



Occurrence of Hypertrophic Cardiomyopathy in a Large Cohort of British Shorthair Cats

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Research Abstract Program of the 2010 ACVIM Forum

Anaheim, California,
June 9 – 12, 2010
Index of Abstracts

ORAL PRESENTATIONS – Thursday, June 10

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SMALL ANIMAL – CARDIOLOGY**			
9:00 am	1	Sonja Fonfara	Cytokine and Matrix Metalloproteinase Expression in Blood Samples of Dogs With Congestive Heart Failure
9:15 am	2	Dennis Trafny	Cardiac Troponin-I Concentration is Elevated Pre and Post-Pacing in Dogs With Bradyarrhythmias: Is Myocarditis a Potential Etiology?
9:30 am	3	Kristine Yee	Diagnostic Test Parameters in Cats With Heart Disease and their Correlation With NT-proANP, NT-proBNP and Troponin I Measurements
9:45 am	4	Gemma Fraga Veloso	Expression of Urocortins in Canine Myocardium and Plasma Levels in Dogs With Cardiac Disease
<i>BREAK</i>			
10:30 am	5	Dan Ohad	Is the Cardio-Renal-Anemia Syndrome Prevalent in Dogs?
10:45 am	6	Andrea Lantis	Aldosterone Escape in Furosemide-Activated Circulating Renin-Angiotensin-Aldosterone System (RAAS) in Normal Dogs
11:00 am	7	Melanie Hezzell	Relationships Between Serum and Urine Aldosterone, Ventricular Remodelling and Outcome in Dogs With Mitral Valve Disease
11:15 am	8	Ian Jones	Flow Mediated Vasodilation in Canine Chronic Mitral Valve Disease
11:30 am	9	Inge Tarnow	Congestive Heart Failure in Dogs is Associated With Enhanced Platelet-Leukocyte Aggregates - A Marker for Platelet Activation
11:45 am	10	Inge Tarnow	Thromboelastography in Dogs With Asymptomatic Myxomatous Mitral Valve Disease
12:00 pm	11	Caroline Rasmussen	24-hour Electrocardiography in Clinical Healthy Cavalier King Charles Spaniels, Wire-Haired Dachshunds and Cairn Terriers
12:15 pm	12	Lisa Freeman	Development and Evaluation of a Quality of Life Questionnaire for Cats With Cardiac Disease

** Also see *Cardiology abstracts 68 - 81 (Thursday, June 10, 2:15 pm – 6:00 pm)*

SMALL ANIMAL – ONCOLOGY

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Boldface type indicates ACVIM Resident Research Award eligibility. Presentation times are subject to change.

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<i>BREAK</i>			
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6:00 pm	180	Jevan Christie	Fecal Sensitivity as a Tool to Differentiate Between Non-Neoplastic and Neoplastic <i>Spirocerca Lupi</i> Nodules Using a Modified Centrifugal Flotation Method

POSTER PRESENTATIONS

On Display:

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Attended by Authors Eligible for ACVIM Resident Research Awards:

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184	Denise Schwartz	Six Minute Walk Test Standardization for Dachshund, Poodle and Labrador Retriever Dogs
185	Aparecido Camacho	Effects of Treadmill Training Over Autonomic and Hemodynamic Functions in Healthy Dogs
186	Masashi Mizuno	Effects of Running on the Renin-Angiotensin-Aldosterone System in Dog
187	Sara Granström	Occurrence of Hypertrophic Cardiomyopathy in a Large Cohort of British Shorthair Cats
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189	Aparecido Camacho	Heart Rate Variability in Dogs With Mitral Endocardiosis or Natural Morbid Obesity
190	Carley Saelinger	Comet-Tail Artifacts in Normal Dogs and Dogs With Cardiogenic Pulmonary Edema
191	Takashi Ebisawa	Clinical Usefulness of Measuring Plasma Atrial Natriuretic Peptide Concentrations for Assessing the Severity in Dogs With Degenerative Mitral Valve Disease
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197	Shigeki Yamano	Endogenous Erythropoietin Levels and Iron Utilization in Dogs With Degenerative Mitral Disease
198	Yoko Fujii	Prevalence of Right to Left Shunt Due to Patent Foramen Ovale Concurrent with Pulmonary Stenosis in Dogs
199	Meg Sleeper	Dobutamine Stress Testing in Portuguese Water Dogs with Juvenile Dilated Cardiomyopathy
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201	Michael Katz	Thiamylal Anesthesia Reveals Predominant Role for the Central Mechanism of Respiratory Sinus Arrhythmia in the Dog
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206	Elizabeth Lechner	Oxidative Stress in Dogs With Lymphoma Before and After Administration of Doxorubicin: A Pilot Study

hunds (476 ± 42 m; min = 400 m; max = 556 m; 95%CI 459–498). In conclusion, regardless of anatomical differences between Poodles and Dachshunds, they walk similar distances. Based on a previously obtained equation ($\text{Distance} = 55.3 + 8.3 \text{ TC} + 0.9 \text{ L} + 2.1 \text{ RH}$), predicted distances were overestimated for Labradors and Dachshunds, demonstrating that standardization is required for different breeds.

ABSTRACT #185
EFFECTS OF TREADMILL TRAINING OVER AUTONOMIC AND HEMODYNAMIC FUNCTIONS IN HEALTHY DOGS. JPE Pascon, D Paulino-Júnior, E Zacché, FN Gava, EMG Ortiz, AA Camacho. College of Agricultural and Veterinary Sciences, São Paulo State University, Campus of Jaboticabal, Brazil.

Regular physical activity has been widely used in human cardiovascular therapy, promoting better autonomic control, heart function, life quality and decreasing sudden death risks. In dogs, however, there is not a standardized guideline to be used. This research has the goals of evaluating the effects of standardized treadmill training over the autonomic and hemodynamic functions of healthy dogs.

Six dogs (4 Beagles; 2 mixed breed), with mean weight of 13,1 Kg, were enrolled in this study. Twenty-four hour time domain heart rate variability (HRV), and echocardiography were analyzed before and after four weeks, five days a week, 40 minutes a day training. The intensity of training was individually determined by a maximal heart rate (MHR), observed in a maximal progressive effort test. Gradually, the intensity of training was increased in 50% of MHR, in the first week, to 60%, 70% and 80% of MHR in the second, third and fourth weeks, respectively. The paired *t* test was used to compare data before and after training. The improvement in functional capacity of the dogs was attested by a better performance on the physical test after training, achieving higher levels of intensity (9,0 km/h to 11,1 km/h; $p = 0,0155$) and decreasing the area under the curve of lactate (31,2 to 26,0; $p < 0,0001$). Increase in parasympathetic tone on HRV was verified by SDANN ($155,5 \pm 35,2$ ms to $231,7 \pm 46,7$ ms; $p = 0,0059$), rMSSD ($115,3 \pm 50,4$ ms to $181 \pm 51,9$ ms; $p = 0,0118$), amplitude of heart rate ($188,5 \pm 21,9$ bpm to $200,3 \pm 17,5$ bpm; $p = 0,0033$), and by a higher percentage of respiratory sinus arrhythmia on a maximal progressive effort test ($> 50\%$ until 2 km/h before training and 8 km/h after training). On the hemodynamic aspect, training lead to increase diastolic interventricular septum thickness ($0,78 \pm 0,12$ cm to $0,91 \pm 0,16$ cm; $p = 0,0294$), decrease left atrial diameter ($2,37 \pm 0,22$ cm to $2,15 \pm 0,19$ cm; $p = 0,0369$), left ventricular end-diastolic ($4,47 \pm 0,80$ to $3,82 \pm 0,62$; $p = 0,0068$), and end-systolic ($2,27 \pm 0,39$ to $1,88 \pm 0,48$; $p = 0,0104$) wall stress indexes, suggesting preload and afterload reduction. Improvement of diastolic function was confirmed by mitral E/A waves ($1,42 \pm 0,19$ to $1,83 \pm 0,46$; $p = 0,0467$). No differences ($p > 0,05$) were detected on systolic function (EF%, SF%, left and right ejection time, left pre-ejection time, ejection index, and mean velocity of circumferential fibers shortening), left ventricular end-systolic and end-diastolic volume indexes, and on Tei index of myocardial performance. As observed in a human being, training results in better autonomic and hemodynamic control in healthy dogs. In a near future we expect that this therapeutic modality could be helpful for cardiovascular improvement in the canine species.

ABSTRACT #186
EFFECTS OF RUNNING ON THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM IN DOGS. M Mizuno, M Uechi, Y Inoue, S Kurihara, Y Kamiyama. Nihon University, Kanagawa, Japan.

Exercise and stress are important factors in the development of congestive heart failure. The present study evaluates the influence of exercise upon circulatory function and the renin-angiotensin-aldosterone system (RAAS) in healthy dogs. A placebo or benazepril

hydrochloride was administered to four dogs and then heart rate and blood pressure were measured every 5 minutes for 30 minutes. Plasma renin activity, angiotensin-converting enzyme (ACE), angiotensin II (Ang II), aldosterone, adrenaline, noradrenaline and urinary aldosterone were measured in the dogs before and after running on a treadmill at 7 km/h for 10 minutes. Benazepril hydrochloride significantly ($P < 0.05$) decreased ACE (0.9 ± 1.0 U/l) and aldosterone (21.1 ± 16.1 pg/ml) compared with the placebo (4.0 ± 1.5 U/l, 42.9 ± 29.8 pg/ml). Plasma renin activity, Ang II, aldosterone and adrenaline levels increased during exercise. Heart rate and blood pressure significantly ($P < 0.05$) increased with both placebo and benazepril hydrochloride during exercise, and heart rate and blood pressure did not significantly differ between the two groups. These results suggest that the increase in heart rate and blood pressure during exercise is related to activation of the RAAS and sympathetic nervous system. Therefore, ACE inhibitors might modulate circulatory function and the RAAS during exercise.

ABSTRACT #187
OCCURRENCE OF HYPERTROPHIC CARDIOMYOPATHY IN A LARGE COHORT OF BRITISH SHORTHAI R CATS. S Granström¹, M. Nyberg Godiksen², M. Christiansen², J.L. Willesen¹, J. Koch¹. ¹Department of Small Animal Clinical Sciences, University of Copenhagen, Denmark. ²Department of Clinical Biochemistry and Immunology, Statens Serum Institut, Copenhagen, Denmark.

Familial hypertrophic cardiomyopathy (HCM) has previously been described in British Shorthair cats (BSH), but until now, no reports have been published on how prevalent the disease is within this breed. The aim of this study was to assess the occurrence of HCM in a large cohort of BSH and to evaluate the effect of gender, weight and age as potential risk factors to presence of the disease.

The study was conducted as a prospective study including all BSH presented at the Small Animal Hospital for HCM screening in the period of April 2006–August 2009. All cats were examined by the same two trained ultrasonographers using a Vivid 7 ultrasonographic system (GE Medical) with a 10 S phased array transducer (8–10 MHz). Measurements of the left ventricle were obtained by conventional 2D- and M-mode imaging of right parasternal long- and short axis views. Diagnosis of HCM was based on an overall assessment of echocardiographic findings, but cats were classified as to have a concentric hypertrophy if the interventricular septum (IVS) and/or left ventricular free wall (LVFW) measured > 5.5 mm in diastole. To rule out other causes of left ventricular concentric hypertrophy, a complete blood count, biochemical profile, thyroxin level and blood pressure were measured in affected cats. In the statistical analyses occurrence of HCM was expressed as a percentage and age, weight and echocardiographic variables as mean \pm standard deviation (SD). A logistic regression analysis was used to test the effect of gender, weight and age on HCM as outcome and a *p*-value of $< .05$ was considered significant.

A total of 282 cats were examined, 189 (67.0%) females and 93 (33.0%) males. The average age of the cohort was $40 (\pm 29)$ months and the average weight was $4.5 (\pm 1.1)$ kg. Twenty-three cats (8.2%) were classified as HCM positive, 14 (4.9%) as equivocal and 242 (85.8%) as HCM negative. Three cats (1.1%) were diagnosed with other heart disease and excluded from further analysis. The average diastolic wall thickness of the IVS and LVFW in the HCM affected cats were $7.0 (\pm 1.2)$ mm and $7.1 (\pm 2.4)$ mm, respectively. In the HCM negative group the corresponding measurements were $3.9 (\pm 0.5)$ mm and $3.8 (\pm 0.5)$ mm. Male cats had a significantly higher occurrence of HCM (20.4%) compared with the females (2.1 %) corresponding to an odds ratio (OR) of 12.7 (95 % CI 4.2–38.6) for male gender ($p < 0.001$). No effect of weight and age on presence of HCM could be identified. Eighteen of the HCM positive cats had diffuse, symmetric hypertrophic changes of the entire left ventricle, whereas 5 had an asymmetric or regional hypertrophy of the left ventricular myocardium.

The conclusion of this study is that the BSH in our cohort had a high occurrence of HCM. Most affected cats presented with pronounced, diffuse hypertrophic changes affecting the IVS, LVFW and papillary muscles. As in many other breeds, male gender predisposed to development of the disease.