlying gastrointestinal (GI) pathology. The aims of the study were to (1) perform a complete clinical evaluation of the digestive system of dogs presented with excessive licking of surfaces, (2) evaluate the occurrence of this behaviour after appropriate treatment of the underlying digestive disease and (3) demonstrate that the probability of finding a GI pathology is significantly higher in dogs affected by this behaviour as compared to a group of healthy dogs.

Thirteen dogs with excessive licking of surfaces (L group) and eight healthy dogs, assigned to a control group (C group), were assessed. Behavioural, physical and neurological examinations were performed, prior to a clinical evaluation of the GI system which included: CBC, serum biochemical profile, urinalysis, measurement of total serum bile acids and canine specific pancreatic lipase immuno-reactivity, faecal flotation by zinc sulphate, faecal culture, abdominal ultrasonography and upper GI endoscopy with biopsies. When a digestive condition was diagnosed, a board-certified internist prescribed the treatment, and dogs were monitored for a subsequent 90 days during which the licking behaviour was recorded.

There were no significant differences between the C group and the L group with regard to weight, age and sex. Various breeds were represented without any apparent breed predisposition. All dogs of the L group presented a GI pathology. This prevalence was significantly higher than in the C group (p<0.01). In the L group, 7 dogs had an eosinophilic gastritis or gastroenteritis associated with vomiting, diarrhoea or abdominal pain. Four dogs had a lymphocytic-plasmacytoid gastritis or gastroenteritis, without any concomitant GI signs. One dog had a gastric foreign body and one dog had multifocal gastric mucosal haemorrhages. Six dogs also had significant delayed gastric emptying. In the C group, six dogs had no abnormality of the digestive system. One dog had a lymphocytic-plasmacytoid gastroenteritis and one dog had an eosinophilic gastroenteritis. At time of submission, 7 dogs of the L group had completed the 90-day follow-up. All of them had resolved the excessive licking behaviour following treatment of the underlying GI disease.

In conclusion, GI disease should be considered in the differential diagnosis of excessive licking of surfaces in dogs.

**ABSTRACT #5**

**THREE IN-HOUSE TESTS FOR THE DETECTION OF FAECA L CANINE PARVOVIRAL ANTIGEN IN COMPARISON WITH ELECTRON MICROSCOPY AND POLYMERESE CHAIN REACTION.** S. Schmitz1, J. Thiel1, K. Failing3, R. Neiger2. Small Animal Clinic (Internal Medicine), Institute for Virology and 1Institute for data processing, Justus-Liebig-University, Giessen, Germany.

Parvovirus infection is a common cause of canine infectious enteritis. It is highly contagious. Therefore, rapid and reliable diagnosis via in-house tests is important in a clinical setting. Different rapid in-house tests are available but their reliability has not been evaluated so far. The aims of this study were to evaluate three different in-house tests and to determine sensitivity and specificity compared to electron microscopy (EM) and polymerase chain reaction (PCR).

Faeces was collected via rectal swabs for in-house testing, EM and PCR from 3 groups of dogs: group A) 50 dogs with acute haemorrhagic diarrhoea with or without leucopenia and with an incomplete vaccination history, group B) 10 dogs with chronic diarrhoea and no suspicion of parvoviral infection and group C) 40 dogs with no history or clinical evidence of gastrointestinal illness that were presented for orthopaedic, neurological or oncological diseases. The in-house tests (IDEXX Snap Test Parvo; Megacore FASTest Strip Parvo; Selectavet Witness Parvo card) were performed as per manufacturers’ instructions. EM and PCR were performed as previously published.

In group A, 32 of the 50 dogs had positive PCR results, 10 of which were also positive in EM. In group B, only one dog was PCR positive, no dog EM positive. In group C, 5 dogs had positive PCR results, no dog was EM positive. Sensitivity and specificity were calculated separately in comparison to EM and PCR for the Snap test, the FASTest and Witness card. Sensitivity in comparison to EM was 50%, 60% and 40%, respectively. Specificity in comparison to EM was 97.8%, 97.8% and 92.2%, respectively. In comparison to PCR, sensitivity was 18.4%, 15.8% and 26.3%, respectively. Specificity in comparison to PCR was 100%, 100% and 95.2%, respectively.

Whether the positive PCR results in healthy dogs are indeed a parvovirus infection or if this represents only intestinal passage remains unclear. This applies also to the dogs with haemorrhagic diarrhoea as only 27 of the 32 dogs with positive PCR were discharged with the diagnosis of Parvovirus infection, based on laboratory analysis. In conclusion, specificity of all in-house tests used is good to excellent, regardless if compared to EM or PCR; in contrast, sensitivity is poor. Thus, faecal in-house tests for parvovirus antigen detection cannot be recommended to exclude parvoviral enteritis in dogs, but a positive test result is very likely to be reliably true positive and appropriate management (quarantine, therapy) is mandatory anyway.

**ABSTRACT #6**

**NEW ASPECTS OF ACUTE HAEMORRHAGIC DIARRHOEA IN DOGS.** S. Unterter, T.-E. Yoo, B. Schulz, K. Hartmann. Clinic of Small Animal Medicine, Ludwig Maximilian University Munich, Germany.

Acute haemorrhagic diarrhoea (AHD) is a syndrome characterised by acute onset of bloody diarrhoea accompanied by marked haemoconcentration. Although several pathogens and mechanisms for AHD are known, frequently, no inciting cause for AHD can be detected. Thus, aims of this prospective study were to identify possible aetiological agents and to describe the characteristics of dogs with AHD. Between April 2006 and May 2007, 70 dogs were presented meeting the inclusion criteria of acute bloody diarrhoea (<3 days). Information on signalment was compared to the hospital population (n=3998) that presented during the same time period. Laboratory parameters (complete blood count, blood count immuno-reactivity, faecal flotation profile, blood gas analysis) and faecal samples (flotation, bacterial culture, electron microscopy for canine parvovirus (CPV) and canine Coronavirus (CCV), ELISA for Giardia and CPV antigen, and Clostridium perfringens enterotoxin (CPE)) were investigated and compared to a control group of healthy dogs (CG, n=23) in which the same tests were performed. The study fulfilled all general German guidelines for prospective studies with owners’ consents. When compared to the hospital population (age (years): median 6.6, range 0.1–22.1; weight (kg): median 21.0, range 0.4–87.0), patients of the AHD group were significantly younger (age (years): median 4.2, range 0.2–16.7; p=0.020) and had less weight (weight (kg): median 12, range 1.5–72.0; p=0.009). Yorkshire Terriers were overrepresented in the AHD group (p=0.042). In dogs with AHD, faecal flotation was positive in 4/61 (CG:0/23); antigen ELISA for Giardia was positive in 5/63 dogs (CG:2/23); CPV antigen was detected by ELISA in 2/58 (CG:0/23) and by electron microscopy in 3/62 dogs (CG:0/23). CCV was identified in 10/62 cases (CG:1/23). Potential enteropathogenic organisms were cultured in 2/57 dogs (both Salmonella spp.) (CG:0/23). CPE was significantly more frequently detected in dogs with AHD (28/55) compared to the CG (2/23) (p<0.001). Dogs with AHD had a significantly increased haematocrit, white blood cell count, and banded neutrophil count, a decreased base excess, a prolonged prothrombin time, and an increased serum lactate concentration compared to the control group (p<0.003). In conclusion, dogs with AHD are younger and of less weight than the hospital population. Primary intestinal pathogens were only detected in a small number of cases. However, CPE was significantly more often present in dogs with AHD than in control dogs and thus, either seems to be a true cause of AHD or the bacterium represents a secondary invader.
ABSTRACT #7
CORRELATION BETWEEN PATHOLOGISTS ASsessING ENDOSCOPIC GASTRIC AND INTESTINAL BIOPsIES USING WSAVA GUIDELINES. M. Willlard1, G. Moore2, B. Denton3, D. Day1, J. Mansell1, T. Blizer3, B. Wilcox3, M. Gualtieri4, D. Olivera2, P. Lecoindre6, D. Twedel3, M. Collett10, E. Hall3, A. Jergens1, J. Simpson12, R. Else12, R. Washahau13. Departments of 1Small Animal Clinical Sciences and 2Pathobiology, Texas A&M University, USA, 3Comparative Pathology, Purdue University, USA, 4Clinical Veterinary Science, University of Bristol, England, 5Institute of Neuropathology, Heinrich-Heine University, Germany, 6Histovet, Canada, 7Veterinary Clinical Sciences, University of Milan, Italy, 8Clinique Vétérinaire des Cerisiéz, France, 9Clinical Sciences, Colorado State University, USA, 10Pathobiology, Institute of Veterinary, Animal and Biomedical Sciences, Massey University, New Zealand, 11Veterinary Clinical Sciences, Iowa State University, USA, 12Veterinary Clinical Studies, University of Edinburgh, Scotland, 13Veterinary Clinical Sciences, University of Minnesota, USA.

We examined agreement between 4 board-certified pathologists who independently evaluated endoscopic mucosal biopsies of canine and feline stomach and intestine using WSAVA Guidelines (J Comp Pathol 2008, 138:S1–43). Slides with 2,287 pieces of tissue from 83 dogs and 41 cats were obtained from 7 institutions. Pathologists scored 16 histological parameters as normal, mild, moderate or severe. Spearman rank correlation coefficient was used to determine pair-wise correlation between individual pathologists (i.e. 6 comparisons for each histological lesion). Correlation was consistent for very few histological features (0.69 +/− 0.20). Spearman rank correlation coefficients were 0.42–0.73. Additional work is necessary to accomplish agreement between pathologists on eosinophils and neutrophils.

ABSTRACT #8
MARPOTIENT HAS NO EFFECT ON GASTRIC EMPTYING. R. Neiger1, T. Fink1, K. Failing2, R. Clemence3. Small Animal Clinic and 2Biomatics, University of Giessen, Germany; 3Veterinary Medicine Research & Development, Pfizer Ltd., Sandwich, Kent, UK.

Marpotiant, a neokinrin-1 receptor antagonist, is newly licensed to treat centrally and peripherally mediated vomiting in dogs. The objective of this study was to investigate if marpotiant has any effect on gastric motility. Cisapride, a 5HT4-serotonin receptor antagonist was used as positive control.

Scintigraphic imaging of gastric emptying with 200 MBq 14C-Technecium labelled food was performed in a cross-over study with three treatments; a vitamin-B12 tablet (V) (10 mg/mo), an oral suspension of marpotiant (M) (2 mg/kg PO); and cisapride (C) (1 mg/kg PO) given each one hour before feeding to 6 healthy beagle dogs. A seven-day washout period was used between investigations to ensure no crossover effect. Scintigrams were obtained immediately after eating and every 15 minutes for the first 2 hours after ingestion of the labelled food and thereafter at 150, 180, 210, 240, 300 and 360 minutes post-feeding. Time to 25%, 50% and 75% gastric emptying was assessed from the area under the gastric emptying curve. A non-parametric test for paired data (Wilcoxon signed-ranks) was performed on the pair-wise treatment combinations.

The median (min, max) 25%, 50% and 75% gastric emptying times (minutes) were as follows: V: 37.5, (26.6; 46.5), 80.4 (57.7; 100.9) and 141.0 (97.5; 178.5), respectively; M: 36.5 (28.5; 50.0), 78.8 (58.8; 107.7) and 137.8 (99.6; 187.0), respectively; C: 36.0 (27.8; 45.7); 76.6 (62.5; 98.2) and 133.6 (107.8; 170.5), respectively. There was a significant difference between marpotiant and cisapride in the 50% (P = 0.04) and 75% (P = 0.02) but not in the 25% (P = 0.05) gastric emptying time.

Although the difference in emptying time between marpotiant and cisapride was significant at both 50% and 75%, the median of the differences between the treatments was only 5.4 minutes at 50% and 10.8 minutes at 75%. These small but significant differences, coupled with the lack of a significant difference in the gastric emptying time of either marpotiant or cisapride compared to that following vitamin treatment, indicate that the differences between marpotiant and cisapride are unlikely to be of clinical importance. This study was designed so as to have detectable power to determine if present, but was unable to demonstrate any gastric prokinetic effect with either marpotiant or cisapride compared to a vitamin tablet.

ABSTRACT #9
BRONCHOALVEOLAR LAVAGE FLUID IMMUNOMARKERS IN CATS WITH ASTHMA AND CHRONIC BRONCHITIS. CR Reineroa, LA Nafea, AE DeCluea. 1Department of Veterinary Medicine and Surgery, College of Veterinary Medicine, University of Missouri, Columbia, MO, USA.

Allergic asthma and chronic bronchitis are chronic inflammatory diseases of the lower airways of cats. In pet cats there is difficulty discriminating between these two naturally developing diseases because of overlapping clinical signs and thoracic radiographic appearances. Lavage fluid cytology is needed to discriminate asthma and chronic bronchitis (predominantly eosinophilic versus neutrophilic inflammation, respectively). However, the immunologic features which drive and maintain the inflammatory cascade in these diseases has not been well characterized in the cat. Investigation of differences in locally produced inflammatory mediators may provide insight into the mechanisms of airway inflammation. The aim of the current study was to compare concentrations of IL-4, IFN-γ, TNF-α and nitric oxide (NO) in bronchoalveolar lavage fluid (BALF) from cats with naturally developing asthma (CLIN ASM) and chronic bronchitis (CLIN CB) and compare them with concentrations from research cats with experimentally induced asthma (EXP ASM), non-septic suppurative inflammation (RES SUPP) and normal healthy controls (RES NORM). We hypothesized that cats with allergic asthma (CLIN ASM and EXP ASM) would have increased IL-4 and IFN-γ concentrations from research cats with experimentally induced asthma (EXP ASM), non-septic suppurative inflammation (RES SUPP) and normal healthy controls (RES NORM).Thirty cats were divided into five groups [CLIN ASM (n = 6), CLIN CB (n = 5), EXP ASM (n = 7), RES SUPP (n = 6), RES NORM (n = 6)] based on predefined BALF cytological criteria. Banked BALF was assayed for concentrations of IL-4 and IFN-γ (feline-specific ELISAs, RnD Systems, Minneapolis, MN, USA), TNF-α (bioassay), and total nitrate (=metabolites of NO; Cayman Chemical, Ann Arbor, MI, USA). Where appropriate, statistical analysis was performed using an ANOVA with a post-hoc Tukey test and a P<0.05 was considered significant. Only EXP ASM cats had detectable IL-4 and IFN-γ (6/7 cats); these cytokines were below the limits of detection for the majority of the other cats. No significant differences were found between groups for the TNF-α and nitrate. Therefore, it does not appear that IL-4, IFN-γ, TNF-α and NO in BALF are useful for discriminating local immune changes in the airways of pet cats with naturally developing feline asthma versus chronic bronchitis.

ABSTRACT #10
INTERLEUKIN-10 PRODUCING CELLS FROM CATS WITH EXPERIMENTAL ASTHMA RECEIVING ALLERGEN SPECIFIC IMMUNOTHERAPY. TM Lee-Fowlera, AE DeClueb, CR Reineroa. 1Department of Veterinary Medicine and Surgery, College of Veterinary Medicine, University of Missouri, Columbia, MO, USA.

Allergen-specific immunotherapy (ASIT) has shown promise in dampening eosinophilic airway inflammation in cats with experimental asthma. However, the mechanisms, by which ASIT work, are poorly understood. Interleukin-10 (IL-10) has been implicated in-
duction of tolerance to allergen in murine models of asthma and in human asthmatics. In experimental asthma, cats sensitized to IL-10 in serum and bronchoalveolar lavage fluid frequently have fallen below the limits of detection of a commercially available ELISA, which has limited the ability to evaluate marker changes in asthma. Therefore, in this study we evaluated an ELISPOT assay for the diagnosis of feline specific-IL-10 in cats administered ASIT for 6 months. We hypothesized that experimental asthmatic cats sensitized to Bermuda grass allergen (BGA) would have the highest number of IL-10 producing cells compared with asthmatic cats sensitized to house dust mite allergen (HDMA) or mock sensitised cats. Cats from a higher responder asthmatic colony were sensitized with BGA (n=3), HDMA (n=4) or saline (n=2). Abbreviated ("rush") ASIT using BGA subcutaneously was performed in all cats over a 2-day period, followed by weekly maintenance ASIT using 200 μg BGA. Aerosol challenges with BGA, HDMA or saline were also administered weekly for the duration of the study. On month 6, whole blood was collected and peripheral blood mononuclear cells harvested using density gradient centrifugation. Using a commercially available ELISPOT kit (RnD systems, Minneapolis, MN, USA) cells were plated in duplicate at a concentration of 5x10^4/well. Cells were incubated in lymphocyte media for 2 days. The remainder of the assay was performed according to manufacturer’s instructions and the plate read with an automated reader. Statistical analysis was performed using paired t-tests with p < 0.05 considered significant. Out of all the groups receiving BGA-specific immunotherapy, cats sensitised to BGA had significantly more IL-10 producing cells (mean ±SD, 243 ±25) than HDMA sensitised cats (115 ±43; p=0.006). Using these data, ASIT appears to increase IL-10 producing cells in an allergen specific manner, which may be one mechanism by which ASIT induces tolerance in feline allergic asthma.

**ABSTRACT #11**

**DIAGNOSIS OF CANINE SINO-NASAL ASPERGILLOSIS.**

F. Billen, D. Peeters, I.R. Peters, P. Huynen, P. De Mol, M.J. Day, C. Clercx. Department of Clinical Sciences, Veterinary Faculty, aFaculty of Medicine, University of Liege, Belgium, bFaculty of Veterinary Medicine, University of Liege, Belgium and cAnimal Physiology, University of Namur, Belgium.

The diagnosis of canine sino-nasal aspergillosis (SNA) can be challenging, and the role of serology is not well established. Several techniques have been evaluated for the determination of serum Aspergillus-specific antibodies, including agar gel double immunodiffusion (AGDD) and enzyme-linked immunosorbent assay (ELISA). However, a major drawback of previous studies has been the use of antigen solutions (AGDD) and enzyme-linked immunosorbent assay (ELISA). Therefore, in this study we evaluated an ELISPOT assay for the diagnosis of canine SNA.

**RESULTS:**

Sera from 17 dogs with SNA (as confirmed by rhinoscopic evidence of Aspergillus spp. released during fungal growth) were tested. Sera from 17 dogs with asthma and 20 control dogs were also tested. Sera from 17 control dogs were negative for Aspergillus antigens. The diagnosis of canine sino-nasal aspergillosis (SNA) can be challenging, and the role of serology is not well established. Several techniques have been evaluated for the determination of serum Aspergillus-specific antibodies, including agar gel double immunodiffusion (AGDD) and enzyme-linked immunosorbent assay (ELISA). However, a major drawback of previous studies has been the use of antigen solutions (AGDD) and enzyme-linked immunosorbent assay (ELISA). Therefore, in this study we evaluated an ELISPOT assay for the diagnosis of canine SNA.

**RESULTS:**

Sera from 17 dogs with SNA (as confirmed by rhinoscopic evidence of Aspergillus plaques), 18 dogs with a nasal tumour (NT), 11 dogs with chronic lymphoplasmacytic rhinitis (LPR) and 33 control dogs were tested with the 3 methods. AGDD was positive in 13 of 17 sera (76.5%) from dogs with SNA, whereas all sera from dogs with non-fungal nasal disease and control dogs were negative. Using a cut-off value calculated by ROC analysis, a positive ELISA result was obtained in 15 (88%) dogs with SNA, and in 2 (18%) dogs with LPR. All patients with NT and all control dogs had a negative ELISA result. Dogs with SNA had significantly higher serum anti-Aspergillus IgG concentrations (median: 45.3 EU/ml) than dogs with NT (median: 0 EU/ml), dogs with LPR (median: 3.34 EU/ml) and control dogs (median: 0 EU/ml). Using a cut-off of 0.5, the result of the Platelia™ test was positive in 24% (4/17) of dogs with SNA, 11% (2/18) of dogs with NT, 9% (1/11) of dogs with LPR and 24% (8/33) of control dogs. The results of this study suggest that: (1) the detection of serum anti-Aspergillus antibodies with AGDD or ELISA, using a purified commercially available Aspergillus antigen preparation, has excellent specificity and sensitivity, (2) specificity is higher for AGDD (100%) than for ELISA (98.6%) while sensitivity is higher for ELISA (88.2%) than for AGDD (76.5%), and (3) serum GM quantification with the Platelia™ test is unreliable for the diagnosis of canine SNA.

**ABSTRACT #12**

**CLINICAL AND FUNCTIONAL RESPONSES TO INHALED SALMETEROL IN EXPERIMENTALLY ASTHMATIC CATS WITH ALLERGEN-INDUCED BRONCHOSPASM.**

F. Bernaerts, J. Leemans, N. Kirschvink, C. Clercx, P. Gustin.

Inhaled bronchodilators in diseased conditions, are lacking in feline asthma. Furthermore, no studies have been run to address considerations for the proper use of metered dose inhaler (MDI) in this species. By means of barometric whole-body plethysmography, the present study aimed at 1) comparing two MDI inhalation techniques in healthy cats and 2) assessing whether the prophylactic use of inhaled long-acting β2-adrenergic agonist salmeterol (SLM) is effective at preventing the early allergen-induced asthmatic response in Ascaris suum (AS)-sensitised cats. Using a randomised parallel group-study (n=10), two doses of SLM were MDI-delivered either according to the advised method in the guidelines (each actuation of the MDI was followed by two puffs) or according two puffs at a time and taking ten subsequent breaths. Airway reactivity (AR) towards inhaled carbachol was assessed before and one hour after SLM treatment by determining the provocative dose increasing Penh, a unitless index of broncho-constriction, to 300% of baseline value (C-Penh300). After five sensitisised cats were enrolled in a controlled crossover trial with a 4-week washout period whereby clinical score (Clin), respiratory rate (RR) and Penh were monitored prior (T0) and 5, 15, 60, 120 and 240 min following AS exposure. Cats were randomised to receive either no treatment or MDI-delivered SLM (2 separate puffs, 25 μg/dose) 24, 12 and 1 hours before AS stimulation. The maximum change (MaxA) as well as the area under the curve (AUC120-4), computed by trapezoidal integration in the two first hours after AS challenge, were calculated for the aforementioned parameters. In healthy cats, both SLM treatments led to significant rises of C-Penh300 values (p<0.05) but no significant differences between the recommended and modified inhalation techniques were found (p=0.77). Compared to T0, RR, Clin and Penh values recorded in untreated AS-stimulated cats were significantly increased, up to 240, 120 and 15 min respectively (p<0.05). Statistical comparisons between SLM-treated and untreated cats did not reach significance for MaxA,Clin, MaxPenh, AUC120-4 and AUC120-4Penh (p>0.05). These findings suggest that: 1) delivering SLM with the modified inhalation technique is more convenient and lead to a similar degree of broncho protection than the conventional one 2) inhaled SLM seems to be ineffective to prevent allergen-induced bronchospasm in AS-sensitised cats.
ABSTRACT #14 VARIATIONS IN BLOOD LACTATE, HEART RATE AND BODY TEMPERATURE IN LABRADOR RETRIEVERS DURING EXERCISE. Luca Ferasin¹, Heidi Cooper², Jaime Shriver³, Andrea Anderson³. ¹Anderson Sturgess Veterinary Specialists, Winchester, UK; ²Meopham Veterinary Surgery, Gravesend, UK; ³VCS Department, University of Minnesota, St Paul, USA.

Physiologic variations in blood lactate (BL), heart rate (HR) and body temperature (BT) before and after exercise have previously been described in Labrador retrievers. However, these studies did not evaluate changes during exercise and failed to assess repeatability of the test. The aim of this study was to determine the reproducibility of an exercise test in Labrador retrievers and evaluate physiologic variations in BL, HR and BT that occur during and after maximal exercise in this breed.

16 healthy adult Labradors underwent an exercise test on a treadmill using a 6-min stage protocol at 5 incremental speeds (6, 7.8, 9, 10 mph) for a total of 30 min. The treadmill slope was adjusted to 5% to run on a treadmill. Reproducibility of the test was assessed by repeating the trial after 7 days, and was expressed as typical error (TE), coefficient of variation (CV) and intra-class correlation (ICC). Full-repeated multivariate analysis of variance (MANOVA) was used to establish within-subject effect of exercise stage and trial repetition.

Degree of association between mean values of the measured variables and exercise stage was assessed by Pearson’s correlation analysis.

13 dogs successfully completed the study. Results related to reproducibility were: TE (BL = 0.22 mmol/l, HR = 9.8 bpm, BT = 0.22 °C), CV (L = 19.3%, HR = 7.9% and BT = 0.6%) and ICC (BL = 0.89, HR = 0.96, BT = 0.95). The effect of both exercise stage and trial repetition appeared statistically significant on MANOVA test (P<0.05) for all parameters. BL did not increase noticeably and a threshold was not clearly detectable. BL disappearance was not observed after recovery. Pearson analysis showed a modest correlation (r) between intensity of exercise and the measured variables (BL = 0.30, HR = 0.32, BT = 0.70). Similarly, BL, HR and BT did not appear strongly associated with each other.

The modest, yet significant, reduction of all parameters in the second trial suggests a lower physiologic stress when the test is repeated. This might be attributable to a learning effect and could be minimised by either introducing a third trial or by pre-conditioning the subjects to the procedure. Nevertheless, results support the reproducibility of this test and provide useful information on various physiologic variations that occur during exercise and recovery in Labrador Retrievers.

ABSTRACT #15 EFFECTS OF PROBIOTIC ADMINISTRATION ON RACING SLED DOGS. N. Sanchez¹, M. Olivarres¹, A. Salas¹, V. Romano¹, C. Torre¹, F. Blanc¹. ¹Iñfinity Petcare, Sant Cugat del Valles, Spain; ²Puleva Biotech, Granada, Spain.

The aim of this trial was to determine the effect of a probiotic supplementation on haematological, biochemical and immunological parameters on racing sled dogs. Probiotics can modulate the immune system, enhance gastrointestinal health and increase natural resistance to infectious diseases. During this year’s Pirena edition dogs run 176 km during 15 days. The effects of exercise on the immune system on dogs are only beginning to be explored.

39 trained adult sled dogs participate in this trial. Dogs came from 3 teams and, within each team were randomly divided into 2 groups: Probiotic (P, n=20) and Control (C, n=19). Two strains of Lactobacillus (Leuteri and L. fermentum), isolated from bitch’s milk were daily administered, in the form of capsules, to dogs on P group and placebo capsules to C group dogs. Supplementation started 7–10 days before the race and finished at the end of the race. Blood samples were taken before supplementation (t0), on day 6 (t2) and 11(t3) of the race. Complete haematological, biochemical and immunological blood parameter were analysed.

Results are expressed as mean ± SEM, p< 0.05. There were no significant differences between groups in circulating T and B lymphocytes at any time point. Circulating lymphocytes were significantly affected by exercise in both groups: percentage of T lymphocytes (63.2±2.5; 58.1±3.0 at t0,t2 for P group and 64.8± 3.7; 53.1±2.2 at 0,t2 for C group) and B lymphocytes (8.0± 0.8; 9.6±0.7 at t0,t3 for P group and 9.7±0.9; 8.3±0.7 at t0,t3 for C group). T helper lymphocytes significantly decreased with exercise in both groups. (20.2±2.4; 12.4±2.1; 15.9±1.6 at t0,t2 for P group and 20.5±1.9; 12.7±1.2; 15.4±1.0 at t0,t2 for C group). Granulocyte phagocytic activity was significantly increased after the first week of race in both groups (93.4±2.1; 97.9±1.0 at t0,t2 for P group and 94.0±1.8; 99.5±0.1 at t0,t2 for C group). Monocyte phagocytic activity significantly increase both with exercise and with probiotics (69.1±4.5; 87.2±2.2 at t0,t2 for P group and 73.9±2.8; 80.9±1.8 at t0,t2 for C group).

IgG plasma concentration (mg/ml) decreased in C group (151.1±1.5; 119.9±1.1 at t0) while no differences appeared in P group. IgE plasma concentration (ng/ml) decreased in P group (438.4±1.5; 370.3±17.4 at t0,t2,t3) while no differences appeared in C group. No significant differences in either haematology or serum biochemistry were observed.

These data indicate that exercise decreases immunological parameters, whilst probiotics supplementation improves immune response indicators and could partially revert intense exercise-induced negative effects.
ABSTRACT #17
EVALUATION OF CATHETER-ASSOCIATED URINARY TRACT INFECTIONS IN FELINE OBSTRUCTIVE LOWER URINARY TRACT DISEASE (LUTD): A PROSPECTIVE STUDY OF 13 CATS. M. Hugonnard, J. Derins, J. Viaillard, J. Goy-Thottot5, Clinic for Small Animal Internal Medicine, Laboratory of Veterinary Epidemiological Department, Intensive Care Unit, EA 4173 – INSEM ESPER ERI 22, National Veterinary School of Lyon, University of Lyon, France.

Placement of an indwelling urinary catheter is the most important risk factor for developing nosocomial urinary tract infections (UTIs). This aspect has not been thoroughly investigated in cats. The objective of this study was to evaluate the risk of cats having a non-infectious obstructive lower urinary tract disease (LUTD) and managed with an indwelling urinary catheter to develop UTIs. Inclusion criteria were that the cat had an obstructive LUTD, had not been catheterised previously, had not received glucocorticoids and/or antibiotics in the past 30 days, and was FeLV/FIV negative. Data collected at presentation were signalment, medical history, clinical signs and serum biochemistry profile. A urinary catheter was placed aseptically, managed with a closed catheter system and removed 48 hours after placement. Four urine samples (three collected through the catheter immediately, 24 hours and 48 hours after placement respectively, one collected by expression 24 hours after its removal) were submitted for complete urine analysis including bacterial culture. The urinary catheter tip was also submitted for bacterial culture at removal. Cats were further excluded if bacteriology was positive at admission, if a break or obstruction in the collection system did occur, if the catheter was inappropriately removed or if the clinical state prompted use of glucocorticoids and/or antibiotics during hospitalisation.

Thirteen cats included from November 2006 to March 2008 completed the study. Mean age was 37 months and mean weight 5.4 kg. On presentation, 100% of cats had microscopic haematuria. Catheterisation for bacterial culture should be recommended in 78% of cases (7/9). The ROFT was positive in 62% of cases (8/13). Most common bacterial species were isolated 2 days after catheter placement (2/9), 48 hours after catheter placement (4/9) and 24 h after catheter removal (3/9). Bacteriological result from catheter tip was positive in 62% of cases (8/13). Most common bacterial species isolated from urine were Streptococcus spp and Staphylococcus spp, and Streptococcus spp from catheter tip. Bacterial species cultured from urine and catheter tip correlated in 78% of cases (7/9).

More than two-thirds of the cats developed a bacteriuria during the study, indicating that urinary bacterial culture should be recommended when indwelling urinary catheter is needed. Further investigations are required to clearly distinguish between bacteriuria and effective UTI.

ABSTRACT #18
COMPARISON OF INTRADERMAL SKIN TESTING AND ALLERGEN-SPECIFIC SERUM IMMUNOGLOBULIN E (IGE) IN EXPERIMENTAL FELINE ASTHMA. TM Lee-Fowler, LA Cohn, CR Reinero, Department of Veterinary Medicine and Surgery, College of Veterinary Medicine, University of Missouri, Columbia, MO, USA.

Reliably identifying clinically relevant allergens(s) for use in allergen-specific immunotherapy as a novel treatment for feline allergic asthma may be challenging. Historically, intradermal skin testing (IDST) has been considered the gold standard and serum allergen-specific IgE has been used as a less invasive and less laborious alternative. Many studies have found poor correlation between results from these tests and clinical response. How these studies have employed pet cats with unknown type(s), duration, timing, and quantity of allergen exposure. We proposed to control these factors by using a feline model of allergic asthma using known allergens to compare IDST and serum IgE tests. We hypothesise that IDST results will more closely correlate with the known allergen exposure than will allergen-specific serum IgE concentrations.

Thirteen specific pathogen free cats were randomly assigned to 1 of 3 groups: saline (placebo), Bermuda grass allergen (BGA), or house dust mite allergen (HDMA). Cats underwent allergen (or placebo) sensitisation and challenge with the corresponding agent. One group (0 prior to sensitisation) and days 28 and 48 after sensitisation (IDST) was performed and serum collected. Serum was banked at −20°C for later analysis. Serum from each cat at each time point as well as pooled serum samples (BGA or HDMA) were collected for detection of allergen-specific IgE using a high affinity IgE receptor (Coating antigens immobilized on the solid phase). Pooled sample was heat inactivated (HI) to selectively destroy IgE. Sensitivity (SE), specificity (SP), and positive and negative predictive values (PPV and NPV, respectively) were calculated for BGA and HDMA. Prausnitz-Kustner (PK) testing using the pooled and pooled HI samples was performed in a naive cat to determine whether the pooled HI samples contained homocytotropic IgG.

For IDST the SE=88% (HDMA) & 100% (BGA), SP=88% (both), PPV=78% (HDMA) & 82% (BGA), and NPV=100% (both). For serum IgE testing, the SE=14% (BGA) & 38% (HDMA), SP=100% (both), PPV=100% (both) and NPV=68% (BGA) & 86% (HDMA). Results from the heat inactivated samples (ELISA) and PK test suggest the presence of homocytotropic IgG. In conclusion, IDST has a higher sensitivity and should be used as initial screening for respiratory allergens. When positive, serum IgE tests were specific and had excellent positive predictive value.

ABSTRACT #19
DEVELOPMENT AND APPLICATION OF A UNIVERSAL HAEMOPLASMA SCREENING ASSAY BASED ON THE SYBR GREEN PCR PRINCIPLE. B. Willi, M. Lutz, R. Lüthi, H. Honegger, C. E. Reusch, R. Hofmann-Lehmann, C. E. Reusch, H. Lutz, R. Hofmann-Lehmann, Inst. of Vet. Bacteriology, and Clinic for Small Animal Internal Medicine, University of Zurich, Switzerland.

Haemotropic mycoplasmas (aka haemoplasmas) are causative agents of infectious anaemia in several mammalian species. Recently, they have drawn increasing attention due to their species diversity and possible zoonotic potential. Specific conventional and quantitative TaqMan PCR systems have been developed. However, conventional PCR is prone to carryover of PCRs in the cycle and does not allow quantification, whilst TaqMan PCR requires expensive equipment and is less suitable as a screening method due to its high specificity. The goal of this study was thus to develop a universal haemoplasma screening assay based on the SYBR Green PCR principle, apply the assay to blood samples from different haemoplasmas and analyze potential tick vectors and blood samples from anaemic or immune compromised human patients to address a zoonotic potential. Primers were designed on the 16S rRNA gene to amplify feline, canine, bovine, porcine, camelid and murine haemoplasmas. The sensitivity and specificity of the optimized assay was assessed. It was applied to uninfected, singly or co-infected blood samples inLIVE with different haemoplasmas and analyze potential tick vectors and blood samples from anaemic or immune compromised human patients to address a zoonotic potential. Primers were designed on the 16S rRNA gene to amplify feline, canine, bovine, porcine, camelid and murine haemoplasmas. The detection limit for feline and canine haemoplasmas was 1–10 copies/PCR reaction. Melting curve analysis revealed that it was possible to differentiate the three feline, the two canine and the two bovine haemoplasma species. In a few negative controls, non-specific amplification was observed as has been reported for other SYBR Green assays. All 1,950 titres analysed were CR-negative.
suggesting that, in Switzerland, these ticks are not a relevant vector for the above-mentioned haemoplasma species. None of the 400 human blood samples tested revealed clear positive results. The present study demonstrates that the SYBR Green PCR assay described is suitable as a haemoplasma screening assay and to identify novel haemoplasma species; positive results, however, should be confirmed by specific TaqMan PCR or sequencing. A zoonotic potential of haemoplasmas could so far not be confirmed.

ABSTRACT #20
DEVELOPMENT, RANCE AND USE OF NOVEL REAL-TIME PCR ASSAYS FOR CANINE HAEMOTROPIC MYCOPLASMAS. E.N. Barker1, S. Tasker1, M.J. Day5, K. Woollery5, R. Rbitles5, K. Georges5, C.D. Ezekol5, S. Cleaveland5, C. R. Heps5.
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Two canine haemoplasma species have been recognised; Mycoplasma haemocanis (Mhc) and Candidatus M. haemoparvum (CMhp). Both have been associated with haemolysis in immunocompromised or splenectomised dogs. The aims of this study were to develop quantitative real-time PCRs (qPCRs) to detect Mhc and CMhp in canine blood samples and to use these assays to determine prevalence of infection in groups of dogs from Trinidad and Tanzania. Both areas have a high prevalence of Rhipeptephagus sanguineus, a putative vector of haemoplasmas.

Using 16S rDNA sequence data, qPCRs specific for each of Mhc and CMhp were designed, and each qPCR was duplexed with a canine glyceraldehyde-3-phosphate dehydrogenase (G3PDH) qPCR to incorporate amplification of an endogenous control. These qPCRs are the first for canine haemoplasmas to use an internal control for the presence of amplifiable DNA in samples. They were successfully used in two prevalence studies, which found that Mhc was the most common canine haemoplasma species in both Trinidad and Tanzania.

ABSTRACT #21
PREVALENCE OF INFLUENZA A H5N1 VIRUS IN CATS FROM AREAS WITH OCCURRENCE OF HIGHLY PATHOGENIC AVIAN INFLUENZA. J. Marschall1, B.S. Schulz1, T. Harder2, T.W. Vahlenkamp3, J. Huebner4, E. Huisinga5, K. Hartmann1. 1. Clinic of Small Animal Medicine, Ludwig-Maximilian University, Munich, Germany. 2. OIE and National Reference Laboratory for Avian Influenza, Friedrich-Loeffler-Institute, Greifswald-Insel Riems, Germany. 3. Institute of Molecular Biology, Friedrich-Loeffler-Institute, Greifswald-Insel Riems, Germany. 4. Laboklin GmbH & Co. KG, Bad kissingen, Germany. 5. Vet Med Labor GmbH, Ludwigsburg, Germany.

Cats are susceptible to infection with highly pathogenic avian influenza A H5N1 virus (HPAIV H5N1), but only little is known about a possible role of cats in the spread of the virus. The prevalence among pet cats as well as the extent of subclinical infections, for example, still require investigation. Therefore, prevalence of influenza A H5N1 virus and prevalence of antibodies in cats from areas with occurrence of highly pathogenic avian influenza A H5N1 in birds were evaluated in this study.

Two groups of cats were included. Cats either lived in a restricted zone (10 km radius around an outbreak of avian influenza A H5N1 in birds for a duration of 30 days) in Germany or Austria, or showed signs of acute respiratory disease (suspected H5N1 infection) and lived close to a restriction zone. Only cats with outdoor access were included. A total of 171 cats (132 from restriction zones, 28 with respiratory signs, and 11 cats meeting both criteria) were examined. Pharyngeal swabs were tested for influenza A virus using real-time reverse transcriptase PCR (RRT-PCR); serum samples were tested for antibodies to H5N1 virus using haemaggulination inhibition assay.

All samples were negative in both PCR and rapid test, so none of the cats showed evidence of infection – neither symptomatic nor subclinical infection, nor overcome infection – with HPAIV H5N1. On the basis of these data, prevalence of H5N1 virus was determined to be < 1.8% (95% confidence interval (CI): 0.000000–0.017366), and prevalence of antibodies was < 2.6% (95% CI: 0.000000–0.025200).

The results show that in epidemiologic situations as they occurred in Germany and Austria, the risk for pet cats of contracting HPAIV H5N1 is very low. Cats, at least in Europe, do not seem to play a major role in the epidemiology of H5N1 and its transmission to humans.
ABSTRACT #23

BLOOD SERUM NESTED PCR EVALUATION AS A DIAGNOSTIC TOOL IN THE NON-MYELOSUPPRESSIVE CANINE MONOCYTIC EHRLICHIOSIS (EHRICHIA CANIS): A RETROSPECTIVE ANALYSIS. M.E. Mylonakis1, V.I. Siarkou2, L. Leontides3, A.F. Koutinas1

The hypothesis of this study was that, in the absence of more suitable substrates such as whole blood, bone marrow (BM) or spleen, aspiration blood serum may be suitable for detecting Ehrlichia canis DNA, by polymerase chain reaction (PCR), in the non-myelosuppressive canine monocytic ehrlichiosis (CME). Our primary objective was to estimate the relative diagnostic sensitivity, specificity and precision of a PCR assay in the blood serum of natural CME cases. A secondary objective was to investigate the association, if any, between PCR positivity and serum sample volume, serum sample haemolysis, or the level of indirect immuno-fluorescence (IFA)-specific antibody titres.

Blood serum samples from a total of 50 dogs were analyzed retrospectively. Our study population included 30 male and 20 female dogs, representing 43 purebreds and 7 crossbreds, with an age range from 0.16 to 11.15 years (mean: 2.4 years). In 38 dogs, the diagnosis of natural non-myelosuppressive CME was based on the compatibility of the clinical and clinopathological findings, the positive IFA serology and BM PCR for E. canis and the normo-cellular BM on aspiration cytology. The remaining 12 dogs served as controls, all of which were clinically healthy, seronegative and BM PCR negative for E. canis. A nested PCR for the E. canis 16S rRNA gene amplification was blindly applied to the pet DNA obtained after the centrifugation of serum samples. PCR positivity was declared after the amplification of E. canis DNA in at least one out of the three assay repetitions.

Ehrlichia canis DNA was amplified in 24/38 (63.1%) dogs with CME, but in none of the 12 controls. A high level of agreement was found among the three PCR repetitions (Kappa=0.85, P<0.0001). No association could be noticed between PCR results and serum volume or hemolysis in the samples applied. Also, the median IFA titre of PCR-negative was significantly higher than that of PCR-positive dogs (Wilcoxon Rank Sum Test; P=0.0029).

In conclusion, blood serum PCR could be a useful diagnostic alternative in the non-myelosuppressive CME, when more suitable materials are not available or difficult to obtain.

ABSTRACT #24

FLOW-MEDIATED DILATION IN HEALTHY DOGS. L.D. Jones1, V. Luis Fuentes1, T. Fray1, S. Beyer1, J. Jones2, C. Vallance1, J. Elliott1, *Royal Veterinary College, University of London, U.K. WALTHAM Centre for Pet Nutrition, Leicestershire, UK.

Flow-mediated vasodilation (FMD) is the arterial dilation that occurs following reactive hyperaemia and is an established non-invasive measure of endothelial function in humans. Our aim was to evaluate FMD in healthy small versus large dogs, of varying ages and breeds, at a range of ambient temperatures.

A 13 MHz linear probe was used to record 2D ultrasound baseline images of the brachial artery in 44 dogs habituated to the procedure. Commercially available software was used to measure vessel diameter in a manually specified region of interest. A blood pressure cuff was then inflated distal to the imaging site to a pressure of 200 mmHg for 5 minutes. Spectral Doppler blood flow recordings were obtained for 15 seconds immediately post-occlusion, followed by 3 minutes of 2D imaging. The peak value of post-occlusion lumen diameter was compared to the average baseline diameter to calculate the relative percentage increase in lumen diameter (FMD).

Median bodyweight was greater in large dogs (26.7 kg, 24.3–31.7 kg, n=23) versus small (8.9 kg, 6.9–13.1 kg, n=21, P<0.01) but ages were similar (3.7, 0.9–9.9 years versus 3.4, 1.3–7.6 years, respectively, P=0.92). Mean FMD was greater in small (7.3±5.7%) versus large dogs (3.8±3.6%, P<0.01) and in dogs ≤ 6 years (5.6±4.9%, n = 32) versus >6 years (3.2 ± 3.5%, n = 12), P<0.05. Ambient temperature (median 22 °C, 13.6–26.1) correlated weakly with FMD (r = 0.17, P<0.05).

Measurement of FMD in dogs is feasible, and can be affected by bodyweight, age and room temperature.

ABSTRACT #25

TISSUE DOPPLER, STRAIN AND STRAIN RATE IN DOGS WITH CHRONIC MITRAL VALVE DISEASE WITH AND WITHOUT CONGESTIVE HEART FAILURE. A. Tidholm1, A. Bodérgård-Westling1, I. Bergsä Väldling1, A. Albinbo Animal Hospital, Stockholm, Sweden, 2Dept. of Small Animal Clinical Sciences, SLU, Uppsala.

Forty-three dogs of 14 different breeds were examined with conventional echocardiography and tissue Doppler imaging including strain and strain rate. According to findings on clinical examination, thoracic radiography and echocardiography/Doppler examination, 23 dogs were classified with CHF (class C) and 20 dogs without CHF (class B) according to the ACC and AHA (Class BI to DIV). There were 23 males (13 with CHF, 8 without CHF) and 20 females (6 CHF). Age ranged from 3.5 to 15.5 years with a mean and median of 8.1 and 7 years. Body weight ranged from 3 to 29 kg with a mean of 11±5 kg and a median of 9 kg. There were no statistically significant differences between groups concerning age, gender or body weight. Mean heart rate was significantly higher in the group with CHF compared to the group without CHF (141 and 114 beats/min, respectively). Mean LA/ALV indexed for bodyweight and mitral E/A were significantly greater in dogs with CHF compared to those without CHF, whereas no statistically significant difference was found in FS between groups. There were no statistically significant differences between groups concerning radial systolic, endocardial and epicardial velocities, radial endocardial and epicardial velocities in early and late diastole and radial mid-wall strain and strain rate. There were no statistically significant differences between groups concerning longitudinal systolic basal and apical velocities, longitudinal basal and apical velocities in early and late diastole and longitudinal mid-wall strain and strain rate. In the study, no significant differences were found between dogs with chronic mitral valve disease and different classes of heart failure or with different systolic performance assessed by LVf/DVs%.

ABSTRACT #26

ASSESSING MITRAL REGURGITATION ATTRIBUTABLE TO MYXOMATOUS MITRAL VALVE DISEASE IN DOGS USING SIGNAL ANALYSIS OF HEART SOUNDS AND MURMURS. J. Liungvall1, C. Ahlstrom1, K. Högland2, P. Hult3, C. Kvart1, M. Borgarelli1, P. Ask1, J. Häggeström2, 1Departments of Clinical Sciences and 2Anatomy, Physiology and Biochemistry, Swedish University of Agricultural Sciences, 3Department of Biomedical Engineering, Linköping University, Sweden, 1Department of Clinical Sciences, Kansas State University, USA.

Previous studies in dogs have shown that increasing severity of mitral regurgitation, attributable to MMVD, is associated with certain characteristic features on the PCG recording. More recently, introduced signal analysis techniques allow a more objective characterisation of heart sounds and murmurs. To our knowledge, signal processing of heart sounds and murmurs have never been applied for assessment of MR in any species. The aim of the present study was, therefore, to investigate if signal analysis of heart sounds and murmurs can be used to assess the severity of mitral regurgitation (MR) in dogs with myxomatous mitral valve disease (MMVD).

Cardiac sounds were recorded from 77 client-owned dogs evaluated by both an auscultatory and an echocardiographic classi-
ABSTRACT #27

BLOOD GAS, RADIOGRAPHIC AND ECHOCARDIOGRAPHIC CHANGES IN BEAGLES EXPERIMENTALLY INFECTED WITH ANGIOSTRONGYLUS VASORUM. A. Kraus1, M. Schnyder1, M. Dennler1, A. Fahrion2, P. Deplazes2, T. Ghans1. Clinic for Small Animal Internal Medicine, Institute of Parasitology, Division of Diagnostic Imaging, Vetsuisse Faculty, University of Zurich, Switzerland.

Dogs infected with Angiostrongylus (A.) vasorum develop severe pulmonary parenchymal lesions at the time of patency due to an intense inflammatory response to egg and larvae. This includes inflammation, haemorrhage and arterial thrombosis. In naturally-infected dogs a variety of clinical and laboratory abnormalities and specific radiographic findings have been described. In a few cases severe pulmonary hypertension (PH) has been documented by echocardiography. The goal of this study was to evaluate the effects of experimental A. vasorum infection on pulmonary gas exchange, radiographs and echocardiographic morphology and function, and to relate the echocardiographic findings to the degree of clinical disease, hypoxemia and radiographic changes. A particular focus was placed on time point and degree of development of PH.

In total 6 healthy Beagle dogs were experimentally infected with A. vasorum (3 with 50 and 3 with 500 larvae). Daily clinical and faecal Baermann examinations were done. Thoracic radiographs and femoral arterial blood gas analyses were performed 8 and 13 weeks after infection (pi), and 9w post therapy (pt). Echocardiography was done at time 0 and 2, 5, 8, 13w, and 9 w pt. Invasive pulmonary artery pressure (PAP) measurements under sedation were obtained 8w pi. Four dogs were treated with a parasitecid at 13w pi. The pre-patent period lasted 47–49 days. The first respiratory signs were observed 42–56 days pi. Radiographic abnormalities were marked at 8w pi with obvious progression to 13w pi, and reduction to near normal at 9w pt. Moderate hypoxemia developed with a median PO2 of 73 and 74 mmHg at 8 and 13 w pi, respectively, reducing to 94 mmHg at 9w pt. No 2D, M-Mode or Doppler echocardiographic changes including Tdi-index were observed at 2, 5, 8 and 13w pi. No relevant PH was discernable at any time; median calculated RV-RA-gradients were 24 mmHg at time 0, and ranged between 19 and 24 mmHg at the different time points pi and pt. Invasive PAP measurements at 8w pi revealed median SPAP and dPAP of 31 and 15 mmHg, respectively. Radiographic lung changes and blood gas abnormalities correlated with clinical signs, but not with echocardiographic findings.

In conclusion, marked pulmonary changes in A. vasorum infected dogs were associated with abnormalities in cardiac function or PH. Relevant PH may only develop at the time of acute and significant pulmonary thrombosis.

ABSTRACT #28

MYOCARDIAL CELL DAMAGE IN 24 SNAKE (VIPERA BERUS) ENVENOMED DOGS. L. Pelander, J. Hagstrom. Department of Clinical Sciences, University of Agricultural Sciences, Upsala, Sweden.

Dogs in the Scandinavian countries frequently experience intoxication after snakebite (Vipera berus). It is clinically recognized that a proportion of these snake envenomed dogs develop a cardiac arrhythmia within days after the bite. The most common arrhythmias are ventricular premature complexes and ventricular tachycardia. ECG is an insensitive instrument for detection of myocardial damage. Therefore it is possible that dogs may have myocardial damage in the absence of arrhythmia. Cardiac-specific Troponin I (cTnI) is a sensitive marker of myocardial cell damage in the dog. The aim of the present study was to investigate if myocardial damage (as indicated by increased serum concentrations of cTnI) develops after snakebite in dogs, and if detection of increased serum concentrations of cTnI occurs in the absence of a cardiac arrhythmia.

Dogs examined at the University Animal Hospital in Uppsala, Sweden between March 2005 and July 2007 because of a snakebite were included in the study. Dogs with a previous history of heart disease or other systemic disease and dogs whose owners were not certain that their dog had been bitten by a snake were excluded from the study. On admission and after 12, 24 and 36 hours an ECG was recorded and serum collected for analysis of cTnI from all dogs. Thus, samples were collected at 4 times.

Twenty-four dogs of 18 different breeds were included. Thirteen (54%) of the dogs had increased serum concentrations of cTnI between 0.06 and 0.18 ng/ml. The increases in cTnI were generally detected in only 3 of these 8 dogs. Thus, our findings suggest that myocardial damage does occur in these dogs in the absence of a cardiac arrhythmia.

ABSTRACT #29

ACCURACY OF ELECTROCARDIOGRAPHIC CRITERIA FOR RIGHT VENTRICULAR ENLARGEMENT IN DOGS WITH CONGENITAL PULMONIC STENOSIS. N. Rodriguez, J. Talsaera, R. Bernardes, M.J. Fernandez del Palacio. Departamento de Medicina y Cirugia Animal. 30100 Espinardo (Murcia). Spain.

Pulmonic stenosis (PS) is one of the most common congenital cardiac defects in dogs. The non-invasive gold standard for assessing the severity of PS is Doppler echocardiography (DE). However, availability and expense may be limiting factors for this technique in routine practice. The aim of this study was to evaluate the accuracy of ECG to estimate severity of PS as determined by DE.

For the purpose of this study 46 dogs with congenital pulmonary stenosis were retrospectively evaluated. Only dogs with a complete echocardiographic examination (including DE) and good quality ECGs were included in the study (n=46). Based on Doppler pressure gradient (DPG), severity of PS was classified as mild (DPG<40 mmHg). ECG criteria associated with right ventricular enlargement (RVE) included: 1) mean electrical axis (MEA) in the frontal plane >103° and clockwise; 2) S wave > 0.05 mV in lead I; 3) S wave > 0.35 mV in lead II; and 4) S waves in leads I, II, III, and aVF. Electrocardiographic RVE (ERV) was considered if more than 2 of these criteria were present. ECGs from 20 normal dogs were used for specificity calculations.

PS was mild in 14/46 dogs, moderate in 11/46 and severe in 21/46. ERVE was present in 17/46 dogs, which 15/17 presented severe PS and 2/17 moderate PS. Criterion 1 was present in 28/46 dogs, which 18/28 had severe PS, 5/28 moderate PS and 5/28 mild PS. Criterion 2 was present in 24/46 dogs which 18/24 had severe PS, 4/24 moderate and 2/24 mild PS. Criterion 3 was present in 17/46 dogs which 14/17 had severe PS and 3/17 moderate PS. Criterion 4 was present in 16/46 dogs which 12/16 had severe PS, 3/16 moderate and 2/16 mild PS. ERVE was moderately sensitive to detect severe PS (71%) but insensitive for moderate (18%) or mild PS (0%). Criterion 1 was moderately sensitive to detect severe PS (86%) but insensitive for moderate (45%) or mild PS (36%). Criterion 2 was moderately sensitive to detect severe PS (86%) but insensitive for moderate (36%) or mild PS (14%). Criterion 3 showed low sensitivity to detect severe (67%), moderate (27%) or mild PS (0%). Criterion 4 was insensitive for moderate (14%) and mild PS (0%).
for severe (57%), moderate (14%) or mild PS (14%). Specificity was 100% for all criteria.

In conclusion, accuracy of ECG criteria for RVE was high to differentiate dogs with severe PS from normal dogs, but insufficient to detect moderate or mild PS. The most sensitive criteria to differentiate dogs with severe, moderate or mild PS from normal dogs were the right MEA deviation and S wave > 0.05 mV in lead I.

**ABSTRACT #30**

**FOCAL JUNCTIANTAL TACHYCARDIA IN THE DOG. R.A. Sasson1, M. Peren2, L. Ramera1, P. Moretti1, G. Spaduccioni2, Clinica Veterinaria Malpensa, Samarate, Varese, Italy, 2Clinica Veterinaria Città di Chiari, Chiari, Brescia, Italy, 3Faculty of Medicine of Insubria, Varese, Italy.**

Junctional tachycardia (JT) is a narrow QRS complex tachycardia caused by abnormally rapid discharges from the atrio-ventricular (AV) junction. Two types of JT have been described in people: focal and non-paroxysmal. The focal JT is a rapid arrhythmia in the dog.

Our group was composed by 15 dogs: 12/15 Labradors; 12 were males and 3 female, the mean age was 6 ± 3.5 years and the mean weight 33.15±9.25kg. Each dogs underwent a physical examination, 12 leads electrocardiogram, chest X-rays and standard echocardiography. In 8 dogs a 24 hours Holter monitoring was done and in 3 dogs an EP study.

At arrival 4/15 dogs had clinical signs compatible with congestive heart failure. 14/15 dogs had a narrow QRS complex tachycardia, while one dog showed the arrhythmia after an electrical bicuspid cardioversion for persistent atrial fibrillation. The mean rate of the tachycardia was 129.67 ± 24.18 bpm. Twelve out of 15 presented isorhythmic AV dissociation with transient one-to-one AV (VA) conduction, while three dogs have fixed one-to-one VA association. Four dogs had echocardiographic findings of dilated cardiomyopathy, one dog of initial chronic valvular disease, while the remaining dogs had echocardiographic findings of dilated cardiomyopathy.

The ventricular response rate (VRR) was programmed at 140 bpm. Heart rate was being constantly documented by the implant, and throughout 291 days the VRR was tightly maintained at 142 ± 23 beats (range: 83–178/min), different only by ±14–15% from the target HR.

This is the first attempted clinical use of a minimally invasive device to constantly control HR during chronic, spontaneously occurring AF, in a client-owned dog. The device was well tolerated for 291 days, and VRR was tightly maintained within the programmed range. Long-term clinical benefits should be tested comparatively in a population-based study. If proven safe and effective, antegrade vagus stimulation may benefit patients with chronic, symptomatic supra-ventricular tachyarrhythmia where pharmacotherapy is intolerable, ineffective, impractical, or contraindicated.

**ABSTRACT #32**

**THE T-WAVE IN THE V10 PRE-CORDIAL ELECTROCARDIOGRAPHIC LEAD IS NEGATIVE IN HEALTHY CHIHUAHUA. M. Dijkstra, V. Szatmari, Department of Clinical Sciences of Companion Animals, Faculty of Veterinary Medicine, Utrecht University, The Netherlands.**

In 1965, Detweiler and Patterson described that the T-waves of dogs have a different pattern in comparison with human ECG, with negative T-waves in lead V10. The T-waves in dogs compared to humans are usually less negative or even positive. Despite this information, until now, there are no studies that confirm this observation in a healthy canine population.

In 2004 and 2006, prospective studies were performed in 67 healthy dogs referred for routine echocardiographic examination and clinical examination at the authors’ clinic. All dogs were healthy and had normal results for all clinical and echocardiographic parameters. The T-waves were negative in lead V10 in 65 dogs (97%) and positive in 2 dogs (3%).

**ABSTRACT #33**

**CHRONIC VAGAL STIMULATION FOR VENTRICULAR RATE CONTROL IN A DOG WITH ATRIAL FIBRILLATION. D.G. Ohad, Y. Sina, B. Carmin, A. Zaretsky & R. Shoffit. Koret School of Veterinary Medicine, The Hebrew University of Jerusalem, Rehovot, Israel; 2Biocontrol Medical Ltd., Yehud, Israel.**

Chronic atrial fibrillation (AF) is a common canine tachyarrhythmia. Whilst not immediately life threatening, it reduces quality and increases morbidity, over time contributing to the development of congestive heart failure (CHF) and abbreviation of life expectancy. Frequently, AF recognition is too late to allow conversion to sinus rhythm. Therefore, rate control is often preferred over attempted rhythm control. Chronic pharmacotherapy, however, may fail to provide adequate rate control, may trigger toxicity, may be impractical due to low owner compliance, or may be contraindicated.

We aimed to apply an empirical novel approach, using a vagus nerve stimulating device, to provide constant prolongation of the sino-ventricular refractory period in a patient with chronic AF. A 4-year-old intact male Dogue de Bordeaux presented with right-sided CHF and diagnosed with severe, congenital pulmonic stenosis and tricuspid dysplasia, along with secondary, chronic AF. Presenting heart rate (HR) was 250 bpm despite digoxin, enalapril and furosemide therapy. Notwithstanding successful balloon valvoplasty, a high HR persisted at 200 bpm. It was therefore decided to implant a product in development: a vagus nerve stimulator (CardioFit™, Model 5000, BioControl Medical LTD., Yehud, Israel).

The device was implanted under a cervical muscle, along with a rate-sensing intra-ventricular electrode, to chronically stimulate the left vagus nerve. Stimulation current was 1–10 mAmp, pulse width was 1 ms, and maximal stimulation frequency was 15 Hz. A mild cough developing on the first post-operative day was self-limiting. The ventricular response rate (VRR) was programmed at 140 bpm. Heart rate was being constantly documented by the implant, and Holter monitoring (x24–45h) was performed 7 times during 9.5 months.

Throughout 291 days the VRR was tightly maintained at 142 ± 23 bpm (range: 83–178/min), different only by ±14–15% from the target HR.

This was the first attempt clinical use of a minimally invasive device to constantly control HR during chronic, spontaneously occurring AF, in a client-owned dog. The device was well tolerated for 291 days, and VRR was tightly maintained within the programmed range. Long-term clinical benefits should be tested comparatively in a population-based study. If proven safe and effective, antegrade vagus stimulation may benefit patients with chronic, symptomatic supra-ventricular tachyarrhythmia where pharmacotherapy is intolerable, ineffective, impractical, or contraindicated.

**ABSTRACT #34**

**THE T-WAVE IN THE V10 PRE-CORDIAL ELECTROCARDIOGRAPHIC LEAD IS NEGATIVE IN HEALTHY CHIHUAHUA. M. Dijkstra, V. Szatmari, Department of Clinical Sciences of Companion Animals, Faculty of Veterinary Medicine, Utrecht University, The Netherlands.**

In 2004 and 2006, prospective studies were performed in 67 healthy dogs referred for routine echocardiographic examination and clinical examination at the authors’ clinic. All dogs were healthy and had normal results for all clinical and echocardiographic parameters. The T-waves were negative in lead V10 in 65 dogs (97%) and positive in 2 dogs (3%).
Methylprednisolone acetate (MPA, Depomedrol) intramuscularly to 8 healthy adult cats and obtained echocardiographic, hemato logical, biochemical, metabolic and kinetic data over a 6-week period. Each cat underwent 2 baseline 3D echocardiograms prior to MPA administration, and 4 echocardiograms (week 1, week 2, week 3 and week 6) after MPA administration. All echocardiograms were performed by one investigator (MR) and analysed off-line in a random fashion to minimise investigator bias. In every cat, the mean of 3 cardiac cycles was used for statistical analysis. Data were analysed with the Friedman nonparametric repeated measures ANOVA. Measured and calculated variables included left atrial, left ventricular septal and left ventricular free wall thicknesses in diastole (IVSd, LVPWd), left ventricular systolic and diastolic chamber dimensions (LVIDd, LVIDs), fractional shortening (FS), left-atrial to aortic ratio (LA/Ao), LA dimension (LA) and LA area (LAArea). None of the ventricular variables differed at any time-point. Chamber dimensions in individual cats fluctuated considerably, but no cats showed evidence of volume overload after MPA administration. One cat showed a 2 mm increase in LVIDd 3 weeks after MPA administration. LA dimensions decreased after MPA administration (LA/Ao: p < 0.06, LA: p < 0.1, LAArea: p < 0.2). However, this was possibly due to factors other than drug administration.

Our results do not support the hypothesis that high-dose MPA causes appreciable changes in plasma volume resulting in increases in cardiac dimensions. Whether it results in volume depletion remains to be elucidated.

LEFT VENTRICULAR DIASTOLIC DYSFUNCTION AND DIASTOLIC HEART FAILURE IN CATS WITH HYPERTROPHIC CARDIOMYOPATHY: VALUE OF DOPPLER ECHOCARDIOGRAPHY IN DISEASE STAGING. KE Schober, T Hart. Department of Veterinary Clinical Sciences, The Ohio State University, Columbus, OH, USA.

Hypertrophic cardiomyopathy (HCM) is the most common cardiac disease in cats, and is characterised by morphologic and functional heterogeneity. Left ventricular (LV) hypertrophy, fibrosis, and diastolic dysfunction are hallmarks of the disease ultimately leading to atrial enlargement and dysfunction, thromboembolism, congestive heart failure (CHF), and sudden death. Functional assessment and staging of cats with HCM seems to be of clinical importance. However, clinicians lack a therapeutic point of view and may aid in prognostication. There is a critical lack of clinical studies focusing on LV diastolic function in feline HCM. We undertook a retrospective study on staging cats with HCM using classes of LV diastolic dysfunction as determined by Doppler echocardiography (DE). We hypothesised that a) class of LV diastolic dysfunction correlates with clinical status; b) morphologic progression of the disease is accompanied by deterioration of diastolic function; and c) diastolic heart failure is a common phenomenon in cats with HCM.

A total of 179 cats (73 healthy control cats – group G-1, 66 cats with preclinical HCM – group G-2), and 40 cats with symptomatic HCM – group G-3 underwent 434 DE examinations were studied.

11 DE variables were determined and 5 classes (increasing severity from 0 to 4) of LV diastolic dysfunction based on a composite of IVRT, trans-mitral and pulmonary vein variables, and TDI indices were defined. Staging of the cats. Groups were compared using parametric and non-parametric procedures including Kruskal Wallis ANOVA, Pearson’s correlation analyses, and linear and logistic regression.

Control, preclinical, and symptomatic cats differed significantly (P < 0.05) with regard to LV wall thickness, LA size, and class of diastolic dysfunction (mean score for G-1: 0.18 ± 0.39, for G-2: 1.21 ± 0.82; and for G-3: 3.47 ± 0.83). Clinical severity of the disease correlated strongly to mean LA size (r = 0.99, P < 0.001), mean class of LV diastolic dysfunction (r = 0.97, P = 0.005), and mean E: Ea ratio (r = 0.95, P = 0.011). Changes of disease severity due to treatment of progression (1 to 2 follow-up studies in 61 cats with HCM) were closely related to concordant changes of functional diastolic classes. 28/31 (90%) cats with CHF had normal LV systolic function indicating the presence of isolated diastolic heart failure.

Results suggest that clinical and morphologic changes of disease severity can be tracked by an echocardiographic system based on LV diastolic function. Staging of cats based on the severity of LV diastolic dysfunction may be useful in the assessment of treatments for HCM to document clinical and functional efficacy.
diagnostic value even in some occult heart diseases. Additionally, in human medicine ANP was found to possess prognostic potential and be a predictor of outcome. ANP is synthesized and stored mainly in the atria and released from the atrial myocytes after wall stretch. The main properties of ANP are natriuresis, diuresis, inhibition of the RAAS and sympathetic nervous system as well as inhibition of vascular smooth muscle and endothelial cell proliferation. The aim of the present study was to investigate whether ANP concentration is a prognostic factor for the outcome of cats with cardiomyopathy (CM).

In all cats, apart from clinical examination thoracic radiography, blood testing, echocardiography, ECG and measurement of NT-proANP was performed.

Cats presenting with signs of decompensation were enrolled into group 2 (CM+CHF), and cats with CM but without signs of congestion were allocated to group 1 (CM-CHF).

NT-proANP was measured using a human NT-proANP 1-98 ELISA. Kaplan-Meier analysis and Cox Regression analysis were performed to evaluate outcome and the influence of ANP values on duration of patient survival.

Fifty-six cats were included in the study (group 1, n=28; group 2, n=28). The NT-proANP concentration differed significantly between the two groups. The median NT-proANP concentration of group 1 (CM-CHF) was 1201 fmol/ml (range,1189–15462), whereas in group 2 (CM+CHF) the median value was 3344 fmol/ml (range,1189–15462).

Cats with CHF had a significantly shorter survival with a median survival time (MST) of 51 days (range, 0–747 days) compared to those without CHF with a MST of 505 days (range, 3–808 days). ANP concentration did not exert a significant influence on the duration of survival in this population of cats.

In conclusion, the results of our study population indicate that NT-proANP appears to have the potential to distinguish cats with CM+CHF from those without CHF, but it could not be shown to be a prognostic marker for patient survival duration. Further studies, with a larger population and sequential ANP measurements, are warranted to confirm these results.

ABSTRACT #37

EVALUATION OF A COMMERCIAL PRO-ANP ASSAY IN A CANINE CARDIORESPIRATORY REFERRAL POPULATION IN BELGIUM. N. Van Israë1. J. Pickworth2. AACPULCO, Belgium; 1Guildhay Ltd. UK.

Atrial Natriuretic peptide (ANP) is a hormone manufactured in and released from the atrial myocardium in response to stretch and increased atrial wall stress. Concentrations of its pro-peptide (PRO-ANP) can be measured in the circulation and increase significantly with cardiac disease. The aim of the study was to assess the potential of this assay to differentiate respiratory disease from cardiac disease, to investigate the ability of this test to differentiate heart disease from heart failure, to differentiate the stages C1, C2, C3 and D of the CHIEF classification system, to differentiate between a cough caused by cardiac or respiratory problems and to differentiate between dyspnoea of cardiac or respiratory origin. It was also investigated whether this test is useful in case of concurrent renal disease or if these animals should be excluded.

Serum samples from 46 dogs out of a cardio-respiratory referral population were taken, spun and frozen immediately and then sent in bulk to Guildhay under temperature controlled conditions with ice packs and stored for PRO-ANP.

“Abnormal” samples were those animals diagnosed on the basis of a full cardiac work-up (ECG, thoracic radiographs and echocardiography) as having heart disease, being in heart failure or having respiratory disease.

Analysis showed that on the current UK PRO-ANP cut-off value of 910 fmol/ml for serum this study has 1) a specificity of 80% and a sensitivity of 61% when distinguishing cardiac from non-cardiac problem when including renal patients; 2) a specificity of 92% and a sensitivity of 68% when distinguishing cardiac from non-cardiac problem when excluding renal patients; 3) a specificity of 70% and a sensitivity of 94% when distinguishing heart disease from heart failure patients; 4) a specificity of 80% and a sensitivity of 60% when distinguishing a cardiac from a respiratory cause of dyspnoea; 5) a specificity of 92% and a sensitivity of 87% when distinguishing a cardiac from a respiratory cause of coughing.

The AUC in all cases showed very good accuracy with very good accuracy in the distinction of cardiac and respiratory causes of coughing and dyspnoea as well as distinguishing respiratory from cardiac patients when renal patients were excluded.

In conclusion, the results of our study population indicate that NT-proANP appears to have the potential to distinguish cats with CM+CHF from those without CHF, but it could not be shown to be a prognostic marker for patient survival duration. Further studies, with a larger population and sequential ANP measurements, are warranted to confirm these results.
The purpose of this study was to evaluate cardiac troponin I for the diagnosis of DCM in Doberman pinschers in various disease stages. The study included 170 cTnI measurements of 136 dogs (65 male and 71 female Doberman pinschers, mean age 6.3 years, weight 24-47 kg). Staging of the disease was based upon 24-hour-ECG (Holter) and echocardiography. Both tests were performed at each examination in all of the dogs. Occult phase was defined as having >100 VPCs/24 hours, but no clinical signs. This stage was subdivided into dogs with or without echocardiographic changes, respectively. Ninety-one dogs were considered to be free of DCM and 45 Doberman pinschers as having the disease. Of the 45 diseased dogs 79 cTnI measurements were included from separate visits. Thirty-one cTnI measurements were from 18 dogs in the occult phase with echocardiographic changes. Additional cTnI samples were collected from 20 dogs in the occult phase with echocardiographic changes. 8 samples were from 7 dogs with clinical, uncomplicated DCM.

There was a linear increase of the cardiac troponin I concentration from stage to stage and with disease progression. There were significant differences between all stages. Using a cut-off value of 0.29 ng/ml, troponin I had a sensitivity of 68.4% and a specificity of 83.5% to differentiate healthy animals from dogs with cardiomyopathy.

cTnI is a useful additional test in the diagnosis of cardiomyopathy in Doberman pinschers, not only to diagnose the clinical stage but also to find some dogs in the occult phase of DCM. Elevated values should raise the suspicion for the disease and frequent follow-up examinations (using echocardiography and Holter) to verify the disease should be suggested.

ABSTRACT #40
CIRCULATING CARDIAC TROPONIN I CONCENTRATIONS IN CATS WITH RESPIRATORY DISTRESS.
D. J. Connolly, H. Copeland, S. Collins*, D. Brodbelt. Royal Veterinary College, University of London UK, *Cedar Veterinary Group, Hampshire, UK.

Cardiac troponin I (cTnI) is a specific and sensitive marker for myocardial cellular damage in many mammalian species. Previous studies have shown that circulating cTnI concentrations are increased in cats with myocardial disease compared to healthy controls. Circulating cTnI concentrations in cats with congestive heart failure (CHF) were also found to be significantly higher than in cats with asymptomatic heart disease. Circulating cTnI has not proven to be useful for distinguishing cardiac from non-cardiac causes of dyspnoea in dogs. The study aim was to determine if circulating cTnI concentration could distinguish cardiac from non-cardiac causes of dyspnoea in cats.

The study recruited 65 cats from 1 university teaching hospital and 1 private practice. Serum cTnI concentrations were measured in 31 cats with respiratory disease RDNC (diseases included asthma, neoplasia, pyothorax, pneumonia, pleural effusion, bronchitis, rhinitis, nasopharyngeal stenosis, nasopharyngeal polyp) and compared to cats with asymptomatic heart disease (AsymHD n=13) and cats with CHF (RDCHF n=23) using a sandwich enzyme immunoassay. The diagnosis in cats with heart disease included hypertrophic cardiomyopathy, hypertrophic obstructive cardiomyopathy or both (n=28); restrictive cardiomyopathy (n=4); mitral dysplasia (n=4). The ability of serum cTnI concentrations to distinguish cats with RDCHF from those with RDNC was explored using receiver operator cut-off (ROC) analysis. The RDCHF group had higher median cTnI concentrations (1.01ng/ml inter-quartile range IQR 0.56-4) than the RDNC group (0.19 ng/ml IQR 0.19-0.33 p<0.0001). The median cTnI concentration of the AsymHD group was 0.02ng/ml IQR 0.02-1.3 which was significantly different from the RDNC group (p=0.0135) but not from the RDCHF group (p=0.1066). The area under the curve (AUC) was 0.863 (95% CI 0.750-0.975) for the ROC analysis of the diagnostic accuracy of cTnI concentrations to discriminate RDCHF from RDNC cats. An optimum cut-off concentration of 0.34 ng/ml accurately discriminated RDCHF from RDNC cats with a sensitivity and specificity of 91.3% and 77.4% respectively. When all cats with heart disease were combined the AUC for the ROC analysis of the diagnostic accuracy of cTnI concentrations to discriminate RDCHF + AsymHD from RDNC cats was 0.818 (95% CI 0.709-0.927). An optimum cut-off concentration of 0.34 ng/ml accurately discriminated RDCHF + AsymHD from RDNC cats with a sensitivity and specificity of 83.3% and 77.4% respectively. Serum cTnI concentrations were, therefore, different in cats with CHF compared with those with respiratory distress of non-cardiogenic origin.

ABSTRACT #41
EFFECT OF ARRYTHMIAS ON NATRIURETIC PEPTIDE LEVELS IN DOGS WITH EITHER VALVE DISEASE OR WITH STRUCTURALLY NORMAL HEARTS.
G. Farace1, A. Beardow*, C. Carpenter*, K. Yeung1, M. Zieba, SJ Eftinger*, SD Forney. 1IDEXX Laboratories, Inc., Westbrook, USA, 2California Animal Hospital, Los Angeles, USA.

An increasing number of articles have appeared in human medical journals showing increased concentrations of natriuretic peptides, in particular N-terminal prohormone brain natriuretic peptide (NT-proBNP), in patients with arrhythmias. The aim of this analysis was to determine whether or not there was a similar correlation in dogs.

Over the past two years the California Animal Hospital has enrolled over 1000 dogs in a study to determine the concentration of natriuretic peptides in dogs presenting a cardiac referral clinic. Each dog underwent a complete diagnostic work up, including an echocardiogram and blood sampling for NTproBNP and N-terminal prohormone atrial natriuretic peptide (NT-proANP) concentrations. The enrolled population was retrospectively divided into four groups; dogs with structurally-normal hearts, dogs with arrhythmia, dogs with normal hearts and arrhythmia, dogs with valve disease and no arrhythmia and dogs with valve disease and arrhythmia. The latter two groups were matched so that severity of disease in the two groups was similar.

347 dogs had valve disease with a further 91 having valve disease and arrhythmias. In these dogs both the NTproANP (1855 vs. 2354; 1277 vs. 2402) and NTproBNP levels (1058 vs. 1652; 1496 vs. 2044) were elevated. In both cases Mann-Whitney tests showed that the difference was significant.

Dogs that have an arrhythmia and concurrent valve disease appear to have much higher concentrations of natriuretic peptides than similar dogs that only have valve disease. This finding appears to mirror the findings in the human literature. Both NTproANP and NTproBNP exhibit the phenomenon with NTproBNP being the more striking of the two. While the levels of NTproBNP are not significantly elevated in dogs with arrhythmias and normal hearts the fact that there is a difference may suggest that the arrhythmia itself induces sufficient stress on the muscle wall to cause the release of NTproBNP.

ABSTRACT #42
EXPERIMENTAL STUDIES OF THE PHARMACOLOGY OF SPIRONOLACTONE IN DOGS.
J. Elliott1, J. Guyonnet*, V. Kalsitas1, 1Royal Veterinary College, London, UK, *CEVA Sante Animale, R&D, Libourne cedex, France.

Mineralocorticoid receptors are present in cardiac, vascular and neuronal tissues mediating pro-fibrotic and proliferative effects. Thus aldosterone-receptor antagonism and its mechanism of action are of great interest in heart failure management in dogs. Spironolactone has been used empirically in dogs without knowledge of its pharmacological properties. This study aimed to investigate the pharmacological properties of spironolactone providing the basis for a clinical dose rate.

Beagles (n=6 per group) were used for these studies which were conducted under local ethical approval and to nationally agreed standards of animal care. Metabolites of spironolactone were measured in plasma using a validated HPLC method. Linear square designs were used to address dose linearity of the kinetics, effect of feeding on oral bioavailability and to determine any changes in pharmacokinetics with repeated administration over 10 days. Dose-
dependent inhibition of changes in the effects of aldosterone (3 mg/kg) on urinary Na/K ratio were determined over a 6 h period. Computerised non-compartmental pharmacokinetic analysis of the data generated was used.

Three metabolites of spironolactone were measured in plasma following oral dosing (2 mg/kg), namely canrenone, 6α-hydroxy-7α-thiouracil-spirolactone and 7α-thiouracil spirolactone. AUC values calculated for each metabolite were significantly greater when spironolactone was dosed with food compared to AUC: 0.79 ± 0.14 vs 0.49 ± 0.15 (P < 0.01) but no change in clearance or half life (e.g. canrenone clearance: 1.52 ± 0.55, 1.55 ± 0.37 and 1.55 ± 0.33 (kg/h following 1, 2 and 4 mg/kg). Repeated dose administration (2 mg/kg) showed no evidence of drug metabolite accumulation (canrenone accumulation factor 0.99 ± 0.36) and a trough canrenone concentration at steady state (after 3 days) was 14 mg/l. Dose-dependent inhibition of the effect of aldosterone on urinary Na/K ratio was demonstrated. The ED_{50} value determined by this study was 1.09 ± 0.08 mg/kg with the dose of 2 mg/kg, providing 87% inhibition of the effect of aldosterone.

The present studies have demonstrated spironolactone is rapidly metabolised into active metabolites following oral administration. Food increases its absorption and it has linear, non-accumulative kinetics. Inhibition of aldosterone is almost complete at 2 mg/kg and extrapolation from the trough concentrations of metabolites would suggest a dosing frequency of once daily would be effective. These data inform the clinical use of spironolactone.

### ABSTRACT #43

THE PHARMACODYNAMICS OF ENOXAPARIN IN THE HEALTHY CAT. CW Van De Wiele, DF Hogan, HW Green, K Dryden, Veterinary Clinical Sciences, Purdue University, West Lafayette, IN USA

Many antithrombotic drugs have been considered in the prevention of thrombo-embolic disease in cats, with the low-molecular weight heparins (LMWH) gaining particular interest over the past decade. Due to their small size, the LMWH allow controlled inhibition of factor Xa with greatly reduced inhibition of factor IIa. Standard coagulation assays such as aPTT are not altered during LMWH therapy so clinical monitoring is difficult. Pharmacokinetic profiling of the LMWH utilising anti-Xa assays has been evaluated in veterinary studies with the conclusion that very frequent dosing is required to maintain a therapeutic drug effect. However, it has been established in humans and other animal species that there is no correlation between anti-Xa levels and antithrombotic effect of the LMWH. The present studies have demonstrated an anti-thrombotic effect in the cat when dosed at the current standard dosing protocol of 1 mg/kg SQ q 12 hrs for 5 consecutive days.

Fourteen normal, purpose bred cats were used for this venous stasis model and divided into 3 groups: Group A; (n=4) control (untreated), group B; (n=5) 4 hrs post final dose (peak), and group C; (n=5) 12 hours post final dose (trough). The model was created by injecting 5 μCi of 125I-fibrinogen (125I-fib) IV followed by 500 μg/kg tissue thromboplastin IV and subsequent isolation of a segment of the abdominal vena cava. The isolated venous segment was maintained for 20 minutes then removed and the amount of thrombus formed was determined. The extent of thrombus formation was objectively measured by the wet weight of the thrombus normalised to segment length and the percent of 125I-fib accreted within the thrombus compared to the 125I-fib within the entire segment. The degree of thrombus inhibition, as well as anti-Xa levels, were determined for groups B and C.

The median normalised thrombus weight and %125I-fib were 0.5902 (mm) and 42.0%, 0.0018/mg/mm (P = 0.01) 0.0% (P = 0.01), and 0.006/mg/mm (P = 0.09) and 3.83% (P = 0.09) for group A, group B and group C, respectively (P values compared to control). The median percent thrombus inhibition for groups B and C were 100.0% and 91.4%, respectively. Anti-Xa levels were not available at the time of writing.

### ABSTRACT #44

RELATIVE SUPERSATURATION: A BETTER PREDICTOR OF STRUVITE UROLITH DISSOLUTION KINETIC THAN URINARY pH. C. Tournier, E. Malandain, M. Esperandieu, S. Aladenise, C. Veñet, C. Ecobichon, R. Sergheraert, V. Biourge, Royal Canin Research Centre, Aimargues, France.

Relative supersaturation (R S S) is a method that measures the potential for urine to dissolve or form crystals. This technique has been previously validated in cats. The aim of this study was to assess whether struvite R S S or urinary pH is the best predictor of in vitro struvite urolith dissolution kinetics in cat urine.

Two pooled feline urines with the same struvite R S S (0.45) but different pH (6.32 vs 6.47) were used in this study. Each of the pooled urine samples was divided into 90 mL aliquots. The aliquots were placed in bottles and stored at −20 °C prior to analysis. Two groups of two feline struvite stones (98 ± 2 mg) homogenous in source, shape and weight were selected. On day 0, a bottle of each urine sample was defrosted, and the struvite stones added. The bottles were placed in a water bath at 38 °C for 24 hours (with a shaking mode during 9 hours to simulate cat activity). The urines were then filtered to collect the stones. The stones were lightly dried on absorbent paper and weighed. The 24-hour process was repeated daily over 7 days.

The average dissolution kinetics for the 2 urines were identical: 7.1 ± 3.1 mg/day for the 6.32 pH urine versus 7.6 ± 2.5 mg/day, for the 6.47 pH urine (p = 0.47). This observation shows that R S S is a better predictor of the urine potential to dissolve struvite stones than urinary pH.

### ABSTRACT #45

EFFECT OF HIGH DOSE ORAL HYDROCORTISONE OVER 84 DAYS ON URINARY CALCIUM EXCRETION IN YOUNG HEALTHY BEAGLE DOGS. S. Schellenberg, C.E. Reusch, T.M. Chue, Division of Renal, Gastrointestinal and Metabolic Medicine, Vetsuisse Faculty, University of Zurich, Switzerland.

In humans, hypercortisolism (HC) increases urinary calcium excretion, which in turn may augment the risk of developing calcium-containing uroliths. There is only a very small percentage of dogs with HC who have calcium phosphate or calcium oxalate urinary calculi, they have a tenfold higher risk of developing calcium-containing uroliths than dogs without HC. Glucocorticoids have been postulated to promote calciuresis; however, we are unaware of any published data in dogs. Therefore, the purpose of this study was to evaluate the influence of HC on serum calcium concentration and urinary calcium excretion in dogs.

Six adult beagles were studied before, during and after administration of hydrocortisone (8 mg/kg PO bid for 84 days). Serum and urinary calcium and creatinine concentrations were measured, and the urinary calcium/creatinine ratio (U-Ca/Cr) as well as the fractional excretion of calcium (F,Ca) were calculated before (day 0), on d1, d5, d28, d56 and d84 during, and on d1p, d5p, d28p, d56p and d84p after hydrocortisone administration. All data are shown as median and range.

Serum calcium concentration was significantly different, i.e. lower, only on d1 compared to all other time points with a calcium concentration [mmol/l] of 2.50 (2.42–2.52) on d1 compared to 2.62 mmol/l (2.57–2.74) on d0, 2.60 (2.56–2.65) on d5, 2.57 (2.4–2.68) on d28, 2.62 (2.47–2.63) on d56 and 2.65 (2.54–2.82) on d84. The serum creatinine concentration significantly decreased from 95.5 mmol/l (50.0–71.0) to a minimum of 30.5 mmol/l (26.0–42.0) on d84, without change in bodyweight. U-Ca/Cr and F,Ca tended to decrease during treatment with U-Ca/Cr from 0.33 (0.24–0.85) to a minimum of 0.08 (0.04–0.35) and F,Ca from 0.65% (0.06–2.10) to 0.15% (0.09–0.45) on d28. After stopping hydrocortisone serum calcium concentrations did not change significantly, whereas serum creatinine concentrations increased significantly to pre-treatment values within 28 days. U-Ca/Cr, but not F,Ca significantly decreased. U-Ca/Cr on d56p and d84p were significantly lower compared to values obtained on d84, d1p and d5p.

In summary, hydrocortisone administration did not cause a relevant change in serum calcium concentration and was not associated with an increased calcium excretion. In contrast, both U-Ca/Cr and F,Ca tended to decrease during hydrocortisone
administration indicating decreased calcium excretion. Our results do thus not support the hypothesis of HC to induce hypercalcuria in dogs. If HC represents a risk factor for the formation of calcium-containing uroliths, increased calcuress does not seem to be the underlying mechanism.

ABSTRACT #46
EFFECT OF ACUTE DIETARY SODIUM ENRICHMENT ON RENIN ANGIOTENSIN SYSTEM AND URINARY ELECTROLYTES AND PROSTANOIDS EXCRETION. Ludovic Pelligand, Jonathan Elliott. Department of Veterinary Basic Sciences, Royal Veterinary College, London, UK.

In response to an acute dietary sodium load, the kidney maintains sodium balance by increasing natriuresis. This regulation takes place in the medulla and is likely to involve renal prostanooids, such as prostaglandin E2 (PGE2). We hypothesised that an increase in natriuresis in response to a high sodium diet will be associated with an increase in medullary PGE2 synthesis and urinary PGE2 excretion in the cat.

Nine healthy neutered cats (4 males, 5 females, 4.0 ± 0.4 kg) were enrolled in the study, which was approved by the local ethics committee. The cats were fed a commercial diet with low sodium content (0.33% as per fed) from which a high sodium diet was made (sodium content 0.97%). The intervention involved acutely switching the diet from low sodium to high sodium diet. The cats were housed individually and urine collection was continuous. Baseline urine was collected for 48 hours before diet change. Blood was collected before and 24 hours after intervention and urine was collected for 48 hours following the intervention. Plasma Aldosterone and plasma renin activity (PRA) were measured using immunoassay methods previously validated for the cat. PGE2 and prostacyclin were measured by radioimmunoassay.

Changes in plasma creatinine, aldosterone, PRA, 24h urinary electrolytes, creatinine and prostanooids (PGE2, 6keto-Prostaglandin F1α) excretions were recorded. Results are presented as mean ± SD. Group means before and after intervention were compared with a paired t-test unless stated otherwise. P values lower than 0.05 were considered significant.

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Changes in plasma creatinine, aldosterone, PRA, 24h urinary electrolytes, creatinine and prostanooids (PGE2, 6keto-Prostaglandin F1α) excretions were recorded. Results are presented as mean ± SD. Group means before and after intervention were compared with a paired t-test unless stated otherwise. P values lower than 0.05 were considered significant.

Urinary output (11.4 ± 3.3 versus 20.7 ± 2.8 mL.kg⁻¹.day⁻¹), urinary sodium (1.34 ± 0.33 versus 6.96 ± 0.61 mmol.kg⁻¹.day⁻¹) and chloride excretion (2.69 ± 0.50 versus 8.59 ± 0.76 mmol.kg⁻¹.day⁻¹) were significantly higher after intervention (P < 0.001). Plasma creatinine and 24h urinary potassium excretion were not significantly changed after intervention. Plasma aldosterone was significantly lower after intervention (201.0 ± 119.0 versus 71.4 ± 62.8 pg.ml⁻¹, P < 0.001) but not PRA (0.41 ± 0.31 versus 0.23 ± 0.21 ng.ml⁻¹.h⁻¹, P = 0.095). There was no significant difference in daily urinary recoveries of PGE2 (Median [inter-quartile range] 56.35 [28.70 - 121.3] versus 51.52 [41.36 - 122.8] ng.kg⁻¹.day⁻¹, P = 0.36, Wilcoxon signed rank test) and 6-keto-PGF1α (58.4 ± 26.2 versus 56.4 ± 17.8 ng.kg⁻¹.day⁻¹).

In conclusion, marginal depression of the RAAS occurred after intervention, 6-keto-PGF1α excretion could be demonstrated.

ABSTRACT #47
URINARY IMMUNOGLOBULIN G, C-REACTIVE PROTEIN AND RETINOL BINDING PROTEIN AS CANDIDATE EARLY BIOMARKERS FOR RENAL DYSFUNCTION IN DOGS WITH PYOMETRA. B.E.J. Maddens², S. Daminet², P. Smets², K. Demeyere¹, H. de Rooster¹, E. Meyer¹. ¹Department of Pharmacology, Toxicology, Biochemistry and Organ Physiology, ²Department of Medicine and Clinical Biology of Small Animals, both Faculty of Veterinary Medicine, Ghent University, Belgium.

Renal dysfunction in dogs has been associated with pyometra. Nevertheless, the mechanism and type of renal injury remain controversial. Routine measurement of serum urea nitrogen and creatinine detects renal injury only in a late irreversible stage and does not indicate the localisation of the damage. We hypothesize that urinary immunoglobulin G (uIgG), C-reactive protein (uCRP) and retinol binding protein (uRBP) may serve as superior renal biomarkers. Both IgG and CRP are high molecular weight proteins indicating glomerular lesions, whereas RBP may serve as a tubular damage marker.

In this study, 14 dogs with Escherichia coli (E. coli) pyometra (P) without concurrent other diseases were included. Age-matched clinically healthy bitches (H) served as controls (n = 14). At ovariohysterectomy (P, H) or ovarietomy (H) blood, urine and uterine swabs were taken. Serum biochemical analysis, CBC, urinanalysis and uterine bacteriological culture were performed. Commercial canine ELISAs were validated and used to quantify uIgG and uCRP. uRBP concentrations were determined with a human RBP ELISA kit validated for use in the dog. All concentrations were related to urinary creatinine concentration (uC) and expressed as ratios.

In P dogs, uIgG/C (196 ± 45.2 mg/g) and uCRP/C (706 ± 298 μg/g) (mean ± SD) were significantly increased compared to those in H bitches (2.1 ± 0.4 mg/g respectively 0.1 ± 0.1 mg/g) (P < 0.01). Furthermore, uRBP/C ratios were significantly higher in P (43.7 ± 1.1 µg/g) than in H dogs (16.7 ± 5.5 µg/g) (P < 0.05). A positive correlation at the 0.05 level was found between the urinary concentrations of all three proteins. Urinary uCRP: uIgG ratios (uT/P:uIgG) were significantly higher in P (0.77 ± 0.19) than in H dogs (0.16 ± 0.06) (P < 0.05). A highly significant positive correlation was found between uT/P and uCRP/C (R = 0.79) or uRBP/C (R = 0.72), but not between uIgG/C and uRBP/C.

Changes in plasma creatinine, aldosterone, PRA, 24h urinary electrolytes, creatinine and prostanooids (PGE2, 6keto-Prostaglandin F1α) excretions were recorded. Results are presented as mean ± SD. Group means before and after intervention were compared with a paired t-test unless stated otherwise. P values lower than 0.05 were considered significant.

Canine leptospirosis is a disease with potential multi-organ involvement with mostly renal and hepatic manifestations. Pulmonary haemorrhage with high mortality rates has been reported in human leptospirosis, while respiratory signs in dogs have been attributed mostly to urticarial pneumonitis or volume overload.

In order to evaluate this discrepancy, dogs diagnosed with leptospirosis in 2007 were assessed prospectively for pulmonary involvement. The diagnosis of leptospirosis in dogs with acute kidney injury was based on MAT titres of 1:800 at presentation or a 4-fold increase in paired samples. Additional inclusion criteria included thoracic radiographs at presentation. To differentiate between the 3 main causes of haemorrhage (uraemia, direct effect of leptospirosis, and haemorrhage due to uraemia and refractory dyspnoea), dogs were assigned for analysis to 2 treatment groups, group 1 for dogs treated with non-dialytic therapy and group 2 for dogs on HD therapy.

Group 1 included 6 dogs, of which 4 (67%) showed clinical signs of dyspnoea at presentation, the other 2 (33%) remaining asymptomatic during the course of treatment. All dogs had radiological evidence of pulmonary involvement, including patchy to confluent interstitial to alveolar changes. Two dogs (33%) were euthanased due to uraemia and refractory dyspnoea. Group 2 included 21 dogs. Of these, 10 dogs (48%) showed clinical signs of dyspnoea at presentation, 9 dogs (43%) developed signs during the course of treatment, and 2 dogs (9%) remained asymptomatic for respiratory dyspnoea. Seventeen dogs (74%) of this group had radiological evidence of pulmonary involvement, similar to changes in group 1. One of the four dogs, without radiological abnormalities, never developed respiratory signs; two showed mild clinical signs at presentation, and one developed fatal respiratory distress over the following days. Ten of 21 dogs (48%) died or were euthanased due
to severe refractory dyspnoea and all displayed haemorrhages from the airways at the time of death. None died or was euthanased due to reasons other than pulmonary. Necropsy was performed in 3 dogs, showing macroscopic and histologic evidence of pulmonary haemorrhage. The 11 survivors (52%) were discharged without evi- dent respiratory sequelae.

Based on these data, pulmonary haemorrhage seems to be an emerging complication of canine leptospirosis in our area with 81% dogs displaying radiographic evidence, poor correlation with clin- ical manifestations, and high rates of morbidity (85%) and mortality (44%), similar to human data. The 100% prevalence of lung involvement, in group 1, excludes heparinisation for HD as the main cause of bleeding.

**ABSTRACT #49**

**TREATMENT OF PULMONARY HAEMORRHAGE IN CANINE LEPTOSPIROSIS WITH DESMOPRESSIN AND DEXAMETHA- SONE.** A. Schweighauser, T. Franey, B. Binkert, A. Schweighauser. Department of Clinical Vet- erinary Medicine, Vetsuisse Faculty, University of Berne, Switzerland.

Pulmonary haemorrhage has been reported as a possible and of- ten fatal complication of human leptospirosis with mortality rates of over 50% despite aggressive therapy including ventilator support. Little is known about successful treatment options so far. As an in- creasing number of case reports with pulmonary involvement has been noted in dogs with leptospirosis presented to our clinic and, based upon our human case series with favourable outcome, a new ther- apeutic approach was adapted for dogs involving desmopressin (1 mg/kg conj 48h) and dexamethasone (0.15 mg/kg IV q24h). This protocol was introduced and used as a standard treatment begin- ning August 2007.

Dogs with acute kidney injury due to leptospirosis with available thoracic radiographs were analysed prospectively regarding possi- ble pulmonary complications and outcome from January to December 2007. Dogs seen before August were used as a negative control group. Respiratory manifestations were graded into 2 stages: 1 = no or minimal clinical signs; 2 = moderate to severe dyspnoea. A total of 27 dogs were included and divided into two groups. The treatment group (Tx) included 15 dogs treated with desmopressin and dexamethasone as described above. The non- treatment group (nTx) consisted of 12 dogs seen earlier in the year with no special treatment against pulmonary haemorrhage. Treat- ment protocols were otherwise identical between the two groups.

In the Tx group, 10 dogs (67%) showed grade 1, and 5 dogs (33%) showed grade 2 respiratory disease at initial presentation. In the nTx group, 6 dogs (50%) showed grade 1, and 6 dogs (50%) grade 2 respiratory disease at initial presentation. No significant difference was found, regarding severity of pulmonary involvement, between the two treatment groups (p=0.63). At the time of their most severe respiratory signs, 4 dogs (27%) had grade 1 and 11 dogs (73%) had grade 2 respiratory disease in the Tx group. In the nTx group, 4 dogs (33%) had grade 1 and 8 dogs (67%) had grade 3 pulmonary involvement. This showed a worsening of respiratory disease during the course of treatment in 6 dogs (40%) in the Tx group and in 2 dogs (17%) in the nTx group (p=0.37). Survival rate was 53% (8/15) for the Tx group and 47% (7/12) for the nTx group (p=0.88).

These data indicate that the treatment with dexamethasone and desmopressin as used in this study did neither alter the course of progression of respiratory disease nor the global outcome in dogs with pulmonary haemorrhage from leptospirosis.

**ABSTRACT #50**

**RENAL AND EXTRA-RENAL DISPOSITION OF UREA IN DOGS WITH SPONTANEOUS CHRONIC KIDNEY DISEASE.** T. Franey, B. Binkert, A. Schweighauser. Department of Clinical Veterinary Medicine, Vetsuisse Faculty, University of Berne, Switzerland.

Chronic kidney disease (CKD) is associated with marked distur- bances of the nitrogen metabolism, including retention of end products from decreased glomerular filtration rate (GFR) and ab- normal generation based on the nutritional state. The determination of the renal and extra-renal handling of the main nitrogen end prod- uct urea can thus provide useful insights in the protein metabolism of animals with CKD.

To quantify global urea metabolism in dogs with spontaneous CKD, we analysed the respective contribution of the renal and extrarenal elimination of urea by using urinary and plasma clearances. Renal elimination was defined as the renal clearance, measured with 2 consecutive 30-min urine collections. Total body elimination was defined as the total plasma clearance of exogenous urea, representing the sum of renal and extra-renal eliminations. To evaluate the safety of the procedure, exogenous urea was injected in increasing doses at 250 (n=3), 500 (n=3), and 1000 (n=3) mg/kg slowly IV over 20 minutes. The resulting plasma elimination curves were evaluated with non-compartmental kinetic analyses. Extra- renal elimination was calculated as the difference between the total plasma clearance and the renal clearance. Parallel clearances of creatinine were performed for the determination of GFR and to as- sess adequacy of urine collections.

Nine dogs with CKD were included in the study (IRIS stage 2: n=2, stage 3: n=6, stage 4: n=1). No side effect was observed from the injections of exogenous creatinine and urea. Renal clearances of creatinine (median 0.66 ml/kg/min [IQR 0.49–1.28]) correlated well with the plasma clearances of creatinine (0.78 ml/kg/min [0.64– 1.13]; r²=0.81). With decreasing GFR, the extra-renal clearance of creatinine increased linearly (r²=0.82; p<0.02) up to a maximum of 55% of the total clearance. Renal clearances of urea (0.33 ml/kg/ min [0.21–0.84]) did not correlate linearly with their plasma clearances (0.82 ml/kg/min [0.64–0.92]; r²=0.15). The extra-renal clearance of urea showed a marked exponential increase with de- clining GFR (r²=0.91), contributing up to 92% of total urea clearance.

These data indicate different mechanisms governing the extra- renal elimination of creatinine and urea, including gastrointestinal elimination, metabolism, or other routes of excretion. The minimal increase observed with creatinine may indicate a limited concentra- tion-dependent diffusion, whereas the exponential increase seen with urea would be more consistent with a mechanism of higher ca- pacity. The methods used in this study could also prove useful to quantify enteric dialysis therapy in CKD.

**ABSTRACT #51**

**FAMILIAL GLOMERULOPATHY IN SEVEN FRENCH MAS- TIFF DOGS.** R. Lavoue1, M.J. Day2, V. Busoni1, A. Poujade3, D. Peeters1. 1University of Liège, Belgium. 2University of Bristol, UK. 3Laboratoire d’anatomopathologie vétérinaire du Sud-Ouest, Toulouse, France.

Familial glomerular diseases are characterised by progressive proteinuria associated with early renal failure. The purpose of this study was to describe clinical, ultrasonographic, histopathological, immunohistochemical and electron microscopic findings in seven French Mastiff (FM) dogs suffering from glomerular disease at an early age and to define the possible mode of inheritance of the disease.

Three affected dogs were presented to the Department of Veteri- nary Clinical Science of the University of Liège. Breeders of these dogs then collaborated to detect other potential cases. Inclusion crit- eria included (1) breed (FM), (2) age (less than 2-years-old at time of diagnosis) and (3) chronic renal failure with histopathological and/or clinical evidence of glomerular disease. Four more cases were then detected. All affected dogs developed clinical signs before 18 months of age including: weight loss, polyuria, polydipsia, vom- iting and generalised seizures. All dogs were diagnosed with stage IV proteinuric, non-hypertensive renal failure. Abdominal ultrasound revealed small hyper-echoic kidneys with poor cortico-medullary definition. Formalin-fixed tissue from six dogs was available for histo- chemical and immunohistochemical studies. In all sections, there was diffuse glomerular disease with most glomeruli showing vari- able dilation of Bowman’s space with either an absent or very small atrophic glomerular tuft. Bowman’s membrane was often thickened and most glomeruli had surrounding interstitial fibrosis with focal aggregations of lympho-plasmacytic cells. Some glomeruli were fo- cally sclerosed and others had a hypercellular tuft with increased matrix. Some of these larger glomerular tufts had focal evidence of thickening of glomerular basement membrane (GBM). Cortical tub- ules were relatively normal, but there was medullary fibrosis with mononuclear inflammation. These findings were compatible with a
diagnosis of membrano-proliferative glomerulonephritis. Immunohistochemistry (using antibodies directed against IgA, IgG, IgM and C3) failed to demonstrate significant immune complex deposition. Electronic microscopy was performed on renal tissue from one dog and showed focal D-glycosaminoglycan GBM wrinkling and immune complexes. The mean survival time after diagnosis was 4 months. Analysis of pedigrees showed a common sire to all affected dogs and suggested an autosomal recessive mode of inheritance.

Genotyping studies, comparing DNA from affected dogs and healthy related animals are warranted in order to define the genetic mutation causing this new disease entity and to allow detection of carrier animals.

**ABSTRACT #52**

**GLOMERULAR AND TUBULAR URINARY MARKERS AND GLOMERULAR FILTRATION RATE IN CLINICALLY HEALTHY YOUNG AND AGED DOGS, P. Smets1, E. Meyer2, B.E.J. Maddens1, S. Croubels1, H.P. Lefèvre1, S. Daminet1, C. Maurey-Guenec1, G. Benchekroun1, D. Rosenberg1, 1Ghent University, Ghent, Belgium, 2Ecole Nationale Vétérinaire, Toulouse, France.

In human medicine, multiple studies have demonstrated structural and functional changes of the kidneys associated with aging. In contrast, limited information exists regarding the effect of aging on renal function in dogs. Glomerular markers such as microalbuminuria and tubular markers such as renal binding protein (RBP) and N-acetyl-D-glucosaminidase (NAG) are gaining interest, because they allow early detection and localisation of renal damage. However, their urinary concentrations in healthy dogs of different ages have not yet been investigated.

Aims of this study are to determine urinary concentrations of albumin, RBP and glomerular filtration rate (GFR) in clinically healthy young and aged dogs, and secondly to assess whether there is a significant difference in these concentrations and GFR between both groups.

Seventeen healthy dogs without abnormalities on physical examination, CBC, biochemical profile and urinalysis including bacterial culture, were included and divided into two groups according to age: group 1 (young dogs, n=9, 2.3 ± 0.7 years) and group 2 (aged dogs, n=8, 9.0 ± 1.4 years). Urinary albumin concentration (uALB) was determined using a canine-specific ELISA, urinary RBP concentration (uRBP) using a human RBP ELISA validated for use in the dog, and urinary NAG activity (uNAG) using a colorimetric assay. In all dogs, GFR was calculated by means of plasma exo- and endo-iohexol clearance (Winolin® non-compartamental analysis).

Results are expressed as mean concentrations ± SEM. uALB/creatinine ratio was 9.0 ± 3.3 mg/g in group 1 and 31.1 ± 17.9 mg/g in group 2. uRBP/creatinine ratio was 14.1 ± 4.5 mg/g in group 1 and 18.6 ± 9.5 mg/g in group 2. In group 1 uNAG index (U/g creatinine) was 2.8 ± 0.4 U/g and 2.3 ± 0.5 U/g in group 2. Using a two sample t-test no statistically significant difference was found between group 1 and 2 for any of the urinary markers (p>0.05). Mean plasma clearance of exo-iohexol (∆ SD) was 2.3 ± 0.4 mL/min/kg in group 1 and 2 ± 0.3 mL/min/kg in group 2. Mean plasma clearance of endo-iohexol was 1.9 ± 0.4 mL/min/kg in group 1 and 1.8 ± 0.2 mL/min/kg in group 2. There was no statistically significant difference in plasma clearance between both groups (p>0.05).

In conclusion, uALB, uRBP and uNAG concentrations do not seem to be age-dependent, although further investigation in a larger number of dogs is needed. The small but significant effect of aging on GFR, demonstrated in a previous study using plasma creatinine clearance, was not corroborated in the current study.

**ABSTRACT #53**

**URINARY TRACT INFECTIONS CAUSED BY CORYNEBACTERIUM UREALYTICUM IN EIGHT DOGS AND EIGHT CATS, C. Maurey-Guenec1, G. Benchekroun1, D. Rosenberg1, and H.J. Boulouis1, 1Internal Medicine Unit, 2Microbiology Unit, National Veterinary School, Maisons-Alfort, France.

Urinary tract infection (UTI) caused by Corynebacterium urealyticum is a rarely recognised condition in veterinary medicine. Apart to its probable low incidence, growth delay could possibly be responsible of under-diagnosis. To date, rare descriptions, few clinical cases and one survey (Bailiff et al., J Am Vet Med Assoc 2005) comprising 5 dogs and 2 cats, are available to identify clinical features associated with UTI infection caused by this pathogen. The purpose of this retrospective study, was to examine the clinical signs, laboratory findings, possible predisposing factors, treatments and outcomes of Corynebacterium urealyticum UTI.

Medical records of all animals diagnosed with Corynebacterium urealyticum UTI at the Veterinary School of Alfort between 1998 and 2007 were reviewed. Organisms were isolated in blood agar after 72h of aerobic incubation.

Eight dogs and 8 cats were included. All dogs had a history of urinary tract catheterisation for various pathologies in distinct veterinary clinics or hospitals. Perineal urethrostomy had been performed in 6 cats. Over the past 12 months, all patients had been treated with antimicrobials. In 7 animals, routine bacterial cultures of urine samples prior to referral were negative. All animals had signs of lower urinary tract disease at the initial diagnosis including macroscopic haematuria (n=15), pollakiuria (n=16) and incontinence (n=7). Median urine pH was 8.6 (range, 7.5 to 9), median specific gravity was 1.026 (range, 1.010 to 1.055). All animals had pyuria and struvite crystalluria. Abdominal ultrasonography was performed in 7 dogs and 6 cats. Abnormalities included thickening of the urinary bladder wall (n=9), accumulations of echogenic debris within the urinary bladder (n=8) and bladder wall encrustation (n=1). All isolates were resistant to amoxicillin-clavulanic acid, cefalexin, enrofloxacin, marbofloxacin, gentamicin. Only one isolate was susceptible to trimethoprim-sulphonamide. Eleven isolates were susceptible to tetracycline or doxycycline. Resolution of UTI occurred in 12 animals that received doxycycline (n=6), tetracycline (n=3), trimethoprim-sulphonamide (n=1), in combination with a calculoletic diet. Three animals died with multiple organ dysfunctions and one was euthanased. This report confirms on a larger cohort of dogs and cats clinical features frequently associated with UTI caused by Corynebacterium urealyticum. The later must be suspected in patients with pre-existing urinary disorders, especially if alkaline urine, struvite crystalluria and encrusted cystitis are present. However, unlike previous descriptions, all isolates in our series were resistant to fluoroquinolones.

**ABSTRACT #54**

**HYPERGLYCAEMIA INDUCES AN INFLAMMATORY RESPONSE IN HEALTHY CATS, M. Osto1, M. Franchini2, Karin Kaufmann1, M. Ackermann2, TA Lutz1, CE Reusch3, E. Zini3, 1Inst. Vet. Physiol., 2Inst. Virol., 3Clin. Small An. Intern. Med., Vetsuisse Faculty, University of Zurich, Switzerland.

Increased levels of circulating inflammatory markers, including cytokines and chemokines, are associated with chronic hyperglycaemia and have been hypothesised to predict the development of type 2 diabetes mellitus (T2DM) in humans and rodent models of the disease. Because feline diabetes closely resembles human T2DM, the aim of this study was to determine the effects of sustained hyperglycaemia on the systemic inflammatory response in cats. In addition, we established tools to quantify circulating levels of selected pro-inflammatory proteins in cats.

A commercial feline-specific kit was used to measure α-1-acid glycoprotein (AGP). Plasma concentration of interleukin (IL)-6 was measured with a dot-blot assay, developed in-house, using a monoclonal anti-feline IL-6 antibody. For detection of plasma monocyte chemotactic protein-1 (MCP-1) a c-reacting canine enzyme-linked immunosorbent assay (ELISA) was validated in our laboratory for use in cats. Healthy cats were infused through the jugular vein with glucose (n=5) for 10 days to clamp their blood concentrations at the approximate level found in untreated feline diabetes (glucose: 25-30 mmol/l). Control cats were infused with saline (n=5) or received no infusion (n=5). At the end of the experiment, plasma concentrations of AGP, IL-6 and MCP-1 were measured.

Hyperglycaemic cats had approximately 3-fold higher plasma levels of AGP and IL-6 than control groups. MCP-1 levels did not differ between cat groups.

In conclusion, increased concentrations of AGP and IL-6 in glucose-infused cats suggest that hyperglycaemia may promote an inflammatory response in cats. Establishment of assays to quantify circulating levels of feline IL-6 and MCP-1 will help to characterize the role of inflammation in feline diabetes and other diseases.
ABSTRACT #55
FUNCTIONAL AND MORPHOLOGICAL CHANGES IN THE ADENOHYPOPHYSIS OF DOGS WITH PRIMARY HYPOTHYROIDISM. M.M. Diaz-Gonzalez1, J.A. Moll2, T.S.G.A.M. van den Ingh3, K.T. van der Vlugt-Meijer1, A. Rijnbrek1, H.S. Kooistra2. 1Department of Clinical Sciences of Companion Animals, 2Department of Pathobiology, and 3Division of Diagnostic Imaging, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands.

Adenohypophyseal function and pituitary size were investigated in 7 beagle dogs for 3 years after induction of primary hypothyroidism. Three of these dogs were followed up for another 1.5 years while treated with l-thyroxine. At the end of the study period, the pituitary of each dog was collected and used for histomorphological and immunohistochemical studies.

Adenohypophyseal function was investigated at 2-month intervals with the combined intravenous administration of CRH, GHRH, TRH and GnRH, and measurement of plasma concentrations of ACTH, GH, LH, PRL, and TSH. Every 6 months the pituitary was imaged with CT.

Induction of hypothyroidism led to high plasma TSH concentrations for a few months, whereafter concentrations gradually declined to values no longer significantly different from pre-hypothyroidism. Basal GH concentrations increased during hypothyroidism and normalized after several months of l-thyroxine treatment. CT scanning revealed enlargement of the pituitary in all dogs. Histomorphology and immunohistochemical studies in 4 dogs, after 3 years of hypothyroidism, revealed thyrotroph hyperplasia, large vacuolated thyroid deficiency cells, and decreased numbers of mammotrophs. Several cells stained for both GH and TSH.

In conclusion, with time hypothyroidism led to a loss of the TSH response to low thyroid stimulating hormone (TSH) concentrations, hypopituitarism, and proportionation of TRH stimulation. Basal GH concentrations remained elevated and returned only to low values during l-thyroxine treatment. Basal PRL concentrations decreased significantly during hypothyroidism and normalized after several months of l-thyroxine treatment. CT scanning revealed enlargement of the pituitary in all dogs. Histomorphology and immunohistochemical studies in 4 dogs, after 3 years of hypothyroidism, revealed thyrotroph hyperplasia, large vacuolated thyroid deficiency cells, and decreased numbers of mammotrophs. Several cells stained for both GH and TSH. 1Department of Pathobiology, University Medical Center Utrecht, Utrecht, The Netherlands.
hypothyroid dogs than controls and in the hypothyroid dogs when comparing euthyroid and hypothyroid states. There was no difference in Pl-creat between groups in the post-1/3/1 time.

Hypothyroidism induces a significant decrease in PECC without a change in Pl-creat. The reduction in GFR would not be detectable in routine clinical cases as it is not reflected by an increase in plasma creatinine concentration.

**ABSTRACT #59**

**SALIVARY CORTISOL MEASUREMENTS IN HEALTHY DOGS AND DOGS WITH HYPERCORTISOLISM.** B. Wenger-Riggenbach, F. S. Boretti, S. Quante, S. Schellenberg, C. E. Reusch, N. S. Sieber-Ruckstuhl. Clinic for Small Animal Internal Medicine, Vetsuisse Faculty, University of Zurich, Switzerland.

Salivary cortisol reflects the unbound biologically active form of serum cortisol. Advantages of measuring salivary cortisol in humans are the easy and non-invasive collection procedure, and its stability at room temperature for at least 7 days. In human medicine determination of salivary cortisol has been suggested to be a useful diagnostic test for hypercortisolism (HC). In veterinary medicine, little is known about salivary cortisol determination and its measurement is not yet established as a diagnostic test for HC. The aim of this study was to validate salivary cortisol measurements in dogs to establish a reference range for salivary cortisol in dogs and to investigate if salivary cortisol measurement is a practical alternative to serum cortisol determination.

Sampling of saliva was performed by having the dogs chew on standard swabs (Salivetten®), for 2 minutes which, thereafter, were centrifuged for 25 minutes at 4800 g. Cortisol concentrations were measured using an automated immunoassay analyzer (ROCHE Elecsys®). Intra-assay variability and linearity were determined by calculating the coefficients of variation (CV) for 10 replicates of 2 samples and the serial dilution of 2 high-concentration samples, respectively. Moreover the correlation of salivary and plasma cortisol concentration of 27 samples were investigated. Salivary samples of 22 healthy dogs at 8 am, 11 am, 2 pm and 5 pm in the clinic and at home were evaluated. In addition salivary samples of 5 dogs with confirmed HC were collected in hospital. The intra-assay CVs were 8.1% and 17.7%. The coefficients of correlation (CC) of the linearity were 0.989 and 0.996, for the ranges 1.3-17.4 nmol/l and 2.2-23.4 nmol/l, respectively. The overall CC of plasma and saliva cortisol concentration was 0.43; if the upper range (> 3 nmol/l) was investigated separately the CC increased to 0.79. The reference range for salivary cortisol was 0.5-4.6 nmol/l with no significant difference if taken in the clinic or at home or at different time points. Dogs with HC had significantly higher (p < 0.001) salivary cortisol values than healthy dogs. The sampling procedure was technically very difficult, especially in anxious and small dogs. In about 25% of dogs, the required 300μl saliva could not be gained.

From this study we conclude that measurement of salivary cortisol by the used immunoassay analyser gives reliable results in dogs. However the technical difficulties experienced during the salivary collection procedure limit the broader application of this method in veterinary medicine.

**ABSTRACT #60**

**ACCURACY OF AN ACTH IMMUNO-LUMINOOMETRIC ASSAY FOR THE DIAGNOSIS OF PITUITARY-DEPENDENT HYPERADRENOCORTICISM IN DOGS.** I. Rodríguez Piñeiro1,2, G. Benchekroun3, P. de Fornel-Thibaud4, C. Maurey-Guenec2, F. Garnier5, and D. Rosenberg6. 1Department of Veterinary Clinical Sciences, Veterinary Faculty of Lugo, Lugo, Spain, 2Internal Medicine Unit, National Veterinary School of Alfort, Maisons-Alfort, France, 3Department of Veterinary, Maisons-Alfort, France, 4Biochemistry Unit, National Veterinary School of Lyon, Marcy l’Etoile, France.

Plasma adrenocorticotrophic hormone (ACTH) measure has been used in dogs for 30 years to distinguish pituitary (PDH) from adrenergic-dependent hyperadrenocorticism (ADH). ACTH thresholds set over the past studies were associated with systematic but highly variable proportion of misclassified or unclassified cases. The purpose of the present study is to retrospectively evaluate the accuracy of a previously validated ACTH immuno-lumino-metric Assay (Immulite ACTH, DPC, USA) in the differentiation between PDH and ADH in a large group of dogs with characterised hyperadrenocorticism (HAC).

Included were all dogs with: 1/ clinical data consistent with HAC associated with ACTH stimulation test and/or low-dose dexamethasone suppression test (DST) corroborating the diagnosis. 2/ An unequivocal characterisation of the cause of HAC: for PDH by cortisol decrease after DST and/or adrenal symmetry, defined as a less than 20% difference between the maximal gland widths, measured by ultrasonography or CT scan; for ADH by histopathological analysis of the removed adrenal gland describing an adrenocortical tumour with atrophied adjacent non neoplastic tissue. 3/ a measure of plasma ACTH concentration processed on Immulite 2000 analyser with adequate pre-analytical conditions.

Of the 82 included dogs, 66 had PDH and 16 ADH. In PDH group ACTH measurements ranged between 6.34 and 1810 pg/ml (median: 31.25 pg/ml), in ADH group all plasma ACTH concentrations were below the limit of quantification (LOQ) of the assay (<5 pg/ml). The 95% confidence interval for estimated sensitivity and specificity in ADH detection were respectively 83–100% and 95–100%.

In this study no overlap of ACTH measures between dogs with PDH and dogs with ADH was identified. The kit used in the study has a low LOQ compared to the techniques used in surveys comparing comparable cohorts (generally between 10 and 20 pg/ml). In the present survey, a LOQ arbitrarily set at 10 pg/ml, used as a threshold, would have resulted in the misclassification of 3/66 dogs with PDH. The stringency of the classification criteria could have contributed to the results by excluding equivocal cases such as asymmetrical adrenal gland without functional histological characterisation. Their confirmation, in a larger number of dogs, is required to estimate more sharply the accuracy of one of the oldest tools used in the characterisation of HAC in dogs.

**ABSTRACT #61**

**RETROSPECTIVE STUDY COMPARING THE USE OF TRILOSTANE ONCE OR TWICE DAILY FOR TREATMENT OF CANINE HYPERADRENOCORTICISM.** M. Augusto, D. Mellor, I. Ramsey. Faculty of Veterinary Medicine, University of Glasgow, Scotland.

Trilostane is widely used as the first choice medical treatment of canine hyperadrenocorticism (HAC). However, there is limited data available on optimal dose rate and frequency of administration, and recent reports have suggested that trilostane may be more efficacious when administered two times daily.

The purpose of this retrospective study was to compare the efficacy of trilostane used once versus twice daily, short-term side effects, and the doses required to achieve control in HAC. To assess clinical progress, laboratory findings were compared, including ACTH stimulation tests, and clinical improvement based on both the owners’ and veterinary surgeons’ judgment by means of a questionnaire.

Dogs with signs suggestive of HAC were recruited during the original multi-centre licensing trials of trilostane that were conducted within the UK. Complete information on signalment, history and physical examination were evaluated. Pre-treatment haematology, biochemistry profile and endocrine tests were performed. Dogs were re-examined at 9–12 days, 4, 12 and 24 weeks following instigation of therapy. A total of 56 animals filled the inclusion criteria. 30 dogs were treated with trilostane once daily (SID group) and 26 dogs were treated with trilostane twice daily (BID group). Differences between groups were tested with the Mann-Whitney test, whilst individual within-group differences were analysed with a Wilcoxon matched paired test.

Comparing both groups, there was no significant statistical difference between the haemoglobin concentration, neutrophil or platelet count, ALT, cholesterol, urea, sodium, potassium, calcium or phosphate concentrations. There was a significant statistical difference between alkaline phosphatase activity in the SID group compared to the BID group before and after 24 weeks of treatment, with a similar magnitude of improvement (p < 0.0001).

This study suggests that there is minimal practical difference between once and twice daily trilostane administrations in treating HAC. Nevertheless, individual dogs may respond better to a particular dosing regimen, and dogs treated once daily may require higher total drug quantities.
ABSTRACT #62
USEFULNESS OF MEASURING THE URINARY CORTICOID-CREATININE RATIO IN DOGS WITH PITUITARY-DEPENDENT HYPERCORTISOLISM DURING TRILOSTANE TREATMENT. S. Galac, J. J.C.W.M. Buijtels, H.S. Kooistra, Department of Clinical Sciences of Companion Animals, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands.

The objective of this prospective study was to investigate if measuring the urinary corticoid/creatinine ratio (UCCR) could be a good alternative to adrenocorticotropic hormone (ACTH) stimulation test to establish the proper dose of trilostane and to evaluate the treatment of dogs with pituitary-dependent hypercortisolism (PDH).

Eighteen client-owned dogs with PDH were investigated. The proper trilostane dosage was determined based upon resolution of clinical signs and results of the ACTH stimulation test. The mean (± SD) dose of trilostane at the moment of good control was 3.5 ± 1.6 mg/kg body weight, once daily. The UCCR during treatment was measured before and 6-h post trilostane administration in two weeks intervals for 2 months after the proper dose of trilostane has been achieved.

The median basal plasma cortisol concentration after reaching the proper trilostane dose was 45 nmol/l (range 21–114 nmol/l) and was significantly lower than basal UCCRs at 2, 4, 6 (P < 0.001), and was significantly higher than basal UCCRs at 8, 10, 12, 16 hours after receiving the proper dose of trilostane (median 5×10−8, range 3.7–8.2×10−8 and median 17×10−8, range 8.5–50×10−8, respectively. In 5/18 dogs and 6/18 dogs the basal UCCR and the 6-h post trilostane UCCR did decline below the upper limit of the reference range within 2 months after receiving the proper dose of trilostane (median 5×10−8, range 3.7–8.2×10−8 and median 6×10−8, range 2.5–8.1×10−8, respectively).

Among dogs, in which the UCCR declined below the reference range within 2 months after receiving the proper dose of trilostane, in 2 dogs the results of ACTH stimulation test were compatible with hypocortisolism at 15 and 22 weeks after start of treatment. Both of them continued the treatment with a reduced trilostane dose.

In conclusion, the UCCR cannot be used as an alternative for the ACTH stimulation test to evaluate the proper dosage of trilostane, but might be helpful in detecting dogs that are at risk to develop hypocortisolism during trilostane therapy.

ABSTRACT #63
PLASMA ACTH PRECURSORS (PRO-OPIOMELANOCORTIN AND PRO-ADRENOCORTICOTROPIN) IN CATS WITH HYPERADRENOCORTICISM. G. Benchekroun1, P. de Fornel Thiebaut1, S. Galac, J.C.W.M. Buijtels, M. Le Goff1, C. Petit1, O. Dossin1, F. Fracassa2, F. Garner1, C. Maurey-Guenc1, and D. Rosenberg1.

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Feline hyperadrenocorticism (FH) is a rare condition. Pituitary-dependent hyperadrenocorticism (PDH) is observed in approximately 80% of cases. Diagnosis of FH is quite difficult. First, clinical signs are non-specific, except for feline skin fragility syndrome. Secondly, the specificity of all tests validated for cats is questionable, all the more diabetes mellitus is often present, and could contribute to false positive results of any exploration of the adrenocorticotropic axis. Recently, an ACTH precursor (POMC/pro-ACTH) assay has been validated in cats (Benchekroun et al., Proc Am Coll Vet Intern Med Forum 2008). The aim of this preliminary study was to evaluate prospectively the plasma concentration of ACTH precursors in a small cohort of cats with PDH and estimate its usefulness in its diagnosis.

Three groups of cats were defined. Group 1 included cats with PDH. The diagnosis of FH was based on clinical data and low-dose dexamethasone suppression test (LDDS). Plasma was demonstrated by adrenal and pituitary gland CT scan. Group 2 and 3 included diabetic and apparently healthy cats respectively. For the two groups, FH was excluded by LDDST or Urine Cortisol:Creatinine Ratio (UCCR).

Six cats were included in group 1. Five cats had a large pituitary tumour with a height ranging from 6 mm to 27 mm. No pituitary tumour was visualised in the remaining cat. Plasma ACTH precursor concentrations ranging from 229 to 1412 pmol/L were measured in PDH cats with large tumours; the remaining cat of group 1 had an ACTH precursor concentration.

Although being found in a small number of cats, these results suggest that large corticotrophic tumours are associated in that species with high plasma concentration of ACTH precursors like in dogs. No plasma POMC/pro-ACTH concentration above 100 pmol/L was found in cats free of PDH. The specificity of high plasma ACTH precursor concentration in cats with PDH has to be confirmed on a larger cohort. If confirmed, given the high prevalence of large pituitary tumours, the introduction of this tool could offer a gain of specificity in the general approach of feline PDH.

ABSTRACT #64
ROLE OF HYPERGLYCAEMIA AND HYPERLIPIDAEMIA IN THE PATHOPHYSIOLOGY OF BETACELL DYSFUNCTION IN CATS. E. Zini2, M. Osto2, M. Franchini3, F. Guisetti4, M. Donath5, A. Perren6, P. Linscheid7, M. Bouwman1, M. Ackermann1, T. Lutz2, C. Reusch2, 1Clin. Small An. Intern. Med.; 2Clin. Vet. Physiol.; 3Inst. Virol.; 4Inst. Vet. Pathol., Vetsuisse Faculty, University of Zurich, Switzerland. 5Clin. Endocrinol. and Diabetes, University Hospital Zurich, Switzerland. 6Dept. Pathol., Technical University of Munich, Germany. 7Dept. Clin. Sci., Utrecht University, The Netherlands.

The prevalence of diabetes mellitus is increasing in cats and humans worldwide. In type 2 diabetic humans sustained hyperglycaemia and hyperlipidaemia exacerbate b-cell dysfunction. The toxic effects of high glucose and lipid levels on b-cells are referred to as “glucotoxicity” and “lipotoxicity”. Feline diabetes shares many similarities with human type 2 diabetes, including insulin resistance related to obesity, decreased beta-cell mass and pancreatic amyloid deposition. Because of these similarities, we hypothesise that “glucotoxicity” and “lipotoxicity” also contribute to b-cell dysfunction in cats.

Healthy cats were infused through the jugular vein with glucose (n=5) or lipids (n=6) for 10 days to clamp their blood concentrations at the approximate level found in untreated feline diabetes (glucose: 25–30 mmol/l; triglycerides: 3–7 mmol/l). As controls, healthy cats were infused with saline (n=5) or received no infusion (n=5). Plasma glucose, triglycerides and insulin levels were assessed during infusion. On day 10, an intravenous glucose tolerance test (iv-GTT) was performed and pancreatic specimens were collected. Pancreatic sections were labelled for insulin and the insulin-positive area was measured. Insulin mRNA was quantified in pancreatic islets. Statistical differences were determined with non-parametric tests.

Circulating glucose and lipid levels were adequately targeted. Cats showed no obvious signs of discomfort and remained in good clinical health throughout infusion. In cats receiving glucose, plasma insulin levels increased during the first 2 days and then progressively decreased to reach baseline levels by day 10. In hyperlipidaemic cats circulating insulin levels were equal to control groups. During the iv-GTT hyperglycaemic cats had no stimulation of insulin secretion, whereas in hyperlipidaemic cats the insulin secretion pattern was normal. Compared to controls, insulin-positive area and insulin mRNA decreased in hyperglycaemic but not in hyperlipidaemic cats.

Sustained hyperglycaemia and hyperlipidaemia are well tolerated in healthy cats and hyperglycaemia but not hyperlipidaemia induces severe b-cell dysfunction in cats. High glucose levels may cause b-cell exhaustion that is not only due to insulin store depletion but also due to decreased insulin gene expression.

ABSTRACT #65
INFUSION OF GLUCOSE OR LIPIDS DOES NOT IMPAIR INSULIN SENSITIVITY IN HEALTHY CATS. M. Bouwman1, E. Zini2, M. Osto1, M. Franchini1, M. Ackermann1, T. Lutz2, C. Reusch2, 1Department of Clinical Sciences of Companion Animals, Utrecht University, The Netherlands; 2Clinic for Small Animal Internal Medicine; 3Institute of Virology; 4Institute of Veterinary Physiology, Vetsuisse Faculty, University of Zurich, Switzerland.

Hyperglycaemia and hyperlipidaemia contribute to insulin resistance in human type 2 diabetes mellitus (2DM). High glucose
levels directly impair insulin sensitivity in several rodent species. In affected humans, hyperlipidaemia is associated with increased plasma levels of free fatty acids (FFA). Excess FFA mediates the detrimental effect of hyperlipidaemia on insulin sensitive tissues. Because insulin resistance is a major feature of feline diabetes mellitus, beside hyperglycaemia, hyperlipidaemia and increased FFA are common findings, we propose that excess glucose and lipids cause insulin resistance in cats. In addition, because plasma adiponectin levels inversely correlate with insulin resistance in human T2DM2 and rodent models of the disease, we hypothesise that high glucose or lipid levels also decrease plasma adiponectin concentrations in cats.

Healthy cats were infused through the jugular vein with glucose (n=5) or lipids (n=6) for 10 days to clamp their blood concentration at the approximate level found in untreated diabetic cats (glucose: 25–30 mmol/l; triglycerides: 3–7 mmol/l). As controls, healthy cats were infused with saline (n=5) or received no infusion (n=5). On day 10, an intravenous glucose tolerance test was performed and insulin sensitivity was calculated using the whole body insulin sensitivity index (WB-ISI) and the homeostasis model assessment (HOMA-S). Differences were analyzed with non-parametric tests.

Infusion of glucose and lipids was well tolerated by cats. In glucose-infused cats body weight did not change and plasma FFA levels were not affected by hyperglycaemia. In lip-infused cats body weight increased on average by 10%, plasma FFA levels increased, whereas glucose concentrations remained similar to controls. Based on the WB-ISI and HOMA-S, neither lipid nor glucose infusion caused insulin resistance. Compared to cats receiving saline, cats infused with lipids had increased plasma adiponectin levels. Glucose infusion did not affect adiponectin concentrations.

In conclusion, ten days of hyperglycaemia or hyperlipidaemia does not impair total insulin sensitivity in cats. In hyperlipidaemic cats, increased plasma adiponectin levels may have prevented the development of insulin resistance.

ABSTRACT #67
IGF1 SECRETION IN HYPERTHYROID CATS : EFFECT OF METHIMAZOLE. Jaillardon L., Martin L., Ayma G., Siliart B. Endocrinology and Nutrition Unit – LDH. National Veterinary School of Nantes, France.

In mammals, it has been demonstrated that thyroid hormones regulate IGF1 production directly or not (Feldt-Rasmussen 2007, Laron 2003). Although, hyperthyroidism is a common condition in old cats, the relationship between IGF1 and feline hyperthyroidism has never been documented. We therefore aimed to assess IGF1 secretion in hyperthyroid cats and evaluate the usefulness of IGF1 assay to follow up the efficiency of treatment.

The objective of the study was to correlate variations of serum IGF1 and serum free thyroxine in hyperthyroid cats, before and after treatment with methimazole.

105 hyperthyroid cats (free thyroxine > fT4 > 40 pmol/l) were included in the study.

One sample was taken at diagnosis and another 4 months after beginning of treatment with methimazole (5 mg BID). The assays were performed by radioimmunoanalysis (fT4: Immunotech® kit 1363, IGF1:Mediagnost IGFIR22).

Concerning the results of fT4 and IGF1 before and after treatment, there was a significant difference (p < 0.001) between the means of fT4 (pmol/l) before treatment (m=73, sd=26) and after 4 months (m=35, sd=29). In the same way, the mean serum IGF1 concentration (ng/ml) before treatment (m=202, sd=165) was significantly lower (p=0.011) than the mean concentration after treatment (m=363, sd=245). There was a significant negative correlation (p < 0.001) between serum fT4 and IGF1 values before and after treatment with methimazole.

IGF1 levels decreased in hyperthyroid cats and increased after 4 months of methimazole treatment in treated cats. The mechanism of the variations are worth assessing particularly by GH assay and exploration of liver function before and after treatment. IGF1 is negatively correlated with fT4 in hyperthyroid cats. Follow-up of IGF1 concentration in these cats may be useful to control the effectiveness of long term hyperthyroid treatment in routine practice.

ABSTRACT #68
EFFECT OF A DESLRELIN IMPLANT ON ADRENAL SIZE AND LH-RECEPTOR ACTIVITY IN FERRETS WITH HYPERADRENOCORTICISM. N.J. Schoemaker, A.M. Kuijten, G. Voorhout. Department of Clinical Sciences of Companion Animals, Faculty of Veterinary Medicine, Utrecht University, The Netherlands.

Hyperadrenocorticism is a common disease in neutered pet ferrets. The disease is characterised by excessive adrenal production of sex steroids. Increased circulating gonadotrophin concentrations (which occur after neutering due to loss of negative feedback of gonadal hormones) persistently stimulate and subsequently activate the LH receptors in the adrenal cortex. This in turn may result in tumour formation. In line with this, plasma concentrations of adrenocorticosteroids only increase after intravenous injection of a GnRH agonist in hyperadrenocortical ferrets, while this is not the case in healthy ferrets. In addition, depot GnRH-agonists have been used successfully in the medical treatment of ferrets with hyperadrenocorticism. To investigate the effect of the depot GnRH-agonist deslrelin on adrenal size and LH-receptor functionality, an abdominal ultrasonographic examination and hCG-stimulation test were performed before and after placement of a slow releasing implant containing 9.4 mg deslrelin.

Eighteen neutered hyperadrenocortical ferrets (10 males, 8 females) with a mean age of 5 years (range 2.5 to 8.5 years) had enlarged adrenal glands on ultrasonographic examination (9 left, 3 plastic wrapping of food had no SA with HT. Drinking clean water (P= .003) had a positive SA with HT.

This study shows surprising results regarding putative risk factors associated with HT in cats living in Belgium and The Netherlands, compared to risk factors associated with HT described in veterinary literature. Feline hyperthyroidism is a multi-factorial disease and possibly the described factors have different weight on the development of HT between different regions.

ABSTRACT #66
PUTATIVE RISK FACTORS ASSOCIATED WITH FELINE HYPERTHYROIDISM IN CATS FROM BELGIUM AND THE NETHERLANDS. L. van Hoek1, L. Duchateau2, N. Mornie1, N.J. Schoemaker, A.M. Kuijten, G. taining dry food (P = .018) though there was no SA for oral contact with PBDE's. Data were analysed using Fisher's exact test and a 5% significance level for a significant association (SA) with HT.

Several factors have been proposed as possible cause for feline hyperthyroidism, but the etio-pathology remains unclear. Recently, polybrominated diphenyl ethers (PBDE's) were suggested. A study on putative risk factors in a population of cats living in Western Europe has not yet been performed. The aim of this study was to search for risk factors associated with feline hyperthyroidism in a population of hyperthyroid (HT) and control (C) cats comparable in age living in Belgium and the Netherlands.

Owners of HT cats presented for treatment with radioiodine at the faculty of veterinary medicine in Ghent and owners of C cats over 6 years of age, were mailed a questionnaire regarding the cat's demographic factors, environment, healthcare, diet and possible contact with PBDE's. Data were analysed using Fisher’s exact test at a 5% significance level for a significant association (SA) with HT.

Data of 77 HT and 127 C cats were included in the study. HT had a positive SA with having known relatives with HT (P < .005) and having a pedigree (P < .026). There were no SA with sex or neutering. There was a positive SA for indoor residence (P = .012) and sleeping (P < .001), use of a cat litter box (P < .001), and living < 50 km offshore (P < .001), but not the use of fertilizers, presence of other cats in the household nor thyroid disorders in members of the household family. HT had a positive SA with vaccination frequency (P = .018), low deworming frequency (P = .005), dental care products (P = .043) or neck collar (P = .037), but not with dental problems, deworming per se, flea control or dietary supplements. Concerning contact with PBDE’s had a positive SA with HT (P = .018) though there was no SA for oral contact with PBDE's nor increased self grooming. HT had a negative SA with diets containing dry food (P < .001), pigmet (P = .028), tuna (P = .045) or trout (P = .045). Wet food, type and storage of containers, diets containing beef, lamb, poultry, salmon, rabbit, milk or fresh meat, or

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right and 6 bilaterally enlarged glands). In 14 of these ferrets androstenedione concentrations increased after administration of 100 IU of hCG. Three months after placement of the implant, the adrenal size had increased in 3 ferrets, decreased in 2 ferrets and was unaltered in the remaining ferrets. Overall, circulating androstenedione concentrations had decreased dramatically and were above the reference value in only 4 ferrets. In addition, a clear increase of androstenedione after hCG administration was seen in only 2 ferrets. In 2 of the 4 ferrets with persistent elevated plasma androstenedione concentrations the adrenal glands had increased in size.

After a period of more than 1 year (range 13–24 months) additional information could be obtained from 10 of the ferrets. In 2 of these ferrets, the adrenal size had increased slightly compared to the size at the time of placement of the implant. In 2 ferrets a decrease was seen. In the remaining 6 ferrets the size of the adrenal glands was unchanged. In all 10 ferrets, androstenedione concentrations were within the reference value and hardly increased after administration of hCG.

We conclude that the deslorelin implant results in inactivation of the adrenal LH-receptors resulting in a cessation of production of adrenal androgens, but does not result in decrease of adrenal gland size. In some cases, the adrenal may even continue to grow.

ABSTRACT #69
URINARY CATECHOLAMINE AND METANEPHRINE TO CREATININE RATIOS IN DOGS WITH PDH, PHAEOCHROMOCYTOMA, AND HEALTHY DOGS. S. Quante1, F. S. Boretti1, N. Siebeck1, M. Hersberg2, C. Mueller1, N. S. Sieber-Ruckstuhl1, C. E. Reusch1. 1Clinic for Small Animal Internal Medicine, Vetsuisse Faculty and 2Institute of Clinical Chemistry, University Hospital Zurich, University of Zurich, Switzerland.

Catecholamines and steroids, produced in the adrenal medulla and cortex, respectively, are important regulators of blood pressure and stress response. Unlike historically assumed, adrenal cortex and medulla appear to be interwoven. Not only do chromaffin cells of the medulla regulate glucocorticoid-hormone release by the adrenal cortex, but also do glucocorticoids induce catecholamine production in the medulla. Based on this, we hypothesised that both, dogs with phaeochromocytoma and dogs with hypercortisolism show increased catecholamine concentrations compared to healthy dogs. The objective of this study therefore was to compare concentrations of urinary catecholamines and their metabolites in dogs with pituitary-dependent hyperadrenocorticism (PDH), phaeochromocytoma (phaeo) and healthy dogs. Diagnosis of PDH was based on typical clinical symptoms, laboratory changes, at least two positive screening tests and well-controlled clinical signs and treatment for at least 6 months of trilostane therapy. Adrenal ultrasonography and/or determination of ACTH levels were used to differentiate PDH and adrenal dependent hypercortisolism. Dogs with phaeo were only included if histopathological confirmation was available. Voided urine samples were collected in 12 dogs with PDH, in 6 with phaeo and in 14 healthy dogs. Urinary free catecholamines comprising epinephrine, norepinephrine and dopamine as well as fractionated metanephrines comprising free and conjugated metanephrine and normetanephrine were separated and quantitatively determined by high-pressure liquid chromatography. Values were expressed as ratios to urine creatinine concentration.

Epinephrine and normetanephrine concentrations were significantly higher in dogs with PDH and phaeo compared to healthy dogs. There was no significant difference between dogs with PDH and phaeo in epinephrine, norepinephrine, dopamine and metanephrine concentrations. Although not statistically significant, normetanephrine concentrations in dogs with PDH were lower compared to dogs with phaeo (dogs with PDH: median 137, range 65–262; dogs with phaeo: median 445, range 157–6430).

Results of our study reveal that dogs with PDH have consistently increased urinary catecholamine and normetanephrine ratios. Only normetanephrine ratios in the high range could differentiate dogs with phaeo from those with PDH. Further studies are needed including dogs with adrenal dependent hypercortisolism to evaluate the usefulness of urinary catecholamines and their metabolites as biochemical parameters to categorize dogs with enlarged adrenal glands.

ABSTRACT #70
SIDE EFFECTS OF DOXYCYCLINE IN CATS. B. Schulz, S. Hupfauer, K. Hartmann. Clinic for Small Animal Medicine, Ludwig Maximilian University of Munich, Munich, Germany.

Doxycline-related side effects in small animals described in the literature include anorexia, vomiting, diarrhoea, pyrexia, and liver toxicity. Especially in cats, oesophagitis and oesophageal strictures have been reported. Growing animals can develop discoloration of teeth, enamel defects, and growth retardation.

The aim of this retrospective study was to investigate the incidence of doxycline-related side effects in cats, and to analyse the correlation between frequency and character of side effects and dosage, frequency of administration, treatment duration, application method, concurrent administration of other drugs (glucocorticoids, other antibiotics), clinical signs before treatment, and signalment.

In the study, 165 cats that had received doxycline were included. Information regarding signalment, clinical signs, and treatment details were taken from the medical records. Correlation between clinical signs and different parameters was statistically evaluated using chi-square test and logistic regression analysis.

Of the 165 cats, 46.7% (77) showed clinical signs while receiving doxycline including anorexia (37), vomiting (19), diarrhoea (19), pyrexia (28), and other signs (12). Increased liver enzymes were detected in 29 cats; 24 animals showed an increase in ALT, eight in ALP. Cats that already had shown clinical signs before initiation of doxycline therapy were significantly more likely to show side effects under therapy than cats that were initially clinically unremarkable (p < 0.001). Furthermore, an increase in liver enzymes during therapy was significantly more likely in cats that already had shown liver enzymes activities above the reference range before therapy (p < 0.001). Cats receiving other antibiotics in addition to doxycline therapy showed a 4.1-times higher risk to develop diarrhoea (p = 0.035). There was no significant influence of the parameters daily dosage, frequency of application, treatment duration, age, gender, and glucocorticoid use on the incidence of side effects.

Following intravenous injection of doxycline, one of six cats developed thombophlebitis, and one of the six had diarrhoea. Two out of three cats that had received doxycline subcutaneously developed abscesses.

Based on the results of this study, cats receiving doxycline should be monitored for occurrence of gastrointestinal side effects and increase of liver enzyme activities. Subcutaneous or intravenous application of doxycline cannot be recommended in cats.

ABSTRACT #71
EFFECT OF THYROID GLAND PALPATION ON SERUM THYROID HORMONE CONCENTRATIONS IN HYPERTHYROID AND EUTHYROID CATS. N. Sieber-Ruckstuhl1, S. Schellenberg1, C. E. Reusch1, F. S. Boretti1. 1Clinic for Small Animal Internal Medicine, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland.

Hyperthyroidism is one of the most common endocrinopathies in feline patients resulting from elevations in thyroid hormone levels. Thyroid storm, an acute, life-threatening exacerbation, is caused by excessive release of thyroid hormones into the circulation. Its clinical presentation includes hyperthermia, tachycardia, hypertension, neurological and gastrointestinal abnormalities, atrial fibrillation and congestive heart failure. In human medicine manipulation of the thyroid gland is a known trigger for thyroid storm. As thyroid gland enlargement is a typical clinical finding in hyperthyroid cats, palpation of the thyroid gland is routinely performed. It is therefore of crucial importance, especially in a teaching hospital, to know whether there is a possible life-threatening risk associated with it.

The aim of the present study was to evaluate the effect of vigorous thyroid gland palpation on clinical parameters like respiration rate (RR), heart rate (HR), body temperature (T) and on total thyroxine (TT4), triiodothyronine (T3) and free thyroxine (fT4) serum concentrations in hyperthyroid euthyroid cats.

Five hyperthyroid cats (T4 > 45 nmol/L) with a palpable thyroid gland (minimal score 3; 5–8 mm) and nine age-matched, healthy, euthyroid cats (T4 45 nmol/L) were included in the study. A standardised thyroid palpation protocol (40 strokes within one minute) was performed and blood was drawn before (t0) and at selected
ABSTRACT #72
COPPER-ASSOCIATED HEPATITIS IN LABRADOR RETRIEVERS: A WORLDWIDE DISEASE? H. Fieten1, M.D. Willard2, T.S.G.A.M. van den Ingh1, P.A.J. Leegewater1, J. Rothuizen1, G. Hoffmann1

1Queen's Veterinary School Hospital, University of Cambridge, Cambridge, U.K. 2College of Veterinary Medicine, Texas A&M University, Texas, USA 3TCCI Consulting BV, Utrecht, the Netherlands.

Copper-associated hepatitis was recently described as a new inherited liver disease in Labrador retrievers from Europe. Dogs are presented with non-specific clinical signs like anorexia, vomiting and weight loss. Elevated hepatic enzymes often occur. A definitive diagnosis is made during histopathological evaluation of liver biopsies after haematoxylin/eosin (HE) and specific copper staining with rubeanic acid. A centrolobular localisation of copper, and specific hepatic lesions are typical findings that differentiate this disease from copper accumulation in the liver due to chronic (extrahepatic) cholestasis. A genetic basis of the disease is likely because in previous studies we found that family members of affected individuals are more likely to be carriers of copper accumulation in the liver compared to unrelated control dogs. The disease shows a fairly high heritability of 0.52, which has been calculated with the variance components method.

The current pilot study was set up to investigate for the presence of copper-associated hepatitis in unrelated Labradors from another part of the world.

Liver biopsies from 13 Labrador retrievers that were presented to Texas A&M University between 2003 and 2008 were retrieved from the archive and HE and copper staining were performed on freshly cut histological slides. A single board-certified pathologist (T.V.D.L.) evaluated all slides. Clinical data were retrieved from the patient files.

Six dogs showed elevated copper concentrations in their liver. Three of these dogs were diagnosed with copper-associated chronic hepatitis, whereas two other dogs showed a copper-associated (sub-) acute hepatitis. Copper accumulation without inflammation was diagnosed in a dog that underwent a routine liver biopsy during splenectomy. This suggests a copper storage disease in the subclinical phase.

The striking resemblance in phenotype between Labrador retrievers from the USA and the Labrador retrievers from Europe suggests the same genetic aetiology.

From this pilot study we conclude that copper-associated hepatitis may be a global disease. We hypothesise that either the responsible genes were in the Labrador population before the breed crossed continents, or are spread by admixture between populations more recently.

ABSTRACT #73
SEVERITY OF HISTOLOGICAL FINDINGS AFFECTS SURVIVAL IN CANINE CHRONIC HEPATITIS WHEN ASSESSED USING WSAVA HISTOLOGICAL CRITERIA. E. Raffan1, T.J. Scase1, P.J. Watson1 1Queen’s Veterinary School Hospital, University of Cambridge, Cambridge, U.K. 2Department of Veterinary Pathology, University of Cambridge, Cambridge, U.K.

Canine chronic hepatitis (CCH) is a commonly recognised problem in small animal practice but little is known about factors that affect survival. Previous studies have examined whether histological findings affect prognosis but have been based on pathological categories that are now outmoded. The authors hypothesised that the severity of histological findings would affect survival when assessed using the recently published guidelines from the WSAVA Liver Standardisation Group (LSG).

The diagnostic pathology database of the QVSH from 1st January 1996–31st December 2006 was searched for cases of canine liver disease. Cases with original biopsy reports suggestive of inflammatory or chronic liver disease were selected for review. A board-certified pathologist (TJS), who was blinded to the clinical case details, assessed all samples; a score of 1, 2 or 3 was assigned, in order of severity, for 4 factors (inflammation, nodular hyperplasia, fibrosis and necrosis) and given an overall subjective grade (1–3 in order of severity). A cumulative severity score was calculated as the sum of the factor scores and results were categorised as mild, moderate or severe for results less than or equal to 4, 5–8 and 9–12 respectively. Date and cause of death was determined from case records and interview of owners and referring vets. The end point of the study was 31st March 2007. Survival from biopsy to death from liver disease was calculated using Kaplan-Meier analysis and significance determined using the Log Rank test.

CCH was diagnosed in 32 dogs. Subjective assessment identified 5 Grade 1, 14 Grade 2 and 13 Grade 3 cases. Cumulative severity scoring identified 8 mild, 19 moderate and 5 severe cases. Median survival was not reached in the subjectively assessed Grade 1 or cumulatively scored mild groups. Median survival was 171 and 63 days in subjectively assessed Grade 2 and 3 groups respectively and 190 and 15 days in cumulatively scored moderate and severe groups respectively. Survival was significantly different for histologically more severe disease according to subjective grade (P=0.025) and cumulative score group (P=0.002).

This study shows that histological severity was associated with survival when the WSAVA LSG guidelines were used to classify the condition. Histological grading can provide prognostic information of value to vets and owners.

ABSTRACT #74
EXPRESSION OF THE PROGENITOR CELL MARKER K19 IN CANINE HEPATOCELULAR NEOPLASIA. R.G.H.M. van Sprundel1, T.S.G.A.M. van den Ingh2, T.A. Roskams3, V. Desmet4, L.C. Penning5, J. Rothuizen1, B. Spec6 1Department of Clinical Sciences of Companion Animals, Faculty of Veterinary medicine, Utrecht University, Utrecht, The Netherlands. 2College of Veterinary Medicine, Texas A&M University, Texas, USA 5Gastrointestinal Consultancy BV, Utrecht, The Netherlands. 6Department of Morphology and Molecular Pathology, University Hospitals Leuven, Leuven, Belgium.

The expression of Keratin (K) 19, present in hepatic progenitor cells (HPCs) and in cholangiocytes but not in normal hepatocytes, has been reported in a subset of hepatocellular carcinomas (HCCs) in man. These K19 positive human HCCs were associated with an increased recurrence after resection compared to K19 negative HCCs indicating their increased malignancy. Currently the incidence of K19 expression in hepatocellular neoplasia in dogs is unknown. Therefore, our aim was to study the occurrence of K19 positive hepatocellular neoplasia in 49 dogs diagnosed with hepatocellular neoplasia.

The expression of hepatocellular differentiation markers (Hep-Par-1), and biliary/progenitor cell markers (K7, K19) was semi-quantitatively assessed by immunohistochemistry. The histological grade of tumour differentiation was determined according to the classification of Edmondson and Steiner (ES differentiation grade).

Of 49 hepatocellular neoplasias, seven were > 50% K19 positive (14%). Of this group six K19 positive hepatocellular neoplasias co-expressed K7. K19 positive tumours expressing K19 in most of the cells did not express Hep-Par-1, although these tumours histologically had evidence of hepatocellular origin. Hepatocellular neoplasias expressing K19 were histologically defined as poorly differentiated (group 4) and often revealed invasion in portal tracts whereas K19 negative hepatocellular neoplasias did not.

In conclusion, K19 positive hepatocellular neoplasias occur in 14 percent of our test group and are associated with a poorly differentiated histology and a more aggressive tumour behaviour.
ABSTRACT #75
SOY-BASED DIET FOR CANINE PORTOSYSTEMIC SHUNT PATIENTS, A DOUBLE-BLIND CROSS-OVER STUDY.
S. Proot, J Rothuizen, Dept Clin. Sci. Comp. Animals, Utrecht University, The Netherlands.

Not all dogs diagnosed with a portosystemic (PS) shunt are surgery candidates, and improved dietary management will improve the prognosis of many cases. Sometimes lifelong low-protein diet and (if necessary) lactulose are the only option. Earlier studies revealed that the protein source might have an important influence and that diets based on vegetable and dairy protein sources lead to better results (symptoms, survival) than those based on meat proteins.

The aim of the study was to determine whether a low protein diet, with soy as its main protein source (test diet), resulted in better scores for clinical performance, biochemical liver function, and hepatic encephalopathy (HE) scores than a diet with the same composition but with poultry as its main protein source (control diet) in dogs diagnosed with a PS-shunt.

In a double-blind cross-over study, 16 dogs received each diet for 4 weeks. Dogs, in group A, first received the test diet and then the control diet, while dogs in group B were fed the diets in the opposite order. Different parameters (body weight, body condition score, HE score, faecal score, CBC, biochemistry, NH3, coagulation tests) were measured at the start of the study, and after completion of the first and the second diet.

One-Way Repeated Measures ANOVA was performed. No carry-over effect was found in any parameter. Plasma NH3 was not different from the start, but was significantly higher after the control diet than after the test diet. The test diet also induced brinogen concentrations and lower PT-times. No significant difference in HE score was found between diets, although the HE score with both diets was significantly better than at the start of the study.

We concluded that both diets achieved a significant improvement in HE score. The soy-based diet did result in lower plasma NH3 and better coagulation parameters than the control diet. The test diet therefore gave better liver function parameters and decreased risk for HE. The trend for improved HE scores remains to be verified in a larger study.

ABSTRACT #76
USE OF STARTING CONDITION SCORE TO PREDICT CHANGES IN BODY WEIGHT AND COMPOSITION DURING WEIGHT LOSS IN OBESE DOGS. A.J. Germana, S.L. Holdena, T. Bissotb, P.J. Morris, V. Biourge.

The aim of the study was to examine the performance of this diet during weight loss in client-owned dogs with naturally-occurring obesity.

24 obese client-owned dogs were included in the study. Eight of these dogs were fed a HPHF diet (2900 kcal ME/kg; protein 103 g/1000 kcal; TDF 97 g/1000 kcal) during their weight programme, whilst a matched ‘control’ group of 16 dogs, received a high protein medium fibre diet (HPMF; 3275 kcal ME/kg; protein 104 g/1000 kcal; TDF 56 g/1000 kcal). Dogs were monitored during weight loss using body weight and body composition quantified by dual-energy X-ray absorptiometry. The key determinants of weight loss, which were assessed, included overall percentage weight loss, mean rate of weight loss, the mean energy allocation required for weight loss, and alterations in body composition.

Baseline characteristics (signalment, percentage overweight, body fat percentage) were not significantly different between the dogs on the HPHF diet and those in the control group. Further, there were no differences between groups for mean energy intake and overall percentage weight loss. However, mean rate of weight loss was significantly faster (1.1±0.40% week vs. 0.7±0.27% week, P=0.017), and percentage body fat mass decrease was greater (53±17.5% vs. 39±14.2%, P=0.044), in dogs fed the HPHF diet.

This study demonstrates that a diet formulated to include high levels of both protein and fibre, improves outcome during weight loss in obese dogs. Therefore, improved compliance is expected when using such diets in clinical practice.

ABSTRACT #77
A HIGH PROTEIN HIGH FIBRE DIET IMPROVES RATE OF WEIGHT LOSS AND PROMOTES BODY FAT LOSS IN OBESE DOGS. A.J. Germana, S.L. Holdena, T. Bissotb, P.J. Morris, V. Biourge.

Sixteen non-obese colony neutered female adult cats were included in the study. Four different experimental dry-expanded diets were evaluated: Diet A (protein: 41%, fat: 10%, 10% total dietary fibre (TDF)); Diet B, the same diet but containing a high-water-binding-capacity fibre (ME: 3115); Diet C (pro-tein: 46, fat: 10, TDF: 10, ME: 3365) and Diet D (protein: 36, fat: 10, TDF: 21, ME: 3090). Four groups of 4 cats were randomly fed all diets according to a 4-wk-Latin-Square design, with a 2-d transition and a 5-d measurement period for each diet. Diets were given ad libitum from 2 pm to 8 am daily. Constant electronic weighing was used to monitor food consumption. The satiety criteria assessed were: meal size (intra-meal satiety or satiation, kcal/meal), time interval (inter-meal satiety: time between 2 meals generated after consumption of 1 kcal during previous meal, minutes/1 kcal) and total energy intake (kcal/kgBW/day). A reduced food/energy intake can be due to either a lack of palatability or a real satiety effect or even both. For each satiety trial, palatability trials were run with all the diets to make sure that they were comparable in terms of acceptability. Cat BW was also recorded. Data were expressed as mean±SD.

ABSTRACT #78
ABILITY OF DIETS TO GENERATE “SATIETY” IN CATS.
E. Servet1, Y Soulard1, C. Venet1, V. Biourge1, A.J. German2.

Today, around 30% of cats are overweight or obese in the Western world. To limit this serious condition, various dietary strategies designed to make cats lose weight already exist. However, on the flip side, these weight loss programmes are less successful than expected from laboratory studies. One solution would be to design a diet inducing a “satiety” that could limit begging, and maintain compliance of the owners. The goal of this study was to assess the ability of various dietary strategies to improve “satiety” (spontaneous food and/or energy intake reduction) in cats.

Sixteen non-obese colony neutered female adult cats were included in the study. Four different experimental dry-expanded diets were evaluated: Diet A (protein: 41%, fat: 10%, 10 total dietary fibre (TDF)); 16% of as fed, ME: 3200 kcal/kg, Diet B, the same diet but containing a high-water-binding-capacity fibre (ME: 3115), Diet C (protein: 46, fat: 10, TDF: 10, ME: 3365) and Diet D (protein: 36, fat: 10, TDF: 21, ME: 3090). Four groups of 4 cats were randomly fed all diets according to a 4-wk-Latin-Square design, with a 2-d transition and a 5-d measurement period for each diet. Diets were given ad libitum from 2 pm to 8 am daily. Constant electronic weighing was used to monitor food consumption. The satiety criteria assessed were: meal size (intra-meal satiety or satiation, kcal/meal), time interval (inter-meal satiety: time between 2 meals generated after consumption of 1 kcal during previous meal, minutes/1 kcal) and total energy intake (kcal/kgBW/day). A reduced food/energy intake can be due to either a lack of palatability or a real satiety effect or even both. For each satiety trial, palatability trials were run with all the diets to make sure that they were comparable in terms of acceptability. Cat BW was also recorded. Data were expressed as mean±SD.
ABSTRACT #79
DIETARY POLYUNSATURATED FATTY ACIDS REDUCE AIRWAY MUCIN PRODUCTION IN OVA-SENSITIZED/CHALLENGED MICE. JA Hall, J Hartman, MM Skinner, AR Schwindt, KA Fischer, WR Vorachek, BA Valentine. Biomedical Research Division, Oregon State University, Corvallis, OR, USA.

Beta-2-agonists and inhaled corticosteroids, along with environmental manipulation, remain the cornerstones of asthma management, but there are side effects. The (n–3) polyunsaturated fatty acids (PUFA) have emerged as a potential new immunotherapeutic. Dietary supplementation may decrease aberrant mucin secretion and accumulation in airway lumen, and reduce the inflammatory response in asthma, thus, decreasing dosage and side effects of corticosteroids. Mice can be sensitised (intra-peritoneally) and then challenged (intra-nasally) with ovalbumin (OVA) to recreate pathologic changes seen in acute allergic airway inflammation. The purpose of this study was to determine if dietary (n–3) or (n–6) PUFA reduced airway mucin production and the inflammatory response associated with OVA-induced airway and lung hypersensitivity. Four groups of mice (n = 10/group) were allotted to 2 groups, each containing 3 normal weight and 3 obese cats. Each group was assessed to each of 2 colonic infusions, in a random order at intervals of 4 weeks. Under general anaesthesia, the test group was given 4 mmol sodium propionate per kg ideal body weight in a 0.2% NaCl-solution. The control group was given normal saline as control solution. Solutions were injected in the hindgut over 30 min. Central venous blood samples were obtained prior to and 5, 10, 15, 30, 45, 60 and 90 minutes after starting the infusion.

Serum insulin concentrations differed significantly over time (p = 0.008) for both infusions, but no significant differences were observed among treatments. Plasma glucose concentrations showed no significant differences over time or between treatments. Insulin to glucose ratio (I/G), calculated to estimate insulin sensitivity, tended to decrease over time (p = 0.081) and tended to decrease (p = 0.087) in cats given the propionate infusion. Serum non-esterified fatty acid (NEFA) concentrations fell significantly over time in all cats, regardless of treatment (p < 0.001), but showed no significant differences among treatments.

The tendency towards a decreased I/G suggests enhanced insulin sensitivity in normal weight as well as obese cats, when given a colonic propionate infusion, which can be caused by a direct effect on the hepatic glucose metabolism and/or an indirect effect via lowering plasma fatty acid concentrations. The lack of a propionate-induced decrease in NEFA does not support the hypothesis that propionate affects hepatic glucose metabolism through reducing NEFA. Despite the inadequate statistical power, the differences in insulin sensitivity between treatments were practically irrelevant.