THURSDAY, September 13

ESVM – European Society of Veterinary Internal Medicine

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<tr>
<td>10:50</td>
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<td>Scheffzek Susanne</td>
<td>Changes in respiratory dead space and gas exchange following carbachol-induced airflow limitation in sedated dogs: Preliminary results</td>
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<tr>
<td>11:05</td>
<td>2</td>
<td>Hirt Reinhard</td>
<td>Effectiveness of inhaled glucocorticoids in canine chronic inflammatory respiratory tract disease</td>
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<td>11:20</td>
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<td>Mercier Elise</td>
<td>Influence of age on bronchoscopical findings in healthy beagle dogs</td>
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<tr>
<td>11:45</td>
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<td>Raffan Eleanor</td>
<td>Ascites is a negative prognostic indicator in canine chronic hepatitis: results of a retrospective case-control study in 37 dogs.</td>
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<td>PCR-based survey of coinfection with multiple vector-borne pathogens related to Leishmania infantum infection in dogs from North Eastern Spain</td>
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<td>Tabar Loli</td>
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<td>Pomba Constança</td>
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ESVCN – European Society of Veterinary Comparative Nutrition

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<td>The effect of isoenergetic substitution of energy sources on glucose tolerance and insulin sensitivity in healthy non-obese cats</td>
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ESVE – European Society of Veterinary Endocrinology

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<tr>
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<td>McMahon Lucy</td>
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<td>Davison Lucy</td>
<td>Glutamic acid decarboxylase-65 (GAD65) autoantibody status and MHC class II polymorphism in 100 diabetic dogs</td>
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**ESVNU – European Society of Veterinary Nephrology and Urology**

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**ESVE – European Society of Veterinary Endocrinology**

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<td>The role of insulin in the blood glucose perturbations seen in canine babesiosis</td>
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<td>Sieber-Ruckstuhl Nadja</td>
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## ESCH – European Society of Comparative Hepatology

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## SATURDAY, September 15

### ESCG – European Society of Comparative Gastroenterology

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<td>Lubas George</td>
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<td>Lecoindre Patrick</td>
<td>Regional granulomatous enteritis in 8 dogs</td>
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<td>Glanemann Barbara</td>
<td>Mycobacterium avium superspecies paratuberculosis (MAP) specific DNA in canine intestinal biopsies</td>
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<td>Allenspach Karin</td>
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<tr>
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### ESV – European Society of Veterinary Cardiology

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<td>Tvarijonaviciute Asta</td>
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<td>Killich Markus</td>
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<td>Wess Gerhard</td>
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<td>Hildebrandt Nicolai</td>
<td>Echocardiography in 9 cats with patent ductus arteriosus</td>
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<td>Santilli Roberto</td>
<td>Validation of a new algorithm for differentiating paroxysmal supraventricular tachycardia in the dog</td>
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<td>Changes in platelet function in Dachshunds with myxomatous mitral valve disease</td>
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<td>Crosara Serena</td>
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<td>Stokhof Arnold</td>
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<td>Falk Torkel</td>
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<td>Schober Karsten</td>
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<td>Höglund Katja</td>
<td>A prospective cohort study of systolic ejection murmurs and the left ventricular outflow tract in Boxer dogs during the growth period</td>
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ABSTRACT #1
CHANGES IN RESPIRATORY DEAD SPACE AND GAS EXCHANGE FOLLOW CARBACHOL-INDUCED CARBON MONOXIDE IN SEDATED DOGS: PRELIMINARY RESULTS. S. Scheffke1, M. Mosing2, R.A. Hirt1, Y. Moens1. 1Clinic for Anaesthesiology and perioperative Intensive Care, 2Clinic for Internal Medicine, University of Veterinary Medicine Vienna, Vienna, Austria.

The aim of this study was to quantify the changes in physiological-, airway-, and alveolar dead space and gas exchange that occur during carbachol-induced bronchoconstriction in sedated dogs. The study had institutional and governmental approval. Seven healthy male beagle dogs (mean age 1.4±0.6 years; mean body weight 15.8±0.5 kg) were sedated with an intravenous injection of acepromazine (0.03–0.05 mg kg−1) and buprenorphine (0.01–0.015 mg kg−1). The dogs were placed in lateral recumbency and the auricular artery was catheterised. A face mask connected to a non-rebreathing anaesthetic system was applied and a gas mixture of 40% oxygen provided at a flow of 4 litre min−1.

The combined CO2 flow-sensor of the NICO® respiratory monitor was placed between the mask and the breathing system. Respiratory parameters and single-breath diagram-derived values for dead space were continuously measured and stored for off-line analysis. A nebuliser was integrated in the inspiratory limb of the circuit. Bronchoconstriction and ensuing airflow limitation was achieved by nebulising increasing concentrations of carbachol solution (0.005%, 0.01%, 0.025%, 0.05%, 0.1%, 0.2%). This was performed in an interval of 2 minutes of nebulisation until clinical signs of bronchoconstriction were evident. Blood gas analysis was performed before carbachol challenge and after the concentration, which caused clinical signs suggestive of bronchoconstriction and airflow limitation. Data of these two time points, were compared using a paired T-Test. p<0.05 was considered significant. Data are presented as mean±SD.

All dogs showed clinical signs of bronchoconstriction. Dogs reacted at 0.05% (1 dog), 0.075% (3 dogs) and 0.01% (3 dogs) carbachol. PaO2 decreased from 216±7 mmHg (range 207–225 mmHg) to a mean value of 174±24 mmHg (range 152–203 mmHg, p=0.02). Alveolar dead space (Vdaw) increased from 0.62±0.33 ml kg−1 to 2.84±1.75 ml kg−1, p=0.03. The ratio (Vdaw/Vt) of airway deadspace (Vdaw) to tidal volume (Vt) decreased from 0.44±0.05 to 0.32±0.06, p=0.01. Vdaw decreased from 5.5±0.75 ml kg−1 to 4.9±0.65 ml kg−1, p=0.1. Physiological dead space (Vdphys) increased from 6.2±0.92 ml kg−1 to 7.7±2.1 ml kg−1, p=0.6 and expressed as ratio Vdphys/Vt from 0.5±0.7 to 0.53±0.14, p=0.08. Vdaw/Vt and Vdaw measured by the single-breath-diagram are significantly reduced during clinically detectable bronchoconstriction.

ABSTRACT #2
EFFECTIVENESS OF INHALED GLUCOCORTICOIDS IN CANINE CHRONIC INFLAMMATORY RESPIRATORY TRACT DISEASE. R.A. Hirt1, A. Haderer. 1Clinic of Internal Medicine and Infectious diseases, University Vienna, Austria.

Chronic non-infectious inflammatory diseases of the respiratory tract are commonly treated with systemic glucocorticoids, the well-known side effects of which sometimes can be pronounced in dogs. Lately, inhaled glucocorticoids have been introduced in small animal medicine as a therapeutic alternative. The purpose of the study was to evaluate retrospectively the effectiveness of this new therapeutic modality. Information about current treatment status, acceptance by the patient, response to therapy, and adherence to therapeutic recommendations was retrieved by questionnaire. From 39 patient owners contacted, feedback was obtained in 25 cases, of which 16 dogs (64%) had eosinophilic bronchitis/bronchopneumonia (EBP), 7 dogs (28%) had chronic bronchitis (CB) and 2 dogs (8%) had chronic rhinitis (CR). Drug administration via metered dose inhaler, spacer and face mask was well tolerated in all but 2 dogs. At the time of writing, twelve dogs (60%) were still on medication (8 EBP, 3 CB, 1 CR). Reasons to stop include lack of effectiveness in 2 dogs (1 EBP, 1 CB), absence of relapse after drug discontinuation in 5 dogs (2 EBP, 2 CB, 1 CR), poor acceptance (2 dogs, 1 EBP, 1 CB), death for unrelated reasons (3 dogs), or deterioration of disease (1 EBP).

Coughing was the predominant presenting sign in dogs with lower respiratory tract disease (13/16 with EBP, 7/7 with CB). In EBP dogs, coughing disappeared in 7, ameliorated in 4, and remained unchanged in 2 dogs under treatment, whereas in the CB group, cough disappeared in 3, improved in 2, and continued in 2 patients. Six dogs with EBP initially showed respiratory distress, which disappeared in 3, improved in 1 and did not change in 2 dogs. For the 3 CB dogs, initial dyspnoea resolved in 2 patients, and continued in 1. Decreased exercise tolerance was present in 11 patients (9 EBP, 2 CB), and resolved/improved/continued in 5/13 EBP dogs, respectively, and ameliorated in 2 animals with CB. Interestingly, there was no clear association between the degree of respiratory tract inflammation, based on broncho-alveolar lavage inflammatory cells, and the response to therapy. The major clinical signs in the 2 dogs with CB were sneezing and nasal discharge, which disappeared in both animals with therapy. In none of the patients under treatment, side effects compatible with systemic glucocorticoid effects were observed.

In conclusion, treatment of chronic non-infectious inflammatory respiratory diseases with inhaled glucocorticoids appears to be an effective alternative, thereby avoiding the unpleasant side effects of systemic glucocorticoid therapy.

ABSTRACT #3
INFLUENCE OF AGE ON BRONCHOCONSPITIONAL FINDINGS IN HEALTHY BEAGLE DOGS. E. Mercier, M. Bolognini, F. Delvaux, V. De Busher, F. Snaps, C. Tual, F. Favaudon, D. Briers, C. Clercx. Department for clinical sciences B44, Faculty of Veterinary Medicine, University of Liège, Belgium.

Bronchoscopy is a reliable procedure for the diagnosis of respiratory tract diseases. Scoring systems based on predefined macroscopical findings observed during bronchoscopy are used to assess the type and severity of bronchial lesions in both patients and experimental models, both at the time of diagnosis and in the course of treatment. In healthy dogs, thoracic radiographic findings are known to be age dependant, but no data exists with regards to the influence of age on bronchoscopical macroscopic findings (TCC and DCC) in the bronchoalveolar lavage fluid (BALF). Therefore, nineteen healthy experimental beagle dogs from three age groups were included in the study; 5 dogs aged 2.5 to 4.5 years (mean: 3.3 years), 7 aged 5 to 8 years (mean: 7.5) and 7 aged 10 to 13 years (mean: 11 years). 10 dogs was a male and 9 was a female.-cardiovascular findings were scored, and BALF TCC and DCC from cytospin preparations were obtained. Radiographical score was based on the severity of bronchial, interstitial and alveolar lesions. The bronchoscopical macroscopical findings were scored as follows: bronchial mucosal surface (smooth to irregular: 0 to 2) and colour (pale to presence of white and red areas: 0 to 2); presence of bronchectasis (enlarged airway diameter and thinned mucosa: 0 to 2), signs of hypertensive (visible arteries to very large and protruding arteries and visible pulsation: 0 to 4) and presence of collapse during expiration (absent to bronchomalacia: 0 to 3). Values are given as mean±SE. Younger dogs had significantly more blood leukocytes than middle-aged and old dogs. Radiographical score was higher in the middle aged and the old dogs than in the younger dogs, although these differences were not significant. Mean TCC in BALF (cells/mL) was significantly higher in older dogs (549±67±70.1) than in middle-aged dogs (253.8±79.5), while younger dogs had a higher but not significantly value (507±165±80.2). There were no statistical differences in BALF DCC amongst groups, at the exception of a higher percentage of lymphocytes in younger dogs. Principal bronchoscopical findings in older dogs included irregular mucosal surface and thinned mucosa, as well as moderate to severe signs of hypertension. Bronchoscopical macroscopical score was significantly higher in older dogs (6.43±0.97) than in middle-aged dogs (3.5±0.76) and in younger dogs (1.8±0.2). This study shows that age has a significant effect on bronchoscopical findings, and that age-related differences need to be taken into consideration before interpreting data in dogs with respiratory disease.

ABSTRACT #4
ASCITES IS A NEGATIVE PROGNOSTIC INDICATOR IN CANINE CHRONIC HEPATITIS: RESULTS OF A RETROSPECTIVE CASE-CONTROL STUDY IN 37 DOGS. A McCullum, E Raffan, PJ Watson. Queens Veterinary School Hospital, University of Cambridge, Madingly Road, Cambridge CB3 0ES.

Chronic hepatitis (CH) is a frequently encountered problem in small animal practice but little is known about factors that affect survival. In humans, ascites is well recognised as a negative prognostic indicator. The authors hypothesised that ascites was a negative prognostic indicator in dogs with CH. Histologically confirmed cases of CH were selected retrospectively from all cases biopsied at the QVSH from 1996–2005. All had compatible clinical signs and biochemical changes. Ascites was assessed by ultrasound and fluid analysis if present. Data were collected on signalment, clinical signs and date of presentation. Cases were excluded if any parameters were unknown. Dogs received variable combinations of commonly used treatments (including antibiotics, anti-inflammatories, antioxidants, diuretics and dietary man-
ABSTRACT 5
MICROBIOLOGICAL EVALUATION OF GALLBLADDER BILE IN HEALTHY DOGS AND DOGS WITH IATROGENIC HYPERCORTISOLISM, P. H. Kook1, Schellenberg2, L. Corboz1, C.E. Reuschi1, T. Glass1. Clinic for Small Animal Internal Medicine, Institute of Veterinary Bacteriology, University of Zurich, Switzerland.

In humans with cholestasis impaired reticular endothelial system function leading to inappropriate bacterial processing and clearance are well documented mechanisms for bactibilia. Glucocorticoids exhibit local immuno-suppressive effects in the liver, and hypercortisolism (HC) in people has been associated with changes in biliary biochemical compositions and chronic acalculous cholecystitis. No data are available on bile microbiota in healthy dogs and it is generally assumed to be sterile; bactibilia has been reported in association with hepatobiliary disease. In cultured dog gallbladder epithelial cells, bacterial infection is associated with marked periductal and gallbladder mucosal inflammation and might be an important factor contributing to the pathogenesis of biliary mucocoele. A HC is a common finding in dogs with gallbladder mucocoele, however the relevance of bactibilia in these cases is unknown. Therefore the aim of this study was to examine the biliary bacterial flora in healthy dogs and dogs with experimental HC in order to try to investigate a relationship between HC, bactibilia and mucocoele formation.

Gallbladder bile of 12 healthy adult Beagle dogs was examined microbiologically and cytologically before, monthly during administration of hydrocortisone (n=6, 8mg/kg PO bid for 90 days) or placebo (n=6) and again monthly over 90 days after discontinuation of treatment. Each time bile was aspirated aseptically via percutaneous ultrasound-guided cholecystocentesis (PC). PCR amplification analysis was performed within 24h. Cytology was performed on dry smears prepared immediately after PUC.

Four of 84 (5%) bile cultures yielded bacterial growth with 2 positive bile cultures in each group. In one dog treated with hydrocortisone Enterococcus sp. was cultured one month after initiation, and in the other Bacillus sp. was cultured only after discontinuation of treatment. In both control dogs positive cultures, Enterococcus sp. in one and E. coli with Staphylococcus sp in the other, were detected at the first PUC. In 4/84 additional occasions cytological examinations revealed presence of bacteria with negative cultures, 3 of them in the HC group. The total of 8 positive results were found in 5 different dogs, 3 in the HC group. In 2 of these 3 dogs with HC, sludge formation was found on ultrasound examination. No complications were seen with repetitive PUC.

Our results show that bile from healthy dogs is not persistently sterile, although the prevalence of bactibilia seems to be low. HC over 3 months does not appear to increase the incidence of bactibilia. Even though biliary sludge was found in some HC dogs with bactibilia, this study does not allow to postulate a causal relationship.

ABSTRACT 6
PRELIMINARY FINDINGS OF CANINE PROCALCITONIN EXPRESSION, S.Kunz1, I.Roehl1, K.Pelegr1, G.Dank1. Koret School of Veterinary Medicine, Hebrew University of Jerusalem, Israel.

Calcitonin (CT) is synthesized as part of a large precursor molecule, pre-pro-CT, which is dissociated into procalcitonin (ProCT). ProCT is processed to mature CT in a regulated secretion pathway, producing signal-regulated secretory vesicles. Additionally, ProCT is secreted as the major product in a secondary, constitutive (unregulated) pathway. In humans, ProCT is considered an acute phase protein and rises in different disease conditions, due to expression of its gene and the constitutive pathway in cells that normally do not produce it; while CT levels remain normal. The rise in ProCT in humans changes with the type (neoplasic/ inflammatory/ infectious) and severity of disease, and is routinely utilized in human medicine as a diagnostic and prognostic marker. Canine ProCT has been sequenced; however, no attempts have been made to utilize it as a diagnostic tool.

We hypothesize that ProCT expression will increase in infection and inflammation and less so in neoplasia, as reported in people. This preliminary study aimed (1) to develop a valid PCR assay for the identification of the previously sequenced canine ProCT gene (2) to determine differences in the amount of RNA extracted over a 24-hour period (3) to utilize real-time PCR to assess the ProCT RNA levels in canine different disease categories.

RNA was extracted from canine thyroid tissue samples. RT-PCR, PCR, and ProCT gene sequencing were performed and the latter was compatible with the literature. Blood samples were collected and RNA was extracted at different time periods over 24 hours. There were no differences between the extracted RNA quantities over time. This allowed a 24-hour period between collection of samples and RNA extraction. Blood samples were collected randomly from dogs admitted to the Veterinary Hospital and underwent RNA extraction and real-time PCR. Signalment, clinical signs, diagnosis, CBC and differential were recorded. The correlation of ProCT expression and the disease category, and ProCT expression and the collected data were evaluated. Based on the final diagnosis the dogs were divided into 4 categories –infectious, inflammatory, neoplastic, and control.

Twenty-seven blood samples were included: infectious (10), inflammatory (8), neoplastic (4), controls (5). ProCT expression was significantly higher in diseased dogs vs. controls (p<0.0007). ProCT expression was significantly higher in the infectious, inflammatory, and neoplastic cases vs. controls (p<0.0015, p<0.04, and p=0.035 respectively). ProCT expression was negatively correlated with the lymphocyte count (p<0.03), but not with other haematological variables.

In conclusion, ProCT expression can be determined in dogs, and its levels are increased in various diseases, most likely due to inflammation. Further study is warranted to assess ProCT expression levels over the course of different diseases, in response to therapy, and as a prognostic indicator in dogs.

ABSTRACT 7
PCR-BASED SURVEY OF COINFECTION WITH MULTIPLE VECTOR-BORNE PATHOGENS RELATED TO LEISHMANIA INFANTUM INFECTION IN DOGS FROM NORTH EASTERN SPAIN. L. Sáez1, M.A. Sánchez2, L. Soldado3, D. Llop3, M. López1, X. Roux1, 2Clinic for Small Animal Internal Medicine, Veterinary Teaching Hospital and 3Molecular Genetics Veterinary Service, Veterinary Faculty, Autonomous University of Barcelona, Spain.

Canine leishmaniasis is endemic in the Mediterranean area, where the prevalence of infection can be as high as 67% of selected populations. Clinical features can vary widely and concomitant disease with other vector-borne organisms may affect the severity and manifestation of the disease. Previous serological studies illustrated the potential for exposure to several vector-borne pathogens in dogs from the Barcelona area, but conflicting or erroneous conclusions could be made due to drawbacks of serological diagnosis. Therefore, the aims of this study were to further characterise the degree of coinfection by molecular identification of multiple vector-borne organisms and determine the exact identity of the pathogen in 4 different groups that varied in their respective Leishmania infantum (Li) status from the area surrounding Barcelona.

The study involved 187 dogs admitted to the UAB-VTH and classified according to Li status (serology, PCR or visualisation of parasites) and presence of clinical signs: 44 healthy uninfected Li dogs, 32 healthy Li infected dogs, 47 unhealthy Li infected dogs and 64 unhealthy Li uninfected dogs. Real-time qPCR was used to confirm species specificity. Based on PCR amplification 30% (57/187) of the samples was positive for Li, 4% (8/187) for A-E (3 were identified as A platys and 3 as E canis), 3% (5/187) for Hepatozoon canis, 2% (3/187) for B canis vogeli, 2% (3/187) for B goshuni, 1% (2/187) for B canis canis and 1% (1/187) for T canis. No amplifications were obtained for B rt and R. 21 dogs were confirmed with at least 2 pathogens. No statistical association was encountered between the different groups and the presence of these agents.
The results of this study evidence the presence of several vector-borne pathogens apart from *Li* and a mild degree of confection among dogs from the Barcelona area. Chronic immunosuppression induced by different pathogens may predispose dogs to secondary infections. However, and in agreement with the results of this study, co-infections could occur merely as a function of lifestyle. The differences in the degree of infection with serorelogical rates previously reported could be explained by the different diagnostic techniques employed. Regional veterinarians should consider the possibility of confection in dogs previously thought to be resistant to leishmanicidal drugs and molecular techniques may help in the direct diagnosis.

**ABSTRACT 29**

**DETECTION OF LEISHMANIA BY REAL-TIME PCR IN A CANINE BLOOD BANK.** L. Tabaré1, X. Rourea1, O. Francinoa2, L. Alletr, R. Ruiz de Gopeguia2, Veterinary Teaching Hospital and 2Molecular Genetics Veterinary Service, Veterinary Faculty, Autonomous University of Barcelona, Spain

Risk for transmission of *Leishmania infantum (Li)* from blood products has been largely demonstrated in human and veterinary literature. Appropriate infectious disease screening is complicated because of variations in incidence of different diseases, existence of chronic carrier states, difficulty in screening-test selection and testing costs. Guidelines for blood transfusion emphasise the importance of including other techniques as screening test apart from serum antibody tests. Specifically, *PCR Li* is suggested as an additional screening test for *Li* seronegative dogs (ACVM Consensus Statement 2005). No previous study has evaluated the importance of testing canine blood donors for *Li* with molecular techniques. This is particularly interesting in an endemic area such as the Mediterranean area. Apart from donor selection, others strategies such as the use of leuko-reduction filters can help to prevent transfusion-transmitted infection. In a preliminary study, we have previously suggested the aid of those leuko-reduction filters for prevention of *Li* transmission by lowering the parasite load (ECVIM 2006). PCR can be used for testing both canine blood donors and their stored blood products to evaluate *Li* parasite load.

The purpose of this study was to do a retrospective and prospective detection of *Li* parasites by real-time qPCR in our canine packed blood bank. Blood samples were obtained over a 18 month period from 86 blood donor dogs presenting to the UAB-VTH. All dogs were considered healthy and appropriate as blood donors after a negative screening protocol. Every dog had a CBC, biochemistry and physical examination performed with results within normal limits; moreover, they were seronegative for *Li* (Snap Idxx Laboratories Test) and *E. canis, D. immitis, B. burgdorferi (Snap 3 Dx Test)*. Each blood sample was analysed by a previous described real-time qPCR assay, targeting the kinetoplast of *Li* (Francino et al. Vet Parasitol, 2006). Of those 86 blood samples analysed, 18 (20.9%) yielded positive results; 13 (15.1%) had a low load of parasites and 5 (5.8%) had a medium-high load. We also performed leuko-reduction of 4 of these *Li* qPCR positive packed blood cells and DNA of *Li* was also amplified from leuko-reduced products, although lower loads were detected.

These results show that *Li* infection is common in canine blood donors and their blood products in an endemic area, even although a negative standard screening for infectious diseases. Therefore, although the specificity and negative predictive value of serology are very good, *Li* presence in these blood donors should be thoroughly investigated and PCR detection and quantification must be included in the screening protocol before accepting a dog as a blood donor. However, PCR positive results could also represent non-viable organisms or past infection, and perhaps some qPCR positive dogs could still be used as blood donors. Therefore, further studies are warranted to investigate the minimum infective parasite load which could avoid unnecessarily eliminate some donors in an endemic location.

**ABSTRACT #10**

**COMPARISON OF CLINICAL AND LABORATORY CHANGES AND OUTCOME IN DOGS WITH LEPTOSPIROSIS INFECTED WITH DIFFERENT LEPTOSPIRA SEROVARS IN GERMANY.** V. Geisen, C. Stengel, K. Hartmann. Clinic of Small Animal Medicine, Ludwig Maximilian University Munich, Germany.

The goal of this study was to investigate the presence of antibodies against different *Leptospira* serovars in dogs with leptospirosis in Germany and to compare history, clinical signs, laboratory findings, and survival rate between dogs infected with different serovars. Data of 42 dogs presented to the Clinic of Small Animal Medicine of the Ludwig Maximilian University Munich, Germany, with the diagnosis leptospirosis were evaluated retrospectively. In all dogs, a microagglutination reaction test against different serogroups of leptospirosis was performed. Mean age of dogs with leptospirosis was 4.8 years. There was a statistically significant overrepresentation of the breeds Bernese Mountain Dogs (5/42) and Dachshunds (4/42) when compared to the hospital population. Reactivity to the serogroup Grippotyphosa (31%, 13/42) was most frequently present, followed by reactivity to the serogroups Saxkoebing (24%, 10/42), Copenhageni (17%, 7/42), Canicola (12%, 5/42) and Bratislava (7%, 3/42).

In humans, folate deficiency occurs with increased demand (active hemolysis, pregnancy, exfoliative dermatitis), dietary deficiency, malabsorptive diseases, or with drugs which interfere with folate absorption or metabolism. In dogs and cats, folate deficiency has been documented only in small intestinal diseases and in pancreatic insufficiency. Vitamin B12 is
LONG-TERM MANAGEMENT OF OBESE DOGS WITH TWO DIFFERENT WEIGHT-REDUCTION DIETS. A Rocksin1, I Jeusette1, C Torre1, J Serpel1, N Schaessay1, D Simon1, T Nolte1, 2Affinity Petcare, Spain.

Body weight excess and obesity are the most common nutritional diseases in companion animals. 25% of dogs presented to veterinarians are obese or have a body weight excess.

The aim of this study was to compare two diets (A and B) for weight reduction in obese dogs and to evaluate their effects on a long-term basis.

In a double-blind study 20 obese dogs (bodyweight excess > 15%) of both sexes were randomly assigned to diet A (n=9) or B (n=11). Dogs with a history of or current compromised kidney function and dogs with endocrinopathies were excluded from the study. Diet A was higher in protein and lower in starch than diet B. In addition, diet A was higher in carotene, in medium chain triglycerides and in omega-3 fatty acids than diet B and contained a low glyceric index source of cereals (barley). Food amount was reassessed each week and adjusted to obtain a weekly weight loss rate of 1–2%. BW was recorded weekly. Data were collected upon presentation still at subsequent intervals following instigation of treatment which consisted of glucocorticoids and other immunosuppressive agents (azathioprine, cyclophosphamide, human immunoglobulin). Serum folate and vitamin B12 were measured by commercial veterinary laboratories using validated assays. One hundred and twelve serum samples were obtained from the 16 animals (range of 1–19 samples per animal). On at least one occasion, two cats and three dogs had low folate concentrations; two dogs had low vitamin B12 concentrations and one dog had low folate and vitamin B12. In total, folate concentration was low in 15 samples (13%) and vitamin B12 was low in 9 samples (8%). All the low folate and B12 values were recorded while the animals were still anaemic. Correlation between these low values and reticulocyte count or MCV was not possible due to prior blood transfusion administered to these animals and the autoagglutination present in some of these samples. Of the eight animals with low folate and/or vitamin B12, only two dogs (one with folate deficiency and one with concurrent folate/B12 deficiency) and one cat achieved a normal PCV with normalisation of folate and vitamin B12.

We conclude that folate and vitamin B12 deficiency may occur in some animals with IMHA, possibly due to increased demand during haematopoiesis as described in humans. In these cases, vitamin supplementation may be beneficial to aid haematopoiesis.

A HIGH PROTEIN, HIGH FIBER DIET DESIGNED FOR WEIGHT LOSS IMPROVES SATIETY IN DOGS. M. Weber1, T. Bisset1, E. Servet2, R. Sergeriera, V. Biourge3, A.J. German3, Royal Canin Research Center, Aimargues, France and 2Department of Veterinary Clinical Sciences, University of Liverpool, Liverpool, UK.

Weight loss programs in dogs are often hampered by increased begging and scavenging behaviour that ensues when food is restricted. It was hypothesised that a diet formulated such that protein and fibre is more satiating than diets that contain only high fibre or high protein.

Six entire female adult dogs (2 Shetland sheepdogs, 2 Brittany spaniels, 2 Labrador retrievers) participated in the satiety studies; median body condition was 5/9 (range 4–6/9) and did not change during the study. 105 adult female dogs of various breeds and ages were used for the palatability studies; none of these dogs were overweight or obese. Three commercially-available diets (high protein [103g/1000Kcal] high fibre [60g/1000Kcal], HPFH; high protein [104g/1000Kcal] moderate fibre [35g/1000Kcal]; HP; moderate protein [86g/1000Kcal] high fibre [87g/1000Kcal], HF) were tested. Fibre sources included in each diet included Cellulose, beet pulp, fructo-oligosaccharides, psyllium husk (HPFH), Cellulose, beet pulp (HP) and Mainly cellulose (HF). Voluntary food intake was measured in five sequential crossover studies, and palatability was assessed with taste tests. Apparent total digestibility of dry matter and protein of the three diets (HPFH, HP and HF) was measured during the satiety studies on the six dogs described above.

Protein digestibility was significantly lower for HF (77.7±2.52%) than for both HPFH (81.1±0.96%) and HP (81.1±1.65%) (P<0.001). Short-term satiety (food offered for 15min every hour for 4h) was better for HPFH than both HP and HF (P<0.038). Medium-term satiety (food offered 3h after first meal) was better for both HPFH and HF than HP (P<0.041). Voluntary food intake 3h after feeding a restricted meal (25% daily MER) was significantly lower on the HPFH diet than on either the HP (P<0.51, P=0.005) or HF (P<0.47, P=0.001). There was no significant difference between the energy intake on the HP and HF diets (+7%; P=0.37). The HPFH and HP diets had equivalent palatability, and both were more palatable than the HF diet (P<0.001).

A HPFH diet has a beneficial satiating effect, and may lead to greater compliance in weight loss programs.

THE EFFECT OF ISOENERGETIC SUBSTITUTION OF ENERGY SOURCES ON GLUCOSE TOLERANCE AND INSULIN SENSITIVITY IN HEALTHY NON-OBSESE CATS. A. Verbrugghe1, M. Hesta1, S. Van Weyenberg1, G. Papadopoulou1, K. Thys1, G. Verhelst1, T. Bosmans1, I. Polis1, G.P.J. Janssens1, 1Laboratory of Animal Nutrition, Ghent University, Belgium. 2Department of Small Animal Medicine, Ghent University, Belgium.

Cats are strict carnivores that rely on nutrients in animal tissues to meet their specific and unique nutritional requirements. In their natural habitat, cats consume prey high in protein with moderate amounts of fat and minimal carbohydrates. Nevertheless, commercial diets are moderate to high in carbohydrates and this might influence glucose metabolism. The objective of this study was to determine the pure effect of the energy delivering nutrients on the glucose metabolism in healthy cats. Nine healthy non-obese adult cats were divided into 3 groups. Three iso-energetic diets were tested in a Latin square design; a low-protein (LP), low-fat (LF) and low-carbohydrate (LC) diet. The home-made diets contained the same ingredients (chicken breast, chicken liver and corn starch), although in different quantities in order to create pair-wise changes in macronutrient content. A tailored vitamin and mineral premix was added to balance the diet. Caloric distributions of the diets were: LP-diet: protein 26%, fat 45%, carbohydrate 29%, LF-diet: protein 48%, fat 28%, carbohydrate 24%, LC-diet: protein 47%, fat 50%, carbohydrate 3%. Each group of cats was assessed to each of 3 diets in a random order at intervals of 3 weeks. The glucose tolerance and insulin response were evaluated by an intravenous glucose tolerance test (IVGTT). No significant differences between the 3 test diets were noted for basal glucose and for each glucose time point after glucose administration. Also the AUCglu did not show any significant difference. Basal insulin was not significantly different between the 3 test
diets. At the 60 minute time point, the insulin concentration tended to be higher for the LC-diet when compared to the LP- and LF-diet (p=0.058). The AUC insulin was significantly higher for the LC-diet (p=0.026) and the second insulin peak showed a strong tendency to occur later when fed the LC-diet (p=0.096). The higher AUC insulin can be explained by the strictly carnivorous nature of the cat, since amino acids appear to be more potent insulin secretagogues when compared to glucose. The absence of significant differences for AUC gluc between the 3 test diets can be explained by the rather low amylase activity in the feline gastrointestinal tract, although fermentation of indigestible carbohydrates might also influence insulin metabolism by the production of short chain fatty acids. To conclude, amino acids are more important than carbohydrates to stimulate the insulin secretion in healthy cats, and feeding a low carbohydrate diet to healthy cats did not result in a lower AUC gluc en AUC insulin, but further research is needed to evaluate the effect of various carbohydrate sources.

ABSTRACT #15
THE HYPOTHALAMIC-PITUITARY-OVARIAN AXIS IN BITCHES TREATED WITH MEDROXYPROGESTERONE ACETATE. N. Bejerink1, S. F. M. Bhatti2, H. Kooistra3, A. C. Schaefer-Oekens4. 1Department of Clinical Sciences of Companion Animals, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands; 2Department of Small Animal Medicine and Clinical Biology, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium.

The oestrus preventing effect of progesterone has been ascribed to suppression of gonadotrophin secretion. The aim of this study was to investigate the effect of medroxyprogesterone acetate (MPA) on the hypothalamic-pituitary-ovarian axis in the bitch. Five Beagle bitches were treated with MPA (10mg/kg, every 4 weeks) for a total of 13 injections, starting during anoestrus. In a first experiment, gonadotrophin releasing hormone (GnRH) was administered before and 2, 5, 8, and 11 months after the start of MPA treatment, and blood samples for determination of the plasma concentrations of luteinising hormone (LH) and follicle stimulating hormone (FSH) were collected at -15, 0, 5, 10, 20, 30, and 45 min after supraventricular stimulation. In a second experiment, the 6-h plasma profiles of LH and FSH were determined before and 3, 6, 9, and 12 months after the start of MPA treatment.

MPA successfully prevented the occurrence of oestrus, ovulation, and a subsequent luteal phase. In the first experiment, MPA treatment did not affect basal and GnRH-induced plasma LH concentrations. The basal plasma FSH concentration was significantly higher at 2 months after the start of MPA treatment than before or at 5, 8, and 11 months after the start of treatment. The maximal FSH increment and the AUC for FSH after supraventricular stimulation were significantly higher before treatment than at 5, 8, and 11 months of MPA treatment. In the second experiment, after 6 months of MPA treatment basal plasma LH concentration was significantly higher than that before treatment. Basal plasma FSH concentration and area under the curve above zero-level (AUCf) for FSH were significantly higher after 3 months of MPA treatment than before and after 9 and 12 months of treatment. MPA treatment did not significantly affect pulse frequency, pulse amplitude, and AUC above the baseline for both LH and FSH. During treatment, 58 significant LH pulses were identified and, although each LH pulse coincided with an increase in plasma FSH concentration, in 17 cases the amplitude of the increase was too small to be recognised as significant FSH pulse.

In conclusion, MPA treatment did not result in suppression of basal plasma gonadotrophin levels in the bitch. On the contrary, treatment caused a temporary rise in both basal FSH and LH concentrations, which may be ascribed to a direct effect of MPA at the ovarian level. In addition, with continuous treatment decreased pituitary sensitivity to GnRH challenge was observed, while several LH pulses were not accompanied by a significant FSH pulse. This suggests that MPA treatment resulted in attenuation of the pulsatile pituitary release of FSH.

ABSTRACT #16
SUPPRESSION AND RECOVERY OF PITUITARY AND ADRENOCORTICAL FUNCTION AFTER LONG-TERM, HIGH-DOSE GLUCOCORTICOID APPLICATION IN DOGS. S. Schellenberg, T. M. Glaess, C. E. Reusch. Clinic for Small Animal Internal Medicine, Vetsuisse Faculty, University of Zurich, Switzerland.

Prolonged administration of glucocorticoids (GC) results in suppression of the hypothalamic-pituitary-adrenal axis, i.e. in decreased CRH and ACTH secretion and atrophy of the adrenal cortex. Whereas the ensuing decrease of cortisol synthesis is well known, the effect of exogenous GC on aldosterone secretion has not been thoroughly investigated. Therefore the objectives of this study were to evaluate the effects of a long-term glucocorticoid administration and its withdrawal on plasma levels of aldosterone and to investigate a possible relation to endogenous ACTH (cACTH).

Six adult Beagles were studied before, during and after administration of hydrocortisone (1-HC, 8mg/kg PO bid for 84 days), six placebo treated age-matched Beagles served as controls. Cortisol and aldosterone before and 1 hour after ACTH application as well as baseline cACTH were measured before (d0) and d56 (during treatment), ACTH d1p, d2p, d5p and d84p after withdrawal of hydrocortisone and placebo, respectively. cACTH was also measured on d1 and d5 of treatment as well as after treatment on d5p.

Before treatment, no differences were found in cACTH, baseline and mean ACTH cortisol and aldosterone concentrations between control and 1-HC dogs. Concentrations of cACTH (pg/mL, median and range) significantly decreased from 12.3 (10.8–16.7) on d0 to 1.8 (1.0–3.9) on d1, and did not change anymore during further treatment. ACTH levels obtained on d1p (26.1; 17.5–48.7) and d5p (23.5; 18.4–55.8) were significantly higher compared to levels before treatment, and also compared to values obtained on d2p, d5p, d5p, and d84p. Cortisol concentrations during treatment were affected by cross-reactivity of hydrocortisone with the immunoassay. After treatment, post-ACTH cortisol concentrations (nmol/L) were significantly lower in 1-HC dogs on d11 (11.0; 2.8–55.2), and d5p (231.8; 179.3–278.7) compared to those in control dogs (295.2; 237.3–375.2 and 306.2; 242.8–341.2). Baseline aldosterone concentration in 1-HC dogs tended to be lower during treatment and to be higher on d1p compared to values in control dogs, however, the differences did not achieve significance. Post-ACTH aldosterone concentrations did not change during the study.

We conclude that withdrawal of long-term hydrocortisone administration resulted in a rebound increase in ACTH concentration, whereas complete recovery of the adrenal glands can take more than 8 weeks. Aldosterone demonstrated a modest suppression during and a transient elevation after hydrocortisone treatment which paralleled with cACTH. These findings suggest that hydrocortisone may affect aldosterone secretion, although its influence appears to be of minor importance.

ABSTRACT #17
ULTRASONOGRAPHIC EVALUATION OF THE ADRENAL GLANDS IN DOGS WITH HYPOADRENOCORTICISM. M. Wenger, C. Mueller, P. H. Koosk, C. E. Reusch. Clinic for Small Animal Internal Medicine, Vetsuisse Faculty, University of Zurich, Switzerland.

Canine hypoadrenocorticism is an uncommon endocrine disease. It is currently believed that most cases suffer from primary hypoadrenocorticism caused by an immune-mediated destruction of the adrenal cortices. Usually, the definitive diagnosis of this disease relies entirely on the ACTH stimulation test, but an alternative method (cortisol-therapy) has recently been described. Regardless of the test used, several days may elapse before the results are known, and imaging modalities illustrating the atrophy of the glands would be helpful in supporting the suspicion of hypoadrenocorticism. The results of our preliminary study containing six dogs with hypoadrenocorticism were encouraging, showing considerably smaller adrenals in diseased dogs compared to healthy dogs. The objectives of the present study were to extent the ultrasonographic evaluation to a more meaningful number of dogs with hypoadrenocorticism and to evaluate possible differences in the adrenal size between dogs with classical hypoadrenocorticism and dogs with atypical (normal Na+ and K+ concentrations) adrenal insufficiency, hypothesising that in the latter, the atrophy of the adrenals is incomplete.

All dogs in which hypoadrenocorticism was diagnosed between 1997 and 2007, and whose adrenal glands had been ultrasonographically examined by the same person were included in the study. The diagnosis was based on an incompletely low level of cortisol 1 hour after withdrawal of exogenous ACTH. Aldosterone was determined simultaneously to cortisol. The ultrasonographic measurements (length and thickness) of the adrenals were completed before getting the results of the test. Fourteen healthy dogs (group A) were used as controls for the measurements of the adrenal glands. The length and thickness of both adrenals in the 28 diseased dogs included in the study (group B) were significantly less compared to group A. Except for one dog in group B, the thickness of the left adrenal showed no overlap between both groups. In 4 dogs of group B, the thickness of the right adrenal was within the range obtained for the dogs of group A. Aldosterone was determined in 26/28 dogs of group B, only three of them had detectable levels. None of the dogs of group B had both normal Na+ and K+, but 5/28 and 4/28 had normal K+ and Na+, respectively. The three dogs with measurable aldosterone levels were part of these nine. Comparing these nine dogs with the rest of group B, no significant difference was noticed for any of the ultrasonographic measurements. This study confirms that dogs with
classical hypoadrenocorticism have significantly smaller adrenals than healthy dogs. Preliminary data suggest that this could be true for dogs with the atypical form of the disease.

It is concluded that a timed baseline serum cortisol concentration may be a useful screening test for adequate control of adrenal function in dogs receiving trilostane for HAC. Based on the findings of this study, a patient with a baseline serum cortisol concentration outside the target range of 35 to 80 nmol/L merits additional evaluation, including a clinical assessment and ACTH stimulation test.

ABSTRACT #18
ABERRANT EXPRESSION OF HORMONE RECEPTORS IN THE ADRENAL CORTEX OF DOGS WITH ACTH-INDEPENDENT HYPERCORTISOLISM. V.J. Kars1, S. Galac2, J.A. Mol3, H.S. Koostroa4. 1Department of Clinical Sciences of Companion Animals, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands.

Adrenocorticotropic hormone (ACTH)-independent hypercortisolism in dogs is known to be the result of autonomous glucocorticoid secretion by an adrenocortical tumour. Several studies in humans have demonstrated that the aberrant expression or abnormal function of hormone receptors other than ACTH-receptors in adrenocortical tumours can also be the cause of excessive production of cortisol. In the dog, meal-induced hypercortisolism, most likely due to aberrant expression of gastric inhibitory polypeptide (GIP) receptors, has been identified so far in one dog. Here, we report on a screening of 23 surgically removed adrenocortical tumours of dogs with hypercortisolism for the presence of aberrant receptors. Normal adrenal tissue served as control tissue. The receptors of interest were those for GIP, vasopressin (V1, V2, and V3), and lutening hormone (LH). Amounts of mRNA for these receptors were quantified using fluorescent quantitative PCR (qPCR). mRNA of all receptors was present in both normal adrenals and adrenocortical tumours. The mRNA expression levels for GIP and V2 receptors were significantly decreased (p<0.05) in the tumours compared with the normal adrenals. For the V1, V3 and LH receptor no significant difference was found between the expression in tumours and normal adrenals. These findings indicate that the investigated receptors should not be considered as “aberrant”, because they are also present in normal adrenal tissue. Furthermore, in general, over-expression of the investigated receptors is not the cause for the hypersecretion of cortisol by canine adrenocortical tumours.

ABSTRACT #19
BASELINE SERUM CORTISOL CONCENTRATION AS A MONITORING TOOL FOR DOGS ON TRILOSTANE THERAPY FOR HYPERADRENOCORTICISM. A.K. Cook5, K. Bond1. 1Department of Veterinary Small Animal Clinical Sciences, College of Veterinary Medicine, Texas A&M University, College Station, Texas, USA; 2Dechra Pharmaceuticals PLC, Shrewsbury, England.

Trilostane, a competitive inhibitor of 3beta-hydroxysteroid dehydrogenase, has become the treatment of choice for canine hyperadrenocorticism (HAC) in Europe. Traditionally, dose adjustments are based on results of adrenocorticotropic hormone (ACTH) stimulation tests, which require repeated venipuncture, administration of an ACTH analogue, and a brief period of hospitalisation. The goal of this study was to determine if a timed baseline serum cortisol concentration could be used as a screening test for adequate control. If so, many patients could be spared an ACTH stimulation test, thereby reducing client inconvenience and expense.

ACTH stimulation tests were performed 4 to 6 hours post trilostane administration on 103 client-owned dogs with spontaneous HAC. 352 paired data points were used for the final analysis. Based on the post stimulation serum cortisol concentration (S2) each ACTH stimulation test result was classified as indicating acceptable control of the HAC [S2 between 40 and 150 nmol/L, n=178], excessive suppression of adrenal function [S2 <40 nmol/L, n=22], or questionably inadequate therapy [S2 >150 nmol/L, n=152]. The baseline serum cortisol concentrations (S1) for these three groups were reviewed, and an attempt was made to identify a target range of S1 for which acceptable control of HAC could be safely assumed.

Excessive suppression of adrenal function was defined as S1 ≤35 nmol/L [n=87]. Compared to the S2 value, this parameter had a sensitivity of 86%, a specificity of 79% and a negative predictive value of 99%. Questionably inadequate dosing of Trilostane was classified as S1 >80 nmol/L [n=131]. When compared to S2, this definition had a specificity of 88% and a positive predictive value of 82%. If the upper acceptable limit for S2 was increased to 250 nmol/L, as per the manufacturer’s recommendations, our target range for S1 correctly identified 82% of individuals on an inadequate dose of Trilostane. A total of 134 dogs had S1 between 35 and 80 nmol/L. Seventy percent (70%) of these patients were well-controlled based on their S2 results. If clinical information such as client feedback and physical examination findings are included, the accuracy of this figure is likely to increase.

ABSTRACT #20
EFFECTS OF TRILOSTANE TREATMENT ON THE PITUITARY-ADRENOCORTICAL AND RENIN-ALDOSTERONE AXIS IN DOGS WITH PITUITARY-DEPENDENT HYPERCORTISOLISM. S. Galac1, J.C.W.M. Buijtels1, J.A. Mol2, H.S. Koostroa3. 1Dept. of Clinical Sciences of Companion Animals, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands.

The objective of this retrospective study was to determine the effect of trilostane, a competitive inhibitor of the 3β-hydroxysteroid dehydrogenase/isomerase enzyme system, on the hypothalamic-pituitary-adrenocortical (HPA) axis and the renin-aldosterone axis in 63 dogs with pituitary-dependent hypercortisolism (PDH). The optimal trilostane dosage was determined based upon resolution of clinical signs and results of an adrenocorticotropic hormone (ACTH) stimulation test. The mean ± SD dosage of trilostane at the time of good control was 2.8 ± 1.0 mg/kg body weight, once daily.

The median plasma cortisol concentration after reaching the proper trilostane dose (37 nmol/L, range 2–101 nmol/L, n=46) was significantly lower (<0.001) than that before treatment (median 164 nmol/L, range 24–1029 nmol/L). Five dogs developed permanent or transient hypocortisolism during trilostane treatment. Two of these 5 dogs were well-regulated initially but developed hypocortisolism 10 and 12 months after reaching the optimal dosage, and 3 dogs developed hypocortisolism before the proper dosage had been established.

The median plasma ACTH concentration in well-controlled dogs at the time the trilostane dosage was justified as optimal (39 nmol/L, range 7–132 nmol/L, n=60) was significantly higher (<0.001) than that before treatment (13 nmol/L, range 2–102 nmol/L). These values did not overlap with the plasma ACTH concentrations of 5 dogs with trilostane-induced hypocortisolism (range 212 to 307 pmol/L). The median cortisol/ACTH ratio (CAR) in well-controlled dogs (0.23, range 0.03–2.5, n=46) was significantly lower (<0.001) than that before treatment (2.59, range 0.27–13.25). In the 5 dogs with trilostane-induced hypocortisolism, CAR ranged from 0.004 to 0.085 (median 0.009).

Trilostane treatment resulted in a significant decrease of the plasma aldosterone concentration (PAC), but the median plasma renin activity (PRA) at the time the trilostane dosage was justified as optimal (265 fmol/l/s, range 70–3280 fmol/l/s, n=18) was significantly higher (P<0.001) than that before treatment (115 fmol/l/s, range 15–1330 fmol/l/s). Similarly, the median PAC/PRA ratio during trilostane treatment (0.16, range 0.003–0.92, n=17) was significantly lower (<0.001) than that before treatment (median 0.44, range 0.04–1.33).

In conclusion, trilostane affects both the HPA axis and the renin-aldosterone axis. The results also suggest that the basal plasma ACTH concentration can be used to detect trilostane overdosage.

ABSTRACT #21
POSTOPERATIVE PLASMA HORMONE PROFILES AFTER TRANS-SPHENOIDAL HYPOPHYSECTOMY IN TREATMENT OF DOGS WITH PITUITARY-DEPENDENT HYPER-ADRENO-CORTICISM. J.M. Hanson, J.A. Mol, B.P. Meij. Department of Clinical Sciences of Companion Animals, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands.

Transphenoidal hypophysecotomy is an effective treatment for pituitary-dependent hyperadrenocorticism (PDH) in the dog. However, after initial remission, recurrences occur in about 25% of the cases. The aim of this study was to analyse the predictive value of immediate postoperative plasma concentrations of adrenocorticotropic stimulating hormone (ACTH), n-melanocyte stimulating hormone (n-MSH), growth hormone (GH) and cortisol for recurrence after transphenoidal hypophysecotomy in dogs with PDH.

Transphenoidal hypophysecotomy was performed in 55 dogs with PDH. Plasma hormone concentrations were measured the day before surgery and after transsphenoidal craniotomy, days 1, 2, 3, 4, 5 and 24 to 48 hours after the removal of the pituitary gland, and analysed with Cox’s proportional-hazard analysis for their prognostic value for recurrence of hyper-adrenocorticism.
Dogs with persistent disease were readily identified with the profile of postoperative plasma ACTH and cortisol values. Preoperative MSH concentrations and postoperative plasma ACTH, cortisol and ß-MSH concentrations were prognostic for recurrence of hyperadrenocorticism. It is concluded that postoperative measurement of plasma concentrations of ACTH, ß-MSH and cortisol is easily performed and valuable for early postoperative evaluation of long-term outcome after transphenoidal hypophysectomy in dogs with PDH.

ABSTRACT #22
URINARY ALDOSTERONE TO CREATININE RATIO BEFORE AND AFTER SUPPRESSION WITH ORAL FLUDROCORTISONE ACETATE IN CATS. S.C. Djadjimgrai-Laane, S.E. Cannembeek, S. Galac, H.S. Koolstra. Department or Clinical Sciences of Companion Animals, Utrecht University, Utrecht, The Netherlands.

The diagnosis of primary hyperaldosteronism in cats is currently based on the ratio between the plasma aldosterone concentration and plasma renin activity, i.e., an elevated aldosterone to renin ratio (ARR). Since the ARR has a number of disadvantages, a more practical diagnostic parameter would be preferable. We therefore aimed: 1. to establish a reference range for the basal urinary aldosterone to creatinine ratio (UACR) in cats; 2. to investigate whether oral fludrocortisone acetate can be used to suppress aldosterone secretion in healthy cats.

Morning urine samples from 42 healthy cats were collected for the determination of the basal UACR. Inclusion criteria were an unremarkable physical and routine laboratory examination, a systemic arterial blood pressure <160 mm Hg, and an ARR below the upper limit of the reference range. Successively, fludrocortisone acetate was administered to 16 healthy cats and one cat with primary hyperaldosteronism, in an oral dosage of 0.05 mg/kg BW BID for four consecutive days. The following morning, urine was collected for the UACR after oral fludrocortisone acetate administration.

Basal UACRs ranged from 1.8–52.3*10^(-9) and non-parametric analysis revealed that the reference range for the basal UACR was <46.5*10^(-9). Oral administration of fludrocortisone acetate caused a reduction in UACR of more than 40% and resulted in a UACR <5*10^(-9) in all 16 healthy cats. In the cat with primary hyperaldosteronism, the basal UACR and the difference after fludrocortisone acetate administration were 32*10^(-9) and 36*10^(-9), respectively.

The results of this study suggest that determination of the UACR, in combination with a fludrocortisone suppression test, may be used to diagnose primary hyperaldosteronism in cats. Dose finding studies and inclusion of more cats with primary hyperaldosteronism are warranted.

ABSTRACT #23
EVALUATION OF THYROID FUNCTION WITH RECOMBINANT HUMAN THYROID STIMULATING HORMONE AND SCINTIGRAPHY IN HEALTHY CATS. I. van Hoek1, K. Peremans1, E. Vanderveen1, L. Duchateau1, S. Dammet1. 1Department of Medicine and Clinical Biology of Small Animals, 2Department of Medical Imaging of Domestic Animals, 3Department of Physiology and Biometrics, Faculty of Veterinary Medicine, Ghent University, Belgium.

Studies in humans with nodular goiter have demonstrated that administration of recombinant human Thyroid Stimulating Hormone (rhTSH) increases the uptake of radioiodine in the thyroid. This results in lower therapeutic doses needed and less irradiation to extra-thyroidal tissue (Nieuwlaat, 2003). Because the thyroid gland of healthy euthyroid cats can be stimulated with TSH (Stegeman, 2001) we hypothesized there could be a similar application of rhTSH in hypertrophic cats as in humans. We investigated whether rhTSH could influence uptake of pertechnetate (which is pumped inside the thyroid cell by the same sodium-sodium symporter as iodide) in the thyroid gland of healthy cats.

Six healthy euthyroid female cats, with an age of 2 years, a bodyweight of 4.7±0.4 (mean±SD) kg and showing no abnormalities on clinical examination, blood- and urinalysis, were included. A pertechnetate scan was performed on day 1. Two mCi pertechnetate was injected IV and static images were acquired 30 minutes after injection under anesthesia (8 mg/kg Propofol IV until effect). Regions of interest (ROI) were drawn manually to calculate the thyroid/salivary gland (T/S) uptake ratio in both thyroid lobes. On day 1 (3.025 mg rhTSH (Thyrogen®. Genzyme corporation, the Netherlands) was injected IV. Six hours later the pertechnetate scan was repeated as on day 1. Two bloodsamples were drawn from the jugular vein by venipuncture, before injection of the rhTSH and the pertechnetate scan respectively. Serum was collected after centrifugation, aliquoted and frozen at -20°C until radioactivity had decayed for measurement of total T4 (TT4, nmol/L). Results are expressed as mean±SD. Based on a fixed effects model, serum TT4 concentration increased significantly (P<0.001) from 0 hours (19.1±4.6) to 6 hours (54.4±5.9) after rhTSH administration. T/S uptake was analysed by a mixed model with cat and lobe as random effects and rhTSH administration, side (left or right) and their interaction as fixed effects. There was a significant effect of rhTSH administration (P=0.013) and of side (P=0.039) with a non-significant interaction (P=0.925). In the left (right) lobe, T/S uptake ratio increased from 1.12±0.07 (0.97±0.07) to 1.27±0.07 (1.13±0.07) from 0 to 6 hours after rhTSH administration. Pearson correlation coefficient between difference in serum TT4 concentration and T/S uptake ratio before and after rhTSH administration was -0.278 and not significantly different from 0 (P=0.59).

The role of pertechnetate in the thyroid of euthyroid cats is marginally influenced by 0.025 mg rhTSH 6 hours after administration. Further studies are necessary to optimize pertechnetate uptake by varying time intervals and doses.

ABSTRACT #24
EFFECT OF BREED ON BODY COMPOSITION IN DOGS. I. Jeusette2, F. Aquino1, A. Fuchetti1, C. Torre1, M. Peterson1, D. Greco1. 1The Animal Medical Center, New York, NY; 2Affinity-Petcare, Barcelona, Spain.

Recently, breed diversity has been characterised by comparison of genetic material from various breeds of dogs to the wolf (Ostrander et al, 2004). Dual X-ray absorptiometry (DEXA) methodology to estimate body composition has been validated in dogs by comparison with chemical analysis and is considered to be a reference method. The first objective of this clinical study was to assess the effect of breed on percentage body fat mass (measured by DEXA) in dogs. Breeds (Siberian Husky, Greyhound, Standard Poodle, Dachshund, Rottweiler) were chosen based on their relationship to the wolf (asian, herders, steppers, mastiffs). The second objective was to compare results of body fat obtained by DEXA analysis with results obtained by bioelectrical impedance (BIA), and morphometric analysis in these dogs.

Healthy client-owned dogs of selected breeds that were sedated or anaesthetised for unrelated reasons were enrolled in the study (n=17). Greyhounds, 3 Standard Poodles, 4 Siberian Huskies, 2 Dachshunds, 3 Rottweilers). Firstly, body weight (BW) was recorded and a body condition score (BCS) was given to each patient according to the 9-point scale (Laflamme et al, 1997), to assess subjectively the degree of leanness/obesity. Then, various morphometric measurements were taken as described by Mawby et al (2004) and used in equations to estimate body fat. Secondly, each anaesthetised patient was submitted to a DEXA scan (Lunar DEXA Vista. Lunaar Corp). Madison WI) and to bioelectrical impedance analysis (BIA) (RJL systems, Clinton MI), using electrodes in 3 different positions: on the two left legs (Left hemisphere), on the two right legs (right hemisphere), on the two front legs (front hemisphere). Data were normally distributed and were submitted to a univariate and multivariate analysis. Differences of variance and correlations were calculated. Differences were considered statistically significant at P<0.05.

In the univariate analysis of variance, DEXA fat mass significantly differed between breeds. For a same mean BCS, Greyhound had significantly less fat then Poodle, Rottweiler, Dachshund and Husky. When including the BCS and breed effects together in the multivariate analysis of variance, the differences between breeds still tend to be significant. In this study, no significant correlation was observed between percentage fat (by DEXA) and BCS, BW, percentage body fat estimated by BIA, or by morphometric equations. BCS correlated with percentage fat (by DEXA) in Greyhound and Poodle but not in Rottweilers or Huskies. Percentage fat (by BIA) correlated with DEXA fat in Huskies and Rottweilers. Body mass index tended to correlate with DEXA fat in large dogs (Greyhound, Husky and Rottweiler) but not in Poodles.

In conclusion, the Greyhound breed is significantly leaner than other breeds of dogs for the same BCS. More data are required but it seems that the current morphometric equations are not adapted to the different breed morphology. Development of breed specific BCS and equations could be envisaged in the future.

ABSTRACT #25
ACUTE PHASE PROTEIN CONCENTRATIONS IN DOGS WITH HYPERCORTISOLISM, DIABETES MELLITUS AND HYPOTHYROIDISM. F. Fraissaci, F. Dondi, E. Mercuriali, A. Mazzi, P. Famigli-Bergamini, F. Gentilini. Veterinary Clinical Department, University of Bologna, Italy.
The purpose of this study was to determine the concentrations of Haptoglobin (Hp), C-reactive protein (CRP) and Fibrinogen (Fib) in dogs with spontaneous hypercortisolism (HCT), diabetes mellitus (DM) and hypothyroidism. Stored (−20°C) serum (Hp and CRP) or citrate plasma (Fib) samples from 35 dogs with HCT (31 PDH and 4 FAT), 24 with DM and 7 with hypothyroidism were analyzed. All samples were obtained from newly diagnosed dogs before starting the therapy for the specific endocrinopathy. Reference ranges for APPs were previously obtained from a population of 25 clinically healthy dogs. CRP and Hp were measured using human immunoturbidimetric assays validated in our laboratory for the dog, as previously reported. CRP concentrations (reference range 0.01–9.82 mg/dl) were between 0.01 and 1.63 (median 0.01; abnormal in 14.3% of cases), between 0.01 and 11.60 (median 1.03; abnormal in 62.5% of cases), and between 0.01 and 9.82 (median 0.01; abnormal in 42.9% of cases) in HCT, DM an hypothyroid dogs respectively. Hp concentrations (reference range 20–140 mg/dl) were between 0 and 590 (median 276; abnormal in 82.9% of cases), between 61 and 387 (median 152; abnormal in 62.5% of cases), and between 2 and 242 (median 109; abnormal in 42.9% of cases) in HCT, DM an hypothyroid dogs respectively. Fib concentrations (reference range 1.45–3.85 g/l) were between 0.82 and 6.16 (median 3.77; abnormal in 47.1% of cases), between 2.32 and 4.27 (median 3.63; abnormal in 41.7% of cases), and between 3.31 and 6.69 (median 4.40; abnormal in 71.4% of cases) in HCT, DM an hypothyroid dogs respectively.

CRP concentrations were significantly lower (p<0.001) in HCT compared to DM dogs. Hp concentrations were significantly higher in HCT compared to DM (p<0.001) and hypothyroidism (p=0.003). Fib was higher in dogs with hypothyroidism compared to dogs with DM but not statistically significant (p=0.051). Only 5 dogs with HCT had a (mild) increase of CRP. 2 had also a severe pyoderma, 2 concomitant DM with ketoacidosis and 1 concomitant mediastinal tumour and haemolytic anaemia in these cases, we considered the increase of CRP inadequate when compared to the expected acute phase response. The high serum concentrations of Hp in dogs with HCT has previously been reported and our results are comparable to those reported in the literature. Lack of exact knowledge regarding the inflammatory/infec-tious status of each dog is the main limitation of this study. In conclusion, APPs were high in a large number of dogs with endocrinopathies and this is probably due to the high incidence of concomitant infectious diseases. CRP is low in dogs with HCT and, like Hp, in this endocrinopathy should be considered a poor marker of the acute phase response. Further studies are required to assess whether serum Hp and CRP could be useful for the diagnostic protocol of dogs with HCT.

**ABSTRACT #27**

**EFFECT OF THYROXINE SUPPLEMENTATION ON GLOMERULAR FILTRATION RATE IN HYPOTHYROID DOGS.** K. Gommeren1, H.P. Lefebvre2, G. Benckendorf3, S. Damment1, 1Department of Small Animal Medicine and Clinical Biology, Ghent University, Merelbeke, Belgium; 2Department of Clinical Sciences, National Veterinary School of Toulouse, Toulouse, France; 3Inserm Medicine Unit, National Veterinary School of Allfort, Maisons-Allfort, France.

Glomerular filtration rate (GFR) is decreased in human hypothyroid patients, but information about kidney function in canine hypothyroidism is lacking. The objective of this study was to assess GFR in hypothyroid dogs, prior to substitution therapy and after reestablishment of a euthyroid state.

Hypothyroid dogs (n=14) without gross abnormalities on renal ultrasonography and urinalysis were included. Blood pressure measurement and exogenous serum creatinine clearance (ECC) test were performed before treatment (t0, n=14), one month (t1, n=14) and 6 months (n=11) after supplementing levothyroxine (20 μg/kg/day) PO therapy. At t1, response to therapy was monitored by measurement of serum total thyroxine and thyrotropin. If thyroid treatment needed to be adjusted, it was reassessed after one month.

Statistical analysis was performed using a general linear model, results were expressed as mean±SD.

Age at t0 was 62.5±1.4 years, body weight decreased (P<0.001) from 35.8±15 kg at t0 to 27.4±14 kg at t6. All dogs remained normotensive throughout the study. Basal serum creatinine also decreased (P<0.005) from 121.3±77 to 98.2±20 and 104±28 μmol/L at t0, t1 and 6 months, respectively. ECC continuously increased (P=0.01), the corresponding values were 1.6±0.4, 2.1±0.4 and 2.0±0.4 mL/min/kg, respectively.

Decreased GFR was observed in hypothyroid dogs. However re-establishment of a euthyroid state increased GFR significantly.

**ABSTRACT #28**

**GLUCONIC ACID DECARBOXYLASE-65 (GAD65) AUTOANTIBODY STATUS AND MHC CLASS II POLYMORPHISM IN 100 DIABETIC DOGS.** L.J. Davison3, M.R. Christie3, A. Holder3, L.J. Kennedy3, A. Barnes4, M.E. Herrtage5, W.E.R. Ollier6, B. Caitchpole7, 1Dept VET Medicine, University of Cambridge, UK; 2Division of Reproduction and Endocrinology, King’s College London, UK; 3Dept Small Animal Medicine, Royal Veterinary College, London, UK; 4Centre for Integrated Genomic Research, University of Manchester, UK; 5Mammalian Immunogenetics Research Group, University of Liverpool, UK.

Previous work has demonstrated an association between certain Major Histocompatibility Complex (MHC) Class II alleles and susceptibility to canine diabetes mellitus (DM). Additionally, a pilot study has provided preliminary evidence that some diabetic dogs have circulating autoantibodies to gluconic acid decarboxylase 65 (GAD65), a pancreatic beta cell protein and important autoantigen in human DM. Such findings imply that autoimmunity might play a role in canine DM; however the correlation between canine MHC haplotype and autoantibody status has not been investigated in dogs. The current study was designed to determine the prevalence of GAD65 autoantibodies in a large cohort of diabetic dogs for whom no other underlying cause of DM was obvious. In addition, the study aimed to test the hypothesis that dogs with GAD65 autoantibodies would share one or more of the canine MHC Class II haplotypes associated with increased DM risk.

The previously described canine GAD65 autoantibody assay was refined by cloning the canine GAD65 gene into the pXAV expression vector, to improve in-vitro transcription / translation of 13S methionine radio-labelled GAD65 from plasmid DNA. Sera from canine diabetic patients (n=100) and normoglycaemic control patients (n=45) were screened for GAD65 autoantibodies by immunoprecipitation. Diabetic dogs who were under 6 months old, female entire, or had a known history of pancreatitis were excluded, since autoimmune pancreatic destruction was thought to be an unlikely underlying cause of DM in these dogs. DNA was also isolated from the canine diabetic blood samples and genotyped at the Dog Leukocyte Antigen (DLA)-DRB, -DQB, -DQA loci; a sequence-based approach. Serum samples were considered positive for GAD65 autoanti-bodies if their reactivity was greater than the mean ± 2 standard deviations of the controls tested.

In conclusion, TLR2 and TLR4 expression appears to be up-regulated in dogs with severe IBD when compared to dogs with milder disease and controls. The marked elevation in TLR2 and TLR4 expression in a group of severely diseased dogs suggests that an abnormal immune response to TLR ligands may provide an excess of inflammatory mediators during the active phase of canine IBD.
One of 45 control dogs and 13 of 100 diabetic patients showed significant serological reactivity to canine GAD65 (p<0.05). There was no single haplotype or specific breed associated with GAD65 autoimmunity, however 8 of the GAD65 autoantibody positive dogs carried at least one copy of either the DLA-DRB1*009/DQA1*001 or DRB1*015/DQA1*006 alleles previously associated with increased DM risk. These results confirm the presence of GAD65 autoantibodies in a proportion of diabetic dogs, but illustrate that the relationship between such antibodies and MHC haplotype is not straightforward. Larger studies are indicated to clarify the role of MHC Class II polymorphism in the development of autoantibodies to pancreatic proteins in dogs.

**ABSTRACT #29**

**ANALYSIS OF CANINE UROLITHIASIS IN MEXICO: PRELIMINARY RESULTS.** J. Del Angel Caraza1, O. F. Chávez Moreno1, C. C. Pérez García1.1 Hospital Veterinario para Pequeñas Especies. Facultad de Medicina Veterinaria y Zootecnia de la Universidad Autónoma del Estado de México. Toluca, Mexico; 2Depart. Medicina, Cirugía y Anatomía Veterinaria, Universidad de León, León, Spain.

Mineral composition of uroliths is a critical element for the management of urolithiasis in any species. In this study we report the results of the analysis of 200 uroliths surgically removed in male (n=112) and female (n=88) dogs of different States of Mexico. Thirty-nine percent of uroliths submitted came from Jalisco. Thirty percent from Mexico City and 28% from fourteen different states of Mexico. They were analysed with stereoscopic microscopy, IR-spectroscopy, scanning electron microscopy and x-ray microanalysis.

The most common type of mineral was struvite (41%), followed of calcium oxalate (26%), mixed (21%), urates (7%), silicates (4%), cystine (0.5%) and calcium phosphate (0.5%). The majority of uroliths were found in mixed-breed (24%) and Schnauzer (24%) followed by Poodle (11%); Dalmatian (6%), German shepherd (4%), Cocker spaniel (4%) and others nineteen different breeds (29%). Seventy percent of the samples come to patients between 3 and 8 years of age. Only in 3% of cases the presentation was in the first year of life, being uroliths of struvite or mixed (struvite and silicate). Almost all of the urinary stones investigated were found in the lower urinary tract (88%). Six percent were removed from the urinary bladder, 19% had uroliths in the bladder and urethra and 13% had uroliths only in the urethra.

Our trends are in agreement with other papers that report dog populations of other geographical areas.

**ABSTRACT #30**

**CANINE AND FELINE UROLITHIASIS IN PORTUGAL: A RETROSPECTIVE STUDY 2004-2006.** M. Tome1, S. Gonçalves2, J. H. Duarte Correia1, C. Pombo1, C. Cesnaim-Hill1. Lisbon, Portugal; 1CHISA, Faculty of Veterinary Medicine, Universidade Técnica de Lisboa, Lisbon, Portugal.

Urolithiasis is a multifactorial disorder, which is a common and recurrent problem in dogs and cats. There is only limited data on small animal's urolithiasis in Portugal. The purpose of this study was to analyse data regarding mineral composition, location, age, breed and gender of affected patients. Canine (n=299) and feline (n=65) uroliths were submitted for analysis at the Minnesota Urolith Center (University of Minnesota, USA), between January 2004 and December 2006. Mineral composition was evaluated by quantitative analysis using polarizing light microscopy, infrared spectroscopy and EDAX (energy dispersive X-ray spectroscopy). Each urolith's submission was accompanied by a questionnaire providing information on the animal medical record. In this study the terms: “calcium oxalate” include calcium oxalate monohydrate, dehydrate or both, “urates” includes the salts of uric acid: ammonium and sodium, “cystine” includes apatite and carbonate forms, “compound” include uroliths with nidus or stone of different predominant mineral and “mixed” includes uroliths with less than 70% of the predominant mineral.

Canine patients were predominantly males (n=177) over 7 years old (n=125), belonging to several breeds: Poodle (11%), Cocker Spaniel (9.7%), Dalmatian (8.7%), Yorkshire Terrier (7.7%) and others. Feline patients were predominantly males (n=42), castrated (n=28), 3 to 7 years old (n=33), belonging to several breeds: domestic shorthair (58.5%), Persian (18.5%), Siamese (6.2%) and others. Cystoliths were found in 59.9% and 64.6% of the canine and feline cases, respectively. The frequency of recurrent urolithiasis was described to be 19.7% for dogs and 33.8% for cats. Mineral composition of canine uroliths was as follows: 132 (44.2%) of magnesium ammonium phosphate hexahydrate (struvite), 66 (22.3%) of calcium oxalate, 38 (12.7%) of urates, 20 (6.7%) of cystine, 4 (1.3%) of both calcium phosphate and xantine, 18 (6.0%) compound and 17 (5.7%) mixed. Mineral composition of feline uroliths was as follows: 29 (44.6%) of magnesium ammonium phosphate hexahydrate (struvite), 29 (44.6%) of calcium oxalate, 4 (6.2%) of urates, 2 (3.1%) compound and 1 (1.5%) mixed.

In our study, the percentage of struvite stones was two times greater than calcium oxalate stones in canine patients. In contrast, struvite and calcium oxalate were equally represented as the most frequent mineral components of feline uroliths. Effective management of urolithiasis depends on identification of mineral composition and initial factors contributing to stone formation. Thus, accurate identification of the urolith type remains the cornerstone of specific-purpose diet and subsequent recurrence prevention of this disorder.

**ABSTRACT #31**

**TREATMENT OF A CHRONIC LOWER URINARY TRACT INFECTION CAUSED BY MULTIDRUG-RESISTANT DOUBLE ESBL-PRODUCING ESCHERICHIA COLI WITH GENTAMICIN IN A CAT.** C. Pombo1, M. Delgado1, M. R. Rebordão5, B. Coelho Baptista3, J. H. Duarte Correia1, CHISA, Faculty of Veterinary Medicine, Universidade Técnica de Lisboa, Lisbon, Portugal; 1Clínica Veterinária das Nogueiras, Cóimbra, Portugal.

Extended-spectrum-β-lactamase (ESBL)-producing Escherichia coli are increasingly common in human but very rarely found in diseased small animals. We report a case of a clinically and microbiologically cured cat that had a chronic urinary tract infection (UTI) caused by a multi-drug-resistant double ESBL-producing E. coli. A 1 year and 4 months old Persian entire male cat with a previous 3 months history of haematuria/dysuria that recurred after antimicrobial therapy with enrofloxacin was presented in acute post-renal failure due to urethral obstruction. After medical management, ultrasound examination revealed chronic cystitis. Forty mg of cefovecin was administered subcutaneously (SC). Urinalysis showed 1 WBC per 400 X magnification field and also abundant rods. E. coli was isolated in pure culture (>105 CFU/ml). This isolate had a positive ESBL-test and was resistant to the following antibiotics tested (disk diffusion and MIC methods): β-lactams (amoxicillin, ampicillin, cefalexin, cefazolin, cefuroxime, cefixime, cefazidime, cefotaxime, ceftriaxone, cefoxime, cefepime, cefepidoxime, carbenicillin, piperacillin, ticarcillin, aztreonam), fluoroquinolones (enrofloxacin, marbofloxacin, ciprofloxacin, norfloxacin, ofloxacin, levofloxacin) and tetracycline. It was susceptible to amoxicillin-clavulanate and piperacillin-tazobactam, aminoglycosides (gentamicin, tobramycin, netilmicine, amikacin), chloramphenicol, trimethoprim-sulfamethoxazole, nitrofurantoin, cefoxitin and cefotetan, and carbapenems (imipenem, ertapenem). Treatment with 8 mg/Kg gentamicin SC, once daily, was carried out for two weeks. Uroculture was negative 5 days after treatment. Follow up was done for 2 months after the antimicrobial therapy without clinical relapses. Further investigation to characterize β-lactam resistance mechanisms by PCR and direct nucleotide sequencing determined that this uropathogenic E. coli strain produced two ESBLs: a TEM-135 and a CTX-M-32. ESBLs are assumed to be resistant in vivo to most β-lactams (regardless in vitro results) and many are also resistant to other antibiotics (Paterson and Bonomo, 2005). Therapeutical options in human medicine include β-lactamase-inhibitor combinations (piperacillin-tazobactam), cephamycins, carbapenems, aminoglycosides, tetracyclines and trimethoprim-sulfamethoxazole. In this case gentamicin was chosen for its expected in vivo efficacy and commodity of dosing regimen. Subcutaneous administration was not an issue because certainty of compliance was crucial. To our knowledge, E. coli isolates carrying the blaTEM-135 and the blaCTX-M-32 genes, either alone or simultaneously, have never been described in small animals with UTI.

**ABSTRACT #32**

**ANTIMICROBIAL RESISTANCE OF UROPATHOGENIC ENTEROCOCCI ISOLATED FROM PETS IN PORTUGAL.** M. Delgado1, A. Pexototo1, J. H. Duarte Correia1, C. Pombo1, CHISA, Faculty of Veterinary Medicine, Universidade Técnica de Lisboa, Lisbon, Portugal.

Enterococci are important pathogens in which multidrug resistance is common and often presents a therapeutic problem. They are intrinsically resistant to several antimicrobial agents and also have the ability to acquire resistance to others. Penicillin, vancomycin, erythromycin, chloramphenicol,
Tetracycline and high-level aminoglycoside resistance has been increasingly reported. For this reason, antimicrobial resistance in enterococci is now a mandatory and important subject of research. The aim of this study was to characterize the antimicrobial susceptibility patterns of pathogenic enterococci isolated from urinary tract infections of pets in Portugal. Forty-two enterococci were isolated from dogs (n=21) and cats (n=21) with urinary tract infection, between January 1998 and March 2007, at the Veterinary Teaching Hospital of the Faculty of Veterinary Medicine & Science and at veterinary practices in the Lisbon area. Isolates were identified at species level using BBL Crystal Gram Positive System®. Minimal inhibitory concentrations were determined by DADE MicroScan® panels and interpreted according to the recommendations of NCCLS. Enterococcus faecalis was the predominant species isolated (85.7%), followed in frequency by Enterococcus faecium (9.5%). None of the isolates was resistant to vancomycin, teicoplanin or linezolid, drugs of choice in the treatment of enterococcal human nosocomial infections. Our isolates remain highly susceptible to penicillin and tetracycline (92.9%). Susceptibility to tetracycline was 71.4% and erythromycin (52.4%). Fluoroquinolones also presented a very high resistance rate: 57.1% for ciprofloxacin and 52.4% for levofloxacin and moxifloxacin. Six (14.3%) high-level gentamicin resistant isolates and thirteen (31.0%) high-level streptomycin resistant isolates were detected. Five (11.9%) presented combined streptomycin and gentamicin resistance. High-level aminoglycoside resistance is a concerning problem that may compromise combined antimicrobial therapy efficacy (β-lactam in association with an aminoglycoside). However, in our experience, these infections may be controlled with ampicillin dosing regimen modifications (intervals shortening and higher dosage). This is of relevant importance in avoiding the extra-label use of human licensed drugs. Furthermore, the localization of genes encoding resistance to antibiotics on mobile elements and the use of the same antimicrobial substances in human and companion animals might favor the transfer of resistance genes from animal to human microbiota. These facts and the close contact between pets and their owners strengthen the need to promote further studies and regular epidemiological surveillance.

**ABSTRACT #33**

**COMPICATIONS DURING AND AFTER HEMODIALYSIS FOR TREATMENT OF RENAL FAILURE IN DOGS.** D. Rödell, L. Nickel, L. Brunnberg, B. Kohn. Small Animal Clinic, Faculty of Veterinary Medicine, Friedrich Schiller University, Jena, Germany. 

The major application of haemodialysis (HD) in veterinary medicine is the management of acute renal failure. However, some cases of chronic renal failure may also benefit from HD. During HD and in the inter-dialytic period, different complications can occur concerning the cardiovascular, respiratory and haematological system as well as the gastrointestinal tract. Furthermore, technical complications and problems of the vascular access are possible. The objective of the study was to evaluate the frequency and severity of intra- and inter-dialytic complications in dogs treated with HD.

In a prospective clinical trial performed between 05/2003 and 02/2007, HD was performed in 33 dogs using a transcutaneous vascular access, bicarbonate-based dialysate and a Fresenius Medical Care 4008 dialysis delivery system (Bad Homburg, Germany). Side effects during HD and problems possibly associated with HD in the dialysis-free period were documented.

A total of 97 HD treatments were performed in 33 dogs suffering from ureaemia. During 56 treatments, 76 complications occurred in 28 dogs (disequilibrium syndrome 30, problems of the vascular access 17, haemolysis 8, hypoglycaemia 7, ventricular extrasystoles 2, technical problems 2, hypothermia 2, conjunctival swelling 1). A decrease of the platelet counts ranging from 1-240 G/l (median 46 G/l) were noted after 69 of 75 HD treatments. In 4 dogs, the post-dialytic platelet count was below 30 G/l. Seven HD treatments had to be discontinued due to complications (atherosclerotic related problems n=4, disequilibrium 3). Two dogs died as a consequence of the disequilibrium syndrome.

Ten inter-dialytic complications in 10 dogs were suspected to be associated with HD (head oedema n=6, hemorrhagic diarhoea n=3, bleeding at catheter implantation site n=1, thrombosis in the right atrium with a syncope n=1, fever n=1). The dog with hemorrhagic diarhoea was euthanased.

The most common intra-dialytic complications were disequilibrium syndrome and catheter problems. Analysis of the side effects led to a critical assessment of the HD management and its subsequent improvement. Moreover, it affected the client information in regard to possible risks of the treatment.

**ABSTRACT #34**

**ATTITUDES TOWARD SMALL ANIMAL KIDNEY TRANSPLANTATION AMONG STUDENTS OF AN ITALIAN AND A BRITISH VETERINARY SCHOOL.** C. Penzo, R. Busetto, D. M. McKeegan. Department of Veterinary Clinical Sciences, University of Padova, Padova (Italy); *Division of Animal Production and Public Health, University of Glasgow, Glasgow (UK).

Small animal kidney transplantation (SAKT) is not offered in any veterinary faculty in Europe and its appropriateness continues to be debated because of ethical and welfare concerns. As the next generation of professionals, veterinary students will be the most involved in offering this therapy to clients if it was to be performed in Europe in the future. In this survey, we wanted to test veterinary students' attitudes towards the kidney transplantation procedure as achieved during their veterinary studies and to compare the attitudes of veterinary students of two European countries. An anonymous self-completed multi-choice questionnaire was distributed by email to all undergraduate veterinary students of the Universities of Glasgow (UK) (GLAst) and Padua (Italy) (PDst). A cover letter and a short fact-sheet on the topic were attached to inform the respondents. Descriptive and χ² statistical analyses were performed (P<0.05). This project has been approved by the Veterinary Ethics and Welfare Committee of the University of Glasgow.

16.6±1.2% of the 350 veterinary students questioned at each University participated in the study. 45.5 and 26.2% of GLAst and PDst respectively (p 0.01) already knew about SAKT. GLAst' source of information was mainly extra-curricular, opposite to PDst (p 0.02). GLAst and PDst' acceptance of SAKT were comparable (p 0.43) with insurance cover being an important factor in decision making. 72.7±8.5% of the students would offer KT as a therapeutic option to the owner of a suitable candidate dog/cat; 52.8% of GLAst were positive about client acceptance of the procedure, while 69.4% of PDst were unsure about it. In order of importance, economical, recipient welfare, donor adoption and donor welfare-connected reasons were quoted as the major reasons of client refusal of KT. The most suitable organ sources were cadavers (53.5±0.97%) and living (7.9±2.4%) donors or both (35.2±3.52%) (p 0.5). Owned animals were the most acceptable living organ source (61.1±4.07%), followed by stray and laboratory animals. Laboratory animals were the most unacceptable living organ source (32.9±4.85%) followed by stray and owned animals. This is the first large survey to evaluate opinions of veterinary students on SAKT in Europe that showed a high rate of approval such as of awareness of the ethical issues and risks that such a new surgical procedure may pose to the professional category, clients and pets. Attitudes toward KT were generally similar among the veterinary students of the analysed countries (UK and Italy).

**ABSTRACT #35**

**THE ROLE OF INSULIN IN THE BLOOD GLUCOSE PERTURBATIONS SEEN IN CANINE BABESIOSIS.** P. Rea, J. P. Schoeman. Department of Companion Animal Clinical Studies, University of Pretoria, Onderstepoort, South Africa.

Hypoglycaemia has been identified as a life threatening metabolic complication in almost 20% of severely ill dogs suffering from babesiosis due to *Babesia canis rossi* infection, and has been correlated with mortality. Insulin is the primary hormone involved in glucose homeostasis, and lowers blood glucose concentration by facilitating intracellular movement of glucose. Hyperinsulinaemia as a result of inappropriate insulin secretion may precipitate hypoglycaemia, and has been suggested as a possible cause of hypoglycaemia in human and murine malaria. A similar phenomenon may exist in canine babesiosis. This prospective, cross-sectional, observational study, including 94 dogs with naturally occurring virulent babesiosis, sought to identify the presence of inappropriate insulin secretion in hypoglycaemic canine babesiosis.

Pre-treatment jugular blood samples were collected for simultaneous determination of plasma glucose and insulin concentrations. Plasma glucose concentration was determined using a commercially available radiommunoassay kit previously validated for use in dogs. The reference range for blood glucose (BG) in dogs was 3.3–5.5 mmol/L. Animals were retrospectively divided into three groups: hypoglycaemic (BG< 3.3 mmol/L; n=16), normoglycaemic (BG 3.3–5.5 mmol/L; n=62), and hyperglycaemic (BG > 5.5 mmol/L; n=16). Data were expressed as median and interquartile range. The median insulin concentrations for the hypoglycaemic, normoglycaemic, and hyperglycaemic groups were 0.0 pmol/L (0.0–18.8 pmol/L), 2.2 pmol/L (0.0–29.53 pmol/L), and 21.7 pmol/L (0.0–45.74 pmol/L) respectively. Statistical analysis, using the non-parametric Kruskal Wallis one way analysis of variance on mean ranked insulin data, revealed no significant difference in insulin concentration between the three groups (Chi-square = 2.418, p = 0.299). Additionally, the median insulin concentration in the hypoglycaemic and normoglycaemic groups was below the detection limit of the assay (<11 pmol/L), suggesting that insulin secretion was appropriately

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low (i.e. undetectable) in these cases. Time since last meal (TLM) was available for 87 dogs. The median TLM was 24 hours, constituting a significant period of illness-induced starvation. Consequently, insulin secretion by pancreatic β-cells would be completely inhibited, thus accounting for the low insulin concentrations observed in this study.

We conclude that hyperinsulinaemia is an unlikely cause of hyperglycaemia in virulent canine babesiosis. Other causes of hyperglycaemia, such as increased glucose consumption, depletion of hepatic glycogen stores, and hepatic dysfunction with impaired gluconeogenesis, are likely to play more important roles in the pathophysiology of hyperglycaemia in canine babesiosis.

ABSTRACT #36
DIABETES MELLITUS IN DOGS: BREED DIFFERENCES IN GENDER, AGE AND SURVIVAL. T. Fall, H. Hansson Hamlin, A. Hedhammar, O. Kämpe, A. Egevall. Department of Clinical Sciences, Swedish University of Agricultural Sciences, Department of Medical Sciences, Uppsala University, Sweden.

Although canine diabetes mellitus (DM) is a common endocrine disorder, the aetiology and pathogenesis of disease is poorly understood and there is a need for comprehensive epidemiological studies. The Swedish dog population is unique in the sense that only about 7% of all dogs are neutered and that longitudinal health information is available for about 30% of the total dog population in a validated insurance database. We studied 182,087 dogs aged 5–12 years accounting for 652,898 dog-years at risk (DYAR). Data from the years 1995–2004 were used retrospectively. Incidence, female proportion and mean age at diagnosis were estimated for each breed with more than 4000 DYAR or more than 10 cases of DM. Median survival time was estimated through Kaplan-Meier curves for breeds with more than 40 cases. The mean age at diagnosis of the 860 DM dogs (72% females) was 8.6 years. The overall incidence of DM was 16.2 cases per 10,000 DYAR. Australian Terriers, Samoyeds, Swedish Elkhounds and Swedish Lapphunds were found to have the highest incidence (45–183 cases/10,000 DYAR) and Golden Retrievers, Boxers and Papillons were found to have the lowest incidence (0–1 cases/10,000 DYAR).

The proportion of female dogs with DM varied significantly between breeds. Swedish Elkhounds, Bassets, Norwegian Elkhounds and Border Collies that developed DM were almost exclusively females (93–100%) while Rottweilers had the lowest proportion of females (33%). These differences could be due to increased susceptibility to progesterone-induced DM in some breeds. The mean age of first diagnosis varied from 7.8 years (Cavailer King Charles Spaniel, Rottweiler, Swedish Elkhound) to 9.3 years (Cairn terrier). When analysing the five breeds that had over 40 cases, there was a significant difference in survival, with the two hunting breeds, Swedish Elkhound and Swedish Lapphund, having the shortest survival time.

The significant breed-specific gender and age differences shown in this study strongly suggest that genetic factors make breeds more or less susceptible to different types of DM. Further studies are needed in order to characterise these subtypes.

ABSTRACT #37
DETERMINATION OF PANCREATIC LIPASE IMMUNO-MUCCITY IN CATS WITH DIABETES MELLITUS. Y. Forcada, A.J. German, P-J. Noble, J. Steiner, P. Graham, L. Blackwood. Clinical Science Department, University of Liverpool, Leahurst, UK; GI Laboratory, Texas State University, USA; Nationwide Laboratories, Poulton le Fylde, UK.

Diabetes Mellitus (DM) is one of the most common endocrinopathies in cats, and a form comparable with human Type II DM (characterised by insulin-resistance with or without dysfunction of the pancreatic β-cells) is most common. Pancreatitis has been postulated to play a role in the aetopathogenesis of both stable and unstable feline DM. However, the extent of its involvement has not been determined in scientific studies, in part due to problems in identifying cases of feline pancreatitis. However, non-invasive diagnosis has been made more achievable with the advent of measurement of IPL. The aim of this study was to use serum IPL to assess the prevalence of clinical and/or sub-clinical pancreatitis in cats with DM.

Stored serum samples from diabetic and non-diabetic cats were utilised in this prospective study. An attempt was made to age-, breed- and gender-match the two groups as closely as possible. Proven hypouricuinaemic and hyperthyroid patients were excluded from the study. IPL and fructosamine were measured in all samples. Non-parametric statistical tests (e.g. Mann-Whitney U test and Spearman’s correlation) were used to analyses the results, and the level of significance set at P<0.05.

A total 52 cats were included: 42 DSH, 4 DH, 2 Persian-X, 1 Birman and 3 of unknown breed. 29 cats were diabetic, whilst there were and were 23 non-diabetic control cats. There were no breed or gender differences, although control cats were significantly older (median age control 162 months, range 96–252; diabetics 144 months, range 48–216, P<0.008). However, age, gender and breed had no significant effect on IPL results. Unsurprisingly, fructosamine concentrations were higher in the diabetic population (median diabetics 514 µmol/l, range 241–782; median controls 238 µmol/l, range 188–293; P<0.001). IPL concentrations were also higher in diabetic patients (median 22.5 µg/l, range 8.1–283.5) than in the control population (median 13.8 µg/l, range 4.6–33.4) (P<0.001). A weak association was found between fructosamine and (P<0.001). However, no differences were found in IPL levels in cats considered to have good diabetic control (according to fructosamine levels <450 µmol/l) and those poorly controlled (fructosamine > 450 µmol/l).

Our study is the first to demonstrate elevated IPL concentrations in cats with diabetes mellitus, suggesting that clinical and/or sub-clinical pancreatitis may be a causal factor in many cases. Further work is recommended to examine this link more closely.

ABSTRACT #38
PLASMA ACETOACETATE MEASUREMENTS USING URINARY DIP STICK METHODOLOGY AS A SCREEN FOR KETONAOEMIA IN FELINE DIABETIC KETOACIDOSIS. E. Zeugswetter, M. Pagitz. Clinic of Internal Medicine and Infectious Diseases, Clinical Department for Small Animals and Horses, University of Veterinary Medicine Vienna, Austria.

The laboratory diagnosis of diabetic ketoacidosis (DKA) relies on the combination of hyperglycaemia, ketonuria and metabolic acidosis. The presence of ketonuria implies ketoacidemia. In emergency cases it is not always possible to obtain a urine sample making a rapid diagnosis difficult. Other diseases like kidney failure, liver failure, lactic acidosis or intoxications have very similar metabolic effects. In one earlier study negative urine samples were found in cases of elevated serum ketones, questioning the accuracy of urine dip stick methodology in cats. Our study was conducted to compare the results of plasma ketone dip test (PKDT, Ketostix®, Bayer) with the results of traditionally used urine ketone dip test (UKDT, Ketostix®, Bayer), β-hydroxybutyrate (β-OHB) measurements (D-3 hydroxybutyrate esterase assay [Ranbut®, Ranbox] on a Hitachi® 911 [Roche Diagnostics]) and venous blood gas analysis (Synthesis 25, Instrumentation Laboratory). Additionally, a hand-held electrochemical ketone sensor (Precision Xtra®, Medisense/Abbott) that measures blood β-OHB concentrations within 30 seconds was tested. DKA was defined as a metabolic acidosis (pH < 7.3) with an increased anion gap (>16 mmol/l) and ketonaemia (defined as β-OHB > 1 mmol/l) in cats with diabetes mellitus. 48 diabetic cats were included in the study. According to laboratory results they were classified into one of three groups: 1) DKA (n=9), 2) diabetic ketosis (evidence of compensated metabolic acidosis, n=14) and 3) diabetic patients without ketonaemia (n=25). Paired samples of urine and blood were collected within 10 minutes and all measurements were performed within 1 hour. Using a low cut off value (≥ 0.5 mmol/l) the UKDT failed to identify ketonaemia in 2 patients of group 1 and 9 patients of group 2. The sensitivity and specificity to identify ketonaemia in group 1 was 70% and 85% respectively. Changing the cut off value to ≥ 1.5 mmol/l improved specificity to 87 %, without changing sensitivity. The sensitivity and specificity using PKDT was 100% and 69% for ≥ 1.5 mmol/l and 89% and 82 % for ≥ 4 mmol/l. The hand held ketone sensor and PKDT had a similar diagnostic performance for the detection of ketonaemia in group 1. In contrast to UKDT negative results eliminated the need for further screening tests.

Measuring plasma acetoacetate using dipstick methodology or whole blood β-OHB using a hand held sensor offer simple and highly sensitive methods to identify ketonaemia in cats with DKA and have the potential to serve as reliable diagnostic tools.

ABSTRACT #39
EVALUATION OF BLOOD 3-β-HYDROXYBUTYRATE AND URE- NARY ACETOACETATE FOR THE DIAGNOSIS OF CANINE DIABETIC KETOACIDOSIS. M. Di Tommaso, S. Viti, F.Rocconi, G. Aste, C. Guglielmini, A. Boari. Department of Veterinary Clinical Sciences, University of Teramo, Teramo, Italy.

In humans, ketonaemia (BK), determined through evaluation of blood 3-β-hydroxybutyrate (3HB) concentration, is the method of choice for the diagnosis of diabetic ketoacidosis (DKA). In small animals, ketonuria (UK),
ABSTRACT #40
REMISSION OF DIABETES MELLITUS IN CATS WITH DIABETIC KETOACIDOSIS, N.S. Sieber-Ruckstuhl1, E. Zini1, F. Boret1, F. Tschuor1, S. Kley2, C.E. Reusch2. 1Clinic for Small Animal Internal Medicine, Vetsuisse Faculty University of Zurich, Zurich, Switzerland; 2College of Veterinary Medicine, University of Georgia, USA.

Diabetes mellitus (DM) is one of the most common endocrinopathies in cats. It is currently assumed that most cats suffer from a type of DM similar to type 2 DM in humans. Remission of disease is seen in about 25-50% of cats after initiating treatment. Diabetic ketoacidosis (DKA) is a complex and potentially fatal metabolic complication of DM. In humans, DKA has been thought to be a typical feature of type 1 DM. Recently, it has been shown that DKA may also affect individuals with type 2 DM, in particular those with severe concurrent diseases. Control of DM without insulin is possible once the episode of DKA has resolved. Until now it is not known if this holds true for cats as well.

The objective of this study was to evaluate cats with DKA with special emphasis on the question if disease remission occurs. Clinicopathologic abnormalities, prevalence of concurrent diseases and pre-treatments were compared between cats with and without remission. Medical records of cats with DKA examined between February 2003 and February 2007 were reviewed. DKA was defined as hyperglycaemia, glucosuria, ketonuria and metabolic acidosis (either pH < 7.3 or TCO2 < 15 mmol/l). Cats were included if DKA was newly diagnosed and no medications for DM had been administered. They were considered to have remission of disease if they stayed clinically normal for at least one month after insulin withdrawal.

Sixteen cats fulfilled the inclusion criteria. While seven of them went into remission either spontaneously (3) or for 5 weeks after a subcutaneous injection of insulin for the whole follow-up period. Four died or were euthanised during the initial stabilisation. Clinicopathologic abnormalities did not differ between cats with disease remission and cats with permanent disease. Concurrent diseases were identified in 13 of 16 cats and included hepatic (8), respiratory (5), myocardial (9), pancreatitis (7), urinary tract infection (2), inflammatory bowel disease (1), autoimmune disease (1), and hepatitis-related death, resulting in an estimated median survival period of 6 months (95% CI, 0.1–16.9) after initial diagnosis.

Based on these findings we have set up a study aimed at detailed understanding of the effects of prednisone treatment in dogs with iCH. We studied a group (n=8) with a histopathologically confirmed diagnosis of idiopathic hepatitis, and with a history of chronic clinical signs. Two liver biopsies were taken per patient; one at initial diagnosis, the other after six weeks of prednisone treatment (1 mg/kg/day). At each occasion tissue was obtained for both histopathology and immediate storage in liquid nitrogen. Of all dogs pre- and post-treatment measurements included semi-quantitative histological scoring and quantitative measurement of gene expression of relevant pathways. Quantitative real-time PCR (qPCR) was performed for parameters revealing pathways of inflammation (IL-1, IL-6, IL-10, TNF-α, IFN-γ, SOCS-3), fibrosis (TGFβ1, TGFβ3, TGFβα2, uPA, HIF-1α), oxidative stress (GPX1, SOD1), growth and regeneration (HGF, c-MET), copper metabolism (ATP7b, MT1A), cell cycle and apoptosis (p53, PTEN, XIAP), and liver function (albumin, desmin, VWF).

Statistical analysis showed no significant changes in mRNA expression upon comparison of the paired biopsies (pre- and post-treatment defined). This was in accordance to our paired histological findings. Our results do not confirm the generally accepted assumption that prednisone has anti-inflammatory and fibrosis suppressing effects in the treatment of iCH. We are in the process of verifying the qPCR results by immunohistochemistry, using antibodies against the effectors of the above mentioned parameters and pathways.

ABSTRACT #41

Canine chronic hepatitis (CH) is a frequently occurring disease, and is diagnosed by histopathological evaluation of thick needle liver biopsies (WSAVA standards). The severity of this disease is mainly characterised by the type and extent of both inflammation and fibrosis, and by portal hypertension induced clinical signs in end-stage cirrhosis. Although CH is theoretically caused by a multitude of aetiologies, only primary chronic liver enzyme accumulation can be distinguished from other aetiologies in the diagnosis, and can be treated effectively with penicillamine, zinc glucenate and/or low copper diet. All forms of non-copper associated CH are considered idiopathic (iCH) and are generally treated with immunosuppressive medication, of which only prednisone has a documented survival elongating effect (Strombeck et al., 1988). Our unpublished retrospective data suggest that clinical recovery of iCH patients with prednisone treatment is less good than expected. There was a high percentage of residual disease, recurrence and liver function abnormalities at the time of death, resulting in an estimated median survival period of 6 months (95% CI, 0.0–16.9) after initial diagnosis.

Based on these findings we have set up a study aimed at detailed understanding of the effects of prednisone treatment in dogs with iCH. We studied a group (n=8) with a histopathologically confirmed diagnosis of idiopathic hepatitis, and with a history of chronic clinical signs. Two liver biopsies were taken per patient; one at initial diagnosis, the other after six weeks of prednisone treatment (1 mg/kg/day). At each occasion tissue was obtained for both histopathology and immediate storage in liquid nitrogen. Of all dogs pre- and post-treatment measurements included semi-quantitative histological scoring and quantitative measurement of gene expression of relevant pathways. Quantitative real-time PCR (qPCR) was performed for parameters revealing pathways of inflammation (IL-1, IL-6, IL-10, TNF-α, IFN-γ, SOCS-3), fibrosis (TGFβ1, TGFβ3, TGFβα2, uPA, HIF-1α), oxidative stress (GPX1, SOD1), growth and regeneration (HGF, c-MET), copper metabolism (ATP7b, MT1A), cell cycle and apoptosis (p53, PTEN, XIAP), and liver function (albumin, desmin, VWF).

Statistical analysis showed no significant changes in mRNA expression upon comparison of the paired biopsies (pre- and post-treatment defined). This was in accordance to our paired histological findings. Our results do not confirm the generally accepted assumption that prednisone has anti-inflammatory and fibrosis suppressing effects in the treatment of iCH. We are in the process of verifying the qPCR results by immunohistochemistry, using antibodies against the effectors of the above mentioned parameters and pathways.

ABSTRACT #42
CHRONIC HEPATITIS IN THE ENGLISH SPRINGER SPANIEL, N.H. Bexfield1, T.J. Scase1, S.M. Warman1, E. Skancke2, W. Farstad3, T.P. Watson4. 1Department of Veterinary Medicine, University of Cambridge, Cambridge, UK; 2School of Clinical Veterinary Science, University of Bristol, Bristol, UK; 3Department of Clinical Sciences, Norwegian School of Veterinary Science, Oslo, Norway.

Canine chronic hepatitis (CH) is seen with an increased incidence in certain breeds, including the Bedlington, West Highland White and Skye Terrier, Cocker Spaniel, Doberman, Dalmatian and Labrador Retriever. In some breeds CH is thought to be associated with abnormalities in copper metabolism. In the majority of cases of CH however, the aetiology is poorly understood. The authors have recently noted a previously undocumented increased incidence of CH in the Springer Spaniel (ESS). The purpose of this study was to describe the history, clinical signs, clinicopathologic abnormalities and outcome in such cases.

ESS presented to referral and general practices in the UK and Norway for investigation of elevated liver enzymes, clinical signs of liver disease and histopathological confirmation of CH were identified. Clinical, laboratory and pathological data were obtained from case records or by contact with the referring veterinarians. Formalin fixed or paraffin embedded liver tissue was obtained for review by one of the authors using a panel of seven liver-specific stains including rubrican acid.

Thirty four cases were identified. Mean age was 3 years 4 months (range 7 months–9 years) and 24 female and 10 male dogs were represented. 28/34 dogs had been vaccinated within the preceding 12 months. Clinical signs at presentation included vomiting, depression, lethargy and anorexia. Pyrexia was documented in 12 cases and 26 dogs were jaundiced. Biochemical changes in all cases included moderate to marked elevations in ALP and ALT and mild to moderate elevations in total bilirubin. Other variable findings included, hypocholesterolaemia, hypercholesterolaemia, hypoalbuminaemia.
minima, decreased urea, elevated bile acids and prolonged coagulation times. Neutrophilia was documented in 12 of 21 dogs. Results of abdominal imaging were specific. Histological examination of liver tissue demonstrated changes consistent with CH including hepatocellular apoptosis or necrosis, a variable mononuclear or mixed inflammatory infiltrate, regeneration and fibrosis. There was no evidence of increased copper accumulation in any dog. Treatment included one or more of dietary modification, antioxidants, antibiotics, ursoeoxycystolic acid and corticosteroids. Follow up data was available in 26 dogs and 16 of these died or were euthanased within a mean of 4 months following initial diagnosis. The median survival time of the remaining dogs was 7 months.

This study suggests that the ESS might be predisposed to a type of CH without copper accumulation which carries a poor prognosis. Further investigations into the aetiology and possible genetic basis of this condition are indicated.

ABSTRACT #43
A COMPARISON OF SURGICAL AND MEDICAL MANAGEMENT OF CONGENITAL PORTO-SYSTEMIC SHUNTS IN THE DOG. S.N. Greenhalgh1, K. Kelman2, E.J. O’Neill3, M. Goodfellow4, P.J. Watson5, N.D. Jeffery6, M.D. Dunning1. Department of Veterinary Medicine, University of Cambridge, UK; 2. Davies Veterinary Specialists, Hertfordshire, UK; 3. School of Agriculture, Food Science and Veterinary Medicine, University College Dublin, Ireland; 4. University of Bristol Veterinary School, UK.

Dogs born with congenital portosystemic shunts (PSS) are believed to have a better long-term prognosis following surgical intervention compared with medical management alone. However, there is no unbiased, prospective, controlled, randomised peer-reviewed study to support this notion. The aim of this prospective study was to compare the long-term outcome, after surgical or medical management, for dogs with congenital PSS. At enrolment, diagnosis of a single or, at most, double congenital PSS was confirmed using a combination of ultrasonography, per-cutaneous cava-venography, portal-venography (if available). PSS were then categorised as either intrahepatic (n=21) or extrahepatic (n=43). Dogs (n=64) were allocated to either surgical (n=41) or medical (n=23) management groups. In the surgical group, complete ligation of the shunting vessel was performed if possible; otherwise an aemorrhoid constrictor, cellophane band or silk ligature was placed to achieve gradual attenuation. Medical management consisted of oral antibiotics and lactulose with dietary modification, the regime individually tailored to each animal according to severity of clinical signs. Follow-up was obtained via telephone conversations with owners and referring veterinarians. Referring veterinarians were questioned as to whether the dog’s eventual death or euthanasia was related to the PSS. Dogs still alive, or dead from causes unrelated to the PSS, were censored in the final analysis. Post-hoc analysis revealed no significant bias in allocation to surgery or medical management groups: mean age at diagnosis and the proportion of intrahepatic and extrahepatic PSS were not significantly different between groups. The maximum follow-up period at the time of writing is 1420 days. There was no significant difference in survival times between surgically and medically managed cases over the follow-up period (p=0.45). There was no significant difference in survival times when comparing shunt type irrespective of management group (p=0.81).

These findings currently suggest that life expectancy for dogs with congenital portosystemic shunts is no better following surgery than after medical management alone.

ABSTRACT #44
COMPARISON OF POSTPRANDIAL TOTAL SERUM BILE ACID (TSBA) STIMULATION WITH CERULETID TSBA STIMULATION (TAKUS®) IN DOGS: PRELIMINARY RESULTS. N. Bridger, R. Glasmann, R. Niegert1. Small Animal Clinic, Justus-Liebig University Giessen, Germany.

TSBA after a 12 hour fast and 2 hours post feeding are commonly used for the assessment of hepatic function. However, several factors such as the rate of gastric emptying, the intestinal transit time, anorexia and vomiting can affect the postprandial (PP) values of TSBA. In order to minimise the influence of these variables and improve standardisation, stimulation using the synthetic cholecystokinin analogue ceruletide (Takus®) has recently been introduced. The aim of this study was to compare the TSBA stimulation test using Takus to PP TSBA stimulation in dogs.

Four groups of animals were investigated. Group 1 (n=8) were healthy dogs, group 2 (n=18) included animals with disorders other than hepatic disease, group 3 (n=16) was composed of dogs with PSS and group 4 (n=7) were dogs with hypoxic disease, which has previously been shown to be associated with mild hepatic dysfunction. Animals with hyperbilirubinaemia were excluded. All dogs underwent TSBA stimulation with Takus (Royal Canin hepatoprotective support, <5 kg body mass (BM) two teaspoons, >5 kg BM two tablespoons) and 0.3 μg/kg BM Takus intramuscularly on two consecutive days. Dogs were randomised by performing the tests in an alternating manner. Blood samples were drawn at baseline, two hours after feeding and 20’, 30’ and 40’ post injection, respectively. All results underwent statistical analysis; p<0.05 was considered statistically significant.

In conclusion, TSBA stimulation with Takus is an easily performed test that can be used for the detection of hepatic dysfunction. It circumvents many variables that influence PP TSBA stimulation and the preliminary data suggest the Takus test to be more sensitive than the PP test for the detection of mild hepatic dysfunction in dogs. However, false positive results cannot be ruled out at the present time and further studies are warranted to investigate test performance.

ABSTRACT #45
OBSERVATION OFERYTHROCYTE AND PLATELET MODIFICATION IN DOGS WITH CHRONIC ENTEROPATHY. V. Marchetti, G. Lubas, M. Corazza, G. Guidi, G. Cardini. Department of Veterinary Clinics, University of Pisa, Italy.

Haematological and iron metabolism modifications in IBD (Inflammatory Bowel Disease) patients are commonly observed in humans but are poorly documented in companion animals. The aims of this study were to evaluate (1) the presence of haematological modifications in 64 dogs with chronic enteropathy (CE) and (2) the possible modifications of iron serum profile (total iron, ferritin, iron binding capacity UIBC, transferring saturation) investigated in only 1264 subjects.

In the case log considered, a diagnosis of Food Responsive Diarrhoea or Antibiotic Responsive Diarrhoea or IBD based on responsiveness to elimination diet, antibiotic therapy and histopathological findings was retrospectively performed. Dogs with concurrent extraintestinal diseases were excluded. In dogs where the iron profile was available, faecal occult blood test and reticulocyte count were performed. A normocytic or microcytic anaemia was identified in 14% of dogs, while microcytosis without anaemia was present in 10.9% of dogs. Common findings were anisocytosis (46.8%), polychromasia (25%) and Howell-Jolly bodies (7.8%) suggesting an activation and/or erythroid toxic injury. Thrombocytopenia was present in 3.1% of dogs, while thrombocytosis (21.8%) and macrothrombocytosis (75%) were more common. The leucomegakaryocytes in CE might be related to modification of iron metabolism induced by chronic disease.

In this retrospective study, thrombocytosis and macrothrombocytosis appear the more common haematological finding. A raised platelet count is a common finding in humans affected by IBD and contributes both to thromboembolic events and local microcirculatory alterations. In inflammatory diseases various cytokines stimulate the megakaryocytes and induce both thrombopoietin and epinephrine hepatic production. In our study, the platelet modifications do not appear related to iron modifications, while the role of inflammatory cytokines or hypercortisolaemia due to the chronic disease may be more suggestive. Further investigation is required in order to establish a specific relationship between erythrocyte and platelet modifications and iron metabolism in CE.
ABSTRACT #46
REGIONAL GRANULOMATOUS ENTERITIS IN 6 DOGS. P. Le
coindre, V. Gouzi, M. Chevalier. Veterinary Clinic of Cerisiez, St Priest, ‘Clinic of Small Animal Internal Medicine, National Veterinary School of Alfort, Maisons-Alfort, ‘M. Mérieux Laboratory, Lyon, France.
Regional granulomatous enteritis is a rare form of canine inflammatory bowel disease characterised by transmural granulomatous inflammation that involves more frequently the distal ileum and ileo-colic junction and results in a stenosing, mass-like thickening of these regions of the intestine. Few cases are reported, whereas the aetiology of this condition remains unknown and the prognosis is guarded.
This short communication describes 8 cases of regional granulomatous enteritis in dogs and reports the results of long-term treatment.
Eight, small breed, adult dogs were referred to the Veterinary Clinic of Cerisiez for exploration of progressive, mostly small bowel diarrhoea with weight loss. The clinical evaluation index was >9 for all the dogs (CIBDAI Score). Cytology on to all dogs revealed a rigid, tubular mass in the cranial abdomen. Complete blood count revealed neutrophilia in 6 dogs. Hypoproteinaemia was observed in 5 cases. Faecal smears examinations and flotation were negative in all cases and stool cultures performed in 5 cases were normal. Abdominal ultrasonography confirmed an abnormal, segmental, partial thickening of the distal ileum, with loss of layering, and hyper-echogenicity of the peripheral fat, dilatation of the intestinal lamina proximally to this zone in 3 dogs, and an intestinal intussusception in 1 case. Mesenteric lymphadenopathy was observed in all dogs. Colonoscopy showed more or less severe inflammatory lesions localized to the ascendant colon. The ileo-colic junction was not passed through in 6 dogs because of severe inflammation. In 2 dogs partial thickness biopsies of the ileum were taken and histological examination revealed histiocytic infiltration. Coeliotomy was performed in the rest of the dogs and showed important thickening of the distal ileum associated with the presence of granulomas in 3 cases, extended inflammation to the cecum and the ileo-caecal junction in all cases, and mesenteric lymphadenopathy. All dogs presented a more or less pronounced stenosis, and enterectomy was realized. Histological examination of the intestine and the lymph nodes confirmed in all cases a transmural granulomatous inflammation. A medical treatment associating antibiotics (enroloxacin and metronidazole), glucocorticoids and, in 3 cases, immunosuppressive drugs (ciclosporin, azathioprine) was initiated in all dogs. Long-term follow-up permitted to report the following results: among the 2 non-operated dogs one was stabilised after 2 years but is still under treatment, the other one was euthanased after an intestinal occlusion due to the disease diagnosed 1 month after initial diagnosis. Among the 6 operated dogs, 1 dog recovered completely 3 years after surgery. 3 are clinically stabilised but present episodic diarrhoea necessitating medical treatment, 2 dogs were not improving for long time after surgery and were euthanased after 6 months because of persistent diarrhoea.

ABSTRACT #47
MYCOBACTERIUM AVIUM SUPERSPECIES PARATUBERCULOSIS (MAP) SPECIFIC DNA IN CANINE INTESTINAL BIOPSIES. B. Glanemann1, N. Bridger1, H. Schonenbrucher2, M. Buete3, R. Neiger4. ‘Clinic for Small Animals and ‘Institute for Veterinary Food Science, Justus-Liebig University Giessen, Germany.
Bacteria of the genus Mycobacterium are increasingly reported as pathogens that induce chronic infections in humans and dogs; however, their importance in veterinary medicine is likely to be underestimated. MAP is the causative agent of paratuberculosis, also known as Johne’s disease, a severe chronic incurable granulomatous bowel disease affecting domestic and wild animals. To date, MAP infections have not been reliably detected in dogs. A re-emerging debate about the link between MAP and Crohn’s disease in humans is responsible for the increasing awareness of public health concerns about the occurrence of MAP infections in domestic animals. This study was designed to examine intestinal biopsies from dogs with a history of chronic gastrointestinal symptoms for the presence of MAP specific DNA by nested PCR (IS9000), a semi-nested PCR (F575) and real time PCR (ISMAR2, F575) and to determine whether the finding of MAP-DNA is associated with a specific histological result. The insertion sequence IS9000 is a widely used MAP reference marker and the sequences F575 and ISMAR2 have also been shown to be unique for MAP. Using two nested PCR systems and a real time PCR instead of conventional PCR guaranteed a very sensitive approach.
Clinical signs of the 42 dogs included in this study were: vomiting (n=24), small bowel diarrhoea (n=16), large bowel diarrhoea (n=11), haematochezia (n=6), melena (n=1) and haematemesis (n=1). Intestinal biopsies obtained by endoscopy were submitted for histopathological examination and molecular investigation.
Dogs had a mean age of 5.9 (SD=3.2) years, and 17 were male. Histopathological examination of the biopsy samples was indicative for IBD in 17 dogs and neoplasia in 6 dogs. Six dogs showed non-specific histopathological changes but did respond to dietary changes and were classified as food responsive enteropathy. In 13 cases histology revealed only mild, M. Mérieux changes secondary to a possible extra-gastrintestinal disorder (e.g. congestion) and a final diagnosis could not be established. MAP specific DNA was detected and confirmed by sequencing of the PCR amplicons in 8 (19%) dogs. The 8 dogs with positive MAP results were diagnosed with food-responsive enteropathy (n=3), IBD (n=2) and no specific diagnosis (n=3).
Even though MAP DNA was not linked with a specific histological diagnosis, these results warrant further studies about the possible detection of viable MAP cells in canine intestinal biopsies by cultural investigation, especially in light of a possible zoonotic potential.

ABSTRACT #48
MANDIBULAR SALIVARY GLAND SIALOADENOSIS IN DOGS INFECTED WITH SPIROCERCA LUPI: A RETROSPECTIVE STUDY. L.L. van der Merwe. Department of Companion Animal Clinical Studies, Faculty of Veterinary Science, University of Pretoria, South Africa.
Sialoadenosis (saladenitis, salivary gland necrosis, hypersialosis) is a secondary complication in dogs with oesophageal and gastric disease and also a primary condition in dogs diagnosed with limbic epilepsy. The condition is treated with phenobarbital. The objective of the study was to evaluate the incidence, presentation and therapeutic response of this syndrome in dogs with spongiosis. Of 281 dogs diagnosed with spongiosis based on thoracic radiographs and oesophageal endoscopic criteria, from 2001-2005, 27 dogs were concurrently treated with phenobarbital for hypersialosis. Phenobarbital was used inappropriately in 3 of these cases which had neoplastic transformed nodules. Thus true sialoadenosis occurred in only 24 cases, an incidence of 8.5%. Only 19 cases had complete records for analysis. Breeds affected included Fox or Jack Russell Terriers (7/19) and Staffordshire Terriers (4/19), terrier breeds thus accounting for 11/19 cases. Clinical history was prolonged and included retching, coughing, hypersialosis, gulping and apparent choking which worsened with stress, excitement or external throat palpation. Signs resolved in 11 cases, worsened with stress, excitement or external throat palpation. In 1 case clinical signs decreased after 48 hours of initiating phenobarbital treatment (2mg/kg/bid) in 11 cases, 3 cases took longer to respond, one of which was ultimately euthanased.
This study shows that sialoadenosis as a complication of spongiosis is not infrequent and can be easily managed in most cases if accurately diagnosed. The dysphagia and vomiting due to sialoadenosis has different characteristics compared to the regurgitation caused by an oesophageal mass. A distinct susceptibility of the terrier breeds is also apparent.

ABSTRACT #49
FUNGAL ORGANISMS IN THE SMALL INTESTINE OF HEALTHY DOGS AND DOGS WITH INFLAMMATORY BOWEL DISEASE (IBD) FROM THE SOUTH-EASTERN UK. K. Allenspach, J.S. Suchodolski1, J. Syme2, J. Eastwood3, G. Garden3, T.M. Nimmo. ‘Department of Veterinary Clinical Sciences, Royal Veterinary College, London, United Kingdom; ‘Gastrointestinal Laboratory, Texas A&M University, College Station, TX, USA.
The intestinal microflora is suspected to play an important part in the development of several gastrointestinal diseases and, in humans, high levels of antibodies to fungal organisms, such as Saccharomyces cerevisiae have been associated with IBD. The aim of this study was to evaluate the prevalence of fungal DNA in small intestinal brushings from healthy dogs and dogs with chronic diarrhoea from the south-eastern UK.

Duodenal brush samples were collected and analysed from a total of 43 dogs. Group 1 consisted of 10 healthy control dogs and group 2 consisted of 33 dogs with IBD, both from the south-eastern UK. Duodenal mucosal samples were collected endoscopically using a cytology brush in the IBD dogs. In the healthy control dogs, cytology brush samples were taken immediately after euthanasia. Fungal genomic DNA was extracted and amplified by a nested PCR protocol using universal fungal primers that target the internal transcriber spacer (ITS) region. For the identification of fungal organisms, a clone library was created. Resolved PCR amplicons were identified by automated cycle sequencing, and subjected to phylogenetic analysis.

Fungal DNA was detected in duodenal samples from 9 of 10 (90%) healthy control dogs and from 26 of 33 (78.8%) dogs with IBD. This difference in the prevalence of fungal DNA between the two groups was not significant (Fisher’s exact test: p = 0.05). Recovery of the clone library revealed the presence of 13 different fungal organisms in the duodenum of dogs with IBD and 6 different species in the duodenum of healthy dogs. Interestingly, members of the genus Cryptococcus were more commonly identified in healthy than in diseased dogs (Fisher’s exact test: p = 0.04). There was a trend for opportunistic pathogens, such as various Candida spp. being more frequently detected in dogs with IBD (Fisher’s exact test, p = 0.05).

These results indicate a high prevalence of fungal DNA in the duodenum of both healthy control dogs and dogs with IBD from the south-eastern UK. In this study, there were qualitative differences in the organisms detected, with opportunistic pathogens possibly being more frequent in dogs with IBD.

ABSTRACT #50
VALIDATION OF THE C-SODIUM ACETATE BREATH TEST (C-SABT) TO ASSESS GASTRIC EMPTYING IN DOGS IN COMPARISON TO 99mTc SCINTIGRAPHY.

The gold standard for assessing gastric emptying is C-Technium (99mTc) scintigraphy. Non-invasive C-Breath tests have been used extensively as an alternative in human medicine but so far have not been compared to scintigraphy in the dog. The aim of this study was to evaluate the C-SABT and compare it to gastric scintigraphy for a solid test meal in the dog. 12 privately-owned healthy dogs were included. Age and weight ranged from 1.5 to 12 years and 9.2 to 38.1 kg, respectively. Normal liver function was ascertained in all dogs via bile acid stimulation test. Test meal consisted of canned dog food (Intestinal, Royal Canin®); the caloric intake was calculated for each dog based on body mass (BM) (kcal per day = 70 × kg BM1.1 × 1.6). Half of the calculated calories were fed. The meal, which was labelled with either 100 mg C-sodium acetate or 150-250 MBq 99mTc colloid, was fed after an overnight fast and C-SABT and scintigraphy were performed on two consecutive days; this procedure was repeated in an alternating order. Breath samples and scintigrams were obtained before and every 15 minutes after the ingestion of the labelled food for 4 hours, then every 30 minutes for another 4 hours. C/CO2 ratio in the breath was measured by non-dispersive infrared spectroscopy. For the 99mTc-SABT half-emptying time (G1/2), gastric emptying coefficient (GECa) and lag phase (laga) were calculated while for scintigraphy gastric half-emptying time (G1/2t) and lag phase (lagc) were calculated. The median G1/2t was 123 minutes (range 32 to 312 min) and median G1/2 was 129 minutes (range 24 to 220 min). Overall, G1/2t and G1/2 correlated weakly (r = 0.58, p = 0.12) and G1/2t and laga values in both sets of breath tests showed a relatively good consistency (r = 0.740 with p < 0.01, and r = 0.787 with p < 0.01, respectively). G1/2t did not correlate between sets of measurements (r = 0.207 and p = 0.52). Lags of both sets of measurements were significantly correlated (r = 0.609 and p = 0.04).

In conclusion, the C-SABT is a useful tool to measure gastric emptying in dogs, as sodium acetate is well tolerated in dogs and the test is easily performed. The test correlates weakly with the gold standard and repetitive testing in the same dog shows good consistency; this was not the case in scintigraphy.

ABSTRACT #51
ANALYTICAL VALIDATION OF A COMMERCIAL IMMUNOASSAY FOR THE MEASUREMENT OF SERUM GASTRIN CONCENTRATIONS IN DOGS.

Serum gastrin concentrations have received little attention in veterinary medicine over the last decade. This may in part be due to the fact that measurement of serum gastrin concentration is only offered by few laboratories. The goal of this study was to validate an immunoassay, developed and marketed for measurement of serum gastrin concentrations in humans, for use in dogs.

A commercially-available immunoassay, Immulite® 2000 Gastrin (Siemens Medical Solutions Diagnostics, Los Angeles, CA), marketed for the measurement of serum gastrin concentrations in humans, was analytically validated for use in dogs. Four serum samples with different concentrations of gastrin were prepared by mixing 3 to 4 left-over canine serum samples for each sample. The assay was validated by determination of parallelism, spiking recovery, intra-assay variability, and inter-assay variability. A control range for serum gastrin concentration in dog serum was established from 41 healthy dogs using the lower 97.5th percentile. Sensitivity of serum gastrin concentration was assessed by measurement of the 4 serum samples after storage at 4°C for 1 week and at −80°C for 3 weeks and 3 months. The reported analytical working range for the assay was 5 to 1000 ng/L. Serum gastrin concentrations for two of the serum samples were too low to determine dilutional parallelism. Observed to expected ratios for serial dilutions for the remaining 2 samples ranged from 101.3 to 133.9% at dilutions of 1 in 2, 1 in 4, and 1 in 8. Observed to expected ratios for spiking recovery ranged from 86.2 to 107.3% for spiking each of the 4 serum samples with each of the other 3 serum samples. Coefficients of variation for intra-assay variability for the 4 serum samples were 1.6, 2.5, 3.9, and 8.6%. Coefficients of variation for inter-assay variability for the 4 serum samples were 4.4, 3.6, 6.6, and 6.2%. Serum gastrin concentrations did not change significantly in samples stored at 4°C for 1 week or frozen at −80°C for 3 weeks. Serum gastrin concentrations did decrease statistically significantly (p < 0.005), but not clinically significantly (mean decrease of serum gastrin concentrations 4.5%) after storage of samples at −80°C for 3 months. The reference range for serum gastrin concentration in dogs using this assay was established as < 27.8 ng/L.

We conclude that this assay, marketed for the measurement of serum gastrin concentrations in humans, is sufficiently linear, accurate, precise, and reproducible for use in dogs. Further studies to evaluate the clinical utility of the measurement of serum gastrin concentration in dogs with a wide range of gastrointestinal diseases are needed and in progress.

ABSTRACT #52
SENSITIVITY OF ENDOSCOPIC BIOPSY SAMPLING FOR THE DETECTION OF GASTRIC AND DUODENAL LESIONS IN DOGS AND CATS.

Our aim was to determine how many endoscopic biopsies were necessary to have 99% confidence of finding a gastric/duodenal lesion, and if quality of tissue sample impacted the number of pieces of tissue required for diagnosis. Histopathology slides containing 2,126 tissue samples from 130 animals were solicited from 8 institutions in 5 countries. Slides were randomised using a table of random numbers and coded. Each tissue on each slide was checked for diagnosis, severity of histologic change, and quality of sample. Quality of biopsy was assessed as inadequate, marginal, adequate or superior. Severity of lesion was assessed as unreadable, normal, mild, moderate or severe. Sensitivity was estimated overall and by subsets of species (cat versus dog), biopsy quality (0–3), organ (stomach, duodenum), participating institution and specific lesion type. There was an inverse linear relationship between the number of biopsies needed for diagnosis and the quality of the tissue samples. If tissue quality was not considered, 99% confidence for finding increased cellularity/epithelial lesions required 3 pieces of duodenal tissue in cats and 6 in dogs; and 4 gastric pieces in cats and 3 in dogs. Finding villi villi required 6 pieces in cats and 9 in dogs; 18 pieces for canine duodenal crypt lesions (this fell to 13 when only adequate tissue samples were considered); and 8 pieces for canine lymphangiectasia. The necessity of taking sufficient numbers of adequate quality biopsies was confirmed, and
adequate tissue samples were significantly more likely to find lesions than poor tissue samples.

ABSTRACT #53
SURVEY OF ERYTHROCYTE PYRUVATE KINASE DEFICIENCY IN SOMALI CATS FROM THE UNITED KINGDOM. A.M. Harvey, C.R. Helps1, A.S. Seng1, U. Giger1, S. Tasker1. School of Clinical Veterinary Sciences, University of Bristol, UK.1 Section of Medical Genetics, University of Pennsylvania, USA.

Pyruvate kinase (PK) is a regulatory enzyme of anaerobic glycolysis and is thereby critical in the energy metabolism of erythrocytes. Erythrocyte deficiencies in PK are described in a number of species, resulting in haemolytic anaemia. PK deficiency is an autosomal recessive trait in Abyssinian and Somali cats and is caused by a splice site mutation. The aim of this study was to screen Somali cats for the PK mutation in the UK.

Members of the UK Somali Cat Club were contacted about participating in the study and buccal swab sampling was carried out at cat shows and breeders/owners’ houses throughout the UK. Swabs were collected from breeding and pet cats of both sexes with ages between 6 weeks and 15 years (mean 4 years). The UK population of Somali cats is estimated to be approximately 2000. Samples were obtained from 126 cats; 68 were female (23 neutered) and 46 were male (27 neutered).

DNA was extracted from the buccal swabs using a commercial spin column based method (Nucleospin Blood, Macherey-Nagel, Germany) and the DNA sequence of interest was amplified by PCR. The PCR products were directly sequenced or subjected to restriction enzyme digestion and electrophoresis to identify cats as wild-type, heterozygous carriers or homozygous affected.

Forty-one of the 126 cats (32%) were found to be carriers for the PK mutation and seven cats (6%) were affected. The affected cats ranged from 1–7 years (mean 4.5 years) and all were clinically well at the time of sampling. One affected cat had previously been identified with mild anaemia and one had episodes of jaundice reported, but both of these cats had no further clinical signs. The remaining affected cats had remained clinically asymptomatic, but haematological studies were not performed. Based upon this survey, the mutant PK allele appears to occur frequently in the UK Somali breed and is a major factor influencing the concept that disease shows variation in age of onset and severity of signs. The results of the study are being used to establish controlled breeding programmes to eradicate PK deficiency from UK Somali cats while maintaining the desired traits in this breed.

ABSTRACT #54
LARYNGEAL DISEASE IN CATS: A RETROSPECTIVE STUDY OF 40 CASES. S.S. Taylor, A.M. Harvey, A. Hotston Moore, M.J. Day. School of Clinical Veterinary Science, University of Bristol, UK.

Laryngeal disease is an uncommon but important cause of dyspnoea in the cat. In this retrospective study, we reviewed the medical records and histopathological findings (where available) of 40 cats referred to the University of Bristol with laryngeal disease between 1996 and 2006. Presenting clinical signs included dyspnoea (31 cats), increased inspiratory noise (27 cats), change of voice (18 cats), gagging/retching (8 cats) and cough (6 cats). Direct visualisation of the larynx under anaesthesia was performed in 37 cases (92.5%) and laryngeal ultrasonography was performed in 18 cases (45%). Laryngeal biopsies were obtained in 14 cases (35%) and fine needle aspiration of laryngeal lesions was performed in 5 cases (12.5%). Post mortem examination was performed in 6 cats. Final diagnoses included neoplasia (14), laryngeal paralysis (15), and inflammation/oeofa (11).

The mean age of cats with neoplasia was 10.9 years (range 7–17 years), and the median duration of clinical signs was 75 days (range 14–390 days). Tumours included lymphoma (7 cats), squamous cell carcinoma (4 cats), adenocarcinoma (2 cats) and undifferentiated epithelial tumour (1 cat). Four cats with neoplasia were FIV positive. Nine cats with neoplastic disease were euthanased at the time of diagnosis. Three cats with lymphoma received chemotherapy (cyclophosphamide, vincristine and prednisolone) achieving survival times between 45 and 1440 days (median 60 days). One cat with squamous cell carcinoma survived for 180 days with prednisolone monotherapy. The mean age of cats with laryngeal paralysis was 8.6 years (range 1–16 years), and the median duration of clinical signs was 60 days (range 10–390 days). Left unilateral laryngeal paralysis was found in 10 cats and bilateral paralysis in five cats. The aetologies of the laryngeal paralysis included laryngitis following thyroidecotomy (2), thoracic adenocarcinoma (1), and cervical thyroid carcinoma (1). Four cats with laryngeal paralysis were treated surgically, with a median survival time of 300 days post surgery (range 10–360 days). Of eight cats treated conservatively the median survival time was 780 days (range 300–2520 days) and no cats were euthanased due to the laryngeal disease.

The mean age of cats with inflammatory laryngeal disease was 6.4 years (range 2–12 years), and the median duration of clinical signs was 30 days (range 3–210 days). No cats had recurrence of respiratory problems following discharge, and the median survival time was 555 days (range 0–2800 days).

Laryngeal paralysis and lymphoma were the most common causes of laryngeal disease in this referral population. In both diseases, there is favourable long-term survival with appropriate conservative management or chemotherapy, respectively.

ABSTRACT #55
EFFECTS OF CORTISOL-INDUCED HYPERTENSTION ON VENTRICULAR MASS AND FUNCTION IN DOGS – AN ECHOCARDIOGRAPHIC STUDY. P. Winkler1, S. Schellenberg2, C.E. Reusch3, T.M. Gläus3. 1Division of Cardiology, ‘Clinic for Small Animal Internal Medicine, Vetsuisse Faculty, University of Zurich, Switzerland.

Hypercortisolism (HC) has an important impact on the cardiovascular system in people, causing systemic hypertension with secondary cardiac changes, and representing a major risk factor for increased morbidity and mortality. In dogs, HC is considered an important cause of systemic and possibly pulmonary hypertension that may contribute to the development of left or right sided heart failure in association with underlying cardiac disease. The aim of this study was to induce hypertension by iatrogenic HC and to evaluate the effect on the heart, specifically on left ventricular (LV) hypertrophy as well as left and right ventricular (RV) function, assessed by 2D, M-Mode, Flow (FD) and Tissue Doppler (TDI) echocardiographic examination.

Iatrogenic HC was induced in 6 Beagles with oral hydrocortisone (8 mg/kg PO bid for 3 months), 6 placebo treated Beagles served as controls. Blood pressure (BP) was measured osccilometrically (SDI), and each echo was performed, by a single operator, with an Accuson Sequoia. Intra-operator reproducibility of all parameters was calculated for each dog, indicated as coefficient of variation (CV).

BP significantly increased to a maximum at 2 months of HC, systolic from a baseline of 123 mmHg (114–136 mmHg) to 137 mmHg (134–139 mmHg), diastolic from a baseline of 69 mmHg (53–78 mmHg) to 82 mmHg (74–82 mmHg). On 2D and M-Mode echo LV (septal) hypertension could not be observed. LV mass calculated by the area-length method was 119 g/m2 (101–125 g/m2) at baseline and did not significantly change over time. No significant changes in LV and RV systolic and diastolic function could be observed. As examples, FD Tei-indices at baseline were 0.52 (0.48–0.57) for the LV and 0.19 (0.07–0.31) for the RV and at 2 months were 0.48 (0.38–0.60) for the LV and 0.14 (0.07–0.23) for the RV; TDI Tei-indices at baseline were 0.85 (0.69–1.17) for the LV and 0.69 (0.57–0.99) for the RV, and at 2 months were 0.77 (0.66–0.90) for the LV and 0.67 (0.58–0.72) for the RV. Indirect evidence of pulmonary hypertension as assessed by RV systolic time intervals could not be observed. CV were <15% for most 2D, M-Mode, FD and TDI parameters, including for LV mass, STIs and TDI Tei indices of LV and RV. CV were >15% for the M-Mode parameters RVWD, RVDD and EPSS, and for most FD mitral and tricuspid inflow parameters as well as for FD Tei indices of LV and RV.

In conclusion, iatrogenic HC over 3 months led to a significant increase in BP in dogs. However, in this model of HC the increase in BP was only very minor and did not reach clinically relevant hypertension. At this degree of HC-induced BP elevation no significant changes in LV dimensions and LV or RV function could be observed. Newer parameters of LV and RV function showed good reproducibility but were not more sensitive to discern potential subtle changes.

ABSTRACT #56
EFFECT OF ATENOLOL ON SERUM CARDIAC TROPONIN-I CONCENTRATIONS IN CATS WITH COMPENSATED HYPERTROPHIC CARDIOMYOPATHY: A PILOT STUDY. Ettiene Côté. Veterinary Teaching Hospital-Atlantic Veterinary College (VTH-AVC), University of Prince Edward Island, Charlottetown, Canada.

Hypertrophic cardiomyopathy (HCM) is the most common heart disease of domestic cats. Nevertheless, studies assessing the effect of treatment on cats with compensated HCM are absent from the literature. The Cardiology
Service of the VTH-AVC conducted a pilot study of cats with compensated HCM in whom an incidentally-discovered heart murmur was the reason for referral to AVC. The diagnosis of compensated HCM was made and M-mode echocardiography revealed left ventricular concentric hypertrophy in the absence of inciting causes, and there were no overt clinical signs of decompensated heart disease. Only cats who were not already receiving medications aimed at treating cardiovascular disease were included in the study. At the time of enrolment (pre), cats had a blood sample drawn for measurement of serum cardiac troponin-I concentration (scTn-I) using the Abbott AsSym cTn-I ADV assay (Abbott Laboratories, Abbott Park, IL, USA). Cats were then treated by owners at home with the beta-blocker atenolol 1.0–1.4 mg/kg p.o. q 24h in the evening and re-evaluated 1–4 weeks later (post) while still receiving atenolol. At that time, a second blood sample was drawn for measurement of scTn-I. Five cats completed this pilot project. Serum scTn-I decreased from median 0.06 (mean ± SD = 0.9 ± 0.056) μg/l pre to median 0.04 (mean ± SD = 0.07 ± 0.067) μg/l post. The change from pre to post was significant (p = 0.03) using a one-sided sign test.

These preliminary results suggest that daily administration of atenolol to cats with compensated HCM reduces the myocardial damage associated with this disease. Larger studies appear justified; based on the present results, such studies should address the placebo effect and the possibility of natural decreases in scTn-I resulting from acclimation, among other variables.

**ABSTRACT #57**

**24-HOUR HOLTERMONITORING OF HEALTHY CATS AT HOME WITH A NEW LIGHT HOLTER RECORDER.** S. Hančl,1 A. Tidholm,1 B. Ström Holst1, 2, Djurdioktor m I mālardalen AB, 2, Västerås, 2, Djuurjugnet Albano, Stockholm, 2, Department of Clinical Sciences, Swedish University of Agricultural Sciences, Uppsala, Sweden.

The normal heart rhythm of cats has not been well defined. To evaluate treatment of cats with arrhythmias it is important to gain knowledge of the normal rhythm and the prevalence of arrhythmias. Stress may affect the heart rate and therefore it is important to record the rhythm at home with as little stress as possible. However, older Holter recording systems weigh about 500g which can be stressful for the cat. Recently, a new Holter recording recorder (HR-100 Welch Allyn) has been developed that weighs just 100g. To date, few studies have been published of the normal heart rhythm of cats using Holter recording. The aims of the present study were: 1) to determine the heart rate and rhythm in normal cats, and to determine whether or not ectopic complexes occur, and 2) to evaluate registrations from the new lighter Holter recorder in cats of different breeds and temperament without sedation. We studied 17 privately owned healthy cats of 10 different breeds, mean 4 years (range 1 to 11 years), 8 males and 9 females using 24 hour ECG. The cats were considered healthy and included in the study if the systolic blood pressure was below 175 mm Hg, physical examination was unremarkable, and auscultation considered normal (no murmur, no gallop sound, and no arrhythmia). Blood samples were taken for evaluation of concentrations of creatinine, glucose and total T4. In addition, echocardiography 2D / M-mode with a 12 Mhz probe with Philips HD Envisor was performed to confirm that chamber enlargement was not present and that the left ventricular/interventricular septal wall thickness in diastole was less than or equal to 5.5 mm. None of the cats were sedated for the procedures. Seven electrodes were placed on the ventral thorax of each cat which provided a 3 lead ECG recording. Before the cat was sent home with the Holter, normal sinus rhythm was documented from the Holter directly on the computer. The Holter was carried by the cats in a garment with a pocket for the Holter. The cats were released and could roam freely in the home environment during 20–24 hours (mean 23hrs 29min). Data from the cats were then manually evaluated by the first author in the Welch Allyn PCH100 Holter analysis system. Normal sinus rhythm was found in all cats and in 13 cats mild to moderate sinus arrhythmia was found intermittently. Heart rates varied from 77 beats per minute (bpm) to 282 bpm (mean 169 bpm). Supraventricular premature complexes were found in 1 cat (6%). Isolated ventricular premature complexes (VPC) were found in 12 cats (71%). The number of VPC varied between 1 and 127 with a median of 2. The cat with the total of 127 VPC showed isolated VPC every third minute intermittently. In conclusion, healthy cats have no or very few VPCs. High quality 24 hour Holter ECGs can be obtained with this new light Holter equipment.

**ABSTRACT #58**

**EFFECT OF ADRENOEDINULIN ON MYOCARDIAL DISTENSIBILITY.** A.P. Fontes-Sousa,1 A.L. Pires,2 C.S. Carneiro,2 A.F. Leite-Moreira2, 1, Department of Veterinary Sciences, University of Trás-os-Montes e Alto Douro (UTAD), 5001-911 Vila Real, Portugal; 1, Department of Physiology, Faculty of Medicine, University of Porto, 4200-319 Porto, Portugal.

Adrenomedullin (AM) is a potent, long-lasting vasoactive peptide originally isolated from human pheochromocytoma. However, the mRNA is expressed in a variety of tissues, including the vasculature and heart. AM has hypotensive, diuretic and natriuretic properties but its role in the development of cardiac pathologies is less clear, considering that it produces disparate biological effects in the cardiovascular system. Plasma and tissue AM expression have been shown to be increased in experimental models and in human patients with cardiovascular diseases such as systemic arterial hypertension and congestive heart failure. In the current study, we investigated the, yet unknown, acute effects of AM on the diastolic properties of the myocardium.

Effects of increasing concentrations of AM (10–10 to 10–5 M) were evaluated in isolated right papillary muscles from male New Zealand White rabbits (Kebs-Runger: 1.8mM CaCl2, 35°C) in the presence of intact endocardial endothelium (EE) (n = 10) and damaged EE (n = 9). Reported parameters include: active tension (AT; mN/mm²), passive tension (PT; mN/mm²) and muscle length (L; L/L0max). Only significant results (means±SEM, p<0.05) are given, expressed as % change from baseline.

In papillary muscles with intact EE, AM induced a significant concentration-dependent negative inotropic effect, with the highest concentration decreasing the AT by 17.8±5.4%. It also promoted a concentration-dependent increase in resting muscle length (increased diastolic distensibility) up to 1.009±0.003 L/L0max at the highest concentration. Correcting muscle length to its initial value resulted in a 25.0±5.9% decrease of PT, indicating decreased muscle stiffness. Both effects on AT and diastolic distensibility were abolished after damaging EE.

The present study showed that AM significantly decreased PT, indicating a decrease in myocardial stiffness, an effect that is dependent of the EE. This effect is a potentially powerful physiologic mechanism, as it may allow the heart to reach the same diastolic volume with up to 25% lower filling pressures. Furthermore, as the plasmatic levels of AM are increased in heart failure, this is a novel finding with potential pathophysiologic and therapeutic implications in this syndrome, which deserves further investigation.

**ABSTRACT #59**

**MEASUREMENT OF NT-ANP IN CATS WITH CARDIOMYOPATHY.** T. Zimmering, F. Meneses, I. Noile, D. Simon. Small Animal Clinic of the University of Veterinary Medicine Hanover, Germany.

Atrial natriuretic peptide (ANP) is a hormone which is synthesised by the atrial myocardium. As a pro-hormone, it is stored in the cytoplasmic granules of the atrial myocytes. The basic function of ANP is to guard the cardiovascular system. This is accomplished through induction of vasodilation and inhibition of the renin-angiotensin-aldosterone and sympathetic systems, natriuresis, and diuresis. The main trigger for ANP release is an increase in atrial wall stretch or pressure.

In humans and dogs a correlation has been recognised between ANP concentration and several cardiovascular parameters. Therefore, we hypothesised that cats with cardiomyopathy would have higher ANP levels (measured as NT-ANP) than healthy cats. Furthermore, we sought to compare cats with congestive heart failure to those without signs of congestion.

Forty nine cats were enrolled in the study and assigned to three groups based on clinical, radiological, and echocardiographical examinations. Group 1 (n=11) were controls, group 2 (n=21) consisted of cats with cardiomyopathy without signs of congestion, and cats with a cardiomyopathy with congestive heart failure were enrolled in group 3 (n=17). Based on the fact that the feline ANP is similar to that of humans (homology of 94%), the plasma NT-ANP analysis was performed by means of a human Nt-proANP 1-98 ELISA.

The NT-ANP plasma levels differed significantly between the three groups. As expected the lowest median value (381 fmol/ml) was found in the control group. In cats with congestive heart failure the highest NT-ANP levels with a median of 2467 fmol/ml were measured. Compared to the control group cats with cardiomyopathy but without congestion also showed significantly elevated NT-ANP levels (median 783 fmol/ml). In addition, these NT-ANP values were significantly lower than those of cats with congestive heart failure.

Subsequently, the plasma NT-ANP level appears to increase and be associated with the severity of heart disease. Further studies with larger patient numbers must be performed to verify these results and to identify possible prognostic value of NT-ANP in feline cardiomyopathy. Further investigations including congestive heart failure should be conducted in order to determine the usefulness of NT-ANP levels as a marker of efficacy of therapy or help to identify cats with cardiac disease, especially considering that cats show less obvious signs of cardiac disease compared to dogs. Last but not least, the assay used in the
present study showed reliable results under daily routine conditions, without the need for special procedures for blood sampling and storage. Since N-ATP is broken down post-2 days at room temperature, sample shipment to a diagnostic laboratory may be considered.

ABSTRACT #60

Biomarkers are used in medicine to facilitate diagnosis, assess risk, determine prognosis and to aid therapeutic decisions. Brain natriuretic peptide (BNP) is considered one of the best biomarkers of cardiovascular diseases since is produced by ventricular myocytes (with a minimum secretion from the atria) in cardiac diseases with chronic pressure, volume overload or ventricular hypertrophy. In humans, C-reactive protein (CRP) has gained a lot of popularity in the recent years as a biomarker of cardiovascular diseases, although to our knowledge studies about the CRP in dogs with heart disease are limited. Therefore, the aim of this study was to measure serum CRP concentrations in dogs with cardiac diseases and congestive heart failure at different stages and to assess and compare the clinical value as cardiac biomarker with BNP concentrations.

Eight healthy dogs and twenty one dogs affected by different heart diseases (chronic mitral valve disease (n=8), dilated cardiomyopathy (n=6), pulmonic stenosis (n=2), patent ductus arteriosus (n=2), neoplasia (n=1), tricuspid dysplasia (n=1) and mitral dysplasia (n=1)) attended to the Veterinary Teaching Hospital of the University of Murcia between October 2006 and March 2007 were included in the study. Diagnostic protocols included a complete history, physical examination, thoracic radiographs, systemic blood pressure measurement, echocardiograms, electrocardiograms and a CBC and serum chemistry profile. Patients were classified in one of the 3 stages of heart failure according to ISACHC (stage I n=4; stage II n=6; stage III n=11). Serum CRP and BNP concentrations were determined by commercial canine-specific enzyme immunoassays. Mean concentrations of BNP were significantly higher in all animals with cardiac diseases compared with healthy dogs (p<0.0001), and dogs at stages II and III showed statistically significant increases in BNP compared with dogs at stage I (p=0.033 and p=0.004 respectively). Although no differences were found for CRP between healthy dogs and dogs with stage I, dogs with stages II and III showed significant higher CRP values than dogs at stage I (p=0.042 and p=0.009 respectively).

These results indicate that BNP is an adequate biomarker to detect heart failure, and in addition it could be postulated that an inflammatory response, detected by high CRP concentrations, could be implicated in the pathogenesis of congestive heart failure in dogs. This fact could have interesting applications in the management of dogs with congestive heart failure as have been recently demonstrated in humans.

ABSTRACT #61

Tissue Doppler imaging (TDI) including strain and strain rate of the myocardium are relatively new echocardiographic modalities of increasing importance, especially concerning the early diagnosis of myocardial disease. TDI allows assessment of global as well as regional myocardial function and Strain and Strain rate allow assessment of segmental myocardial contraction and stretching and rate of deformation. Breed specific differences concerning TDI velocities have been reported. The purpose of the present study was to establish reference values for TDI, Strain and Strain rate parameters in young puppies of different breeds.

Thirty-seven 8-week old puppies of 6 different breeds (6 Newfoundlands, 5 St. Bernards, 4 Wheaten terriers, 8 Irish Water spaniels, 9 French Bulldogs, 1 Golden retrievers and 2 Toy Poodles ), free of cardiac diseases detectable by echocardiography, were examined using TDI, Strain and Strain rate. Twenty were male and 17 were female. Body weight ranged from 1.6 to 8.2 kg (mean 4.2 ± 1.7). Heart rate ranged from 131 to 240 beats/min (mean 179±25). Radial systolic endocardial velocities ranged from 2.45 to 7.15 cm/s (mean 3.9 ± 0.99). Radial systolic epicardial velocities ranged from 1.06 to 5.13 cm/s (mean 2.4±0.8).

Longitudinal systolic velocities in the basal interventricular septum (IVS) ranged from 1.7 to 5.8 cm/s (mean 3.4±1.1). Longitudinal systolic velocities in the apical IVS ranged from 0.3 to 2.7 (mean 1.2±0.6). Longitudinal systolic velocities in the basal left ventricular (LV) wall ranged from 2.0 to 6.6 cm/s (mean 3.8±1.1). Longitudinal systolic velocities in the apical LV ranged from 0.2 to 2.3 cm/s (mean 0.8±0.6). Radial systolic velocity gradient ranged from 0.4 to 2.5 cm/s (mean 1.45±0.7). Longitudinal systolic gradient ranged from 0.7 to 4.2 (mean 2.2±1.1) for the IVS and from 0.3 to 3.3 (mean 1.8±1.1) for the LV. The systolic wave in the LV wall preceded the systolic wave in the IVS in most dogs with a range of -7 to 39 ms (mean ± 7.2). In one Newfoundland dog the systolic wave was asynchronous as the systolic wave of the IVS preceded the LV with 81 ms. Radial systolic Strain in mid-LV ranged from 19 to 64 % (mean 42±14) and longitudinal Strain ranged from -8 to -38 (mean ±16.64) in the mid-IVS, and from -5 to -31 % (mean ±16.7) in the mid-LV. Radial Strain rate ranged from 2.5 to 9 s-1 (mean 6.4±1.8) and longitudinal Strain rate ranged from 1 to 6.5 s-1 (mean ±2.8±1.4) in the LV. In comparison with studies of adult dogs, TDI systolic velocities appear to be lower in puppies, whereas systolic velocity gradients and Strain and Strain rate appear similar. As in adult dogs, basal and endocardial velocities exceeded apical and epicardial velocities, respectively, and radial Strain and Strain rate exceeded longitudinal Strain and Strain rate.

ABSTRACT #62
TISSUE DOPPLER IMAGING AND STANDARD ECHO-DOPPLER MARKERS OF CANINE PULMONARY ARTERIAL HYPERTENSION: A PROSPECTIVE STUDY OF 105 CASES. F. J. Serres1, V. Chetboul1, B. Tisser1, C. Carlos Sampedro2, V. Gouni2, J. E.ouchel3, 1Unité de Cardiologie d’Alfort, 2UMR INSERM U841, 3Unité de Pharmacie-Toxicologie, Ecole Nationale Vétérinaire d’Alfort, Maisons-Alfort, France.

Diagnosis of pulmonary arterial hypertension (PAH) in the awake dog relies on Doppler assessment of pulmonic or tricuspid regurgitations (TR), which are however not always detectable. The aim of the present study was to compare the sensitivity and specificity of several indirect imaging markers, i.e., standard echo-Doppler and tissue Doppler imaging (TDI) indices, in the diagnosis of canine systolic PAH. For this purpose, dogs (n=105) presenting TR allowing indirect measurement of systolic pulmonary arterial pressure (SPAP) were prospectively recruited, and categorized as presenting either normal (n=45), equivocal (n=19), or increased (n=41) SPAP, based on TR peak velocities of <2.5, 2.5-3.0, or >3.0 m/s respectively. Ten quantitative imaging parameters were assessed, including measurement of main pulmonary arterial diameter to aortic diameter ratio (MPA/Ao), pulmonary flow acceleration time (AT), acceleration to ejection time ratio (AT/ET), TDI index of right ventricular function, and 6 longitudinal right basal ventricular TDI indices (systolic (Stdi) wave velocity, early/late diastolic wave ratio (E/Atdi), Stdi/Etdi, and last 3 TDI indices). A significant (p<0.05) correlation was observed between SPAP and all the 10 tested variables. Amongst them, the combined TDI index of systolic and diastolic right ventricular function (Stdi/Etdi) had the highest sensitivity and specificity (89% and 93% respectively for a cut-off of 11.8 m/s) for detection of equivocal and increased SPAP. This index also could discriminate dogs with equivocal SPAP from those with normal SPAP. In conclusion, TDI indices are effective predictors of increased SPAP, with diastolic and systolic myocardial alterations detected even for mild SPAP increases.

ABSTRACT #63
INFLUENCE OF AGE, WEIGHT AND BREED ON LONGITUDINAL TSSTICULAR TISSUE DOPPLER MODALITIES. M. Kılıçl1, K. Hartung2, G. Wess1. Clinic for Small Animal Medicine, University of Munich, Germany.

Tissue Doppler Imaging is a new diagnostic tool that allows an objective evaluation of myocardial function. Tissue Velocity Imaging (TVI), Strain (S) and strain rate (SR) are different tissue Doppler modalities that measure velocity, deformation and the rate, by which the deformation occurs, respectively. In human medicine they are used for example in ischemic heart disease or for early detection of subclinical cardiomyopathies. Although not yet being routinely used, several small studies demonstrated their diagnostic value in veterinary echocardiography. However, to date there are only a few studies investigating the influence of physiologic factors on these modalities.

Therefore, the aim of the study was to investigate the influence of age, weight and breed on systolic TVI, SR and S. A total of 199 healthy dogs – consisting of more than 15 different breeds – were included. Median age and
weight were 5 years and 25 kg, respectively (mean age: 5.2 years; mean weight: 25.0 kg). All dogs had a complete clinical, electrocardiographic and echocardiographic examination, using a Vivid 7 ultrasound machine (GE). Doberman Pinschers also had a 24-h-ECG prior to enrolment. Left ventricular septum and free wall were imaged from a left-parasternal view, making sure that the ultrasound beam was aligned parallel to the longitudinal motion of the respective wall. Both walls were then recorded as single walls. TVI, SR and S analysis was performed offline using the Q-analysis EchoPac software package (version BT 04) (GE). To determine the influence of age and weight, dogs were assigned into different groups (age group 1: 0–1 years; age group 2: 1–3 years (n=67); age group 3: 3–7 years (n=78); age group 4: 7–11 years (n=40); age group 5: >11 years (n=14); weight group 1: <15 kg (n=64); weight group 2: 16–30 kg (n=60); weight group 3: >30 kg (n=75)).

Whereas age was negatively correlated with systolic TVI, this parameter had no influence on systolic S and SR. In contrast, weight showed a positive correlation with systolic TVI, whereas a negative correlation was found for systolic S and SR. In addition, breed had a significant influence on all three tissue Doppler modalities, irrespective of age and weight. In conclusion, tissue Doppler modalities are influenced by age, weight and breed. However, differences were more of statistical then of clinical relevance.

ABSTRACT #564
EVALUATION OF A FREE SOFTWARE PACKAGE FOR MYOCARDIAL TISSUE VELOCITY ANALYSIS IN CATS. G. Wess, S. Schiller, K. Hartmann. Clinic for Small Animal Internal Medicine, LTH University of Munich, Germany.

Tissue Doppler Imaging has become an important alternative tool for the non-invasive quantification of myocardial function using echocardiography. Diastolic function can be assessed by measuring the peak early (E-wave) and peak late (A-wave) myocardial tissue velocity during diastole using echocardiographic tissue Doppler velocity imaging (TVI). Systolic function can be assessed measuring systolic S-waves. Commercial software packages such as EchoPac Q-Analysis (GE) are usually used for the offline evaluation of myocardial TVI, but they have to be bought in addition to the ultrasound machine and are often expensive. SPEQLE (Software package for Echocardiographic tissue Signification Leuven) is a software program that is freely available and which is used frequently in human medicine. The SPEQLE software extracts peak velocities automatically, after the different phases of the cardiac cycle have been defined using time markers. Aortic and mitral valve opening and closure are used as time markers. To our knowledge this software package has not yet been evaluated in veterinary medicine. We tested whether EchoPAC Q-Analysis and SPEQLE yield similar information of myocardial TVI in cats.

Colour Tissue Doppler images were acquired from 62 healthy normotensive cats (26 male, 36 female, one to 21 years of age, with a mean age of 5.3 years). Images were acquired using a left apical 4-chamber view superimposed with real time colour tissue Doppler and three to five cardiac cycles were stored digitally. High frame rates between 170 and 350 frames/sec (mean 259+/− 37) were recorded for offline-data analysis using a narrow angle, single wall picture with a Vivid 7 (GE) machine. The same loop was used for measurement of systolic S and diastolic E and A waves using EchoPac Q-Analysis and SPEQLE in three segments (basal, mid and apical) of the septum and left ventricular free wall. Fused E and A waves were recorded as EA waves. Tracking of the regions of interest during the cardiac cycle was done with both methods semi-automatically.

TVI curves during the cardiac cycle showed the same characteristics with both methods. A basal to apical velocity gradient, with higher velocities at the basal segments was found with both software packages. There was no statistical difference in systolic and diastolic peak velocities between both methods. However, standard deviations were higher with the SPEQLE software.

Tissue velocity analysis is faster and more convenient to perform with the commercial software EchoPac Q-analysis. However, SPEQLE is a free software package that can be used as an alternative and accurate method for tissue velocity measurements in cats.

ABSTRACT #565
ECHOCARDIOGRAPHY IN 9 CATS WITH PATENT DUCTUS ARTERIOSUS. N. Hildebrandt, M. Schneider, M. Wehner, I. Schneider. Small Animal Clinic (Internal Medicine), Justus-Liebig-University, Giessen, Germany.

Patent ductus arteriosus (PDA) is a rare congenital defect in cats and, therefore only limited information about echocardiographic findings in this species are available. The goal of the study was to describe retrospectively the echocardiographic changes in 9 unselected cats in which a PDA was diagnosed between January 1998 and January 2007. Data were tested for normal distribution prior to analysis.

Median body weight was 2.5 kg (range 0.9–4.8 kg) and median age 18.5 months (range 2.6–152.7 months). Five were female and four were male. Concurrent cardiac diseases were identified only in one patient (subaortic stenosis).

Echocardiography revealed a mean left ventricular internal diameter of 20.6±4.6 mm (mean±SD) during diastole and 12.3±5.4 mm during systole. The ventricular diastolic wall diameter of the right ventricle was more than 50% of the left ventricle in 5/9 cats. The ratio between left atrium and aorta was 1.8±0.57 with an increased left atrial dimension in 6/9 cats. A dilatation of main pulmonary artery compared to the aorta was found in 9/9 cats with a calculated ratio of 1.08±0.05. PDA retrograde flow in the main pulmonary artery could be visualised with colour Doppler mapping in all patients from the right short axis and left apical view. In five cats the flow was seen up to the pulmonary valve and in the other four patients the main pulmonary valve was completely filled with the turbulence. Systolic-diastolic flow pattern was seen in all ten cats. Peak systolic PDA flow velocity was 3.93±0.73 m/s and end diastolic flow velocity was 2.39±1.24 m/sec. The PDA itself could be visualised in 9/9 cats and the minimal PDA diameter was measured with 2.4±1.0 mm.

Compared to dogs we found some similarities like atrial and left ventricle volume overload. But cats with PDA seems to develop more often mild to moderate pulmonary hypertension with reduce PDA flow velocities and mild right ventricular hypertrophy.

ABSTRACT #566
VALIDATION OF A NEW ALGORITHM FOR DIFFERENTIATING PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA IN THE DOG. R.A. Santilli, M. Perego1, M. Borgarelli, C. Bellino, G. Spadacini. 'Clinica Veterinaria Malpensa, Samarate, Varese, Italy, ‘Department Patologia Animale, Faculty Veterinary Medicine, Grugliasco, Italy, ‘Faculty of Medicine of Insubria, Varese, Italy.

Different algorithms able to differentiate paroxysmal supraventricular tachycardias (SVT) such as atrioventricular nodal reciprocating tachycardia (AVNRT), atrioventricular reciprocating tachycardia (AVRT) and atrial tachycardia (AT) have been tested in human medicine. Despite the presence of these symptoms in canine patients, the use of these algorithms is still limited.

We compared 40 dogs with confirmed SVT (29 paroxysmal atrial tachycardia, 7 atrioventricular nodal reciprocating tachycardia and 4 atrial tachycardia, 20 with known mechanism according to endocardial mapping. We selected 23 dogs with documented SVT of different breed, 21/23 males, with a mean age of 29.48±31.55 months and a mean body weight of 30.61±14.69 kg. Each dog underwent a physical examination, chest X-ray, 12-lead electrocardiogram and echocardiographic and electrophysiological studies. 14/23 dogs had bypass tract-mediated tachycardia and 9/23 focal AT. Surface ECG findings for each tachycardia were analysed by one author (RAS) comparing QRS-T morphology during sinus rhythm and SVT for the following parameters: cycle length alternans, QRS alternans, P wave axis, and RP/PR ratio. Using these data an algorithm was formulated and each arm analysed. As final step we prospectively tested our algorithm using 17 SVT with a group of 16 cardiologists blinded on the tachycardia mechanism. RP/PR less than 0.7, QRS alternans and inferior-superior P wave axis during tachycardia resulted good markers for the diagnosis of AVRT, while RP/PR > 0.7, cycle length alternans and superior-inferior P wave axis during tachycardia for focal AT. Global sensitivity for the algorithm used resulted for the diagnosis of AVRT 71% and for AT 66%, the specificity of 66% for AVRT and of 71 % for AT. Despite several differences of the electrocardiographic appearance of SVT in the dog and in the human beings, the overall accuracy of surface ECG in differentiating AVRT from AT appears similar. In conclusion, according to our findings some ECG criteria described in man and corrected for dog appeared to be useful in differentiating paroxysmal narrow QRS complex tachycardias in canine patients.

ABSTRACT #567
CHANGES IN PLATELET FUNCTION IN DACHSHUNDS WITH MYXOMATOUS MITRAL VALVE DISEASE. T.M. Soerenсен1, A. Stierup1, S.G. Moosgaard1, I. Tornow1, A.T. Kristensen1, A.L. Jensen1, L.H. Olsen1. 1Department of Basic Animal and Veterinary Sciences, 2Department of Small Animal Clinical Sciences, University of Copenhagen, Denmark.
Changes in platelet function might be involved in the pathogenesis of myxomatous mitral valve disease (MMVD). An increased platelet aggregation has been found in some cats with chronic heart failure (CKCS), a breed with a high prevalence of MMVD. Conversely a form of platelet dysfunction likely due to changes in von Willebrand’s factor multimer distribution has been reported by a different method (the ability to form a platelet plug in the hole of a membrane at high shear rates) as a point-of-care platelet function analyzer (PFA100®) in CKCS with mitral regurgitation. However it is unclear whether other dog breeds with MMVD have changed platelet function. The aim of the study reported here was to evaluate platelet function in Dachshunds with MMVD.

This study included 34 wire-haired standard sized Dachshunds (15 males and 19 females), over 5 years old. Clinical examination and echocardiography were performed in all dogs. No dogs had clinical signs of disease other than mitral regurgitation. Blood samples were taken from a jugular vein and the whole blood aggregation analyses were performed within 3 hours. Platelet function was evaluated in citrate anti-coagulated whole blood using the PFA 100 (reported as closure time) with collagen and adenosine diphosphate (ADP) coated cartridges. In addition, platelet aggregation response was evaluated using whole blood impedance aggregometry by addition of ADP (final concentration 20 μM).

Higher PFA 100 closure time (median value: 88 seconds) (inter quartile intervals 82-100 s) was found in 12 Dachshunds with mild to moderate mitral regurgitation (evaluated by colour flow mapping as jet size in percentage of left atrial area ≥ 15% and < 55% ) compared to 8 to 22 Dachshunds (median value: 74 s (inter quartile interval 64-86 s) with no to minimal mitral regurgitation (jet size ≤15%) (P=0.033). Only 5 out of 34 Dachshunds had ADP in the whole blood aggregation analyses.

Further studies are needed to elucidate whether the compromised platelet function in Dachshunds measured by the PFA100 are correlated to changes in von Willebrand’s factor multimer distribution as described in CKCS likely due to high shear stress in relation to mitral regurgitation.

Conclusions: The higher closure time found in Dachshunds with mitral regurgitation compared to Dachshunds with no or minimal mitral regurgitation suggests a form of platelet dysfunction in Dachshunds with mitral regurgitation. In addition, a whole blood aggregation response to ADP was only found in few Dachshunds.

**ABSTRACT #68**

**NATURAL HISTORY AND RISK PREDICTORS OF CHRONIC DEGENERATIVE MITRAL VALVE DISEASE IN ASYMPTOMATIC DOGS.** S. Ciosara, M. Bargielli, G. La Rosa, P. Savarino, C. Bellino, R. Zanatta, J. Haggstrom, A. Tarducci, Dep. Animal Pathology, University of Turin, Italy; 3 Dep. Clinical Sciences, Faculty of Veterinary Medicine and Animal Science, Uppsala, Sweden.

Chronic degenerative mitral valve disease (DVD) is a slowly progressive degeneration of the mitral valve leading, usually at old age, to left ventricle volume overload and eventually to heart failure (HF). The aim of this study was to investigate survival time and clinical and echocardiographic risk factors for progression of the disease in asymptomatic dogs. The records of 261 dogs with DVD (2001–2006) were collected. All dogs were in the class of CHF, ISACHC: I (126 in class Ia, 135 in class Ib). The dogs were of different breeds, 175 were males and 86 females, 184 weighing less than 15 Kg and 77 more than 15 Kg. The data relative to physical examination, blood pressure, chest radiographs, echocardiogram and ECG were analysed. The clinical progression of each dog was ascertained by a telephone interview with the owner. Following the phone interview, 48 dogs were re-submitted to a complete cardiologic recheck to evaluate progression of the disease. Fisher test was used to evaluate the probability of an adverse event relative to different clinical and echocardiographic signs presented at the first visit. Fisher test was used to identify dogs with discordant changes in the survival time between the first visit and the follow-up. Clinical and echocardiographic signs included sex, age, systemic blood pressure, syncope, cough, arrhythmias, affected leaflets, end systolic (ESV-I) and end diastolic (EDV-I) volume, systolic and diastolic velocities, heart rate (HR), mean arterial pressure, ejection fraction, heart rate, ventricular arrhythmias, heart rate variability, and the following events: death, hospitalisation due to cardiac disease as well as the following events: death, hospitalisation due to cardiac disease as well as changes in the cardiac parameters. A positive result of Fisher test was defined as *p < 0.05*. The parameters showing the highest risk of progression were: age > 10 years (p=0.055), ESV-I > 100 ml/m2 (p=0.055), and ESV-I > 150 ml/m2 (p=0.012). These parameters would identify animals which are at high risk for complications and might allow targeting individuals in need of therapy in the near future because of heart failure in developing. For low risk patients, unwarranted owner concerns of heart failure may be avoided.

**ABSTRACT #69**

**EXPRESSION OF CD34+ CELLS IN CANINE MYXOMATOUS MITRAL VALVE LEAFLETS.** D.J. Gow, R.I. Han, A.T. French, G. Culshaw, Y. Martinez, S.A. Argyle, B.M. Corcoran. Hospital for Small Animals, Victoria Veterinary Clinical Studies, The University of Edinburgh, Scotland, UK.

Myxomatous mitral valve disease (MMVD) in both dogs and humans is associated with a change in the interstitial cell phenotype in the myxomatous areas of the leaflet. We have previously shown an increase in α-smooth muscle actin positive cells in canine valves suggestive of an activated myofibroblast population, but these cells localize towards the valve edge and there is minimal change in cell numbers in the overlying myxomatous parts of the valve leaflets. Studies in human MMVD suggest there is an increase in cell numbers in myxomatous areas and that these cells are predominantly CD34+ fibrocytes. The aim of this study, therefore, was to see if we could identify similar expression of CD34+ cells in canine MMVD and to see if changes might be associated with disease severity.

Mitral valve leaflets (anterior and posterior) were obtained from normal dogs (n=5) and dogs with varying severity of disease (Whitney Grades: 1, n=6, 2, n=8, 3, n=8, 4 n=4), fixed in paraformaldehyde, paraffin embedded and sectioned for routine immunohistochimistry staining using an avidin-biotin method (Vector ABC Kit, Vector Laboratory Ltd). 3,3’-diaminobenzidine (DAB) was used as chromogen. Anterior and posterior leaflets were assessed separately, and there were 62 leaflets in total. The primary antibody used was a mouse raised anti-canine CD34 antibody (Serotec Ltd). Slides were counterstained with haematoxylin and cells identified and counted using a standard light microscope. canine bone marrow was used as a positive control.

Small numbers (varying 1 to 10 per leaflet) of CD34+ cells were seen in 25% of leaflets examined. Cells were located mainly in the spongiosa with the majority in the mid zone of the leaflet. The largest number of cells was seen in dogs over 11 years of age. Grade 3 valves had the largest percentage (64%), total absolute number (38) and number per leaflet examined (2.38) of positive cells. CD34+ cells were not visible in any Grade 4 leaflets. Only 4 dogs had CD34+ cells in both leaflets of which 3 dogs had Grade 3 disease. Of the 16 CD34+ leaflets, 9 were anterior and 7 were posterior.

We have demonstrated for the first time the presence of CD34+ fibrocytes in canine mitral valves. While the number of cells is much less than that reported for human MMVD, the stromal location is similar. CD34+ fibrocytes are derived from circulating CD14+ cells (monocytes) and therefore might be involved in the pathogenesis of MMVD as they can form a platelet plug in the hole of a membrane at high shear rates with a point-of-care platelet function analyzer (PFA100®) in CKCS with mitral regurgitation. However it is unclear whether other dog breeds with MMVD have changed platelet function. The aim of the study reported here was to evaluate platelet function in Dachshunds with MMVD.

This study included 34 wire-haired standard sized Dachshunds (15 males and 19 females), over 5 years old. Clinical examination and echocardiography were performed in all dogs. No dogs had clinical signs of disease other than mitral regurgitation. Blood samples were taken from a jugular vein and the whole blood aggregation analyses were performed within 3 hours. Platelet function was evaluated in citrate anti-coagulated whole blood using the PFA 100 (reported as closure time) with collagen and adenosine diphosphate (ADP) coated cartridges. In addition, platelet aggregation response was evaluated using whole blood impedance aggregometry by addition of ADP (final concentration 20 μM).

Higher PFA 100 closure time (median value: 88 seconds) (inter quartile intervals 82-100 s) was found in 12 Dachshunds with mild to moderate mitral regurgitation (evaluated by colour flow mapping as jet size in percentage of left atrial area ≥ 15% and < 55% ) compared to 8 to 22 Dachshunds (median value: 74 s (inter quartile interval 64-86 s) with no to minimal mitral regurgitation (jet size ≤15%) (P=0.033). Only 5 out of 34 Dachshunds had ADP in the whole blood aggregation analyses.

Further studies are needed to elucidate whether the compromised platelet function in Dachshunds measured by the PFA100 are correlated to changes in von Willebrand’s factor multimer distribution as described in CKCS likely due to high shear stress in relation to mitral regurgitation.

Conclusions: The higher closure time found in Dachshunds with mitral regurgitation compared to Dachshunds with no or minimal mitral regurgitation suggests a form of platelet dysfunction in Dachshunds with mitral regurgitation. In addition, a whole blood aggregation response to ADP was only found in few Dachshunds.

**ABSTRACT #70**

**CLINICAL EFFICACY OF PIMOBENDAN IN 11 CATS WITH SYSTOLIC HEART FAILURE.** C.P. Sturgess1, L. Ferasini2. Anderson Sturgess Veterinary Specialists, Winchester, Hampshire, UK; 1University of Minnesota, College of Veterinary Medicine, St Paul, MN.

Pimobendan (Velmed®) is classified as an inodilator as it exhibits both positive inotropic and vasodilator activity. A limited number of studies have looked at its activity in cats both in vivo and in vitro and have consistently shown a positive inotropic effect. Hypotension was noted in one study supporting a vasodilator activity. In all in vivo studies, pimobendan was administered intraneously to anaesthetised cats. Whilst the majority of acquired feline heart disease is hypertrophic and hyperdynamic, it has been estimated that around 15–20% of cats might benefit form positive inotropy including a proportion of cats with hypertrophy that develop systolic failure in the later stages of disease. To date, digoxin has been widely prescribed in cats requiring inotropic support however it’s narrow therapeutic index, slow onset of activity and the lack of evidence of clinical efficacy makes digoxin a questionable choice. Based on the experimental data, pimobendan represents a more logical choice for cats with cardiac disease requiring positive inotropic support.

In response to this lack of a proven alternative for cats, an open trial of pimobendan was undertaken. The clinical records from the 11 cats that had received pimobendan (1.25mg BID) as part of their therapeutic regime were
reviewed retrospectively. All cats had evidence of systolic failure based on their echocardiographic examination and 10/11 cases had pulmonary oedema or pleural effusion with an associated tachypnoea. Mean heart rate at pre-
sentation was 216 bpm and mean systolic blood pressure was 124 mmHg. Based on a traditional classification, seven cats had dilated, three hypertrophic and one restrictive cardiomypathy. Survival time was highly variable (range 9–52 months) but never shorter than the median survival time in cats with similar diagnoses not given pimobendan. Maximum duration of therapy was 585 days. In those cases which survived beyond 2 weeks, the owners felt that there was a significant improvement in the demeanour and appetite of their cats. This was associated with improvements in clinical signs with resolution of the dyspnoea and pleural effusion in echocardiographic parameters where measured that were marked in some cases. Adverse side effects relateable to the use of the pimobendan were not noted. Whilst recognising that pimobendan was not given as a monotherapy, the authors feel that the data from these cases when compared to a cohort of cats not given pimobendan as part of their therapeutic regime strongly justifies further evaluation of the use of pimobendan in the management of systolic failure in cats.

ABSTRACT #71
CLINICAL EFFICACY OF PIMOBEAND IN COMPARISON TO BENAZEPRIL AND METILDIGOXIN IN IRISH WOLFHOUNDS WITH PRECLINICAL DCM; PRELIMINARY EVALUATION OF AN ONGOING STUDY AFTER 6 YEARS, A.C. Vollmar, I. Ljungvall, K. Hansson, I. Ljungvall, P.R. Fox, Small Animal Veterinary Clinic, Bonn a. Wissen, Germany; Boehringer Ingelheim Vetmedica GmbH, Germany; Animal Medical Center, New York, USA.

A prospective, randomised, blinded study has been developed to evaluate the clinical effect of early therapeutic intervention in Irish wolfhounds with preclinical (asymptomatic) DCM or atrial fibrillation (AF) (i.e. dogs corresponding to an ISACHC score class I). Therapies include either pimobendan (0.25 mg/kg bid), benazepril (20.25–0.33 mg/kg/d), or metildigoxin (0.01 mg/kg/d, divided into two doses), with concomitant dietitazem (1–3 mg/kg bid) permitted in dogs with AF and tachycardia for the purpose of heart rate reduction.

The primary endpoint was a deterioration to heart insufficiency score (ISACHC) class II or III or b. After reaching the primary endpoint, therapies are modified in accordance with individual patient needs. The secondary endpoint was death/euthanasia due to cardiac disease.

At time of interim analysis more than 65 dogs were included in the study. In the pimobendan group, therapy failure was observed in only 1 dog after more than 52 months on therapy and development of severe mitral regurgitation compared to more than 20% and 30% of therapy failures in metildigoxine and benazepril group, respectively. For pimobendan treated dogs, left ventricular end-diastolic diameter (LVEDD) and left ventricular end-diastolic volume (LVEDV) was observed in a higher percentage of DCM cases and the normalisation of LV measurements lasted longer than in the dogs on benazepril or metildigoxin treatment.

Sudden cardiac deaths were reported for one case in the pimobendan group, and for two cases in the metildigoxin and benazepril group.

ABSTRACT #72
COMPARISON OF SHORT TERM EFFECTS OF PIMOBEAND AND BENAZEPRIL ON PULMONARY TRANSIT TIMES AND NEUROENDOCRINE PROFILE IN DOGS WITH DECOMPENSED MITRAL REGURGITATION. J. Higgsstrom, K. Hansson, K. Höglund, C. Kvart, I. Ljungvall, P.F. Lord, Departments of Clinical Sciences, and Anatomy, Physiology and Biochemistry, Swedish University of Agricultural Sciences, Uppsala, Sweden.

The angiotensin-converting-enzyme (ACE) inhibitor benazepril (Fortev- kor) and the modulator pimobendan (Vetmedin) are frequently used in treating dogs with uncompensated mitral regurgitation (DMR). Their effects on heart-rate normalised pulmonary transit times (nPPT), which is a measurement of overall cardiac pump function, and the neuroendocrine profile are incompletely studied. The aims of the present study were to compare the short-term effects of pimobendan to benazepril on nPPT and neuroendocrine profile in dogs with DMR treated either with benazepril (n=8) or pimobendan (n=8) treatment while continuing the furosemide therapy. The study was designed as a single blinded controlled study. Each dog underwent a full clinical examination, thoracic radiography, ECG examination, echocardiography, first-pass nuclear angiocardioscintigraphy (to obtain nPPT), and collection of blood and urine samples at day 0 and at day 7. Plasma concentrations of N-terminal fragments of pro-atrial and brain natriuretic peptides (NT-proANP and NT-proBNP), ACE, angiotensin II (AII), aldosterone (Aldo), vasopressin (Vas) and urinary ratios of Aldo, Aldo and Vas concentrations to urinary creatinine concentrations were measured. P-values < 0.05 were considered statistically significant. At day 7, nPPT, NT-proANP and NT-proBNP had significantly decreased in both treatment groups, and ACE-activity was significantly reduced in the benzapril group. Using repeated measurement analysis, the reductions in nPPT were significantly greater in the pimobendan group, whereas the reduction in ACE-activity was significantly greater in the benazepril group. The reduction in NT-proANP tended to greater in the pimobendan group (P=0.050). Changes in any other above mentioned variables were not significantly different between the two treatment groups. However, the change in NT-proANP was significantly correlated to the change in nPPT. It is concluded that pimobendan reduces nPPT to a greater extent than benazepril in dogs with DMR and that NT-proANP was the most efficient neuroendocrine variable in predicting changes in nPPT.

ABSTRACT #73
QUADRUCUSPID AORTIC VALVE: A RARE AETIOLOGY OF AORTIC REGURGITATION IN DOGS. G. Santamarina, I. Rodriguez, D. Insua, P. Pesini, L. Espino, M.L. Suarez. Department of Veterinary Clinical Sciences, Department of Anatomy, Faculty of Veterinary of Lugo, University of Santiago de Compostela (Spain).

Quadrucuspid aortic valve (QAV), a rare congenital cardiovascular anomaly, is an uncommon cause of aortic regurgitation. We report two unusual cases of this pathology in dogs.

Case #1: A 6-year-old male boxer was referred for evaluation of a heart murmur detected on routine physical examination. Careful cardiac auscultation revealed a grade III/VI systolic murmur over the left heart base. A grade II/VI diastolic murmur was also heard. Thoracic radiographs showed an elongate cardiac silhouette (VHS 12). Echocardiography revealed a QAV with four approximately equal sized cusps. A moderate aortic regurgitation was present. The aortic flow was turbulent with a maximal velocity of 3.15 m/s, indicating that the anomaly was causing mild blood obstruction. Echocardiography did not reveal any other notable cardiac abnormality. The dog was asymptomatic on presentation and no treatment was prescribed.

Case #2: A 6-year-old female boxer was presented with a history of anorexia and weight loss. After evaluation, a diagnosis of chronic kidney disease stage 3 (IRIS stagen system) was reached. The dog was proteinuric (UP/C=2) and hypertensive (SBP>180 mmHg). Cardiovascular evaluation was required to investigate a heart murmur detected during physical examination. A grade II/VI diastolic murmur was also heard. Thoracic radiographs showed an elongate cardiac silhouette (VHS 12.5). Echocardiography revealed a dilated left ventricle with an end- diastolic left ventricle diameter of 6.18 mm. FS was 35.9%. Right short axis view clearly demonstrated a 4-cusped aortic valve with an “X-shaped” commissural aspect in diastole. Colour-flow Doppler indicated moderate severe aortic regurgitation. Peak aortic outflow velocity was 2.62 m/s. Maximal velocity of the aortic regurgitation was 6.10 m/s, indicating that the anomaly was causing mild blood obstruction. Echocardiography did not reveal any other notable cardiac abnormality. The dog was asymptomatic on presentation and no treatment was prescribed.

ABSTRACT #74
A RETROSPECTIVE INVESTIGATION OF ECHOCARDIOGRAPHIC REPORTS BEFORE AND AFTER ATENOLOL TREATMENT IN CATS WITH HCM. Arnold A. Stokhof, Viktor Szatmari. Dept. of Clinical Sciences of Companion Animals, Utrecht University, The Netherlands.
The effect of medical treatment on myocardial changes in feline HCM is not well documented. We have investigated if atenolol treatment resulted in improvement measurable with routine echocardiography. Referred felines being examined in our Utrecht University Companion Animal Clinic between October 2003 until July 2006 and showing clinical symptoms of cardiac abnormality were sent to the diagnostic imaging section for echocardiography. If the report mentioned left ventricular hypertrophy compatible with HCM, the cats were additionally examined on hypertrophicidism and arterial hypertension. On exclusion of those syndromes they entered the study. The majority of cats (70%) were males.

The cats were treated with atenol (6.25 mg/day/cat below 3 kg bodyweight and 12.50 mg/day/cat above 3 kg of bodyweight). After three months a re-examination was performed. The initial examination and the last control examination have been used for comparison using the La/Ao ratio, FS, IVSs and IVSd. LVSPs and LVPWs, LVDPs and LVDPd. In individual cats the increase, no change or decrease of the numerical values of the mentioned parameters have been used, and in addition the Wilcoxon signed rank-test for the La/Ao values (not naturally distributed) and the Student’s paired t-test for the other parameters has been applied.

Sixty two cats were reported with left ventricular hypertrophy. Sixty two dogs did not show hypertroidyism or arterial hypertension and could be included. Control examination became available in 26 cats; in 18 a complete set of results was retrievable.

The individual comparison showed no differences in the parameters mentioned, except for the LVPWd showing a decrease and the LVDPd showing a decrease compared to the initial values measured.

With the statistical evaluation no significant (p value 0.05) changes could be documented.

We conclude that in feline HCM the male sex predposition has been confirmed. We have not been able to demonstrate a beneficial effect of the atenolol treatment.

**ABSTRACT #76**


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Doppler echocardiography (DE) indices are routinely used to assess left ventricular (LV) diastolic function, and more specifically, to estimate left ventricular filling pressure (LVFP) in dogs with congestive heart failure (CHF). However, accuracy of these indices has not yet been determined in dogs with heart disease. The aim of the study was to compare LVEDP determined invasively with variables of LVDPd determined by DE. We hypothesized that a furosemide-induced decrease of LVFP can be predicted by DE in a canine model of pacing-induced left-sided CHF.

Five experimental hound dogs instrumented with a telemetry LV pressure (LVp) gauge were used. Dogs were paced at 160 to 180 bpm for 2 weeks to induce mild left-sided CHF as defined by LVDPd > 20 mmHg. Dogs were randomised to either furosemide (4 mg/kg IV) or placebo (equal volume of 0.9% saline) using a cross-over double blind study design. Echocardiograms and LVp were recorded simultaneously at baseline and 30, 60, 120, and 240 min after drug administration. Seven DE variables commonly used to assess LVEDP were determined. Effect of treatment and time on variables was assessed using Two-Way RM ANOVA. Correlation between variables was assessed by Spearman rank order correlation analysis using pooled data. A P value of < 0.05 was considered significant.

RV pacing led to elevated LVDPd (range 22 to 33 mmHg) in all dogs. Furosemide but not placebo reduced LVEDP (median at baseline 26 mmHg and 240 min after drug administration; 26 mmHg and 18 mmHg and 26 mmHg and 28 mmHg, respectively). Of the DE variables examined, only the peak early transmural flow velocity-to-sysolicumension relax time ratio (E/IVRT) predicted changes in LVDPd (r = 0.58; p < 0.01) with a median E/IVRT of 1.10, 0.67, 0.65, 0.47, 0.46 for baseline thru 240 min furosemide.

Results suggest that the E/IVRT ratio may be used as a non-invasive index of LVEDP. Further studies in dogs with naturally-occurring CHF are needed to clinically validate our findings.

**ABSTRACT #77**

**A PROSPECTIVE COHORT STUDY OF SYSTOLIC EJECTION MURMURS AND THE LEFT VENTRICULAR OUTFLOW TRACT IN BOXER DOGS DURING THE GROWTH PERIOD.** J. Höglander, J. Häggeström2, C. Bassadoni, C. Kwart1.

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There is a high prevalence of low intensity ejection murmurs in adult boxer dogs which may be related to abnormal development of the left ventricular outflow tract (LVOT). This has not previously been investigated in growing boxers. The aims of the current study were to compare the progression of heart murmurs, development of the LVOT and flow velocities in the great arteries during the first year of life in two groups of boxer puppies, those with and those without a low intensity ejection murmur at 7 weeks of age.

Matched pairs of privately-owned boxers, one puppy with a low intensity ejection murmur and one without, were selected. None of the dogs had structural evidence of heart disease at inclusion. The dogs were studied prospectively with examinations at 7 weeks, 3, 4, 6, 9 and 12 months of age by cardiac auscultation, ECG and Doppler echocardiography.

Variation in presence and intensity of heart murmurs was found in both groups, and there were no significant differences in LVOT dimensions between the groups. None of the dogs developed subvalvular aortic stenosis. Three dogs with grade II/VI murmurs at inclusion developed mild-moderate aortic insufficiency. There were no significant differences in aortic or pulmonic flow velocities between the groups at any of the examinations.

In conclusion, the variability in presence and intensity of low intensity ejection murmurs is high during the first year of life in boxers. A subsupopulation of dogs with grade II/VI murmurs appears to be at risk of abnormal development of the LVOT, as indicated by development of aortic insufficiency. The importance of a relatively smaller size of the LVOT in the generation of low intensity ejection murmurs in boxers remains to be demonstrated.