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# European Society of Veterinary Clinical Pathology (ESVCP) Special Program

In conjunction with the European College of Veterinary Internal Medicine — Companion Animals (ECVIM-CA) 16th Congress

Amsterdam, The Netherlands — September 14–16, 2006

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## Oral Platform Presentations

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1

URINARY EXCRETION OF ALBUMIN AND RETINOL-BINDING PROTEIN AS EARLY INDICATORS OF CANINE RENAL DISEASE. **J. Raila<sup>1</sup>, B. Kohn<sup>2</sup>, F.J. Schweigert<sup>1</sup>**. <sup>1</sup>Institute of Nutritional Science, University of Potsdam, Germany; and <sup>2</sup>Clinic for Small Animals, Free University of Berlin, Germany.

Early diagnosis of renal disease is an important issue in veterinary nephrology. Its presence is often detected at a late stage if azotemia or even uremia is already present. Validated biomarkers are a prerequisite for early detection of renal disease, and thus for timely application of therapeutic interventions that may slow or halt disease progression. We suggested that concentrations of urinary albumin (UAlb) and urinary retinol-binding protein (URBP) are sensitive indicators of glomerular and tubular dysfunction in dogs. However, the application of UAlb and URBP as early indicators for diagnosis of canine renal disease has not been established yet. The objective of this study was to compare concentrations of UAlb and URBP between dogs with renal disease and healthy controls. Blood and urine samples were obtained from 68 client-owned dogs of various breeds. Renal function was determined on the basis of glomerular filtration rate (GFR), plasma creatinine and the ratio of urinary protein to urinary creatinine (UP/UC). Concentrations of UAlb were determined by an enzyme-linked immunosorbent assay (ELISA). Levels of URBP were assessed semiquantitatively by immunoblotting after SDS polyacrylamid gel electrophoresis. Healthy dogs (GFR > 90 ml/min/m<sup>2</sup> body surface area; UP/UC ≤ 0.5; n=8) had low concentrations of UAlb/UC (median 0.008, range 0.002–0.08), which were not different from those found in dogs with slightly reduced GFR (45–90 ml/min/m<sup>2</sup> body surface area; n=26). UAlb/UC was elevated (P < 0.05) in dogs with normal GFR but questionable UP/UC (0.5 to 2), and in dogs with apparent renal disease (serum creatinine ≥ 125 μmol/l; UP/UC ≥ 2; n=15). URBP was not present in any healthy dog, whereas 13 out of the 26 dogs with reduced GFR (45–90 ml/min/m<sup>2</sup> body surface area) had

elevated URBP/UC. In dogs with apparent renal disease, detection of URBP was positive throughout. The URBP/UC and UAlb/UC values correlated (Spearman ρ = 0.59; P < 0.001) and both parameters were positively related to UP/UC (P < 0.001). The higher excretion of UAlb and URBP are due to dysfunction of the glomeruli and proximal tubuli, respectively, and detects alterations in renal protein handling. The determination of UAlb and/or URBP, however, does not provide diagnostically valuable information to detect slight reductions of GFR and thus the early onset of renal insufficiency in dogs.

2

EFFECTS OF AGE AND BODY WEIGHT ON GLOMERULAR FILTRATION RATE IN HEALTHY DOGS. **N.H. Bexfield<sup>1</sup>, R. Heiene<sup>2</sup>, R.J. Gerritsen<sup>3</sup>, M. Karimi<sup>4</sup>, K.A. Eliassen<sup>4</sup>, M.E. Herrtage<sup>1</sup>, A.R. Michell<sup>5</sup>**. <sup>1</sup>Department of Veterinary Medicine, University of Cambridge, Cambridge, UK; <sup>2</sup>Department of Companion Animal Clinical Sciences, Norwegian School of Veterinary Science, Oslo, Norway; <sup>3</sup>R.J. deKompaan Veterinary Clinic, Ommen, Norway; <sup>4</sup>Department of Basic Sciences, Norwegian School of Veterinary Science, Oslo, Norway; and <sup>5</sup>Department of Biochemical Pharmacology, St. Bartholomew's Hospital, London, UK.

Measurement of glomerular filtration rate (GFR) is regarded as the gold standard index of renal function and is more sensitive than measurement of serum creatinine. Whilst the ageing human kidney demonstrates well-documented changes in morphology accompanied by a decline in GFR, similar data do not exist for dogs. The aim of this prospective study was to estimate the GFR in healthy dogs of different ages by the plasma clearance of iohexol (CL), and to test the hypothesis that an age-related reduction in GFR would be evident. The study population consisted of clinically healthy dogs of varying breeds, ages and weights. Concurrent disease was excluded based on physical examination, serum biochemistry, a complete blood count and urinalysis. CL was measured by an intravenous bolus of iohexol, with blood samples collected at 0, 2, 3, 4 hours post injection and with informed owner consent. Area under the curve was calculated by WinNonlin using a compartmental model and an empirical correction formula (Heiene et al, J Vet Intern

Med.1999;13:587–596) normalised to body weight in kg. In 132 dogs, CL varied from 0.96 to 4.31 ml/min/kg. There was no significant correlation between CL and age ( $r^2 < 0.1$ ,  $p > 0.05$ ), however, there was a trend for a decreased GFR with increasing body weight. It is, therefore, possible that assessment of CL in dogs grouped by body weight might be required for demonstration of age-related changes in GFR. Such functional studies would also be complemented by assessment of morphological changes in the canine kidney with age. Age and body weight may be important when assessing renal function in canine patients.

### 3

EVALUATION OF THE PROTHROMBINASE-INDUCED CLOTTING TEST (PiCT) ASSAY FOR MONITORING OF HEPARINIZATION OF CANINE WHOLE BLOOD WITH DALTEPARIN.

**L.R. Jessen, K.H. Jensen, L.B. Pedersen, B. Wiinberg, A.L. Jensen, A.T. Kristensen.** Small Animal Clinical Sciences, The Royal Veterinary and Agricultural University, Copenhagen, Denmark.

Low molecular weight heparin (LMWH) is increasingly used in veterinary medicine for both treatment and prophylaxis of thromboembolic disease. Since conventional plasma clotting assays are only minimally influenced by LMWH, the anti-Xa assay is considered the gold standard for monitoring of therapy. However, although the anti-Xa assay reflects the concentration of LMWH in plasma several studies have demonstrated that the anti-Xa assay is a poor predictor of antithrombotic efficacy and bleeding risk in the individual patient treated with LMWH. PiCT is a novel plasma assay for the determination of anticoagulant activity through FXa and/or FIIa inhibition. Studies in humans have demonstrated that the PiCT assay determines the activity of direct and indirect thrombin inhibitors in a linear fashion, thus suggesting that the assay is suitable for monitoring of LMWH therapy in humans. The aim of this study was to determine the influence of in vitro heparinization of canine whole blood with dalteparin (Fragmin) on PiCT values in order to investigate the usefulness of the method in monitoring of LMWH therapy in dogs. Blood samples were collected from 7 clinically healthy dogs. Citrated whole blood (WB) was spiked with dalteparin (Fragmin) to final concentrations of 0, 0.2, 0.4, 0.8, 1.2 and 1.5 U/ml WB. PiCT was performed by adding plasma to a reagent containing FXa, FV activator from Russels snake venom and phospholipids. After 180 seconds of incubation the sample was recalcified and the clotting time was determined. Measurements were performed using an ACL 9000, which was set to measure for 190 sec. All measurements were run in duplicate along with a plasma pool from 5 healthy dogs. SAS 9.1 was used for descriptive statistics and linear regression. One dog was excluded from statistical analyses due to lipemic plasma. The PiCT values are expressed in seconds and given as means (standard deviations). The PiCT clotting times were 25.5 (0.95), 55.2 (2.55), 82.4 (3.85) and 134 (6.5) at dalteparin concentrations of 0, 0.4, 0.8 and 1.6 U/ml plasma, respectively. PiCT values above a dalteparin concentration of 1.6 U/ml plasma were not measurable. The correlation between dalteparin concentrations and the PiCT values was  $R^2=0.96$  ( $P < 0.0001$ ). In conclusion, the PiCT assay appears to be a sensitive method for the simultaneous detection of Anti-Xa and Anti-IIa activity in canine plasma at dalteparin concentrations from 0–1.6 U/ml plasma. In this range the PiCT assay provides excellent linearity, thus suggesting that the assay is a suitable method for monitoring of dalteparin therapy in dogs. Prospective clinical studies are needed to evaluate the clinical usefulness of PiCT for the monitoring of treatment with LMWH in vivo.

### 4

ANTIOXIDANT DEFICIENCIES IN CLINICALLY ILL DOGS AND CATS. **K.R. Viviano, L. Goodman, S.N. Lavergne, L. Grundahl, B. VanderWielen, L.A. Trepanier.** Department of Medical

Sciences, University of Wisconsin-Madison, Madison, Wisconsin, USA.

Deficiencies in the antioxidants glutathione, cysteine, and/or ascorbate have been found in critically ill human patients with a number of diseases, and have been correlated with both severity of illness and decreased survival. Other than studies in patients with liver disease, little is known about antioxidant deficiencies in clinically ill dogs and cats. The purpose of this study was to compare antioxidant status in clinically ill versus healthy dogs and cats, to determine whether antioxidant depletion is related to severity of disease, duration of hospitalization, or survival to discharge. **Study design:** four groups of client owned pets were studied: 1) clinically healthy dogs, 2) clinically healthy cats, 3) clinically ill cats and 4) clinically ill dogs, admitted to the Veterinary Teaching Hospital for diagnostics and/or treatment. Whole heparinized blood was obtained from all animals after a morning fast and prior to any treatment in the hospital was analyzed for plasma ascorbate, plasma cysteine, and erythrocyte reduced glutathione, using HPLC. Signalment, weight and diet history were recorded for all animals. In addition, disease diagnosis, severity of disease, days hospitalized, and survival status at the end of hospitalization were recorded for ill patients. Patients receiving blood transfusions in the previous 3 months or total parental nutrition, vitamin containing fluids, N-acetyl cysteine, or S-adenosylmethionine in the 2 weeks prior to sampling were excluded. **Results:** Data from 30 dogs and 12 cats have been collected to date. Erythrocyte glutathione concentrations were significantly lower in clinically ill cats (median 2.0 mM, range 1.1–2.8 mM) compared with healthy cats (2.8 mM, range 2.5–3.3 mM;  $P=0.025$ ). In dogs plasma ascorbate concentrations were significantly lower in clinically ill dogs (median 11.9  $\mu$ M, range 0.5–36.0  $\mu$ M) compared to healthy dogs (24.0  $\mu$ M, range 1.5–59.3  $\mu$ M;  $P=0.024$ ). These preliminary results indicate that antioxidant deficiencies are indeed present in clinically ill dogs and cats. Additional patient recruitment is ongoing to fully characterize these deficiencies, and to determine the association between antioxidant status, severity of disease, and patient survival. The final results of this study will allow us to better predict which populations of ill cats and dogs are likely to benefit from antioxidant therapy and will provide the basis for prospective studies on the potential benefits of vitamin C, N-acetyl cysteine, or S-adenosylmethionine supplementation in hospitalized veterinary patients.

### 5

A STUDY OF THE PROGNOSTIC USEFULNESS OF BLOOD LEUKOCYTE CHANGES IN CANINE PARVOVIRAL ENTERITIS.

**A. Goddard<sup>1</sup>, A.L. Leisewitz<sup>2</sup>, N. Duncan<sup>3</sup>, M.M. Christopher<sup>4</sup>.** Departments of <sup>1</sup>Companion Animal Clinical Studies, <sup>2</sup>Veterinary Tropical Diseases and <sup>3</sup>Paraclinical Science, Faculty of Veterinary Science, University of Pretoria, Pretoria, South Africa; and <sup>4</sup>Department of Pathology, Microbiology & Immunology, School of Veterinary Medicine, University of California, Davis, USA.

Canine parvoviral enteritis is an economically important disease in South Africa and globally. Although treatment of dogs with parvoviral enteritis is often successful, many dogs die of complications related to septicaemia or are euthanized because of anticipated high costs. More effective prediction of the outcome of this disease will have an economic impact if a prognosis can be determined early in the course of the disease. Although leukocyte responses seldom are pathognomonic for a specific disease, they can provide clinical information to establish a fairly reliable prognosis. A prospective study was performed on 62 puppies presented to the Onderstepoort Veterinary Academic Hospital (OVAH) with typical clinical signs of canine parvoviral enteritis that subsequently was confirmed on electron microscopy. Full haematology was performed at admission

as well as every consecutive day until death or discharge. Of the 11 puppies that died (18%), 9 died due to complications of the disease and two were euthanized due to financial restrictions and a poor prognosis. The puppies that died due to the disease died within the first 3 days of hospitalization. All the puppies that died were sent for a full post-mortem examination and histopathological evaluation. Statistical analysis of the data showed that there was a definite difference between the puppies that died and those that survived in several of the leukocyte parameters. These parameters included the total leukocyte, lymphocyte, monocyte and eosinophil counts. In none of the puppies that died from the disease did the total leukocyte count rise above  $1.0 \times 10^9/L$ . In the puppies that survived, the total leukocyte count started rising within 24–48 hours after admission and often resulted in a rebound leukocytosis. The puppies that died did not develop lymphocytosis to indicate an immune response, whereas the surviving puppies developed lymphocytosis within 24–48 hours after admission. The puppies that died also did not develop monocytosis and remained severely eosinopaenic during the course of the disease. Evidence of impaired leukocyte production was found on histopathology. Most of the puppies that died from the disease showed marked to severe thymic and lymphoid atrophy and marked to severe bone marrow hypocellularity. These results show that a reliable prognosis could be obtained within 24–48 hours after admission by evaluation of the leukocytes, specifically the total leukocyte, lymphocyte, monocyte and eosinophil counts.

**6**  
ACCIDENTAL AFLATOXICOSIS DUE TO A CONTAMINATED COMMERCIAL DIET IN 46 DOGS INDUCED SEVERE HEPATOPATHY AND LIVER DYSFUNCTION, DECREASED ANTITHROMBIN ACTIVITY, COAGULOPATHY, DIC AND HIGH MORTALITY. **I. Aroch, E. Sella, Y. Bruchim.** School of Veterinary Medicine, The Hebrew University of Jerusalem, Israel.

Aflatoxin refers to a closely related group of metabolites of *Aspergillus flavus*, and is a common contaminant of stored grains. An outbreak of aflatoxicosis had occurred in Israel due to contaminated maize included in a commercial canine diet. The aflatoxin concentration in several food samples was 80–300 ppb, while FDA regulation allows a 20 ppb concentration. Dogs consumed this diet for at least 14 d, and some for as much as 60 d prior to admission. During this outbreak, 46 dogs were admitted to the Hebrew University Veterinary Teaching Hospital, and treated for 1–21 days. Upon admission, the most common clinicopathological abnormalities included increased activities of alkaline phosphatase (89%), aspartate aminotransferase (83%), alanine aminotransferase (76%), prolonged prothrombin (PT, 72%) and activated partial thromboplastin (aPTT, 72%) times, decreased antithrombin concentration (<80%, 72%), hyperbilirubinemia (71%), hypocholesterolemia (57%), increased hematocrit (>0.5, 57%), thrombocytopenia (< $150 \times 10^9/L$ , 40%), hypoproteinemia (30%), neutrophilic leukocytosis (26%) and increased  $\gamma$ -glutamyltransferase activity (22%). Based on these abnormalities, severe hepatopathy and liver failure were diagnosed. Four days later, the prevalence of increased liver enzymes activities, hypoantithrombinemia (78%) and thrombocytopenia (68%) was increased in the surviving animals, despite intensive fresh or fresh frozen plasma therapy, while the prevalence of hypocholesterolemia decreased (21%). Eight days post-admission, the prevalence of hypoantithrombinemia was 81% (17/21), while that of prolonged PT and aPTT was 80% and 65%, respectively. Hyperammonemia was present in 10 dogs during hospitalization. Disseminated intravascular coagulation (DIC) was diagnosed if dogs had thrombocytopenia (< $150 \times 10^9/L$ ) as well as at least 2 of the following: prolongation (>25%) of the PT or aPTT, hypoantithrombinemia (<70%) and clinical signs compatible with DIC (i.e., petechiae, ecchymoses, hematochezia, hematemesis or hematuria).

Based on these criteria, 29/46 (63%) dogs were diagnosed with DIC. Acute renal failure was observed in 3/46 dogs. The overall mortality was 67% (31/46). Hypocholesterolemia upon admission, the presence of DIC and bilirubin concentration > 7 mg/dl ( $120 \mu\text{mol/l}$ ) at one point during hospitalization were significant ( $p = 0.0006$ ,  $p = 0.0037$  and  $p < 0.0001$ , respectively) risk factors for mortality. Aflatoxicosis in dogs is characterized by severe liver failure leading to DIC, and carries a guarded to grave prognosis.

## Poster Presentations

**7**  
HAPTOGLOBIN AND C-REACTIVE PROTEIN IN CANINE EFFUSIONS. **M.D. Parra<sup>1</sup>, K. Papisoulitis<sup>2</sup>, F. Tecles<sup>1</sup>, J.J. Cerón<sup>1</sup>.** <sup>1</sup>Animal Medicine & Surgery Department, Faculty of Veterinary Medicine, Murcia, Spain; and <sup>2</sup>Clinical Veterinary Science Department, Bristol University, Bristol, UK.

The purpose of the present study was to assess if the quantification of two acute phase proteins, haptoglobin (Hp) and C-reactive protein (CRP), in canine effusions could be used to differentiate these body cavity fluids. Two time-resolved immunofluorometric assays were used for determining the Hp and CRP concentration in 19 canine effusions: 10 exudates and 9 transudates, according to their total protein (TP) concentration and nucleated cell count (NCC). Samples were obtained from dogs which had presented with various diseases to the Veterinary Hospitals of Murcia or Bristol University. Fluids were collected into EDTA and plain tubes. Samples from the plain tube were transferred into Eppendorf tubes which were frozen at  $-20^\circ\text{C}$  until analysis. Haptoglobin concentrations in canine effusions were arbitrary and did not allow differentiating transudates from exudates, however, CRP levels in exudates were significantly higher than those observed in transudates ( $P < 0.01$ ). Hp is an acute phase protein that undergoes moderate increases in its concentration after an inflammatory stimulus, so maybe the changes associated with exudates are not high enough to be detected. Another limitation is that Hp is influenced by glucocorticoids and other drugs. Thus, although methodological limitations did not exist, measuring Hp concentration in canine effusions did not permit classifying them as transudates or exudates, unlike CRP quantification, which was demonstrated to be useful for the differentiation of both types of fluids.

**8**  
CYTOHISTOLOGICAL ASPECTS OF CANINE TRANSMISSIBLE VENEREAL TUMORS. **D. Ganga<sup>1</sup>, M. Sincal<sup>1</sup>, D. Argheriu<sup>1</sup>, M. Ganga<sup>2</sup>.** <sup>1</sup>Cell Biology-Histology Department, Faculty of Veterinary Medicine, Timisoara, Romania; and <sup>2</sup>Private Veterinary Practice, Timisoara, Romania.

Transmissible venereal tumors (TVT), also known as Sticker tumors, are contagious, sexually transmitted tumors of dogs. TVT is a benign reticuloendothelial tumor, usually seen in sexually active dogs from an environment with a high concentration of free roaming dogs with uncontrolled reproduction. Due to their sexually transmitted nature they are most commonly found on the external genitalia and occasionally on the internal genitalia. These tumors also have been observed in other locations such as the nasal and oral cavities. In these instances the neoplasm is spread by social behaviors

including sniffing and licking. Sometimes, if the patient is immune-suppressed due to very young age or disease condition, the tumor can indeed spread in a cancerous fashion. The definitive diagnosis of TVT is based on cytohistological exam of the tumors that reveal some typical findings. Our studies involved 10 dogs (4 male and 6 female) that were clinical diagnosed with TVT of the genital mucosa. From tumor aspirates we made smears that were stained by Wright-Leishman and Diapanoptic methods. After one week, the tumors were surgically resected and small tumor fragments were obtained and prepared for cytohistological studies by H&E and Mallory methods. Cytological examination revealed in all the cases the presence of the typical round to slightly polyhedral cells. These neoplastic cells had a round nucleus, fine to granular chromatin pattern, and often a single, prominent nucleolus. Mitotic figures are frequently observed. The cytoplasm was pale blue and moderately abundant. The most prominent cytological feature of TVTs was the presence of distinct, clear, cytoplasmic vacuoles. TVT cells that lack cytoplasmic vacuoles may be easily confused with other round cell tumors. The morphological appearance and location of the tumor, however, are helpful in the diagnosis. A variety of inflammatory cells may be observed, especially in traumatized neoplasms. Cytohistological exam of the tumors revealed a homogenous tissue with a compact mass of cells that were mesenchymal in origin and the border of which could not easily be differentiated. In 8 cases infiltration of lymphocytes, plasma cells and macrophages was observed. In conclusion, the cytohistological aspects observed in TVT are very useful to establish the diagnosis. The diagnosis may be made solely from cytological examination of smears based on the presence of the typical neoplastic cells.

9

ACCURACY OF A PORTABLE MONITOR (LACTATE SCOUT) FOR MEASUREMENT OF LACTATE CONCENTRATIONS IN CANINE BLOOD. **L. Ferasin<sup>1</sup>, S.J. Dodkin<sup>2</sup>, A. Amodio<sup>2</sup>, J.K. Murray<sup>2</sup>, K. Papisoulitis<sup>2</sup>.** <sup>1</sup>College of Veterinary Medicine, University of Minnesota, St Paul, MN, USA; and <sup>2</sup>Department of Clinical Veterinary Sciences, University of Bristol, Bristol, U.K.

The study was performed to evaluate the accuracy of a portable analyser (Lactate Scout) in measuring canine blood lactate concentrations. First, the effect of sample storage time and temperature on plasma lactate concentrations was evaluated on blood samples obtained from 6 dogs and stored at 4°C and 20°C. Plasma lactate was measured with a spectrophotometric system (Kone lab) 30, 60, 120, and 240 min after blood collection. The obtained values were compared with the lactate concentration measured immediately after the blood collection. Statistical analysis revealed no significant effects of storage time or temperature. The comparison of lactate values obtained by the portable method with those obtained by the reference analyser (Konelab) was performed on blood samples from 48 dogs. The correlation between methods was  $r = 0.98$  ( $sl = 0.81$ ;  $int = 0.20$ ) The level of agreement (Bland Altman) was good for mean concentrations lower than 5 mmol/L. At higher concentrations the Scout analyser values were lower than those measured by the Konelab method, although only 5 of the 48 samples analysed in this study had a lactate result above this value. In summary the Lactate Scout meter exhibits good comparability with the reference Konelab method in the range 0–5 mmol/L.

10

CANINE CRP MEASUREMENT IN WHOLE BLOOD AND SALIVA: AN ALTERNATIVE TO SERUM QUANTIFICATION. **M.D. Parra, P. Fuentes, A. Gutiérrez, L. Soler, S. Martínez,**

**J.J. Cerón.** Animal Medicine & Surgery Department, School of Veterinary Medicine, Murcia, Spain.

**Aim:** To compare the measurement of canine CRP in serum, whole blood and saliva specimens by using a time-resolved immunofluorometric assay (TR-IFMA). **Materials & Methods:** Samples for CRP measurement were obtained from 7 clinically healthy dogs and from 40 dogs with random pathological processes. Blood samples were collected by venipuncture into EDTA tubes, and tubes containing a coagulation activator and a gel separator were used to obtain serum. For saliva collection, commercial Salivette tubes were used. CRP determination was carried out by using a TR-IFMA previously described (MD Parra, M Tuomola, J Cabezas-Herrera, JJ Cerón. 2006. Analytical and clinical validation of a time-resolved immunofluorometric assay (TR-IFMA) for canine C-reactive protein in serum. *Veterinary Research Communications* 30(2): 113–126. Parra et al, 2006). **Results:** CRP levels in diseased dogs were significantly higher than those observed in healthy ones in all types of samples ( $P < 0.001$ ). The largest differences between both groups were seen in saliva specimens. A high correlation was found for CRP measurements in serum and whole blood ( $R^2 = 0.91$ ), but the correlation was low between serum and saliva CRP levels ( $R^2 = 0.55$ ). CRP cut-off values of 8, 3 and 0.008  $\mu\text{g/ml}$  showed good sensitivity (87.5%, 87.5%, 100%) and specificity (100%, 100%, 100%) in serum, whole blood and saliva specimens, respectively. **Conclusion:** The TR-IFMA provides a highly sensitive assay for CRP determination in dog specimens. The clinician might choose among serum, whole blood and saliva specimens in order to analyze CRP. However, measurement in whole blood provides time savings, since centrifugation is not needed, whereas the use of saliva presents the advantage of an easier and less stressful sampling method for the animals.

11

THE BEHAVIOUR OF TUMOUR CELLS IN FELINE AND CANINE ADENOCARCINOMA UNDER TREATMENT WITH MAGNETIC FLUIDS.

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The experiments were performed to study the antitumoral effect of some compounds with magnetic nanoparticles. In addition, we observed the behavior of the tumor tissue under the treatment with magnetic fluids over time. For the experiment 2 biocompatible magnetic fluids were chosen. These magnetic fluids were: MF1—water magnetic fluid, 80 G, with magnetite ( $\text{Fe}_3\text{O}_4$ ) stabilized with laurel acid and MF2—water magnetic fluid with  $\text{CoFe}_2\text{O}_4$  nanoparticles, 80 G, stabilized with laurel acid. The experiments were done on 3 cats and 3 bitches in a private veterinary clinic. Both magnetic fluids were injected into mammary adenocarcinomas in cats and bitches with the owners' permission. From each magnetic fluid about 4 mg magnetic nanoparticles/ $1\text{cm}^3$  tumor tissue were injected in several symmetrical points. To maintain the magnetic nanoparticles in the tumor tissue for a longer time two external magnets with a magnetic field of about 0.1 Tesla were placed on the mammary gland for 10 minutes. After injecting magnetic fluids the animals were monitored. In all cases, after 7 days a pronounced tendency for tumor regression was observed. Parts of the tumors were removed after 1 month and the others after 2 months. From the tumor tissues small fragments were taken for cytohistological exam. The microscopic exam revealed that at 1 month after the magnetic fluid injection the tumor cells were overloaded with magnetic nanoparticles and the proliferation of the tumors had stopped. After

two months, the microscopic exam pointed out a massive degeneration of the tumor cells, but many tumor cells remained blocked with nanoparticles having a stony aspect. Also the formation of a fibroconnective tissue was observed. In the mammary gland no more invasive tumor cells were found.

## 12

RETROSPECTIVE REVIEW OF ABNORMAL CANINE SERUM PROTEIN ELECTROPHORESIS RESULTS. **S.W. Tappin, S.J. Dodkin, S. Tasker, K. Papasouliotis, K.F. Murphy.** Department of Clinical Veterinary Sciences, University of Bristol, Bristol, UK.

Serum protein electrophoresis (SPE) is performed to investigate protein abnormalities in canine patients. Although dysproteinaemias are reported to occur in reviews of specific diseases and individual case reports, to the authors' knowledge, there are no currently published reviews of abnormal SPE results in the dog. The aim of this study was to describe the SPE results in a canine referral population in the UK and to relate any abnormalities to an underlying aetiology. Between January 2000 and September 2005, SPE was performed in 123 dogs as part of their diagnostic investigations at the University of Bristol. SPE was performed on cellulose acetate

gel and read by a single operator (S.J.D.) using a densitometer. These SPE results were compared with reference ranges for SPE data derived from 75 clinically healthy dogs (constructed using the mean  $\pm$  2 SD). Of the 123 dogs, 93 (75.6%) had abnormal SPE values. Common presenting signs in these dogs were lethargy (32/93), anorexia (18/93) and polyuria/polydipsia (15/93). The most common clinical examination findings were pyrexia (21/93), poor body condition (16/93) and lymphadenopathy (8/93). The 93 dogs with abnormal SPE values were classified according to aetiology. Sixty-four dogs had an infectious and/or inflammatory condition (Group A) which included 4 dogs with steroid-responsive meningitis and 3 with discospondylitis. Nineteen dogs had neoplasia (Group B) including 4 dogs with lymphoma and 3 with multiple myeloma. Twenty dogs had diagnoses that were neither neoplastic nor infectious/inflammatory (Group C); these included 3 dogs with portosystemic shunts and 3 with idiopathic epilepsy. There were 20 dogs where no final diagnosis was reached (Group D). Dysproteinaemias occurred in a wide variety of canine disease processes. The most frequent abnormality detected was raised  $\gamma$ -globulins (44 cases, range 10.8–64.7 g/L) which was most commonly associated with infectious/inflammatory conditions. Five dogs had monoclonal spikes; all had neoplasia (3 multiple myelomas, 1 spinal lymphoma and 1 splenic plasmacytoma).