Journal of Veterinary Internal Medicine
ACVIM
Open Access

J Vet Intern Med 2016

2016 ACVIM Forum Research Abstract Program

2016 ACVIM Forum Research Abstract Program
Denver, Colorado, June 9–10, 2016
Index of Abstracts

ORAL PRESENTATIONS – Thursday, June 9

Time	#	Presenting Author	Abstract Title
CARDIOLOGY			
9:00 am	C01	Bryan Eason	Sinus Rate Approximation with VVI, VVIR, and VDD in Dogs with Third Degree Atrioventricular Block (*ACVIM Resident Research Award Eligible*)
9:15 am	C02	Janne Lyngby	Validation of a Method for Quantitation of Clopidogrel and Clopidogrel Active Metabolite in Feline Plasma (*ACVIM Resident Research Award Eligible*)
9:30 am	C03	Dar Ozer	Efficacy of Bronchial Stenting in Dogs With Myxomatous Mitral Valve Disease and Bronchial Collapse (*ACVIM Resident Research Award Eligible*)
9:45 am	C04	J.D. Rhinehart	Study of Echocardiographic Variability in Estimating Pulmonary Artery Pressure and Pulmonary Vascular Resistance in Dogs (*ACVIM Resident Research Award Eligible*)
10:30 am	C05	Kursten Roderick	Changes in NT-PROBNP Associated with Treatment and Survival Time in Cats with Congestive Heart Failure (*ACVIM Resident Research Award Eligible*)
10:45 am	C06	Courtney Smith	Right Ventricular Outflow Tract Obstruction and Coronary Anatomy in French and English Bulldogs with PS (*ACVIM Resident Research Award Eligible*)
11:00 am	C07	Melissa Tropf	Cardiac Function and Metabolic Parameters in Obese Dogs (*ACVIM Resident Research Award Eligible*)
11:15 am	C08	Darcy Adin	Comparison of Furosemide Infusion Diluted with 2.4% Hypertonic Saline Vs. Dextrose 5% in Water (D5W)
11:30 am	C09	Amelie Beaumier	Medical Management and Survival Time Associated with Congestive Heart Failure Stage D: A Retrospective Study
11:45 am	C10	A. Ray Dillon	MRI 7T Resonance Spectroscopy (MRS) Predicts Cardiac Energetic Reserves in Dogs with Preclinical Mitral Insufficiency
12:00 pm	C11	Chris Lam	Immunohistochemical Study of the Pro-Natriuretic Peptide Convertase Corin in Severe Canine Myxomatous Mitral Valve Disease
12:15 pm	C12	Giulio Menciotti	Anatomic Regurgitant Orifice Area Using 3D-Echocardiography in Dogs with Myxomatous Mitral Valve Disease
2:15 pm	C13	Takeshi Mizuno	Analysis of Mitral Valve Morphology with Real-Time 3-Dimensional Echocardiography in Dogs Undergoing Mitral Valve Repair

dog), *E. canis*/*M. haemocanis* (one dog), and *E. canis*/*A. platys*/*M. haemocanis* (one dog).

Vector-borne agents detected to date likely reflect common exposure to *R. sanguineus*, as this tick vectors each of the PCR-confirmed agents. Further information will be gained by completion of the PCR assay analysis of the blood, fleas, and ticks.

ID27

IDENTIFYING AGREEMENT AND BARRIERS TO PROPOSED CANINE INFECTIOUS DISEASE GUIDELINES FOR DOG GROUP SETTINGS. Jason Stull[1], Michelle Evason[2], Jennifer Kasten[1]. [1]Ohio State University, Columbus, OH, USA, [2]Rayne Clinical Nutrition Canada, Burnaby, BC, Canada

Canine group settings, locations or events where dogs temporarily come together in a shared environment (e.g., shows, sporting events, dog parks) pose an increased risk for infectious disease transmission. Despite this increased risk, few guidelines exist to provide recommendations for reducing disease risk in these settings. During 2014–2015 a panel of canine infectious disease experts reviewed the current literature and drafted a set of 44 evidence-based recommendations for prevention of infectious diseases for dogs in group settings. In August 2015 a survey of attendees at the AKC Canine Health Foundation Parent Organization conference was completed to determine agreement with and perceived barriers to these recommendations. The 15-minute self-administered survey was provided to 238 Conference attendees and consisted of a series of Likert-type and open-ended questions (online and paper format) seeking feedback on 22 of the recommendations. The survey was completed by 185 individuals (78%), and all responses were reviewed, summarized, and open-ended comments categorized by theme. Respondents self-identified as: participants, judges, and breeders in a variety of local, national, and international canine group events. Most respondents (> 40%) agreed with all but three of the panel's recommendations, yet a majority of respondents stated the recommendations would be difficult or very difficult to implement in their setting (primarily dog shows). Common survey result themes related to difficulty of implementation included: administrative concerns (cost, human resources/manpower), enforcement issues, ethical concerns, privacy concerns, and strong need for official outreach to promote awareness and education related to canine infectious diseases. Survey responses identified needs for: further refinement of recommendations to aid comprehension and clarity (especially around ecto- and endoparasite control), and education to promote culture changes related to disease risk prevention. In order to raise awareness of canine infectious disease in group settings amoungst event participants, attendees, and organizers; an online freely available canine infectious disease risk calculator tool is being developed.

ID28

CORRELATION OF *MYCOPLASMA* QUANTITATIVE PCR TO SEVERITY OF CONJUNCTIVITIS IN CATS. Alexis Dubin, Jennifer Hawley, Cynthia Powell, Michael Lappin, Julia Veir. Colorado State University, Center for Companion Animal Studies, Fort Collins, CO, USA

Mycoplasma species are one of the most common infectious causes of conjunctivitis in cats. *Mycoplasma felis* is commonly implicated as a primary pathogen, but other *Mycoplasma* species have also been detected in clinically ill cats. Findings from previous studies using conventional PCR (cPCR) to investigate the role of *Mycoplasma* species in causation of feline conjunctivitis have been mixed as *Mycoplasma* can be carried by apparently normal cats. Therefore, the purpose of this study was to determine if increasing severity of conjunctivitis in cats correlates with higher *Mycoplasma* species copy numbers using qPCR.

A total of 77 conjunctival swabs collected from 29 shelter cats with conjunctivitis and confirmed to contain *Mycoplasma* species DNA using cPCR were selected for study. The severity of conjunctivitis at the time the samples were acquired was determined using a grading scheme from 0 - 9. The samples were evaluated using a previously validated qPCR to determine the *Mycoplasma* copy number. Statistical methods consisted of using the Spearman's rho test to determine if severity of conjunctivitis was correlated to qPCR *Mycoplasma* species copy number.

The results revealed the severity of conjunctivitis significantly correlated to qPCR *Mycoplasma* copy number (Spearman's correlation coefficient −0.32, $P = 0.0042$), however, the strength of this correlation was only mild to moderate.

Based on the results of this study, future investigation of the impact of *Mycoplasma* species other than *M. felis* on the correlation of qPCR and severity of conjunctivitis in cats should be performed.

NM01

EFFECT OF THE HYPER-IMMUNE EGG YOLK SUPPLEMENTATION ON WEIGHT GAIN IN NEONATE PUPPIES. Hanna Mila[1], Alexandre Feugier[2], Claire Mariani[2], Aurélien Grellet[2], Sylvie Chastant-Maillard[1]. [1]École nationale vétérinaire de Toulouse, UMR 1225 Interactions Hôte-Pathogènes, INP, Toulouse, France, [2]Royal Canin, Aimargues, France

Colostrum provides puppies with most of their passive immune transfer, as in dogs only 5% of immunoglobulin G (IgG) is acquired via transplacental transfer. Inadequate colostrum intake during the first day of life will deprive puppies not only of immunoglobulins, but also from many hormones, growth factors and nutrients. Hence, it increases the risk for neonatal morbidity and mortality. Supplementation during the first hours of life with canine serum or plasma increased blood IgG concentration[1] in colostrum deprived puppies as well as improved their growth during the entire neonatal period (0–3 weeks)[2]. This study aimed to evaluate the effect of exogenous specific antibodies administrated via egg yolk before the intestinal barrier closure on growth in pre-weaning puppies.

Specific antibodies against canine parvovirus type 2 (CPV2) and *E. coli* were obtained in eggs from hens vaccinated separately against one of the mentioned agents[3]. Egg yolk was flash-dried and tested for the presence of CPV2 and *E. coli*-specific antibodies. Hyper-immune solution was then prepared by mixing egg powder with a commercial milk replacer (Babydog Milk, Royal Canin, Aimargues, France; 1 g of egg powder with CPV2 antibodies and 1 g of egg powder with *E. coli* antibodies with 12 mL of reconstituted milk). A total of 334 puppies from 16 different breeds, enrolled in one breeding kennel, were included in the study. Depending on the expected adult body weight, puppies were classified into small breed dogs (S; adult weight < 25 kg), and large breed dogs (L; > 25 kg). Within each litter and taking into account the birth weight, puppies were assigned into supplemented or control group. Each puppy from the supplemented group received orally 1.5 mL/100 g bw of hyper-immune solution at once within the first 8 hours after birth. Puppies from the control group received at the same dose (1.5 mL/100 g) and time after birth (< 8 h) the milk replacer only. All puppies were weighed at birth and at 7, 14, and 21 days of life. Linear mixed models (MIXED procedure; SAS Institute Inc., Cary, NC, USA) with litter modeled as a random effect were performed to determine the variables affecting birth weight and weight gain during the neonatal period: breed size (small; large), age (0–7; 7–14; 14–21 days), supplementation (supplemented or control group). All the interactions between mentioned fixed effects were also tested.

L represent 38.3% (128/334) of the included puppies. Among L and S, 65 (50.8%) and 104 (50.5%) were supplemented, respectively. The weight at birth was significantly higher in L compared with S (median: 370 g [interquartile range: 325; 408 g] versus 200 g [156; 248 g]; $P < 0.001$). Birth weight was found not different between supplemented and control puppies whatever the breed size ($P = 0.14$): supplemented L 366 g [330; 412 g] versus 375 g [322; 405 g] in controls; supplemented S 199 g [155; 247 g] versus 201 g [159; 248 g] in controls. Weight gain during the neonatal period was influenced by time ($P < 0.001$), supplementation ($P = 0.031$) and the interactions between the breed size and supplementation ($P = 0.027$) and time and breed size ($P = 0.001$). L gained 176 g [67; 294 g] during the 1st week, 223 g [158; 324 g] during the 2nd week and 260 g [160; 382 g] during the 3rd week

of life, with significantly greater weight gain compared with S only during the 1st week (S = 116 g [66; 172 g]; $P = 0.001$). Whatever the period concerned, supplemented L gained more weight during the entire neonatal period than the controls (841 g [485; 1087 g] versus 623 g [436; 858 g]; $P = 0.048$). No difference was evidenced between supplemented and control S ($P = 1$).

In our study large breed puppies supplemented at birth with the hyper-immune egg yolk had greater weight gain during the entire neonatal period. Retarded growth at the early stage of life increases the risk of morbidity and mortality in puppies[4]. Thus it could be hypothesized that better growth in supplemented puppies reflects a better health. Nevertheless, further studies are needed in order to confirm our findings in other breeding kennels and on large number of individuals.

[1]Poffenburger et al., 1991; [2]"Canine health product containing antibodies against canine parvovirus type 2" WO2015004181 A1; [3]Van Nguyen et al., 2006; [4]Mila et al., 2012.

NM02

EFFECTS OF DIETARY MEDIUM CHAIN TRIGLYCERIDES ON VOLUNTARY ACTIVITY IN DOGS AND CATS. Yuanlong Pan, Hui Xu, Sandeep Bhatnagar, Janet Jackson. Nestle Purina Research, St Louis, MO, USA

Decline in cerebral glucose metabolism is a common feature of aging in people and animals including rats, dogs, and monkeys, and it is closely associated with age-dependent cognitive decline. We had confirmed in a previous study that dietary medium chain triglycerides (MCTs) can enhance cognitive functions in dogs by providing the brain with an alternative energy source. In this study, we investigated the effects of dietary MCTs on voluntary activity in dogs and cats.

In the cat study, sixteen middle-aged and senior cats were fed 100% of their maintenance energy requirements (MERs) with a control diet for one week, and then were switched to the MCT-containing diet for 28 days. Their daily activity was monitored during the feeding trial with activity monitors. In the dog study, twenty senior dogs were fed 100% of their MERs with a control diet for 6 days, and then were assigned to one of 2 MCT-containing diets with 10 dogs per diet for 27 days. Then the dogs were switched to the alternative MCT diet for 32 days. Daily activity was recorded with activity monitors during the feeding trial. In cats, the MCT-containing diet significantly increased both daytime (17381.23 ± 2551.18 versus 22628.55 ± 2790.61, $P < 0.0001$) and night time activity (4415.56 ± 654.71 versus 5926.66 ± 786.88, $P = 0.002$). Interestingly, in dogs, both MCT diets significantly increased only daytime activity (80349.46 ± 9703.34 versus 99254.33 ± 12163.83; 80349.46 ± 9703.34 versus 105120.38 ± 11550.91, $P < 0.05$). The results show that both dogs and cats became more active when fed a diet containing MCTs

NM03

EFFECTS OF DIETARY MACRONUTRIENT CONTENT AND FEEDING PATTERN ON LEPTIN CONCENTRATIONS IN LEAN HEALTHY CATS. Dagmar Tarkosova[1], Jacquie Rand[2], Heidi Farrow[2], Marcia Coradini[2], John Morton[3]. [1]University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic, [2]The University of Queensland, Brisbane, Australia, [3]Jensora Pty Ltd, Geelong, Australia

Excessive weight gain is associated with metabolic and hormonal changes that predispose cats to insulin resistance and other disorders. The adipokine leptin is an important regulator of energy metabolism, and circulating leptin concentrations correlate with fat mass in cats and other species. In cats, leptin is associated with insulin resistance, independent of bodyweight. Although dietary factors such as energy density, fat content and feeding pattern increase the risk of obesity, there is limited information on how dietary factors such as feeding, fasting, and macronutrient content influence leptin concentrations in cats. The aims of this study were to compare leptin concentrations in lean, healthy cats fed diets high in protein, fat and carbohydrate, to assess associations between leptin concentrations and insulin, glucose, and NEFA concentrations, and to determine the effects of feeding pattern on baseline and postprandial leptin concentrations.

A controlled trial was conducted with clinically healthy cats (n = 24). Mean body weight was 4.9 kg and all cats had ideal body condition score of 3 on a 5-point scale. All cats were fed a "washout" diet (commercial feline diet) for five weeks, and were then fed one of three test diets high in one of protein, fat or carbohydrate for five weeks. Diets were dry extruded formulations, and each test diet provided approximately 50% of energy from the test macronutrient, and 25% of energy from each of the other two test macronutrients. Leptin concentrations were measured during two feeding patterns: a meal-feeding test (once daily feeding) and an *ad libitum*-feeding test, conducted 4 weeks after commencement of the test diets. During the meal-feeding test, cats ate 90 - 100% of the 12 hour *ad libitum* intake as a single meal in 0.5 hour. Blood samples (4 mL), were collected over 24 hours in the meal feeding test and 12 hours in the *ad libitum* test.

Distributions of leptin variables in the *ad libitum* and meal-feeding tests were similar across dietary groups after consumption of the washout diet for 5 weeks. Mean baseline concentrations (average of −30 and −5 minutes values), mean concentrations over 24 hours (mean 24-h), and peak leptin concentrations in the meal feeding test varied significantly by diet (overall $P < 0.001$ to 0.027). Baseline, mean 24-h and peak leptin concentrations for the high fat diet were significantly higher than for the high protein diet, and for baseline and mean 24-h, for the high carbohydrate diet. A similar pattern was observed in the *ad libitum* feeding test with highest leptin concentrations in cats consuming the high fat diet. In general, leptin concentrations after consuming the high carbohydrate diet were not significantly different from the high protein diet, but if they differed, leptin concentration for the high carbohydrate diet was higher compared to the high protein. There was no significant effect of diet on the time to peak leptin concentration in the meal-feeding test (overall $P = 0.855$), and median times to peak leptin concentration were 15 hours for all diets. In the meal-feeding test, only 3/8 cats significantly exceeded their baseline leptin concentration for each of the high protein and high fat diets, but 7/8 did so for the high carbohydrate diet. In general, leptin concentrations decreased significantly approximately 2 hr after eating in the meal feeding test, but remained relatively constant during *ad libitum* feeding. When data for all diets were combined, leptin was significantly positively correlated with insulin concentrations during *ad libitum* feeding ($P = 0.008$ to 0.036), but only at baseline and at 24 hours in the meal feeding test ($P = 0.025$ and <0.001, respectively). There were no correlations between leptin and either glucose or NEFA across all diets. Glucose, insulin and NEFA did not account for the decline in leptin soon after feeding in the meal feeding test.

In conclusion, independent of feeding pattern, leptin concentrations tend to be highest in lean cats consuming a diet with 50% of energy from fat, compared to diets high in protein or carbohydrate. Leptin concentrations vary minimally over 12 hours of *ad libitum* feeding, whereas leptin decreases approximately 2 hours after feeding following a fast, and this decrease is not accounted for by changes in insulin, glucose or NEFA concentrations. Further investigation is needed to understand the interactions between hormones associated with satiety, dietary factors and weight gain in cats.

NM04

EFFECT OF HIGH SODIUM DIET ON BLOOD PRESSURE AND CARDIAC FUNCTION IN HEALTHY ADULT DOGS. Hui Xu, Dottie Laflamme, Sandeep Bhatnagar, Xuemei Si, Grace Long. Nestle Purina PetCare Research, St. Louis, MO, USA

Promoting water intake is recommended for managing dogs with lower urinary tract disease. Increased dietary salt has been used for this purpose in veterinary therapeutic diets. The objective of this study was to evaluate potential adverse effects of dietary salt (sodium chloride) on blood pressure and cardiac function in dogs.

Following a two week baseline period where dogs were fed a Control Diet containing 0.13 g sodium/100 kcal ME, twenty healthy dogs (6–10 years old) were allocated to two groups and fed diets differing only in total sodium chloride content: CONTROL (CON) = 0.13 g sodium /100 kcal ME, or High Sodium Diet (HNA) = 0.41 g sodium/100 kcal ME. Dogs were fed their