## Thursday, June 9

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<th>Presenting Author</th>
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<td>2:10 pm</td>
<td>Liz Pluhar</td>
<td>Surgery and Vaccine-Based Immunotherapy for Canine Glioma</td>
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<tr>
<td>2:35 pm</td>
<td>Luis Gaitero</td>
<td>Micrornas MIR-21 and MIR-181C in Cerebrospinal Fluid and Serum in Canine</td>
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<td>Meningoencephalomyelitis of Unknown Origin</td>
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<td>3:10 pm</td>
<td>William Bush</td>
<td>C-Reactive Protein in the Diagnosis of Discospondylitis</td>
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<td>3:35 pm</td>
<td>Melissa Lewis</td>
<td>Do Dogs Spinal Walk? Electrophysiologic Characterization of Long Tract Integrity in Canine Spinal Cord Injury</td>
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<tr>
<td>4:25 pm</td>
<td>Andrea Tipold</td>
<td>Does a Th17 Skewed Immune Response in Steroid-Responsive Meningitis-Arteritis Exist?</td>
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<td>4:50 pm</td>
<td>Andrea Tipold</td>
<td>Imepitoin: Field Observations</td>
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<td>5:25 pm</td>
<td>Veronika Stein</td>
<td>Does a Panel of CSF Biomarkers Enhance the Prognostic Value in Canine Spinal Cord Injury?</td>
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<tr>
<td>5:50 pm</td>
<td>Charles Vite</td>
<td>Hope for Treating Krabbe Disease</td>
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**Also See Neurology abstracts, Saturday, June 11.

## Friday, June 10

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<tr>
<td>8:00 am</td>
<td>Missy Simpson</td>
<td>Overweight/Obesity in Golden Retrievers as a Function of Neuter, Age, Activity Level, and US Region</td>
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<tr>
<td>8:25 am</td>
<td>Mark Peterson</td>
<td>Evaluation of Body Weight, Body Condition, and Muscle Condition in Cats with Hyperthyroidism</td>
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<td>9:00 am</td>
<td>Joshua Stern</td>
<td>Response to Sildenafil Citrate in Dogs with Pulmonary Hypertension and PDE5A:E90K Polymorphism</td>
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<tr>
<td>9:25 am</td>
<td>Lynelle Johnson</td>
<td>Response to Sildenafil Differs in Dogs with Pulmonary Hypertension Associated with Cardiac and Respiratory Etiologies</td>
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<tr>
<td>5:25 pm</td>
<td>Jan Suchodolski</td>
<td>A Dysbiosis Index to Assess Microbial Changes in Fecal Samples of Dogs with Chronic Enteropathy</td>
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<tr>
<td>5:50 pm</td>
<td>John Peauroi</td>
<td>Utility of Parr Analysis for Improved Detection of Lymphoma in Feline Endoscopic Duodenal Biopsies</td>
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**Also See Small Animal Internal Medicine abstracts, Saturday, June 11.
9:25 am  George Lubas  Electrochemotherapy with Intravenous Bleomycin for Treatment of Feline Squamous Cell Carcinoma: Experience on 12 Cats

10:30 am  J. Paul Woods  Novel Oncolytic Maraba Virus for the Adjuvant Treatment of Feline Mammary Carcinoma

10:55 am  Shay Bracha  Osteosarcoma-Derived Exosomes Impair CD4+ and CD8+ T-Cell Proliferation and Induce T-Regulatory Cell Expansion

SMALL ANIMAL INTERNAL MEDICINE

8:00 am  Eva Furrow  Three Diverse Mutations Underlying Canine Xanthine Urolithiasis

8:25 am  Erin Burton  Urinary Microbiota in Healthy Dogs

9:00 am  Valerie Parker  Vitamin D Metabolites, Parathyroid Hormone and Fibroblast Growth Factor-23 in Canine Chronic Kidney Disease

9:25 am  Valerie Parker  Association Between Vitamin D Metabolites and Proteinuria in Dogs

10:30 am  Andrew Mackin  Development of Biomarker Assays for the Pharmacodynamic Evaluation of Mycophenolate Mofetil in the Dog

10:55 am  Claire Fellman  Effects of Immunosuppressive Drug Therapy on Canine Activated Whole Blood Expression of Interleukin-2 and Interferon-γ

11:30 am  Allyson Berent  Subcutaneous Ureteral Bypass Device Placement for Benign Ureteral Obstruction in Cats: 137 Cats (174 Ureters)

11:55 am  Jill S. Pomrantz  ALICAM and Gastrointestinal Disease in Dogs

2:10 pm  Jessica Quimby  Short Telomeres are Associated with Feline Chronic Kidney Disease and Hypertension

2:35 pm  Shelly Vaden  Regenerative Medicine Approach to the Treatment of Urinary Incontinence in Female Dogs

3:10 pm  Marileda B. Carvalho  Neutrophil Gelatinase-Associated Lipocalin Urinary Concentration in Dogs – New Proposal for the Interpretation

3:35 pm  John Thomason  Effects Of Immunosuppressive Agents On the Hemostatic System in Dogs

4:25 pm  Hannes Lohi  Prevalence of Genetic Disease Variants in 100,000 Purebred and Mixed Breed Dogs

4:50 pm  Sharon Center  Aminoaciduria May Explain Hypoaminoacidemia in Canine Hepatocutaneous Syndrome (n=20)

EQUINE

8:00 am  Mark Bowen  The Assessment of Behavioral Changes Displayed in Horses with Equine Glandular Gastric Disease

8:25 am  Ben Sykes  Pharmacodynamics of a Long-Acting Injectable Formulation of Omeprazole in the Horse

9:00 am  Sharanne Raidal  Enantioselective Bronchopulmonary Pharmacokinetics of Salbutamol in Horses

9:25 am  Kathleen Ivester  Immunoproteomic Analysis of Inhalable Barn Dust

10:30 am  Kelsey Hart  Effects of Free and Carrier-Bound Cortisol on Equine Neutrophil Function

10:55 am  M. Julia Felippe  Bone Marrow Transplantation and Epigenetic Modulation Of Hematopoietic Precursors in Equine Common Variable Immunodeficiency

11:30 am  Amy Johnson  Serum and CSF Lyme Multiplex Results for Neurologic Horses with and without Neuroborreliosis

11:55 am  Adam Krull  Use of Enrichment and Quantitative PCR to Improve Detection of Salmonella in Referral Hospitals
this study was to compare concentrations of serum IGF-1, insulin, glucose, ketones, and lactate concentrations in dogs with lymphoma compared with age, sex, and weight-matched controls. Dogs with naive lymphoma (n = 16) were identified and matched with controls (n = 16) on the basis of age, sex, and weight. Serum insulin, glucose, ketones, and lactate concentrations were measured in fasted blood samples. Variables were compared between groups and analysed for correlations between the individual variables. Insulin, IGF-1 and glucose were not different between cases and controls (P = 0.007, P < 0.001) and these variables were correlated with each other (r = 0.450, 0 < r < 0.01). Insulin and IGF-1 (r = 0.457, P = 0.009) were also correlated across both groups of dogs. This study did not demonstrate increased IGF-1 and insulin in this small group of dogs with lymphoma compared to the controls. However, ketones were higher in the cases and correlated with lactate, which suggests that they could also be a useful bio-marker of metabolism in dogs with lymphoma.

**ELECTROCHEMOTHERAPY WITH INTRAVENOUS BLEOMYCIN FOR TREATMENT OF FELINE SQUAMOUS CELL CARCINOMA: EXPERIENCE ON 12 CATS.** Alessio Pierini1, Ron Lowe2, Valentina Grazianera1, Veronica Marchetti1, George Lukas1, 2,3, 4, 5, 6. 1. Department of Veterinary Medicine, University of Padova, Pisa, Italy, 2. Ashleigh Veterinary Clinic Limited, Knaresborough, UK.

The aim of this study was to evaluate the efficacy and safety of neoadjuvant electrochemotherapy (ECT) with intravenous bleomycin for the treatment of skin squamous cell carcinoma (SCC) of the head in cats.

Twelve client-owned cats with histological diagnosis of SCC of the head were enrolled. The owners elected to carry out ECT as an alternative treatment to surgery. All cats were staged by physical examination, fine-needle aspiration of mandibular lymph node (if palpable) and three-view thoracic X-rays. Complete blood count, serum biochemistry profile, and urinalysis also were performed as the patients underwent general anesthesia as well. Cats with lymph node involvement or radiographic features of pulmonary metastases were excluded from this study. Clinical T stage was assigned on the basis of WHO criteria. The longest tumor diameter based on physical examination was used for clinical staging and follow-up.

For ECT treatment, cats were premedicated with medetomidine and butorphanol. Once sedated, an IV catheter was placed in a peripheral vein, cats were preoxygenated via a face mask, and anesthesia was induced with alfaxalone administered IV. Then cats were intubated and anesthesia was maintained with oxygen, nitrous oxide and isoflurane. Bleomycin was diluted in three milliters of saline solution and administered IV at a dosage of 15–20 mg/m².

The electroporation was performed using a Cytopulse PA4000 (Cyto Pulse Sciences, Inc) in nine cats or a Cytopulse Oncovet in one case. The pulse pattern employed was 8 monophasic square pulses of 100 microseconds each at a frequency of 1 Hz (interpulse interval 0.9999 sec) with the PA4000 or 5 kHz (interpulse interval 0.01 sec) with the Oncovet. The latter equipment allowed more rapid application of the therapy because of the higher pulse frequency and the improved user interface. The Gehl electrode pattern consists of two parallel 1–1.5 cm rows of 6 needles, the rows being 6 mm apart (Gehl and others 1999). The pulse amplitude was 600–720 volts (1000–1200 volts/cm). This pulse pattern was established by Gehl and others (1999). In one case (periocular SCC) a Cliniporator (IGEA S.p.a.) with 8-needle electrodes and 20 mm length needles was used. The voltage setting for the Cliniporator was pre-set by the manufacturer at 1000 volts/cm with current varying between applications depending on tissue conduc-

Patients were assessed every 3–10 days for the initial 4 weeks after treatment. Tumor response was assessed every 6–8 weeks following the response evaluation criteria for solid tumours established by veterinary cooperative oncology group consensus document by physical examination, fine-needle aspiration of mandibular lymph node if palpable and 3-view thoracic X-rays. Tumor measurements were made until remission or until relapse occurred. Complete remission (CR) was defined as total disappearance of the tumor. A partial remission (PR) was defined as ≥30% reduction in tumor diameter. Stable disease (SD) was defined as <30% reduction in tumor diameter or <20% increase in tumor diameter, and progressive disease (PD) was defined as ≥20% increase in tumor diameter. Presence of new lesions near to the pre-existing tumor or presence of metastasis were considered progression.

A minimum duration of two to three weeks was required for a response to qualify as positive.

Progression-free survival (PFS), median survival time (MST) and overall response rate (ORR) were calculated. PFS was defined as time from ECT until tumor progression, recurrence or death. ORR was defined as proportion of cats that reached CR or PR.

The toxicity treatment (especially locally) was assessed by interview-the owner and carrying out a physical examination up to 7–14 days after ECT. Only early adverse effects were evaluated and a subjective scoring system from zero (no adverse effect) to 4 (toxicity-related death) was used. For each cat, the highest toxicity score was used for analysis.

Eleven of twelve SCC were localized on the nasal planum. One was localized on the periorcular region. Ten were neutered males and 2 were spayed females. Ages ranged from 7 to 16 years old (median, 11.4). SCCs were classified with WHO T-stage as T1 (6), T2 (3), T3 and T4 (3).

Sixteen ECT treatments were done. The cat with periorcular SCC had four treatments and one cat with nasal planum SCC had two treatments. Eleven of 12 cats were eligible for survival analysis. A cat with nasal planum T1 SCC due to treatment toxicity (toxicity-related death) was euthanized at 9 days after ECT was calculated.

For survivor cats, ORR was 100%. There were 8 (73%) CR and 3 (27%) PR. Six (100%) of 6 cats with T1 SCC had CR and two cats (66%) of 3 T2 SCC had CR. One cat with T2 and two cats with T3 and T4 SCC had PR. All cats were dead at the end of the study. Three cats developed PD, with a median PFS of 253 days (range, 97–468 days). All of them had PR. One cat with a nasal planum T3 SCC developed recurrence after 97 days after the first ECT treatment and was euthanized 468 days after the first ECT. One cat had a periorcular T2 SCC developed the first recurrence 468 days after ECT. Overall, this cat was treated for a total of four times for new recurrences and was euthanized 730 days after the first ECT. The third cat had a nasal planum T4 SCC and was euthanized 194 days after ECT. The other eight cats were died for unrelated causes. No cats developed metastasis. Overall MST was 452 days (range, 194–2973 days). MST for cats that achieved CR was 452 days (range, 194–2973 days) and 231 days (range, 194–730 days) for cats that achieved PR. MST was calculated for any T stage and was 397 days for T1 (range, 251–2973), 730 days for T2 (range, 599–1731), 231 days for T3 and 194 days for T4.

All twelve cats were evaluated for toxicity. All cats developed early effects. Toxicity was classified as grade 1 (9/12), grade 2 (1/12), grade 3 (1/12) and grade 4 (1). Toxicity was mild in almost all T1 SCC (6 grade 1, 1 grade 4). Several therapeutic strategies are described to treat feline SCC of the head such as surgery, external-beam radiation therapy, strontium-90 plesioterapy, cryosurgery, photodynamic therapy, laser application, hyperthermia, thermocoagulation with curettage and electrochemotherapy. However, only superficial cancers can be managed effectively with almost the treatments described above.

Nowadays, ECT has become a reliable treatment for cutaneous SCC of the head in cats. Recently, two papers evaluated the efficacy of ECT delivered five-minute after intravenous bleomycin in feline cutaneous SCC at varies WHO T stage. Tozon et al. (2014) obtained an ORR of 87.5% for sixteen superficial SCC in cats. Spugnini et al. (2015) reported the capability of ECT to improve bleomycin efficacy for feline SCC. Twenty-six cats were treated with intravenous bleomycin coupled with ECT and 21 cats were treated with bleomycin alone. ORR in the ECT treated group was 88.5% versus 33% for control group. Median time to progression in the ECT treated animals was 30.5 months, whereas in controls it was 3.9 months. In the present study an overall response rate of 100% and a MST of 452 days (range, 194–2973 days) was observed. Many reports have indicated that aggressive local tumor control offers the best chance to obtaining clinical tumor response and long survival times. However, tumor control achieved by aggres-

sive surgical excision or external beam radiation therapy is depen-

dent on reaching adequate surgical margins or the degree of response to radiation therapy. In a previously study, cats with SCC treated with ECT that did not reach CR were more likely to
be in an advanced WHO T stage. In the present cohort of cats PR was reached in T3 and T4 SCC and in 4-cm T2 SCC. Authors speculated that more advanced T stage SCCs can benefit of more ECT treatments until CR is reached or can eligible to have a multimodal therapy.

Moreover, aggressive surgical excision can be limited by anatomical localization and cosmetic concerns for owners. On the other hand, radiation therapy is limited by early and late effects on the eyes in periorcular SCC and by financial concerns for owners. In the present study early effects were considered well tolerated in nine of twelve cats. Two cats with severe early effects had a T4 SCC and a 4-cm periorcular SCC. Severe effects can occur more frequently in cats with bulky or infiltrative tumor. Discharge instructions for owners advised application of an Elizabethan collar on cats. Nevertheless, the present study did not review symptomatic therapeutic modalities that authors used in management of pain and/or scratching. Non-steroidal antiinflammatory drug such as meloxicam was previously reported for successfully early effect management in ECT treated cats. Furthermore in the present study one cat with a T1 SCC developed an ECT toxicity-related death. The major limit to interpret toxicity-related death is that cat was euthanized due to owner’s decision and authors were not able to confirm whether the owner followed discharge instructions for scratching control.

This study has some limitations. First, the small number of enrolled cats can influence ORR, MST and toxicity evaluations. Second, the subjective evaluation of the toxicity makes interpretation of the results difficult. Finally, ORR and MST were calculated by the use of different electroporation machines and a non-standard dose of intravenous bleomycin.

In conclusion, intravenous bleomycin coupled with ECT is well tolerated for cutaneous SCC in cats. The results of this study suggest that ECT should be considered as an alternative treatment option, especially in superficial SCC, and when owners do not accept other treatment approaches due to cosmetic or financial concerns.


NOVEL ONCOLYTIC MARABA VIRUS FOR THE ADJUANT TREATMENT OF FELINE MAMMARY CARCINOMA. J. Paul Woods1, Byram Bridle2, Michelle Oblak1, Robert Foster2, Victoria Sabine1, Jeff Hummel1, Brian Lighty1. Clinical Studies, Centre, McMaster University, Hamilton, ON, Canada, 2Pathobiology, Ontario Veterinary College, University of Guelph, Guelph, ON, Canada, 3Oregon State University-Department of Biomedical Sciences, Corvallis, Oregon, USA, 4Oregon State University-Department of Clinical Sciences, Corvallis, Oregon, USA, 5Oregon State University-Department of Chemistry, Corvallis, Oregon, USA.

Exosomes are microvesicles secreted by cells that function in cell-to-cell communication through cellular uptake of exosomal protein and RNA cargo, as well as interaction with surface-expressed proteins. Exosomes are crucial for tumor progression, angiogenesis and immune evasion. Although the role of tumor exosomes has been described in numerous studies, the role of osteosarcoma exosomes on T-cells is lacking. We hypothesize that osteosarcoma-derived exosomes carry a vastly different cargo in comparison to exosomes from healthy osteoblasts, and include immunosuppressive proteins which directly impact healthy T-cells. Our study included unexposed lymphocytes and lymphocytes exposed to an osteosarcoma exosomes on T-cells is lacking. We hypothesize that induction of anti-tumoral immunity and direct oncolysis of metastatic (often occult) disease using our oncolytic vaccine booster will delay or prevent post-surgical relapse and extend survival in cats with mammary carcinoma.

Cats with FMC (histologically confirmed) were staged (CBC, biochemical profile, thoracic radiographs, abdominal ultrasound or CT). Cats were vaccinated with an adenovirus expressing a cancer gene, then 2 weeks later the tumour was excised (radical mastectomy), and then 4 weeks postoperatively the cats received a booster with an oncolytic virus (Maraba virus) also expressing the same cancer gene. Cats were followed up with physical exams and thoracic radiographs.

Twelve female (spayed) cats have entered the study with a mean age of 12.5 years (range 7.5–16.8), median weight of 4.4 kg (range 3.25–5.89), consisting of 7 DSH, 4 DLH, 1 Turkish Van. The FMC consisted of 7 stage 1, 1 stage 2, and 4 stage 3. During oncolytic virus infusion 1 cat died of putative anaphylaxis (severe acute diffuse pulmonary hemorrhage and edema on post mortem). Otherwise toxicity of the adenovirus vaccine, surgery and marabavirus infusion was manageable. Following the anaphylactic death, pre-infusion skin testing of the marabavirus was introduced for the 5 subsequent cats and all 5 cats were negative. Six cats are dead with 5 dying of disease and 1 dying due to putative anaphylaxis during the oncolytic virus infusion treatment. None of the cats were alive (ranging from 92–568 days). The median overall survival is 240 days.

Therefore we are conducting a clinical trial combining the two emerging cancer treatment modalities, tumour vaccination and oncolytic viruses, to treat FMC following surgery (i.e. adjuvant therapy in addition to surgical excision). Our goal is to test our heterologous prime:boost strategy targeting tumour antigens relevant to FMC. We hypothesize that induction of anti-tumoural immunity and direct oncolysis of metastatic (often occult) disease using our oncolytic vaccine booster will delay or prevent post-surgical relapse and extend survival in cats with mammary carcinoma.