

# Abstracts: 47th Annual Meeting of the American College of Veterinary Ophthalmologists, Monterey, CA October 26–29, 2016

## POSTER ABSTRACTS

### ABSTRACT NO.: 001

#### The effect of trabectome® on intraocular pressure and postoperative medical management in 11 cases of canine glaucoma

MD Armour

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**Purpose:** To summarize the outcome of Trabectome® in 11 canine cases. **Methods:** A total of 11 eyes (9 canines) were included in the study. Patients were enrolled in the study if intraocular pressure (IOP) was >25 mmHg and were determined to have goniodysgenesis or closed iridocorneal angle. Patients were admitted for trabectome procedure and monitored postoperatively. Major outcome measures included mean post-operative IOP, number of glaucoma medications prior to surgery and post-operatively and secondary rescue surgical procedures performed. Mean post-operative IOP/number of medications was defined as the average of all recorded IOP/number of medications after surgery. Wilcoxon test was used for comparing measure before and after surgery. A *P*-value of less than 0.05 is considered statistically significant. **Results:** Nine of the 11 eyes were visual at the time of the procedure. Eight of the 9 dogs were goniodysgenic, and the remaining dog exhibited severe complete anterior synechia from Rocky Mountain Spotted Fever. Two cases had secondary rescue surgeries thus were not included in the analysis of IOP and number of glaucoma medications. Both failed cases underwent prior glaucoma surgeries. Of the remaining nine cases, mean IOP was reduced from  $60.9 \pm 27.6$  mmHg to  $14.4 \pm 6.9$  ( $P = 0.02$ ) and number of medications was reduced from  $3.2 \pm 1.0$  to  $1.9 \pm 0.4$  ( $P = 0.04$ ) post-operatively. Mean follow-up time was  $5 \pm 3$  months (range: 1–10). **Conclusions:** On average, IOP was reduced by 62% after surgery. There was a postoperative 29% reduction in medications. Trabectome may be effective in reducing IOP and medication dependency in canines in the short term follow up period. **Support/Disclosure:** None.

### ABSTRACT NO.: 002

#### Use of a rotational skin flap and closed suction drain system following orbital exenteration in a cat with squamous cell carcinoma of the eyelid

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**Purpose:** To demonstrate the use of a rotational skin flap and closed suction drain system following orbital exenteration and excision of a lower eyelid squamous cell carcinoma in a cat. **Methods:** An ulcerated mass in the lower right eyelid of a 10-year-old neutered male domestic-short-haired cat was wedge resected by a referring veterinarian. The tumor was histologically identified as a squamous cell carcinoma that had been removed with clear margins. Four months later a 1 cm dermal nodule presented at site of excision. The nodule was excised, the orbit exenterated, and the resultant defect closed with a rotational skin flap. A Jackson-Pratt drain removed post-operative transudate from the enclosed orbital space. The excised tissue and eye were submitted for histopathology at COPLow. The tissues were also immunohistochemically stained for papillomavirus antigens by The Animal Disease Diagnostic Laboratory at Purdue University. **Results:** The surgical outcome was cosmetic, without complication, and free of recurrence. Histopathology revealed a squamous cell carcinoma and epithelia with Bowenoid papulosis (carcinoma *in situ*). Papillomavirus antigens were not detected by immunohistochemistry. **Conclusions:** Orbital exenteration, mass excision, a rotational skin flap, and a closed suction drain system were an effective treatment for a lower eyelid squamous cell carcinoma in a cat. This case report did not demonstrate an association between Bowenoid papulosis and papillomavirus. **Support/Disclosure:** None.

### ABSTRACT NO.: 003

#### Orbital emphysema secondary periodontal abscess in a cat

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**Purpose:** To report orbital emphysema secondary to periodontal abscess in a cat. **Methods:** An approximately 3 month old cat was referred to the ophthalmology service. Examination revealed purulent ocular discharge, conjunctival hyperemia, corneal edema and vascularization, perforation with extravasation of intraocular contents and phthisis bulbi in the right eye. In the left eye, only purulent discharge was observed. After treatment with topical tobramycin for 7 days, enucleation of the right eye was performed. **Results:** 6 months after enucleation volume increase was observed in the right orbital region. There was no pain on palpation. Blood test showed no significant change. Prednisolone was administered 1 mg/kg SID for 10 days with partial improvement. After treatment, orbital air and increasing socket volume was noted again. Orbital ultrasound revealed gas density accumulation. The animal was anesthetized for exam the oral cavity and orbital aspiration. Oral examination revealed the presence of gingivitis more evident in fourth right maxillary premolar tooth. Full mouth dental radiographs were performed, showing the presence of periapical lesion in all the three roots of the 4th premolar, suggesting infection. Surgical extraction was performed. Culture of the orbital secretion showed the

presence of *Staphylococcus* sp. Three months after tooth removal there was no emphysema. **Conclusions:** Periodontal abscess can cause orbital emphysema in patients with anophthalmic orbital cavity. This is the first report that the authors have knowledge of orbital emphysema secondary periodontal abscess. **Support/Disclosure:** None.

### ABSTRACT NO.: 004

#### Evaluation of the canine oral mucosa for presence of mucin secreting cells

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**Purpose:** Labial mucosa transplantation for the treatment of canine keratoconjunctivitis sicca (KCS) has been reported recently. Post-op alleviation of clinical signs was assumed to be the result of labial salivary glands providing lubrication to the ocular tissue. The aim of this study was to evaluate the presence of mucin secreting cells in the canine oral mucosa. **Methods:** Oral mucosal biopsies were collected from six dogs that died ( $n = 1$ ) or were euthanized ( $n = 5$ ) for reasons unrelated to this study. The breeds included were two Doberman Pinchers, one Labrador Retriever, one Portuguese Water Dog, one German Shepherd Dog and one mixed canine. Three were spayed females, and three were castrated males with the average age of 9.7 years ( $\pm 3.6$ ). Samples were obtained by an 8 mm punch biopsy at the following locations of the canine oral cavity: upper rostral labial mucosa at midline, lower rostral labial mucosa at midline, upper labial mucosa near the commissure, lower labial mucosa near the commissure, and buccal mucosa approximately 1 cm caudal to the commissure. Samples were routinely processed and stained with H&E and periodic acid-Schiff (PAS) stains. The samples were evaluated for mucin secreting cells by light microscopy. **Results:** At the selected locations, no mucin producing cells were detected. **Conclusions:** Mucin producing cells are not responsible for alleviation of clinical signs associated with KCS in dogs following labial mucosa transplantation. Further studies are needed to determine the mechanism leading to improvement of KCS clinical signs in canine patients following labial mucosal transplantation. **Support/Disclosure:** None.

### ABSTRACT NO.: 005

#### Intravitreal gentamicin and dexamethasone injection for the management of chronic glaucoma in dogs: a retrospective study of 74 dogs (88 eyes) from 2011–2015

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**Purpose:** To evaluate the long-term outcome of blind canine end-stage glaucoma patients treated with intravitreal gentamicin and dexamethasone sodium phosphate (IVGD). **Methods:** Medical records from Cornell University Veterinary Teaching Hospital were reviewed to identify canine patients treated with IVGD for glaucoma between 2011–2015 with at least 3 months follow-up. Signalment, intraocular pressure (IOP), ocular diagnoses and post-procedure outcome data were collected. Ocular centesis preceded an intravitreal injection of 25–50 mg gentamicin combined with 1–2 mg dexamethasone SP under chemical restraint. **Results:** Seventy-four dogs (88 eyes), met the inclusion criteria. Mean follow-up duration was 60.2  $\pm$  14.9 weeks. Cocker spaniels (21%), golden retrievers (12%), and shih tzus (10%) were overrepresented. Fifty-one eyes (58%) had primary glaucoma, while 37 eyes (42%) had secondary glaucoma. The 2 most common causes for secondary glaucoma were cataract surgery (38%) and golden retriever uveitis (32%). Mean IOP immediately preceding IVGD was  $40.9 \pm 4.1$  mmHg. Mean IOP at first recheck ( $3.7 \pm 1.3$  weeks) was  $10.0 \pm 2.0$  mmHg. Mean IOP at last follow-up was  $9.7 \pm 2.1$  mmHg. After a single IVGD injection, 82% (72/88) of eyes maintained IOP < 20 mmHg, which increased to 91% (80/88) after a second IVGD and 93% (82/88) after a third IVGD. Among the eyes that became normotensive, 98% did not require long-term anti-glaucoma medication, however 74% of these required topical long-term anti-inflammatories. Complications after IVGD occurred in 84% of treated eyes. The most common complications were cataracts (41%), phthisis bulbi (31%), and hyphema (25%). **Conclusion:** IVGD was successful at lowering IOP to <20 mmHg long-term in blind and glaucomatous canine eyes. **Support/Disclosure:** None.

### ABSTRACT NO.: 006

#### Rock inhibitor fasudil (HA-1077) potentially attenuates canine corneal fibrosis

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**Purpose:** To evaluate the safety and efficacy of the ROCK Inhibitor fasudil (Abcam, Cambridge, UK) in the prevention of canine corneal fibrosis using an *in vitro* model. **Methods:** Canine corneas were collected and used to generate primary canine corneal fibroblasts (CCFs) by growing cultures in minimal essential medium supplemented with 10% fetal bovine serum. Canine corneal myofibroblasts (CCMs), used as a model of canine corneal fibrosis, were produced by growing CCF cultures in serum-free medium containing transforming growth factor  $\beta 1$  (1 ng/mL). Trypan blue viability assays determined the optimal fasudil dose for this *in vitro* model while phase contrast microscopy, and TUNEL assays

were used to evaluate potential cytotoxicity. Scratch and MTT assays evaluated the effect of fasudil on cellular migration and proliferation. Immunocytochemistry, immunoblot analysis, and Real-time PCR targeting  $\alpha$ -smooth muscle actin ( $\alpha$ SMA; myofibroblast marker) were employed to determine the efficacy of fasudil to inhibit CCM formation *in vitro*. **Results:** Treatment with 3 nM fasudil significantly decreased  $\alpha$ SMA expression when compared to the TGF $\beta$ 1 control group ( $P < 0.01$ ). Fasudil treatment  $\leq 3$  nM did not affect CCF phenotype or cellular viability and did not result in significant cytotoxicity. **Conclusions:** Fasudil safely and effectively inhibits TGF $\beta$ 1-induced myofibroblast proliferation in the canine cornea *in vitro*. *In vivo* studies are warranted. **Support/Disclosure:** Supported in part by NIH Postdoctoral Training Grant in Comparative Medicine RR032020, and Ruth M. Kraeuchi Endowed Funds. None.

## ABSTRACT NO.: 007

### Correlation of pre and post pupillary dilation intraocular pressures and incidence of post operative ocular hypertension (poh) after phacoemulsification in canines

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**Purpose:** To determine if the initial intraocular pressure (IOP) or changes in IOP pre and post pupillary dilation correlate with incidence of POH after routine phacoemulsification in canines. **Methods:** One hundred and three canine globes (of sixty-four patients) underwent routine phacoemulsification. Patient breed, age, sex & diabetic status were recorded. Intraocular pressure, estimated by rebound tonometry, was evaluated at pre-dilation (initial), thirty minutes post-dilation with 1% Tropicamide (Bausch & Lomb) and post-operatively at four hours, twenty-four hours, seven days and fourteen days. Pre-and peri-surgical medication protocols were consistent, with the exception of systemic anti-inflammatory therapy which comprised either Carprofen (Rimadyl<sup>®</sup>, Pfizer Animal Health) or prednisone (Westward Pharmaceutical Corp) depending on the patient's diabetic status. POH was evaluated as an IOP  $\geq 20$  mmHg and  $\geq 25$  mmHg. Analysis was performed using the software SAS v9 (SAS Institute Inc., Cary, NC, USA) with significance set at  $P \leq 0.05$ . **Results:** The difference in pre and post pupillary dilation IOP is not a significant predictor of POH at both  $\geq 20$  mmHg ( $P = 0.34$ ) and  $\geq 25$  mmHg ( $P = 0.50$ ). The initial IOP is not a significant predictor of POH when set at  $\geq 25$  mmHg ( $P = 0.066$ ); however is when POH is set at  $\geq 20$  mmHg ( $P = 0.0018$ ). **Conclusions:** In this study, there was no correlation of pre and post dilation IOP with regards to POH after phacoemulsification in canines. The initial IOP (pre-dilation IOP) may be a predictor for the potential of POH. **Support/Disclosure:** None.

## ABSTRACT NO.: 008

### Clinical signs, imaging findings and outcome in twelve cats with internal ophthalmoparesis/ophthalmoplegia

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**Purpose:** To describe clinical signs, imaging findings and outcomes of feline internal ophthalmoparesis/ophthalmoplegia. **Methods:** Retrospective study of feline patients with internal ophthalmoparesis/ophthalmoplegia from the archives of the Royal Veterinary College (2008 – 2015). For inclusion into the study, cases must have had imaging performed and follow-up information available. **Results:** Twelve cases of feline internal ophthalmoparesis ( $n = 2$ )/ophthalmoplegia ( $n = 10$ ) were identified. Affected cats had a median age of 10.54 years (range 5.75 to 13.17), and both sexes were affected (9 males; 3 females) of varying breeds – mostly domestic short hairs ( $n = 8$ ). Additional clinical signs commonly included alteration in mental status ( $n = 10$ ) and additional cranial nerve deficits ( $n = 9$ ). MRI/CT scans of the head were performed in most cats ( $n = 10$ ) revealing a mass lesion in all cases in varying locations: middle cranial fossa ( $n = 7$ ); extra-axially between the pons and midbrain ( $n = 1$ ); retrobulbar space ( $n = 1$ ) and intranasally extending to the orbital fissure ( $n = 1$ ). Two cats only had abdominal ultrasound performed leading to a diagnosis of lymphoma. All twelve cats were euthanized; mean time from diagnosis to euthanasia was 3.5 days (range 0 to 80 days). **Conclusions:** Feline internal ophthalmoparesis/ophthalmoplegia rarely presents as the sole clinical sign in a referral hospital. MRI is the best imaging modality for investigating the possible underlying cause if other intracranial signs are present. Abdominal ultrasound may be of benefit for cats that have systemic signs and negate the need for further advanced imaging. Feline cases with internal ophthalmoparesis/ophthalmoplegia associated with other intracranial/systemic signs have a poorer prognosis. **Support/Disclosure:** None.

## ABSTRACT NO.: 009

### Use of DNA sequence analysis and literature search to diagnose and treat a previously unreported bacteria (*Macrococcus carousselicus*) from an infected corneal ulceration in a horse

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**Purpose:** To describe the first reported case of *Macrococcus carousselicus* causing a complicated corneal ulcer in a horse. DNA sequence analysis was required for diagnosis and antibiotic susceptibility. **Methods:** A 17 year old American Paint Horse mare presented to the ophthalmology service at the University of Minnesota for evaluation of corneal ulceration caused by a corneal foreign body removed by the regular veterinarian. The horse was diagnosed with a superficial complicated corneal ulcer with hypodrops formation. Conventional culture and susceptibility was unsuccessful in identifying the causative organism or establishing a susceptibility pattern due to growth of an unfamiliar organism. Standard antibiotic

therapy was instituted, including a topical cephalosporin and two different generations of fluoroquinolones, with only mild effects on the healing process. The bacteria was identified with a DNA sequence analysis performed by the use of Polymerase Chain Reaction (PCR). Literature review was used to identify the best antibiotic treatment. **Results:** Cytology revealed large, gram positive, paired cocci. PCR analysis of pure growth on culture identified *Macrococcus carousselicus*. Literature review revealed reports of resistance to beta-lactams and fluoroquinolones in other *Macrococcus spp.* and susceptibility to chloramphenicol. Following addition of chloramphenicol to the treatment protocol, the corneal ulceration improved >50% in 24 hours. **Conclusions:** To the author's knowledge, this is the first case report of a normal commensal *Macrococcus spp.* resistant to standard therapy causing an infected corneal ulceration in a horse. PCR was required to successfully diagnose and guide therapy. **Support/Disclosure:** None.

## ABSTRACT NO.: 010

### Ocular melanosis with secondary chronic glaucoma in a 13-year-old female spayed english setter

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**Purpose:** To describe the clinical appearance, aqueous humor cytology, and histological findings of ocular melanosis affecting the right globe of an English setter. **Methods:** A 13-year-old female spayed English setter presented to University of Minnesota Veterinary Medical Center ophthalmology service for an evaluation of a buphthalmic right eye. Complete ophthalmic examination, including Schirmer, applanation tonometry, and fluorescein staining were performed. The eye was enucleated and submitted for histopathology. An aqueous paracentesis was performed on the right eye immediately after enucleation. **Results:** Ophthalmic examination revealed the right eye to be blind, buphthalmic, with two focal areas of scleral pigmentation. The pupil was non-responsive and mydriatic and the iris was diffusely hyperpigmented. The lens was posteriorly subluxated. Fundic examination revealed optic nerve cupping. The intraocular pressure of the right eye was 26 mmHg. Cytology from the aqueous paracentesis was low cellularity but dense aggregates of heavily pigmented uniform oval to polyhedral cells characterized by single round nuclei were identified on scanning. Histopathology of the globe supported the findings from cytology and diagnosed ocular melanosis with focal melanocytoma. **Conclusion:** Ocular melanosis is a Cairn terrier-related ocular disease, also described in Labrador retrievers and Boxers. This report describes ocular melanosis in an English setter, making it an important differential diagnosis in this breed, given risk to the fellow eye. Aqueous humor cytology, combined with clinical findings, may be a useful diagnostic tool in the pre-enucleation setting. **Support/Disclosure:** None.

## ABSTRACT NO.: 011

### Causes and outcomes of hyphema in canines presenting to a referral hospital

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**Purpose:** To investigate the causes and common sequelae of hyphema in dogs and identify factors associated with negative outcomes. **Methods:** Medical records of dogs diagnosed with hyphema at Colorado State University's Veterinary Teaching Hospital between 2004 and 2015 were reviewed. Inclusion criteria were patients not previously diagnosed with ophthalmic disease, who also received a diagnostic work-up. Logistic regression was used to evaluate the effects of various factors on vision outcomes. **Results:** Ninety-one dogs (112 eyes) were included. The most frequently diagnosed causes of hyphema included trauma (22/91, 24.2%), systemic neoplasia (16/91, 17.6%), and idiopathic hyphema (12/91 13.2%). Forty eyes (43.4%) were visual at their last recheck, regardless of the cause of hyphema. Enucleation was performed or recommended in 38 eyes (41.8%), and 18 eyes (22.8%) were diagnosed with glaucoma. Initial exam findings that significantly increased odds of permanent blindness were absent indirect PLR (OR = 24.2), absent dazzle (OR = 15.9), elevated intraocular pressure (OR = 7.7), unilateral hyphema (OR = 6.3) and complete hyphema (OR = 3.3). Breed, age, and duration of hyphema prior to presentation were not significantly associated with blindness. Causes of hyphema with poor visual outcomes were ocular neoplasia (5/5 eyes non-visual), chronic uveitis (4/4 eyes non-visual), and traumatic hyphema (15/18 eyes non-visual), while systemic neoplasia (5/18 eyes non-visual) and immune-mediate thrombocytopenia (1/9 eyes non-visual) had better outcomes. **Conclusion:** The prognosis for vision is highly dependent on the cause of hyphema and the initial presenting signs. Negative visual prognostic factors noted at presentation include: absent indirect PLR and dazzle, elevated intraocular pressure, and complete hyphema. **Support/Disclosure:** None.

## ABSTRACT NO.: 012

### Differences in epitope sites of lens alpha A-crystallin in dogs with and without cataract

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**Purpose:** Since serum autoantibodies against alpha A-crystallin are detected in dogs with and without cataract, we evaluated epitope sites of lens alpha A-crystallin in such dogs. **Methods:** Western blotting was used to evaluate positive antibodies against alpha-A crystallin in sera of 10 dogs with cataract (aged 4.0  $\pm$  2.31 years old; 1 dog with hypermature cataract and 9 dogs with mature cataract) and 7 healthy dogs (aged 3.43  $\pm$  2.51 years old). Fourteen synthetic peptides were prepared from the alpha-crystallin A chain (Canis lupus familiaris) sequence (NP\_001074367). Each overlapping peptide had a sequence of 18 amino acids. ELISA was used to measure antibody titers against the synthetic peptides. Incidence of positive reaction to synthetic overlapping peptides in ELISA was compared between dogs with cataract and healthy controls by using analysis of contingency tables, at a significance of  $P < 0.05$ . **Results:** More positive-antibody fragments were present in the sera of dogs with cataract than in the sera of healthy dogs ( $P = 0.0385$ ). There was no significant difference between dogs with cataract and healthy dogs in the incidence of positive-antibodies against N-terminal (57.1% vs. 70.0%, respectively;  $P = 1.000$ ) and C-terminal (42.9%

vs. 90.0%, respectively;  $P = 0.1190$ ) sites. Significantly more positive antibodies against the HRRYRL<sup>120</sup> fragment site were detected in the sera of dogs with cataract than in that of healthy dogs ( $P = 0.0295$ ). **Conclusions:** Epitope sites of alpha A-crystallin differ between in dogs with or without cataracts. **Support/Disclosure:** None.

### ABSTRACT NO.: 013

#### Modified trabeculectomy, using Ologen<sup>®</sup> collagen matrix implants, for treating glaucoma in 4 dogs

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**Purpose:** To describe the surgical techniques and outcomes associated with using Ologen<sup>®</sup> Collagen Matrix (Ologen<sup>®</sup> CM, Aeon Astron, Netherlands) implants in modified trabeculectomies for medically uncontrolled glaucoma in four dogs. **Methods:** Modified trabeculectomies were performed as follows: A 12 o'clock fornix-based conjunctival/Tenon's flap was prepared with dissection of the conjunctiva and Tenon's capsule, 1 mm behind the superior limbus. Then, a rectangular 2.0 × 2.0 mm<sup>2</sup>, 300-µm thick scleral flap was dissected using a crescent knife, followed by a 1 × 1-mm trabeculectomy. The scleral flap was repositioned, with Ologen<sup>®</sup> CM (3.0 × 2.0 × 1.0 mm) implantation beneath the scleral flap. Another Ologen<sup>®</sup> CM (diameter, 12 mm; height, 1 mm) implant was positioned on top of the scleral flap, without the use of sutures. Finally, the conjunctiva was closed. **Results:** Four eyes from 4 dogs underwent the described procedure. Intraocular pressure (IOP) was normalized immediately after surgery; antiglaucoma medications were gradually reduced in concert with IOP normalization. An adequate bleb formation was identified, without bleb-related complications, within the short-term follow-up periods for 4 months. **Conclusions:** This is the first report of a modified trabeculectomy using Ologen<sup>®</sup> CM implants. This method is another management option for the treatment of medically uncontrolled glaucoma in dogs. **Support/Disclosure:** None.

### ABSTRACT NO.: 014

#### Effects of topical ophthalmic ganciclovir in dogs with experimental ocular canine herpesvirus-1 infection

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**Purpose:** To determine the effects of ganciclovir ophthalmic gel in dogs with experimental ocular canine herpesvirus-1 (CHV-1) infection. **Methods:** A randomized, masked, placebo-controlled trial was performed using beagles with latent CHV-1 infection. Recurrent ocular CHV-1 infection was experimentally-induced by administration of systemic prednisolone for 7 days. Dogs received 0.15% ganciclovir ophthalmic gel or artificial tear gel topically 5 times daily in both eyes for 7 days, then 3 times daily for 7 days, beginning on the 4th day of prednisolone administration. Dogs were then monitored for 30 days. Clinical ophthalmic examinations were performed and clinical ocular surface disease scores calculated. *In vivo* confocal microscopic ocular examinations were performed and leukocyte infiltrates quantified. Ocular samples for CHV-1 polymerase chain reaction assays and blood for hemograms and serum biochemistry panels were collected at predetermined intervals. **Results:** Clinical ocular disease scores were significantly lower in the ganciclovir group compared to the placebo group. Conjunctival and corneal leukocyte infiltrates measured by *in vivo* confocal microscopy were significantly lower in the ganciclovir group. The duration of ocular viral shedding was reduced in the ganciclovir group compared to the placebo group. Hemogram and serum biochemistry panel values were unremarkable and overt signs of local irritation or toxicity associated with ganciclovir administration were not detected. **Conclusions:** Topical application of ganciclovir ophthalmic gel was well tolerated and effective at reducing clinical disease scores, tissue inflammation, and viral shedding duration in dogs with experimental ocular CHV-1 infection. **Support/Disclosure:** Supported by the Cornell University Research Grants Program in Animal Health. None.

### ABSTRACT NO.: 015

#### Ocular manifestations of leishmaniasis in a cat in Brazil: case report

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**Purpose:** To describe the ocular clinical signs and the progress over 6 months of a cat with visceral leishmaniasis, which was diagnosed by aqueous humor culture and positive polymerase chain reaction (PCR). **Methods:** An 8-year-old domestic shorthair female cat was initially presented with bilateral uveitis with pseudotumoral appearance in the iris of the right eye and chemosis in upper eyelid of the left eye. Topical 0.3% ketorolac trometamol and 1% prednisolone acetate were prescribed every 6 h for both eyes. A biopsy of the eyelid and palpebral conjunctiva, bone marrow and aqueocentesis was suggested for further investigation. **Results:** The patient tested negative for feline immunodeficiency virus, feline leukemia virus and *Toxoplasma gondii*. Histopathology of a granulomatous lesion on the conjunctiva revealed amastigotes compatible with *Leishmania* sp. Aqueous humor cultured in biphasic NNN medium revealed promastigotes and PCR was positive for *Leishmania infantum*. Treatment with allopurinol (10 mg/kg/BID/PO) was prescribed. After 45 days, iris in the right eye and chemosis in the left eye showed slight improvement. Complete remission of the intraocular inflammation was detected 15 days later; iris atrophy was observed in the right eye and corneal melanosis was observed in the left eye. Discontinuation of topical treatment resulted in worsening of the clinical signs. Six months of treatment with oral allopurinol and topical 0.3% ketorolac trometamol and 1% prednisolone acetate helped to improve the ocular signs. **Conclusions:** Leishmaniasis should be considered as a differential diagnosis in cats presenting uveitis with pseudotumoral appearance. Allopurinol alone did not control ocular signs. To our knowledge, this is the first report of feline leishmaniasis with ocular manifestation in Brazil, in which the diagnosis was confirmed by aqueous humor analysis. **Support/Disclosure:** None.

### ABSTRACT NO.: 016

#### Intraocular cytauxzoon felis in a domestic shorthair cat

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**Purpose:** To describe a case of intraocular involvement in a cat confirmed with cytauxzoonosis on necropsy. **Methods:** A 5-month-old intact male domestic shorthair cat was received for gross necropsy in October, 2015. The cat was euthanized by the primary care veterinarian after presenting in a moribund state with hyperthermia, pancytopenia, and marked serum biochemical profile abnormalities. Two other cats on the property were found acutely dead the day prior to presentation. **Results:** Gross examination revealed episcleral vessel injection and diffuse icterus of the mucous membranes and internal fat stores, multifocal lung lobe parenchymal hemorrhages, spleen and mesenteric lymph node reddening and enlargement. Histologic examination revealed macrophages laden with protozoal schizonts diffusely within blood vessels and vascular spaces of all affected organs, including the blood vessels of the uveal tract. The ciliary body was most affected; however, organisms were identified within blood vessels throughout the uveal tract. Additionally, moderate amounts of vitreal hemorrhage were present. **Conclusions:** To the authors' knowledge, this is the first description of cytauxzoonosis affecting the eyes of an infected cat. In cats presenting with history and clinical findings suggestive of cytauxzoonosis, complete ophthalmic examination is indicated to confirm or rule-out ocular involvement. **Support/Disclosure:** None.

### ABSTRACT NO.: 017

#### Effect of the frequency of diamond burr tip usage on healing outcomes of spontaneous chronic corneal epithelial defects (SCCED) in dogs

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**Purpose:** To evaluate if the number of diamond burr tip uses affects healing rates of SCCED treated with diamond burr keratectomy (DBK). **Methods:** A retrospective review of medical records was performed for dogs with a newly diagnosed SCCED by a veterinary ophthalmologist and treated with a DBK from March, 2012 to December, 2015. All procedures were performed with a motorized burr unit and 5 mm rounded burr tips. The number of tip uses was tracked throughout the duration of the study for up to 28 uses before being discarded. Analyses were performed using SAS V 9.3 with  $P < 0.05$  considered significant. **Results:** Eighty-nine dogs (102 eyes) were included for analysis. Thirteen eyes of 10 dogs were not healed by 21–23 days (14.6%). Of these, 10 eyes of 8 dogs required a repeat DBK (11.2%). The average number of uses for unhealed ulcers was 7.3 and 11.1 for healed ulcers. The average number of uses for eyes that required a repeat DBK was 7.9 and 10.9 for eyes that did not. The number of uses did not reach significance for the healing rate or repeat procedures. A longer duration of clinical signs was significantly associated with a repeat DBK ( $P = 0.036$ ). Having an alternative procedure before referral also increased the risk for a repeat DBK ( $P = 0.049$ ). No other analyzed variables reached statistical significance. **Conclusions:** Results suggest that a diamond burr tip used for a DBK up to 28 times has no effect on the healing rate or the need for a repeat DBK at 21–23 days. **Support/Disclosure:** None.

### ABSTRACT NO.: 018

#### Retrospective study of incidence and treatment of ocular hypertension and glaucoma after phacoemulsification with foldable intraocular lens implants in diabetic dogs

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**Purpose:** To identify whether diabetic dogs who underwent phacoemulsification with foldable intraocular lenses are at an increased risk to develop ocular hypertension and glaucoma compared to diabetic dogs treated without foldable intraocular lenses. **Methods:** Medical records of diabetic dogs that underwent phacoemulsification from January 2014 to February 2016 at Long Island Veterinary Specialists were reviewed. **Results:** 114 diabetic dogs (213 eyes) were evaluated. Glaucoma was found in 8% ( $n = 17$ ) and ocular hypertension in 21.1% ( $n = 45$ ) of eyes. Of those 213 eyes, 178 had foldable IOLs which had an incidence of 6.7% ( $n = 12$ ) of glaucoma and 24.2% ( $n = 43$ ) of ocular hypertension. Diabetic dogs with IOLs have approximately 3 times the risk of developing OH as compared to dogs without foldable IOLs (24.2% vs. 8.6%,  $P = 0.04$ ). The proportion of dogs developing glaucoma in the two populations was similar. Of the 45 eyes with ocular hypertension, 42 had IOP controlled with medical therapy alone, 3 were controlled with endoscopic cyclophotocoagulation, and 1 was lost to follow-up. Of the 17 eyes with glaucoma, 10 were controlled with medical therapy alone, 5 were controlled with endoscopic or transscleral cyclophotocoagulation, and 2 remained uncontrolled on medical therapy. Vision was lost at the time of the last evaluation in 76.5% (13/17) of eyes with glaucoma with a mean time to loss of vision of 142 days. **Conclusions:** Diabetic dogs that underwent phacoemulsification with foldable intraocular implants had a higher risk of ocular hypertension but not glaucoma as compared to dogs treated without foldable intraocular implants. **Support/Disclosure:** None.



**ABSTRACT NO.: 019****Influence of artificially induced posterior lens capsule rupture on real-time intraocular pressure during phacoemulsification in dogs *ex vivo***

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**Purpose:** To evaluate changes in intraocular pressure (IOP) after artificially induced posterior lens capsule rupture (PLCR) during phacoemulsification in canine *ex vivo* eyes and to compare IOPs between before and after PLCR and between different phacoemulsification stages in 2 different bottle heights (BH). **Methods:** Coaxial phacoemulsification was performed with a venturi-based machine in enucleated canine eyes. A pressure transducer, inserted in the peripheral cornea, monitored the IOPs in real-time. On one half of the lens, sculpt-segment removal (SS) procedure was followed by irrigation/aspiration (IA). The PLCR was artificially created and then the SS and IA were repeated on the residual half-lens. The simultaneous IOPs digitally recorded multipoint IOPs every 0.1 to 0.2 sec. The mean IOP at each stage was calculated and compared. **Results:** After PLCR, vitreous body was exposed to the phaco needle or IA tip, interrupting aspiration of lens fragments, so the minimum IOPs increased with raising the mean IOPs. The mean IOP after PLCR was significantly higher than that before PLCR at each SS and IA stages in both BHs. It was shown that there was larger increase in IOP after PLCR at SS stage and high BH than IA stage and low BH, respectively. **Conclusions:** The occurrence of PLCR during phacoemulsification led to IOP increase at both SS and IA stages. Elevated IOP after PLCR might be one of the most important factors for ocular tissue damage, reducing ocular perfusion. Additionally, the BH should be reduced to prevent complications from the raised IOP. **Support/Disclosure:** None.

**ABSTRACT NO.: 020****Ultrasound biomicroscopy of anterior segment changes after phacoemulsification in canine eyes *ex vivo***

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**Purpose:** To evaluate changes of the anterior segments after phacoemulsification with or without intraocular lenses (IOL) implantation using ultrasound biomicroscopy (UBM) in canine eyes. **Methods:** The 24 enucleated canine eyes were used in this study. Clear corneal incision (group C), phacoemulsification without IOL implantation (group P), and phacoemulsification with IOL implantation (group PL) were randomly performed on respectively 8 eyes. Anterior segment parameters including geometric iridocorneal angle (ICA), width of the ciliary cleft (CC) entry, area of the CC, angle of posterior end of the CC (CC angle), and anterior chamber depth (ACD) were measured using UBM before and after the surgeries. Percentages of these parameter changes between the groups were assessed using student's *t*-test. **Results:** In group P and group PL, geometric ICA and ACD was significantly increased, compared to group C ( $P < 0.01$ , both). In group P, CC angle was also significantly increased, compared to group C ( $P < 0.05$ ). Other parameters showed no statistical significance. **Conclusions:** After phacoemulsification, UBM showed prominent shifting of iris diaphragm to backward, which might be related to increasing not only geometric ICA and ACD but also CC angle in canine eyes. Because anterior segment structures were changed into facilitating aqueous humor outflow, postoperative hypertension might be considered to result from physiological problem, not structural problem. **Support/Disclosure:** None.

**ABSTRACT NO.: 021****Diamond burr debridement combined with superficial grid keratotomy versus diamond burr debridement alone for the management of spontaneous chronic corneal epithelial defects (SCCED): a retrospective study of 347 dogs**

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**Purpose:** To evaluate the efficacy of a combined diamond burr debridement and grid keratotomy procedure vs. diamond burr alone for the management of spontaneous chronic corneal epithelial defects (SCCED) in dogs. **Methods:** A retrospective analysis for 347 dogs (378 eyes) from three different institutions with a diagnosis of SCCED who received diamond burr debridement and/or superficial grid keratotomy between 2003 and 2015 were included. Age, breed, sex, underlying corneal disease, history of previous SCCED, medications, procedures performed, time to healing, and complications were investigated for statistical associations. **Results:** Average age was 8.7 years (range <1–18 years). Boxers were the most common breed (21.5%) followed by mixed breeds (15.3%), Labrador Retrievers (6.9%), and Boston Terriers (4.3%). One hundred and twenty-two out of 154 eyes (79.2%) receiving a combination of diamond burr debridement with superficial grid keratotomy healed on the first combination treatment (average healing 16 days, range 5–45 days). In contrast, 172 of 243 eyes (70.8%) receiving diamond burr debridement as a single treatment modality healed on the first debridement (average healing 14 days, range 4–30 days) revealing a borderline significant increase rate in healing for eyes receiving a combination treatment ( $P = 0.06$ ). Post-treatment complications occurred in 25.9% of eyes receiving only a burr debridement and in 20.1% of eyes receiving a combination treatment with edema and fibrosis being the most common complications. **Conclusions:** Preliminary statistics reveal a borderline significant trend of better healing time and fewer complications post combination treatment vs. diamond burr alone. **Support/Disclosure:** None.

**ABSTRACT NO.: 022****Subconjunctival amphotericin B injection adjunctive therapy for refractory equine keratomycosis**

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**Purpose:** Equine keratomycosis is a common, progressive, and vision threatening ocular disease that is frequently poorly responsive to antifungal medications. The purpose of this study was to review the protocol, complications, and outcomes of the use of subconjunctival amphotericin B (X-GEN; Big Flats, NY) as adjunctive therapy in refractory equine keratomycosis. **Methods:** Horses that presented to the Ophthalmology service at NC State University between 2007 and 2015 and diagnosed with fungal keratitis, were deemed non-responsive to anti-fungal medical therapy, and received subconjunctival amphotericin B were reviewed. Data collected included signalment, duration and type of corneal disease, type of fungus, treatments, amphotericin B protocol, adverse effects, and outcome of the horses. **Results:** Fifty horses were included in the study, 48 of which resided in the southeast United States (NC, SC, AL, VA). Stromal abscesses were the most common diagnosis at presentation (34/50). All patients received 0.2–0.3 mL of a 50 mg/mL solution of amphotericin B every 48 hours for an average of 3 injections. Post-injection side effects were mild and localized to injection site (hyperemia, chemosis, blepharospasm). Eleven horses eventually required surgical intervention (6 penetrating keratoplasty; 5 keratectomy). Of 36 horses with long-term follow-up, 22 horses healed completely while 14 required enucleation. **Conclusions:** Subconjunctival amphotericin B administration was well tolerated and shows promise as adjunctive therapy for patients poorly-responsive to the initial topical regimen for fungal keratitis. Future study will need to compare refractory fungal cases that receive amphotericin B with other therapeutic interventions and antifungal agents. **Support/Disclosure:** None.

**ABSTRACT NO.: 023****A trial of semiconductor laser trabeculectomy under an ophthalmic endoscope in eyeballs of canine cadavers**

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**Purpose:** In dogs, severe glaucoma induces corneal edema, which hinders the observation of the iridocorneal angle during trabeculectomy. This study aimed to assess the use of a semiconductor laser under an ophthalmic endoscope during trabeculectomy in the eyes of dogs. **Methods:** Fresh eyes were obtained from adult beagle cadavers. Ethics approval for this study was obtained from the Azabu University animal research committee. A DVL-20 400 μm-diameter diode semiconductor laser (Asuka Medical Inc., Kyoto, Japan) was used for surgery, with a pulse mode of 0.2 seconds, and laser power range of 4.5 to 9.5 W. A laser hand-piece was adapted with an inlet for perfusate for the trabeculectomy procedure. A 20-gauge endoscope was used with an FT-203F 3CCD imaging system (FiberTech Co., Ltd., Chiba, Japan). The results of trabeculectomy were assessed using video footage, scanning electron microscopy (SEM) images, and histological examination findings. **Results:** SEM images indicated a sharp outline and complete penetration of the irradiated area of the iridocorneal angle when applying a laser output of 5.9 W, compared with 4.5 and 5.2 W outputs. The irradiated spot sizes for 6 and 9 W outputs were  $0.226 \pm 0.081$  and  $0.342 \pm 0.082$  mm<sup>2</sup>, respectively ( $P < 0.01$ ). Histological findings for irradiated areas using the 9 W laser output showed no tissue response at the bottom of the hole formed by the laser. **Conclusions:** Direct irradiation of the iridocorneal angle using a semiconductor laser and ophthalmic endoscope is potentially an effective tool for draining anterior humor during the treatment of glaucoma in dogs. **Support/Disclosure:** None.

**ABSTRACT NO.: 024****The equine third eyelid contains a conjunctival pocket with lymphatic tissue**

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**Purpose:** To describe the gross, histopathological, and immunohistochemical findings of a previously unreported structure within the equine third eyelid (TEL). **Methods:** The eyes of 22 adult research horses with normal ocular findings were collected shortly after euthanasia. The globes and attached TELs were fixed in 10% formalin and submitted to the Comparative Ocular Pathology Laboratory of Wisconsin for histological evaluation. Sections were stained with H&E, Periodic acid Schiff (PAS) and Alcian Blue, and labeled with CD20, CD79a, CD3, and IgG antibodies for immunohistochemistry (IHC). **Results:** There is a curvilinear, redundant fold of conjunctival epithelium that forms a focal pocket near the mid-point of the bulbar surface of the equine TEL. Histologically, a double layer of cuboidal epithelium lines the structure. Multiple ducts emanating from the TEL gland converge in the direction of the pocket, and appear to connect at its base. Surrounding the pocket, there are numerous lymphoid follicles aggregating into lymphatic nodules that contain characteristic features of conjunctiva-associated lymphoid tissue (CALT). Diffuse lymphatic tissue also surrounds the pocket and is characterized by subepithelial clusters of lymphocytes and plasma cells as well as intra-epithelial lymphocytes. Cells within the germinal center of lymphoid follicles were strongly positive for CD20 and CD79a, confirming B-cell origin. Peripheral lymphocytes surrounding the follicles, and within the conjunctival epithelium, were strongly positive for CD3, confirming T-cell origin. **Conclusions:** This study describes a TEL structure unique to equids that is associated with the TEL gland and likely plays a role in CALT. **Support/Disclosure:** None.

**ABSTRACT NO.: 025****A novel *ex vivo* model of equine corneal epithelial wound healing**

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**Purpose:** Corneal disease is a significant cause of decreased vision or blindness in the horse worldwide. However, research related to equine corneal disease is limited and more heavily devoted to *in vivo* studies. The objective of this study was to develop an *ex vivo* model of equine corneal epithelial wound healing that maintained normal corneal anatomy. **Methods:** Equine corneas ( $n = 14$ ) were harvested within two hours of humane euthanasia for reasons unrelated to the study and processed immediately. Corneas were randomly assigned to wounded ( $n = 8$ ) or unwounded ( $n = 6$ ) controls. Corneoscleral rims were excised 2 mm posterior to the limbus. The axial cornea was wounded by applying filter paper soaked in 1N sodium hydroxide for 60 seconds and epithelial ulceration was confirmed employing fluorescein stain. Corneas were subsequently cultured using an air-liquid interface model in media supplemented with 10% fetal bovine serum, 10 ng/ml epidermal growth factor and 5  $\mu$ g/ml insulin. The rocker was set to bathe the cornea 8 times per minute to simulate normal horse blinking. Corneas were stained with fluorescein daily and ulcers measured. Corneas were submitted for histologic evaluation at predetermined time points of 24, 48 and 72 hours post wounding. **Results:** All corneas healed within 3 days (72 hours) of epithelial ulceration. Histologically, corneas maintained normal architecture including viable epithelium, minimal stromal edema and presence of endothelium. **Conclusions:** Air-liquid interface with media bathing is an effective *ex vivo* model of equine corneal wound healing and could decrease the use of live horses for such studies. **Support/Disclosure:** None.

**ABSTRACT NO.: 026****Use of 1% polidocanol and pre- and post-computed tomography for treatment of a nasolacrimal duct cyst in a dog**

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**Purpose:** To describe the efficacy of the sclerosing agent polidocanol in the treatment of a nasolacrimal duct cyst in a dog, utilizing computed tomography. **Methods:** A 5-year-old castrated male Golden Retriever presented with chronic epiphora of the right eye. Ocular examination including slit lamp biomicroscopy and indirect ophthalmoscopy was otherwise normal. Jones test I was negative and nasolacrimal duct flush failed to establish patency of the duct. Computed tomography with dacryocystography confirmed a cystic structure in the right ventral orbit that extended into the caudal nasal cavity adjacent to the orbit. The mass caused partial physical obstruction of the right nasolacrimal duct. Cytology was consistent with cystic material. Ultrasound-guided centesis of the cystic structure was performed and 1% polidocanol (compounded, People's Custom Rx, Memphis, TN, USA) was subsequently injected into the cyst. **Results:** The epiphora was completely resolved two weeks post-injection. Repeat computed tomography with dacryocystogram was performed 8 months post-injection, and revealed complete resolution of the cyst. **Conclusions:** Intra-lesional polidocanol therapy was successful in the resolution of a nasolacrimal duct cyst in a dog. Computed tomography was beneficial in demonstrating lack of recurrence 8 months post-injection. **Support/Disclosure:** None.

**ABSTRACT NO.: 027****Use of 0.03% tacrolimus eye drops in olive oil or linseed oil for the treatment of keratoconjunctivitis SICCA in dogs**SF Andrade,\* LFC Zulim,\* GA Nai,<sup>†</sup> R Giuffrida,\* CSG Pereira,\* H Benguella,<sup>‡</sup> AG Cruz,<sup>‡</sup> BTD Foglia<sup>‡</sup> and AS Batista<sup>§</sup>

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**Purpose:** To compare the efficacy of tacrolimus 0.03% eye drops diluted in two vehicle types, linseed oil and olive oil, for the treatment of keratoconjunctivitis sicca (KCS) in dogs. **Methods:** Sixty dogs were used; 20 healthy dogs were allocated to the control group, and 40 dogs diagnosed with bilateral KCS were randomly allocated to two groups: tacrolimus in olive oil (TO) and tacrolimus in linseed oil (TL). The animals were evaluated monthly using ophthalmic examinations, Schirmer Tear Test (STT), Tear Film Break-up Time (TBUT), Fluorescein Test (FT) and Rose Bengal Test (RBT), as well as monthly cytological examinations and histopathological examinations at the beginning and end of the study. **Results:** In both groups, the clinical signs, healing of corneal ulcers and STT, TBUT and RBT ophthalmic examinations improved significantly after one month of treatment. At the end of the experiment, in the cytological analysis, both groups presented decreases in lymphocytes, neutrophils and metaplastic and squamous cells, whereas in the histopathological analysis, decreases in lymphocytes and neutrophils and an increase in goblet cells were observed; in the TL group, the decrease in neutrophils was more significant in both analyses. **Conclusions:** Tacrolimus 0.03% eye drops diluted in olive oil and linseed oil were efficient in the treatment of KCS. There were no significant differences between the groups in the evaluated parameters, except for the reduction in neutrophils, which was more significant in the TL group. Thus, linseed oil might present a new alternative as a tacrolimus eye drop diluent. **Support/Disclosure:** None.

**ABSTRACT NO.: 028****Ex vivo and *in vivo* study of kowa HA-2 applanation tonometer in the measurement of intraocular pressure in dogs**SF Andrade,\* AL Andrade,<sup>†</sup> GP Kanashiro,\* DA Silva,\* RC Barbero,\* JMP Kuhn\* and AC Silva\*

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**Purpose:** The objective of this study was to evaluate the use of the Kowa HA-2 applanation tonometer in measuring intraocular pressure (IOP) in dogs. **Methods:** Twenty eyes were used in an *ex vivo* study in which the calibration curve for manometry vs. tonometry was determined by artificially raising the IOP in 5 mmHg increments up to 60 mmHg (10–60 mmHg). Both eyes of 10 anesthetized dogs were studied *in vivo* to compare manometry vs. tonometry. In the ambulatory study, 168 healthy eyes, 74 eyes with glaucoma and 60 eyes with uveitis were evaluated by tonometry. **Results:** The *ex vivo* study showed an excellent correlation coefficient ( $r^2 = 0.993$ ) between the aneroid manometer and the Kowa HA-2 tonometer. In the *in vivo* study, there was no significant difference ( $P > 0.05$ ) between the IOP values by manometry and tonometry, showing the excellent accuracy of the Kowa HA-2 tonometer. In the ambulatory study using the Kowa HA-2 tonometer, the IOP values (mean  $\pm$  SD, in mmHg) were  $15.1 \pm 1.8$  (12.0–20.0) for the healthy eyes,  $25.2 \pm 4.0$  (20.0–38.0) for glaucomatous eyes and  $10.1 \pm 2.3$  (5.0–13.7) for eyes with uveitis. **Conclusions:** There was a strong correlation between the IOP values obtained by direct ocular manometry and those from the Kowa HA-2 tonometer. In the ambulatory study, the IOP values measured by the tonometer were compatible for healthy eyes and for eyes with glaucoma or uveitis. We conclude that Kowa HA-2 applanation tonometer is accurate and practical for IOP measurement in dogs. **Support/Disclosure:** None.

**ABSTRACT NO.: 029****Eye blink rate, tear production, and corneal sensitivity in cavalier king charles spaniels**GV Fontinhas Netto,\* AR Eyherabide,\* AP Ribeiro<sup>†</sup> and AA Bolzan\*

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**Purpose:** To determine the eye blink rate, tear production and corneal sensitivity in the Cavalier King Charles Spaniels. **Methods:** Eleven healthy Cavalier King Charles Spaniels (5 females and 6 males) aged from 3 to 10 years were included in this study. These dogs were from the "Lilies Cavaliers Kennel" (Valinhos, Sao Paulo, Brazil) and all procedures were conducted with the consent of the owner. The eye blink rate (EBR) was obtained from digital video imaging of each dog's eyes captured during three minutes and represented a counting of the eyelid movements (complete and incomplete blinks). Tear production was measured with the Schirmer tear test 1 (STT1). The central corneal sensitivity was determined by evaluating the corneal touch threshold (CTT) with the Cochet-Bonnet aesthesiometer. The tests were performed in both eyes without instillation of anesthetic eye drops. The right eye was the first eye tested. **Results:** There were no significant differences between the left and right eyes ( $P \leq 0.05$ ). The mean value of the EBR was 9.6 blinks/minute (0.6 complete blinks and 9.0 incomplete blinks). Mean  $\pm$  SD tear production was  $24.1 \pm 1.6$  mm/minute and CTT was  $1.7 \pm 0.3$  cm. **Conclusions:** The procedures were easy to perform and reliable to measure the chosen parameters. The values obtained in our study are original (except tear production) and may contribute to establish normal patterns for eye blink rate, tear production and corneal sensitivity in adult Cavalier King Charles Spaniels. **Support/Disclosure:** Supported by FAPESP grants n° 2010/20555-9 and 2013/04012-3. None.

**ABSTRACT NO.: 030****Effects of unilateral topical administration of 5 different latanoprost ophthalmic solutions in normal female dogs**CM Brines,\* F Espinheira Gomes<sup>†</sup> and ES Storey<sup>‡</sup>\**The Ohio State University College of Optometry, Columbus, OH, USA;*<sup>†</sup>*Cornell University College of Veterinary Medicine, Ithaca, NY, USA;*<sup>‡</sup>*South Atlanta Veterinary Emergency and Specialty Center, Fayetteville, GA, USA*

**Purpose:** Evaluate the effects of topical administration of Xalatan<sup>®</sup> (Pfizer, NY) and four different generic preparations of 0.005% latanoprost on intraocular pressure (IOP), pupil diameter (PD), and conjunctival hyperemia (CH) in normal female dogs. **Methods:** In 16 dogs, one eye received one drop of Xalatan<sup>®</sup>; the contralateral control eye received one drop of artificial tears. IOP, PD, and CH were evaluated for 12 hours. Following a washout period, the treatment was repeated using a generic brand of latanoprost; this was repeated for all four generic preparations. Mixed model linear regression with baseline as a covariate and subject as a random factor was performed for changes in IOP and PD at all time points. Non-parametric testing was performed on area under the curve for CH. Significance was set at  $P < 0.05$ . **Results:** IOP significantly decreased in all latanoprost-treated eyes, except Xalatan<sup>®</sup> at 1 h. All drugs caused miosis within 1 h of treatment. In latanoprost-treated eyes, there were no significant differences over time for either IOP (after 1 h) or PD. CH in all latanoprost-treated eyes was greatest at 2 h. One generic brand had significantly less CH compared to two different generic preparations. There were no significant changes in IOP, PD, and CH in the control eyes, except that IOP was significantly increased at 1 h. **Conclusions:** Regardless of brand, all topical latanoprost products caused a similar decrease in IOP and PD in normal female dogs, when administered once unilaterally. CH severity may be affected by the latanoprost manufacturer. **Support/Disclosure:** Supported by LSU VTH-VCS ORF Grant. None.

**ABSTRACT NO.: 031****Electroretinogram of the normal eye of Maine coon cats**JLV Chieurciu, DN Cremonini, MG Sereno and NB Merlini  
*Pet Vision Private Clinic*

**Purpose:** Describe the values of electroretinogram (ERG) in normal Maine Coon cats submitted to the same sedation and dark and light adaptation protocol, using the BPM 200 electrodiagnostic system. **Methods:** Fifteen healthy Maine Coon cats (29 eyes) from both genders were used for this study. The electroretinogram was recorded using an active monopolar corneal contact lens electrode and a reference needle electrode in lateral canthus. A third needle electrode was used as ground. After dark adaptation for 20 minutes and maximum pupil dilation, the scotopic response of the rods with low-intensity white flash and the combination of the rod and cone system (total) response with bright white flash were made. The animals were then light adapted for 10 minutes and the photopic cone response was made. The measures of amplitude related to peak of a-wave to peak of b-wave and b-wave implicit time were taken. **Results:** The mean and SD, peak to peak amplitude of the rods response, total response and cone response was  $173.48 \mu V \pm 69.85$  (73.06–345),  $459.77 \mu V \pm 135.45$  (234.03–793.06) and  $39 \mu V \pm 12.76$  (23.33–80.56) respectively. The mean b-wave implicit time was  $56.65 \text{ ms} \pm 3.58$  (50–65.5),  $32.39 \text{ ms} \pm 3.14$  (22–39.5) and  $22.06 \text{ ms} \pm 3.04$  (16–35) respectively. **Conclusions:** Even though ERG standardization studies in specific dog breeds have been made, there is a lack of studies regarding specific breeds of cats. This study will improve knowledge of cats in general and the Maine Coon breed particularly. **Support/Disclosure:** None.

**ABSTRACT NO.: 032****Detailed optical coherence tomography analysis of sards dogs with comparison to observed systemic abnormalities**SD Grozdanic, H Kecova, M Chatzistefanou and T Lazic  
*Animal Eye Consultants of Iowa, North Liberty, IA, USA*

**Purpose:** To perform detailed analysis of retinal changes in SARDS dogs using optical coherence tomography and funduscopy, and compare findings with observed systemic changes. **Methods:** Twenty nine dogs from twelve US states and Canada were diagnosed with SARDS by eight different ophthalmologists. All dogs were evaluated using chromatic pupil light reflex testing (cPLR), electroretinography (ERG), complete ophthalmic examination including funduscopy, retinal photography and optical coherence tomography (OCT). Complete laboratory analysis, blood pressure evaluation, abdominal and thoracic radiographs and CT imaging was performed to evaluate for possible systemic abnormalities. **Results:** Total of 39% (11/29) of all evaluated SARDS patients had evidence of sub-millimeter retinal detachments (RD) during OCT analysis, which could not be detected during funduscopy evaluation or analysis of retinal photographs. Dachshund breed was over-represented in RD group (36%, 4/11), compared to non-detachment (ND) group (11%). Females were more frequently affected with RD (82%) compared to ND group (61%). Systemic abnormalities were much more frequently present in RD group compared to ND group:  $\square$  Alk Phos/ALT (RD = 64%, ND = 44%); proteinuria (RD = 60%, ND = 25%). Systemic hypertension did not seem to be contributing factor to retinal detachment (RD = 21%, ND = 20%), and none of evaluated dogs had evidence of inflammatory or neoplastic CT changes. There was no statistically significant difference in age (RD =  $7.9 \pm 1.9$  years (mean $\pm$ SD); ND =  $7.6 \pm 1.7$  years,  $P > 0.1$ , Student's *t*-test) or duration of blindness prior to presentation (RD =  $18 \pm 7$  days (mean $\pm$ SD); ND =  $21 \pm 12$  years,  $P > 0.1$ , Student's *t*-test). **Conclusions:** Retinal detachment is a frequent finding in SARDS patients, and is associated with higher probability of systemic organ abnormalities. **Support:** Iowa State University Biotechnology Fund, Sophie's SARDS Research Grant from Stoffers family. **Conflicts of interest:** None.

**ABSTRACT NO.: 033****Clinical trial of a tear substitute containing 0.1% polyvinyl alcohol, 0.3% sodium hyaluronate, and 5% dodecahydrosqualene in 14 dogs with keratoconjunctivitis sicca: a pilot study**T Hasegawa,\* S Tanaka\* and S Sawa<sup>†</sup>\*Osaka Prefecture University, Osaka, Japan; <sup>†</sup>Senju Pharmaceutical CO. LTD., Kobe, Japan

**Purpose:** A clinical trial of a tear substitute containing 0.1% polyvinyl alcohol (PVA), 0.3% sodium hyaluronate (SH), and 5% dodecahydrosqualene (DHS) was performed to evaluate the therapeutic effects of the substitute in canine eyes affected by keratoconjunctivitis sicca (KCS). **Methods:** Twenty-four KCS eyes in 14 dogs were used in this study, and the eyes were divided into the following 3 groups: (i) 6 severe KCS eyes with Schirmer values of 0–3 mm/min, (ii) 9 moderate KCS eyes with Schirmer values of 4–7 mm/min, and (iii) 9 mild KCS eyes with Schirmer values of 8–15 mm/min. The examined eyes were given the tear substitute 3 to 6 times per day, and their clinical symptom scores, Schirmer values, tear film break-up times (BUT), and scores for ocular staining with fluorescein (FL) and lissamine green (LG) were evaluated. **Results:** The mean substitute administration frequency was 3.9 times per day. In the severe KCS eyes, treatment with the substitute significantly improved the scores for ocular discharge and conjunctival injections. In the moderate KCS eyes treated with the substitute, the scores for ocular discharge, conjunctival injections, corneal superficial neovascularization, and LG ocular staining were significantly decreased. In the mild KCS eyes, the FL ocular staining score was significantly improved by the administration of the substitute. Eighty percent of the dogs' owners were fully satisfied with the therapeutic effects of the substitute. **Conclusions:** These findings indicate that the 0.1% PVA/0.3% SH/5% DHS tear substitute is useful as a long-acting tear substitute for treating KCS dogs. **Support/Disclosure:** None.

**ABSTRACT NO.: 034****Evaluation of polyprenyl immunostimulant as an ophthalmic drop: a safety study**GM Newbold,\* DVH Hendrix,\* T Chen,\* DA Ward,\* T Kuritz<sup>†</sup> and RE Heidel<sup>‡</sup>\*Small Animal Clinical Sciences, College of Veterinary Medicine, University of Tennessee, Knoxville, TN, USA; <sup>†</sup>Sass & Sass, Inc, Oak Ridge, TN, USA; <sup>‡</sup>Department of Surgery, University of Tennessee, Knoxville, TN, USA

**Purpose:** To evaluate the safety of polyprenyl as an ophthalmic drop. Polyprenyl is an immunostimulant shown to reduce the severity and duration of conjunctivitis and rhinitis when given orally to cats challenged with herpesvirus-1 that developed rhinotracheitis. **Methods:** Normal adult domestic short haired cats were treated with either polyprenyl in an artificial tear solution containing 0.25% polyethylene glycol for a 0.4 mg/ml solution (Blink Tears<sup>™</sup>) (8 cats) or the artificial tear solution containing 0.25% polyethylene glycol (Blink Tears<sup>™</sup>) alone (8 cats). All cats were treated twice daily for 14 days. The study was masked to all participants. All cats were given a complete ophthalmic exam at the beginning and end of the study. Once daily all cats were examined for conjunctival hyperemia, blepharospasm, ocular discharge, conjunctival hyperemia and anterior uveitis. Additionally corneas were stained once daily with fluorescein to evaluate for ulcers and Schirmer tear tests were done at 7 days of treatment. The Fisher exact test and Chi-square test were used to compare outcomes between the two groups. **Results:** No difference was found between the groups for any clinical sign,  $P > 0.05$ . No cats developed corneal ulcers or anterior uveitis. **Conclusions:** Polyprenyl (2 mg/ml) in an artificial tear solution containing 0.25% polyethylene glycol (final concentration of 0.4 mg/ml) administered twice daily for 14 days appears to be safe in cats. **Support/Disclosure:** Funded by Sass & Sass, Inc. of Oak Ridge TN. Disclosure: GM Newbold, DVH Hendrix, T Chen, DA Ward (N), T Kuritz (E), RE Heidel (N).

**ABSTRACT NO.: 035****Intraocular pressure reference intervals in eyes of clinically normal miniature donkeys**CD Hibbs,\* PM Barrett\* and DD Dees<sup>†</sup>\*Eye Care for Animals, El Paso, TX, USA; <sup>†</sup>Eye Care for Animals, Austin, TX, USA

**Purpose:** To determine intraocular pressure (IOP) reference intervals in eyes of healthy miniature donkeys. **Methods:** Sixty-two (124 eyes) healthy miniature donkeys were included. IOP's (TonoVet and TonoPen XL) were obtained OU. Forty animals (San Angelo group) received IM xylazine and an auriculopalpebral block (APB) prior to obtaining measurements. Twenty-two animals (Austin group) received no sedation or APB. Statistical analysis followed the guidelines given in the ASVCP Reference Interval Guidelines paper. **Results:** The mean IOP  $\pm$  SD was  $25.51 \pm 5.82$  mm Hg OU for rebound tonometry with reference limits of 13.88 and 37.15. The mean IOP  $\pm$  SD was  $20.52 \pm 5.11$  mm Hg OU for applanation tonometry with reference limits of 12.61 and 33.37. No significant difference in IOP was found between the two study groups ( $P = 0.25$ ). A significant difference was noted between rebound and applanation IOP's ( $P < 0.0001$ ), with rebound tonometric values tending to be higher. **Conclusions:** Reference intervals for IOP's were established for this species. IOP readings obtained by the rebound tonometer were significantly higher than with applanation. Sedation and APB did not affect IOP estimates. **Support/Disclosure:** None.

**ABSTRACT NO.: 036****Clinical use of ultrasound biomicroscopy in evaluation of equine corneal disease**

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**Purpose:** To describe the clinical use of ultrasound biomicroscopy (UBM) in evaluation of equine corneal disease. **Methods:** Images were obtained using a 50-MHz probe ultrasound biomicroscopy system (Quantel Aviso) and Clear Scan<sup>®</sup> probe cover. Six horses with corneal disease were evaluated for lesion size, lesion depth, and continuity of Descemet's membrane. Horses were sedated and received auriculopalpebral nerve blocks and application of topical anesthetic prior to UBM. **Results:** Three cases of corneo-limbal squamous cell carcinoma were evaluated via UBM which provided valuable information regarding lesion depth for planning of keratectomies using fixed-depth keratomes and subsequent radiation therapy. Two horses with stromal abscesses were evaluated with UBM which provided valuable information regarding corneal depth and continuity of Descemet's membrane for planning therapeutic options. In one horse with a corneal foreign body, UBM allowed more accurate assessment of the foreign body's stromal depth which could not be assessed during the ophthalmic examination due to the extensive corneal cellular infiltrate. The information regarding depth allowed for more accurate pre-surgical planning. **Conclusions:** Ultrasound biomicroscopy provided useful information regarding lesion depth and continuity of Descemet's membrane for patients with corneo-limbal squamous cell carcinoma, stromal abscesses, and a corneal foreign body, allowing for better pre-surgical planning and development of therapeutic protocols. **Support/Disclosure:** None.

**ABSTRACT NO.: 037****Loss of visual performance in glaucomatous but not wild-type dogs associated with latanoprost-induced miosis**

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**Purpose:** To assess the effect of latanoprost-induced miosis on visual performance in glaucomatous vs. wild-type ( $\pi\pi$ ) dogs by use of obstacle avoidance course. **Methods:** A well-established 3.71-m long obstacle avoidance course was used to test 11 dogs: 3  $\pi\pi$  (age: 1.1 years), 3 ADAMTS-10-mutant pre-glaucomatous dogs (1.5–1.9 years), and 5 ADAMTS-



10-mutant glaucomatous dogs (2.9–4.1 years). Visual performance was measured with and without latanoprost-induced miosis (Xalatan<sup>®</sup>; Pfizer, NY) under photopic (646 lux) and scotopic (0.02 lux) conditions, totaling 12–30 course runs per dog within 24 wks. Both transit times and number of collisions with obstacles were assessed. In addition, all dogs were evaluated by regular complete ophthalmic examination, including diurnal intraocular pressure, streak retinoscopy, optical coherence tomography (OCT) of retina and optic nerve head, and A-scan biometry. **Results:** Neither pupil diameter nor ambient light intensity affected visual performance of  $wr$  (mean transit time  $\pm$  SD: 5.4  $\pm$  1.0 s; 0 collisions) and pre-glaucomatous mutant dogs (4.1  $\pm$  0.9 s; 0 collisions). However, under scotopic conditions and with miotic pupil, 3/5 glaucomatous dogs exhibited prolonged transit times and significantly increased number of collisions (8.3  $\pm$  6.5 s; 0.6  $\pm$  1.3 collisions;  $P < 0.05$ , Student's *t*-test). Two of these dogs also collided under photopic conditions with a miotic pupil (12.3  $\pm$  7.6 s; 1.7  $\pm$  2.3 collisions). The remaining 2/5 glaucomatous dogs did not exhibit loss in visual performance (3.8  $\pm$  1.5 s; 0 collisions). **Conclusions:** Evaluation of visual performance during latanoprost-induced miosis can aid in the assessment of early vision loss in glaucomatous dogs, especially under scotopic conditions. **Support/Disclosure:** Supported by Shepard Family, MSU-DFI. None.

### ABSTRACT NO.: 038

#### Comparison of effects of 0.0015% tafluprost and 2% dorzolamide/0.5% timolol on the intraocular pressure and pupil diameter in healthy dogs

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**Purpose:** To evaluate and compare the effects of 0.0015% tafluprost (T) and 2% dorzolamide/0.5% timolol (DT) on the intraocular pressure (IOP) and pupil diameter in healthy dogs (PD). **Methods:** Baseline IOP and PD were assessed over 2 days. The next morning, one eye was randomly assigned to receive one drop of T or DT over 4 consecutive days, every 12 h. The same parameters were assessed daily during the 4 days of treatment, and for one more day after the treatment period. **Results:** Mean  $\pm$  SE baseline IOP and PD was 16.63  $\pm$  0.30 mmHg and 5.00  $\pm$  0.10 mm, respectively. In comparison to baseline, IOP of the eyes treated with T and DT decreased 1.50, 2.18, 2.14, and 2 ( $P < 0.001$ ); and 0.74 ( $P < 0.05$ ), 1.88, 2.94, and 3.01 mmHg ( $P < 0.001$ ), respectively, from day 1 to 4. In comparison to baseline, PD of the eyes treated with T and DT decreased 2.27, 2.49, 2.36, and 2.62 ( $P < 0.001$ ); and 0.24, 0.32, 0.49, and 0.39 mm ( $P < 0.01$ ), respectively, from day 1 to 4. During the posttreatment period, IOP remained lower in T and DT-treated eyes, and PD values returned to baseline values in T and DT-treated eyes. At day 4, IOP of the eyes treated with DT was 1.16 mmHg lower than the eyes treated with T ( $P < 0.05$ ). PD of the eyes treated with T decreased 2.12, 2.27, 1.90, and 2.39 mm, in comparison with the eyes treated with DT ( $P < 0.001$ ). **Conclusions:** Tafluprost and dorzolamide/timolol reduced IOP and PD in healthy dogs. However, dorzolamide/timolol showed a significant cumulative effect on IOP in the 3 first days of treatment. Tafluprost was more effective in reducing the PD. **Support/Disclosure:** None.

### ABSTRACT NO.: 039

#### Retinal nerve fiber layer thickness measurement using optical coherence tomography in dogs with degenerative retinopathy

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**Purpose:** To measure the peripapillary retinal nerve fiber layer (NFL) with SD-OCT scan circle, in dogs with Sudden Acquired Retinal Degeneration (SARDS) and Progressive Retinal Atrophy (PRA). **Methods:** SD-OCT was performed in 16 small breed dogs between 3–12 years old: 4 normal, 6 SARDS and 6 PRA, with diagnosis confirmed with full field electroretinogram and fundoscopic examination. The thickness of the NFL was manually measured in the temporal regions (T), superior temporal (ST), inferior temporal (IT), nasal (N), superior nasal (SN) and inferior nasal (IN). The values of superior (S) and inferior regions (I) were obtained by the arithmetic mean of the values ST and SN, and IT and IN respectively. Final values were compared between groups SARDS, PRA and control. **Results:** N region was thinner in the control group than in the SARDS group, with a statistically significant difference ( $P = 0.0182$ ), but not between PRA and control ( $P = 0.2303$ ). There was no statistical difference between all groups in the others regions (T, S and I). The mean and SD of the control group was 96.75  $\mu$ m  $\pm$  7.22  $\mu$ m (T), 97.00  $\mu$ m  $\pm$  3.08  $\mu$ m (N), 109.25  $\mu$ m  $\pm$  21.26  $\mu$ m (S) and 93.00  $\mu$ m  $\pm$  10.01  $\mu$ m (I); SARDS was 112.00  $\mu$ m  $\pm$  17.78  $\mu$ m (T), 127.60  $\mu$ m  $\pm$  19.86  $\mu$ m (N), 139.50  $\mu$ m  $\pm$  30.47  $\mu$ m (S), and 99.63  $\mu$ m  $\pm$  25.94  $\mu$ m (I); PRA 109.86  $\mu$ m  $\pm$  28.86  $\mu$ m (T), 115.43  $\mu$ m  $\pm$  28.96  $\mu$ m (N), 130.93  $\mu$ m  $\pm$  24.95  $\mu$ m (S) and 97.79  $\mu$ m  $\pm$  30.03  $\mu$ m (I). **Conclusions:** All the NFL thickness values were higher in PRA and SARDS groups than control group, due to a possible edema of the NFL. Only one measurement was significantly different, demonstrating that it is necessary to increase the sample number to validate this statement. This study shows that SD-OCT may be of help in the pathophysiology of degenerative retinal diseases. **Support/Disclosure:** Supported by FAPESP 2011/24039-8.

### ABSTRACT NO.: 040

#### Comparison of the cytobrush, Kimura Platinum Spatula, and blunt scalpel edge corneal cytology collection techniques for evaluation of equine ulcerative keratitis: a pilot study

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**Purpose:** To compare equine corneal cytology samples obtained via 3 common sampling techniques: cytobrush (CB), Kimura Platinum Spatula (KS), and the blunt edge of a scalpel blade (SB) in patients with ulcerative keratitis. **Methods:** Five equine patients presenting to the University of Florida College of Veterinary Medicine with ulcerative keratitis were included. Following microbial culture sampling and topical Tetracaine 0.5% ophthalmic solution application, 6 randomly ordered cytology samples (2 per method per patient) were collected with sterile CB, KD and SB by the same clinician. Cytologic evaluation included objective measures of cellular populations, integrity, the presence of microorganisms per 10 monolayer cell populations viewed under 50 $\times$  oil, and the total number of multilayered populations per slide. Variables were compared using ANOVA with Tukey's post hoc analysis or Student's *t* Test when appropriate. **Results:** Thirty samples were collected for analysis. The KS yielded the lowest quality samples with 4/10 providing an inadequate sample for analysis ( $P = 0.007$ ). The SB showed the greatest number of intact/fragmented cells compared to KS ( $P = 0.03$ ). Of the 5 ulcers, 4 were noted to have bacterial sepsis or fungal hyphae also confirmed via microbial culture. Bacterial ulcers had a higher ratio of inflammatory to epithelial cells than either fungal or sterile ulcers ( $P = 0.006$ ). Order of collection was not significant for the number of intact and fragmented cells, or yield of microorganisms. **Conclusions:** All sampling techniques can be adequate methods for corneal cytology, but the blunt scalpel edge technique consistently provided the best sample in this pilot study. **Support/Disclosure:** None.

### ABSTRACT NO.: 041

#### Evaluation of the effects on short electroretinography by acepromazine, acepromazine and propofol, or acepromazine and alfaxalone in adult beagles

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**Purpose:** To quantitatively compare electroretinography (ERG) recordings in dogs sedated with acepromazine, acepromazine and propofol, or acepromazine and alfaxalone. **Methods:** Prospective, randomised, blinded, cross-over study in seven adult Beagles (9–12 kg) with normal ophthalmic exams. Short ERG protocol for dogs was used: following 5-minute dark adaptation, mixed rod-cone ERG responses were recorded bilaterally. All dogs received each intravenous sedation protocol: acepromazine (0.02 mg/kg, Boehringer Ingelheim, Canada) followed by saline infusion (AS), acepromazine (same dose) followed by propofol (Fresenius Kabi Animal Health, Canada) infusion (AP: bolus 2 mg/kg, CRI 0.2 mg/kg/min) and acepromazine (same dose) followed by alfaxalone (Zoetis, Canada) infusion (AA: bolus 1 mg/kg, CRI 0.06 mg/kg/min). Sedation was quantified with a published canine scale. Sedation and ERG parameters signal amplitude and implicit time (a- and b-wave) were compared with Kruskal-Wallis (Dunn's post-hoc test) and 1-way ANOVA (Tukey's post hoc test), respectively. **Results:** Sedation: AS (7 [6–9]) was less than AP (15 [14–17],  $P = 0.04$ ) and AA (15 [13–18],  $P = 0.03$ ). AP and AS did not differ ( $P > 0.9$ ). Compared to ERG without sedation, sedation decreased b-wave amplitude (AS, 26%,  $P = 0.01$ ; AP, 38%,  $P < 0.001$ ; AA, 34%,  $P < 0.001$ ) and prolonged b-wave implicit time (AS, 9%,  $P = 0.6$ ; AP, 25%,  $P < 0.001$ ; AA, 27%,  $P = 0.001$ ). A-wave amplitude was increased by AS (185%) and AP (218%,  $P = 0.01$  both) and implicit time prolonged by AA (18%,  $P = 0.002$ ). **Conclusions:** Sedation resulted in significant attenuation and delay of the ERG response, but was least affected by acepromazine. **Support/Disclosure:** Supported by a Faculty of Veterinary Medicine Internship Research Fund. None.

### ABSTRACT NO.: 042

#### Immunohistochemical properties of 23 normal canine eyes

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**Purpose:** Immunohistochemistry is an integral technique that is used routinely in diagnostic pathology and research. 23 normal canine eyes without lesions were examined immunohistochemically by screening with a panel of 13 antibodies to develop a broader baseline of normal parameters. **Methods:** The antibody panel included pan-cytokeratin (AE1/AE3), vimentin, desmin,  $\alpha$ -smooth muscle actin (a-SMA), glial fibrillary acidic protein (GFAP), Melan-A, PNL2, S100, p53, Ki-67, telomerase reverse transcriptase (TERT), chromogranin A and periaxin. **Results:** In addition to confirming known antibody staining patterns in the literature, novel results included strong PNL2 immunopositivity to the tapetum lucidum, AE1/AE3 and chromogranin A immunopositivity to the optic nerve; possible GFAP immunopositivity to corneal nervous tissue; Ki-67 immunopositivity to the lens epithelium and retinal pigment epithelium; periaxin immunopositivity in the nervous tissue except for the optic nerve; and strong p53 immunopositivity to melanocytes, lens epithelium and lens fibres. **Conclusions:** These findings provide a broader baseline of normal tissue immunohistochemistry staining. These results will further aid in diagnosis and classification of neoplasms and play a supporting role in basic and applied research.

**ABSTRACT NO.: 043****Correlation of orbital measurements to globe size for presurgical determination of orbital prosthesis size in horses**

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**Purpose:** To identify an external orbital measurement that correlates with globe size/orbital depth in order to predict orbital prosthesis size prior to enucleation surgery and to evaluate interuser variability of the measurement techniques in horses. **Methods:** Thirty healthy adult horses were utilized in the study. Three independent observers performed three external orbit/globe measurements: 1. horizontal corneal diameter (HzCoD), 2. vertical orbital rim distance (VOrbRim), and 3. medial to lateral canthus distance (MeLaCa). B-mode ultrasonography was used to objectively measure axial globe length (HzAxGL) in order to correlate these external measurements to globe size. Univariable and multivariable mixed model analyses were used to assess the association of independent variables to axial globe length. An intra-class correlation analysis was performed to determine interuser variability. Significance was set at  $P$ -value  $<0.05$ . **Results:** An association was found between HzAxGL and HzCoD ( $P = 0.0066$ ), MeLaCa ( $P = 0.0158$ ) and gender ( $P = 0.0214$ ) in the multivariable model for Observer 1. The regression equation for the multivariable model was  $\text{HzAxGL} = 19.90 + 0.33(\text{HzCoD}) + 0.13(\text{MeLaCa}) + 1.36(\text{Gender})$ . A significant association was found between HzAxGL and VOrbRim ( $P = 0.0044$ ) for Observer 1; however, the intra-class correlation (0.401) suggested that there was poor reliability among observers. **Conclusions:** Vertical orbital rim, horizontal corneal diameter, and medial to lateral canthus measurements correlate with globe size could possibly predict a cosmetic orbital prosthesis size in horses prior to enucleation. The vertical orbital rim measurement has potential as a single measurement as a predictor of cosmetic orbital prosthesis size but there is poor reliability among observers. **Support/Disclosure:** Supported by the Veterinary Student Research Initiative Grant provided by Mississippi State University College of Veterinary Medicine. None.

**ABSTRACT NO.: 044****Age progression and cataract stage interference in full field electroretinography in Yorkshire terrier dogs**

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**Purpose:** To investigate the effect of cataract stage and age on the rod-, combined rod-cone- and cone-mediated electroretinogram (ERG) in Yorkshire Terrier dogs. **Methods:** Through 2006 and 2013 period, 84 exams and 157 eyes were selected and separated in the following groups: no cataract (37 eyes), incipient (15 eyes), immature (26 eyes), mature (48 eyes) and hypermature cataracts (31 eyes). The exams were also separated by the dogs' ages: 1–5 years (33 eyes), 6–10 years (84 eyes) and 11–15 years (42 eyes). Full-field electroretinography was performed in all animals using BMP-200 (*RetinoGraphicsInc*) with monocular ERG-jet lens, and active and ground needle electrodes. Three responses were analyzed: dark-adapted rod, dark-adapted combined rod-cone, and light-adapted cone. **Results:** Kruskal-Wallis test, with post-hoc Dunn's test, revealed significant difference in rod ( $P = 0.016$ ), combined rod-cone ( $P = 0.0001$ ) and cone ( $P = 0.034$ ) amplitudes between all age groups. Combined rod-cone implicit times also showed significant difference ( $P = 0.0003$ ). Cataract stage did not interfere significantly with amplitude and implicit time of rod, combined rod-cone and cone responses. **Conclusions:** In this investigation, age was the most significant factor to affect the electroretinogram within the same dog breed. **Support/Disclosure:** None.

**ABSTRACT NO.: 045****Evaluation of dexmedetomidine and nalbuphine association as sedation agent for dogs undergoing full-field electroretinography**

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**Purpose:** To determine the cardiorespiratory and sedative effects of dexmedetomidine and nalbuphine combination as a sedation protocol for electroretinography exam. **Methods:** Seventeen adult dogs with cataracts, undergoing pre-surgical electroretinography examination, were selected. The 5-step full-field electroretinography protocol (ISCEV) was used. Intramuscular injection of 5 mcg/kg of dexmedetomidine (Dexdomitor<sup>®</sup>) and 0.2 mg/kg of nalbuphine (Nubain<sup>®</sup>) were performed 15 minutes prior to the begin of the exam. Cardiac and respiratory rate were measured every 10 minutes for 3 measurements beginning at the start of the exam (T1, T2, and T3), using a stethoscope. Systolic, mean and diastolic blood pressure were measured using an oscillometric method (petMAP<sup>®</sup>). Atipamazole (Antisedan<sup>®</sup>) was used after the conclusion of the exam to reverse the sedation effects. **Results:** Mean and SD of T1, T2 and T3 were: 75.6  $\pm$  38.0, 73.6  $\pm$  32.8 and 67.8  $\pm$  23.9 beats per minute respectively, 26.7  $\pm$  23.1, 17.6  $\pm$  5.8 and 15.1  $\pm$  6.1 breaths per minute respectively, 178.6  $\pm$  33.6, 167.5  $\pm$  29.3 and 162.6  $\pm$  31.5 mmHg (systolic); 136.8  $\pm$  26.6, 133.0  $\pm$  27.9 and 128.9  $\pm$  29.9 mmHg (mean) and 115.3  $\pm$  28.7, 114.1  $\pm$  28.6 and 113.9  $\pm$  30.7 mmHg (diastolic). All animals remained in a relaxed position during the exam, without muscle tremors. The quality of the resulting electroretinogram waves were satisfactory for analyses and interpretation. **Conclusions:** All measured parameters were considered within physiologic range for the species and remained stable during all the sedation period. The combination of dexmedetomidine and nalbuphine revealed as a safe and efficient protocol to promote muscle relaxation and permit an adequate animal positioning to perform the exam. **Support/Disclosure:** Supported by FAPESP 2009/07014-3; 2015/13557-9 and Zoetis.

**ABSTRACT NO.: 046****Characterization of a novel form of progressive retinal atrophy in whippet dogs: a clinical, electroretinographic and breeding study**

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**Purpose:** To describe a form of progressive retinal atrophy (PRA) in Whippets including clinical, electroretinographic, optical coherence tomographic changes and breeding aspects. **Methods:** All animals were submitted to routine ophthalmic examination for presumed inherited ocular disease which included: visual tests, such as obstacle course tests, in scotopic and photopic conditions, and ocular fundus evaluation followed by fundus photography. Additionally, electroretinography (ERG) and optical coherence tomography (OCT) were performed. **Results:** Sixteen dogs were diagnosed with PRA. Night blindness and absence of responses during visual tests were ubiquitous signs in older affected dogs. Abnormal ophthalmoscopic signs included a generalized progressive hyper-reflectivity, blood vessel attenuation and multifocal serous retinal detachments, which was first seen at 6 months of age. On OCT's examination of selected young dogs revealed multiple areas of retinal detachment, and a diminished full retinal thickness in affected dogs when compared to unaffected (control) dogs. An abnormal electroretinographic response, consisting of a typical negative-type shape of ERG was observed initially in all affected dogs, when higher flash light intensities were used. However, it later progresses, resulting in a complete flat line in parallel to the deterioration of the retinal function before animals reach one year of age. Breeding analysis suggested an autosomal recessive inheritance model. **Conclusions:** The phenotype of the PRA in Whippet is unique; it shows initially a negative-type of ERG similar to the stationary night blindness but progressing to a total loss of retinal function. The gene mutation associated with this early onset degenerative disease was not yet established.

**ABSTRACT NO.: 047****Flash visual evoked potential (F-VEP) in Mangalarga Marchador horses**

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**Purpose:** The aim of the present study was to characterize the Flash Visual Evoked Potential (F-VEP) for Mangalarga Marchador horses. **Methods:** F-VEPs recordings were obtained from four healthy castrated Mangalarga Marchador horses with Neupack 2 MEB-7102A/k (Nihon Kohden<sup>®</sup>, Tokio, Japan) using subdermal electrodes. The location of electrodes is described as follows: active electrode was placed over the external sagittal crest, the ground electrode over the frontonasal suture and reference was positioned in the halfway of the distance from the active and ground electrodes. The flash stimulation was generated using a 20 degrees angle white LED at 20 cm from the eye, with a light intensity of 3 cd/m<sup>2</sup>. All recordings were undertaken in a low light level environment. Descriptive statistical analysis was performed and mean ( $\pm$  SD) values of implicit time (in seconds) and amplitude (in microvolts) for positive (P1 and P2) and negative (N1, N2 and N3) peaks were analyzed. **Results:** The implicit times of positive and negative peaks were obtained: N1: 8.72  $\pm$  3.92; P1: 25.85  $\pm$  6.37; N2: 44.72  $\pm$  13.61; P2: 62.50  $\pm$  14.13; N3: 68.03  $\pm$  18.72. The amplitude values of positive and negative peaks were as follows: N1: 3.64  $\pm$  1.48; P1-N2: 11.54  $\pm$  5.34; N2-P2: 17.58  $\pm$  8.19; P2-N3: 10.13  $\pm$  4.20. **Conclusions:** The present study contributes to the standardization of F-VEP for the Mangalarga Marchador breed. F-VEP is an efficient diagnostic tool and the data provided here serve as reference for future investigations of pathological conditions that could alter the F-VEP signal. **Support/Disclosure:** None.

**ABSTRACT NO.: 048****Sudden acquired retinal degeneration syndrome (SARDS): a retrospective study from a southern hemisphere location (2010–2015)**

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**Purpose:** SARDS is a retinal disorder of unknown cause in dogs that results in vision loss. The study aims to analyze and compare retrospective data from a southern hemisphere location to previously reported data. **Methods:** Retrospective data was collected from canine patients with complaint of sudden vision loss from years 2010–2015 ( $n = 83$ ). A total of 25 patients were included and data related to breed, age, sex, time of presentation, duration of signs, ophthalmic exam, systemic signs, laboratory findings and comorbidities were assessed. Inclusion criterion was the performance of electroretinogram and confirmation of SARDS. All other animals were excluded due to neurological signs, normal ERG results or no consent for ERG. **Results:** All animals presented bilateral flat trace on full-field ERG examination. The majority of patients with SARDS were females (64%) with mean age of 7.96 years (median 8.0) and most frequent breeds were mixed-breed (24%), Miniature Schnauzer (16%), Lhasa Apso (16%) and Dachshund (14%). Most cases presented initial signs from November to February (59.1%) and duration of vision loss from 2 to 4 weeks (45.8%). Pupillary reflex was decreased (60%) and ophthalmoscopy was normal (37.5%) or slightly altered (45.8%). Patients presented altered systemic signs (64%), such as weight gain (62.5%), elevated biochemical serum levels (CHOL: 63.2%, TG: 42.1%, ALT: 45.5%, ALP 31.8%) and systemic disease (24%). **Conclusions:** All data analyzed is in accordance to reported data from northern hemisphere studies, except for seasonality, which prevailed summer. **Support/Disclosure:** Supported by FAPESP grant n° 2009/07014-3. None.



**ABSTRACT NO.: 049****The effects of storage conditions on pH stability of cryopreserved and fresh equine amniotic membrane homogenate**AL Pascoli,\*<sup>†‡</sup> T Villar\* and BC Martins\*\*College of Veterinary Medicine, University of Illinois, Champaign, IL, USA; <sup>†</sup>College of Veterinary Medicine, São Paulo State University, Jaboticabal, SP, Brazil; <sup>‡</sup>College of Veterinary Medicine, Regional University of Blumenau, Blumenau, SC, Brazil

**Purpose:** To verify the pH stability of cryopreserved equine amniotic membrane homogenate (EAMH) stored for one year, one month and fresh EAMH, *in vitro*. **Methods:** Equine amniotic membrane (EAM) were collected and processed as previously described, and stored at  $-80^{\circ}\text{C}$ . Sample stored for one year, one month and fresh EAM were utilized. The EAMHs were prepared by resuspending 600 mg of EAM in 3 ml of phosphate buffered saline (PBS, Gibco), to a final concentration of 200 mg/ml. Samples were homogenized for 3 minutes (Omni-TH Tissue Homogenizer), centrifuged at 10 000 rpm for 15 minutes and the supernatant was collected (EAMH). The EAMHs were kept under refrigeration at  $4^{\circ}\text{C}$  for one week. The EAMHs pH were evaluated on days 1, 3, 5 and 7 after thawing (pH meter 510 series, OAKTON). **Results:** pH levels varied from 6.97 to 7.02 in the one-year cryopreserved sample, from 7.06 to 7.17 in the one-month cryopreserved sample, and from 7.15 to 7.25 in the fresh EAMH sample. **Conclusions:** All samples maintained a pH within normal range recommended for ophthalmic usage. One-year cryopreserved sample had the lowest values of pH, which might suggest mild acidification of the tissue over time. **Support/Disclosure:** None.

**ABSTRACT NO.: 050****Comparison of canine central corneal thickness measurements using the Pentacam-HR<sup>®</sup> scheimpflug system, optical coherence tomography, and high-resolution ultrasound biomicroscopy**AE Wolfel, S Pederson, A Cleymaet, A Hess and KS Freeman  
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**Purpose:** To compare pachymetry values in canine eyes using Pentacam-HR<sup>®</sup> (Pentacam), spectral-domain optical coherence tomography (SD-OCT), and high-resolution ultrasound biomicroscopy (UBM), and generate normative canine Pentacam pachymetry values. **Methods:** Twenty-four sedated canine patients of varying ages and breeds were evaluated generating data from thirty-seven eyes, as only non-diseased corneas were included. Corneal images were acquired via Pentacam, SD-OCT, and UBM. Machine-calculated values of central corneal thickness (CCT) from Pentacam and SD-OCT were compared to hand-measured values from UBM. A Bland-Altman analysis was performed to assess for agreement between instruments. **Results:** Mean corneal thickness at the corneal apex  $\pm$  SD measured by Pentacam was  $629.73 \pm 64.57$   $\mu\text{m}$ , by SD-OCT was  $610.56 \pm 57.48$   $\mu\text{m}$ , and by UBM was  $689.77 \pm 55.93$   $\mu\text{m}$ . On average, Pentacam CCT was  $19.17 \pm 32.90$   $\mu\text{m}$  thicker (approximately a 3% difference) than SD-OCT and  $65.12 \pm 44.52$   $\mu\text{m}$  thinner than UBM (approximately an 11% difference). The 95% limits of agreement were  $(-45.31, 83.65)$  and  $(-152.38, 22.13)$  for Pentacam vs. OCT and Pentacam vs. UBM, respectively. All differences were statistically significant ( $P < 0.01$ ). **Conclusions:** Considering that there is an average 7.5% normal diurnal variation in canine pachymetry, a 3% difference between Pentacam and OCT values while statistically significant, may not be clinically significant. However, the Pentacam and OCT measurements are both statistically and clinically different than UBM measurements. **Support/Disclosure:** Funded by Young Investigator Grant Program, Center for Companion Animal Studies, Colorado State University. None.

**ABSTRACT NO.: 051****The effects of total intravenous anesthesia with various dose combinations of ketofol on intraocular pressure in dogs**LE Yanmaz, MG Senocak, E Dogan and Z Okumus  
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**Purpose:** This study was aimed to detect the effects of total intravenous anesthesia with various dose combinations of ketofol on intraocular pressure in dogs. **Methods:** Twenty-one healthy mixed breed male dogs (aged 12–18 months, weighing 10–25 kg) were used. The animals were randomly divided into 3 groups and received 1:1 ketofol (6 mg/kg ketamine and 6 mg/kg propofol), 1:2 ketofol (3 mg/kg ketamine and 6 mg/kg propofol) and 1:3 ketofol (2 mg/kg ketamine and 6 mg/kg propofol) until tracheal intubation were possible. Anesthesia was maintained with ketofol 1:1, 1:2 and 1:3 ratios (0.3 mg/kg/min for each group). Total induction volume and total drug administered were recorded. Intraocular pressure, heart rate, respiratory rate, rectal temperature, non-invasive blood pressure, peripheral capillary oxygen saturation and end tidal carbon dioxide were measured every 5 minutes until 60 minutes. The data were evaluated using one-way ANOVA followed by Post-Hoc tests. **Results:** There were no significant differences among groups at all time intervals. However, the intraocular pressure significantly increased in all groups compared to baseline values. The mean value of intraocular pressure at all time points was lowest in 1:3 ratio ( $16.73 \pm 2.41$ ) followed by 1:2 ( $19.03 \pm 2.41$ ) and 1:1 ( $23.18 \pm 2.41$ ) ratios. **Conclusions:** Increasing the ketamine ratio in ketofol admixture resulted in high intraocular pressure. **Support/Disclosure:** The study was funded by the Scientific and Technological Research Council of Turkey (project # 215S062). None.

**ABSTRACT NO.: 052****Computed tomographic evaluation of the normal eyes in eastern imperial eagles (*AQUILA HELIACA*)**F Asadi,\* A Rahafrouz,<sup>†</sup> S Soroori,<sup>‡</sup> M Molazem,<sup>§</sup> I Memarian<sup>§</sup> and Y Vali<sup>§</sup>\*DVM student, Faculty of Veterinary Medicine, University of Semnan, Semnan, Iran; <sup>†</sup>DVM student, Faculty of Veterinary Medicine, University of Tebran, Tebran, Iran; <sup>‡</sup>Department of Radiology and Surgery, Faculty of Veterinary Medicine, University of Tebran, Tebran, Iran; <sup>§</sup>Chief Veterinarian of Tebran Zoo and Pardisan Rehabilitation Center, Tebran, Iran

**Purpose:** To determine the dimensions and density of ocular structures in normal Imperial Eagles by computed tomography (CT). **Methods:** Eight eyes of 4 healthy Imperial Eagles based on normal ophthalmologic examinations were included in the present study. CT examination of all skulls was performed in dorsal recumbency under general anesthesia using a restraint device. CT scans were reconstructed at 1 mm by software (Syngo 5.5) in dorsal plane. In order to measure the density, regions of interest (ROI) about  $0.04\text{ cm}^2$ ,  $0.1\text{ cm}^2$  and  $0.2\text{ cm}^2$  were chosen in the anterior chamber, lens and vitreous, respectively. Axial lengths of globe, anterior chamber, lens, and vitreous chamber were measured. All data were statistically analyzed. **Results:** The mean weight of the included birds was 3.5 kg. The mean  $\pm$  SD axial globe length was  $2.84 \pm 0.09$  cm. The mean  $\pm$  SD distance and density of anterior chamber, lens, and vitreous were  $0.47 \pm 0.03$  cm,  $12.23 \pm 1.7$  HU,  $0.54 \pm 0.05$  cm,  $120.92 \pm 22.74$  HU,  $1.73 \pm 0.1$  cm, and  $12.93 \pm 1.52$  HU, respectively. There was no statistically significant differences in the evaluated parameters between left and right eyes. No significant correlation was found between mean  $\pm$  SD ocular parameters and weight. **Conclusions:** Eastern Imperial Eagle is a threatened species from southeastern Europe to western and central Asia including Iran. The results of present study can be used as reference values which will be helpful in determination of ocular abnormalities in this species. **Support/Disclosure:** None.

**ABSTRACT NO.: 053****Eyelid hibernoma in a dog**B Beckwith-Cohen,\* GC Shaw,<sup>†</sup> RR Dubielzig<sup>†</sup> and LBC Teixeira<sup>†</sup>  
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**Purpose:** To report the first eyelid hibernoma in any species. **Methods:** A recurring lower eyelid mass of an 11-year-9-month-old female-spayed Cardigan Welsh corgi underwent fine-needle-aspiration for cytologic assessment and was later surgically excised. Formalin-fixed tissue was submitted to the COPLOW and was paraffin embedded. Histological sections were stained with hematoxylin-eosin and immunohistochemistry was performed for desmin. **Results:** Cytologic evaluation was consistent with a well-differentiated epithelial tumor, either an adenoma or adenocarcinoma. Grossly, the sample consisted of a  $2 \times 1 \times 0.5$  centimeters haired skin tissue with a multilobular tan mass. Histologically, a multilobulated, non-encapsulated and well-delineated neoplastic mass expanded the superficial and deep dermis. Neoplastic cells comingle with fully differentiated skeletal muscle fibers. The mass was composed of sheets of polygonal cells surrounded and separated by moderate amounts of fibrovascular stroma. Neoplastic cells had finely vacuolated and clear cytoplasm with a round, peripheralized nucleus exhibiting homogenous chromatin and one to two nucleoli. Mitotic figures were rare and cellular pleomorphism was mild. Margins were clean but narrow and the mass was suspected to be cutaneous hibernoma – a benign tumor of vestigial brown fat. The cell cytoplasm stained strongly for desmin using immunohistochemistry, confirming the diagnosis. **Conclusions:** Hibernomas are rare neoplasms which occur in body cavities, subcutaneous tissue and within muscle. Orbital hibernomas in dogs were recently described, and are the only hibernoma tumors reported in dogs. To the authors' knowledge this is the first report of a hibernoma occurring in the haired skin of any species. **Support/Disclosure:** None.

**ABSTRACT NO.: 054****Efficacy and safety of three protocols to obtain mydriasis using rocuronium bromide in blue-fronted amazon parrots (*Amazona aestiva*)**PJ Dongo,\* DG Pinto,\* L Milanelo,<sup>†</sup> MB Guimarães,\* AMV Safatle\* and AA Bolzan\*\*College of Veterinary Medicine, University of Sao Paulo, Sao Paulo, Brazil; <sup>†</sup>Tiete Ecological Park of Sao Paulo, Sao Paulo, Brazil

**Purpose:** To evaluate the efficacy and safety of three protocols to obtain mydriasis in blue-fronted Amazon parrots with topical application of rocuronium bromide. **Methods:** Twelve healthy adults blue-fronted Amazon parrots received three different doses of rocuronium bromide (10 mg/ml), applied with a pipette, in both eyes: ROC1 (a single instillation of 20  $\mu\text{l}/\text{eye}$ ); ROC2 (two instillations of 20  $\mu\text{l}/\text{eye}$ , with 15 minutes apart) and ROC3 (three instillations of 20  $\mu\text{l}/\text{eye}$ , with 15 minutes apart). The birds were maintained in lateral recumbence for 1 minute after each instillation. Pupillary diameter (PD) was measured with digital caliper before the treatments (Tbase), and every 15 minutes during 1 hour (T15, T30, T45, T60) and hourly for 6 hours post-administration (T120, T180, T240, T300, T360). The parrots were also examined after 24 hours of administration (T24H). The occurrence of adverse effects was monitored. **Results:** Significant differences ( $P < 0.05$ ) were observed between ROC1-ROC2 (T45 and T60), and ROC1-ROC3 (T15 to T60), without differences between ROC2-ROC3. The basal PD was 2.75 mm and maximal values were  $3.31 \pm 0.72$  mm (T45-ROC1),  $3.83 \pm 0.46$  mm (T60-ROC2) and  $4.04 \pm 0.54$  mm (T45-ROC3). The only adverse effect observed was transient lower eyelid paresis, in 8.3% (ROC1), 33.3% (ROC2) and 50% (ROC3) of the birds; any local sign was noted. At T360 and T24H, the PD was similar to baseline and, in cases of paresis, the eyelid was returned to the normal position. **Conclusions:** The maximal mydriasis was obtained in ROC2 and ROC3. These protocols were most effective and relatively safe considering the mild side effect manifested. **Support/Disclosure:** Supported by CNPq grants n<sup>o</sup>190312/2013-0. None.

**ABSTRACT NO.: 055****Ophthalmic artery blood flow in rabbits treated with sildenafil citrate in different doses**FLC Brito,\* SVSG Barros,<sup>†</sup> LCC Lacerda,<sup>†</sup> FA Marinho,<sup>†</sup> TB Lima<sup>†</sup> and JL Laus<sup>†</sup><sup>\*</sup>VetVision Oftalmologia Veterinária, Brazil; <sup>†</sup>Department of Veterinary Medicine and Surgery, College of Agricultural and Veterinary Sciences, Campus of Jaboticabal, São Paulo State University – UNESP, Brazil

**Purpose:** To investigate the effects of sildenafil in different doses on ocular blood flow. **Methods:** 16 rabbits were used, subdivided into 4 subgroups containing 4 rabbits that received 25 mg, 50 mg, 100 mg and 200 mg of sildenafil daily. The parameters were measured at baseline, 7, 15, 30 and 60 days, corresponding to the time M0, M1, M2, M3 and M4, respectively. Measurements included peak systolic velocity (PS), end-diastolic velocity (ED), pulsatility (PD) and resistive (RI) index. Ocular blood flow measurements were performed using color Doppler ultrasonography. For statistical analysis the Student's t test were used. **Results:** There was a significant difference ( $P < 0.05$ ) in PS at doses of 50, 100 and 200 mg in M1. For ED, in M2, there was significant difference in the doses of 25 and 200 mg. In M3, observed differences at doses of 25 and 50 mg and 100 and 200 mg M4. Values of PI, there were a significant difference ( $P < 0.05$ ) in M1, as the doses of 25 and 100 mg and 50, 100 and 200 mg. In M2, Differences were observed at all doses and M3, only 50 and 100 mg. M4, there is difference in the doses of 25, 50 and 200 mg, 50 and 100 mg, and 100 and 200 mg. For RI in the M2 observed difference for the doses of 25 and 100 mg, and 50, 100 and 200 mg. In M3, with respect to 25 to 200 mg and 50 to 200 mg. **Conclusion:** Sildenafil induces changes in blood flow of the ophthalmic artery. **Support/Disclosure:** Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) (Process n° 509468/2010-1 and the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) (Process n° 2011/08728-8) for sponsoring this research. None.

**ABSTRACT NO.: 056****The use of episcleral subconjunctival cyclosporine implants to control otaiid keratopathy**CMH Colitz,\* BC Gilger,<sup>†</sup> R Grundon,<sup>‡</sup> E Anderson,<sup>§</sup> A Berliner,<sup>¶</sup> D Blyde,\*\* M Bowman,<sup>††</sup> S Buchanan,<sup>‡‡</sup> F Chua,<sup>§§</sup> B Doescher,<sup>¶¶</sup> M Menchaca,<sup>\*\*\*</sup> D March,<sup>†††</sup> J Olds,<sup>‡‡‡</sup> W Phillips,<sup>§§§</sup> T Reidarson,<sup>¶¶¶</sup> C Seruca,<sup>\*\*\*\*</sup> A Sogorb,<sup>\*\*\*\*\*</sup> L Staggs<sup>††††</sup> and R Wells<sup>‡‡‡‡</sup>

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**Purpose:** To determine whether the use of episcleral subconjunctival cyclosporine implants would control Otaiid Keratopathy in sea lions and fur seals. **Materials and Methods:** Surgical implantation of these devices was performed over the past 6 years, in eyes of 57 sea lions and fur seals, specifically 27 California sea lions (*Zalophus californianus*), 9 New Zealand fur seals (*Arctocephalus forsteri*), 7 Australian sea lions (*Neophoca cinerea*), 6 Subantarctic fur seals (*Arctocephalus tropicalis*), 4 South American sea lions (*Otaria byronia*), 3 Australian fur seals (*Arctocephalus pusillus doriferus*), and 1 Steller sea lion (*Eumetopias jubatus*). **Results:** Forty animals including 29 females, 28 males, between 0.67 years to 29 years of age, average age 15.9 years were included. Four animals, one California sea lion, one Subantarctic fur seal, and 2 Australian sea lions had 2 sets of implants placed at different surgical eyes. One eye of one animal had 3 implants placed; and one animal had implants changed periodically due to potentially not working anymore. Forty-nine animals (86%) have had few to no flare ups of Otaiid Keratopathy since getting the CSA implants, as per the medical records and compared to prior to implants and compared to other animals without implants. One animal has continued to have uncontrolled keratopathy and a second set of implants will be placed. Therefore, use of CSA implants has been able to positively impact this recurrent frustrating disease. **Conclusions:** Overall, over 95% of eyes were improved in terms of recurrence of Otaiid Keratopathy. It will be important to monitor otaiids that received implants at a young age and see if they have overall healthier corneas, develop cataracts later than normal, and continue to have controlled disease.

**ABSTRACT NO.: 057****Concurrent spindle cell variant and round cell variant of feline post-traumatic ocular sarcoma in a single eye**

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**Purpose:** To report a case of Feline Post-Traumatic Ocular Sarcoma (FOPTS), spindle-cell variant and round cell variant occurring simultaneously in a single globe. **Methods:** A 7-year-old neutered male domestic shorthair cat was presented to a veterinary ophthalmologist for evaluation. The patient had a history of ocular trauma OD with suspected perforation three years prior. Ophthalmic examination, enucleation, histopathology, and immunohistochemistry were performed. **Results:** Clinical examination of the right eye revealed keratitis with stromal vascularization and irregular corneal surface, and a suspected intraocular mass. Histopathology showed a neoplastic population of spindle-shaped cells

exhibiting mild to moderate anisocytosis and anisokaryosis with variably frequent mitotic figures associated with the anterior uvea and within the lens capsule. A second homogenous population of round cells with scattered mitotic figures was observed carpeting the ciliary body, choroid, and vitreous surfaces. Alcian Blue-PAS stain revealed robust and extensive PAS-positive basement membrane formation associated with the spindle cells within the anterior uvea, characteristic of the spindle cell variant of FOPTS. With immunohistochemistry, the neoplastic spindle cell population stained positively for cytokeratin and smooth muscle actin, consistent with the spindle cell variant of FOPTS. The suspected neoplastic round cell population uniformly stained positively for CD20 and CD79a, confirming a neoplastic population of B cells, consistent with the round cell variant of FOPTS. **Conclusions:** To the authors' knowledge, this is the first reported case of both spindle and round cell variants of FOPTS in the same eye. Further investigation is needed to elucidate the pathogenesis of these lesions. **Support/Disclosure:** None.

**ABSTRACT NO.: 058****The eye of the giant anteater (*Myrmecophaga tridactyla*): biometric findings and reference values for selected ophthalmic diagnostic tests**ACV Rodarte-Almeida,\* AO Passos,\* FV Mergulhão,\* RP Bonorino<sup>†</sup> and PD Galera\*<sup>\*</sup>College of Veterinary Medicine, University of Brasilia, DF, Brazil;<sup>†</sup>Fundação Jardim Zoológico, Brasilia, DF, Brazil

**Purpose:** To determine normal morphologic parameters and values for ophthalmic tests on the giant anteater (*Myrmecophaga tridactyla*). **Methods:** Twenty-four eyes of 12 healthy giant anteaters, young and adults of both sexes, were investigated. Schirmer tear test (STT), bacterial culture of the conjunctiva, intraocular pressure (IOP) by rebound tonometry, palpebral length (PL), corneal diameter and fundus images were collected. **Results:** The mean value found for the STT was  $8.0 \pm 6.2$  mm/min. Horizontal superior PL was  $1.6 \pm 0.2$  cm. In males PL was significantly longer than in females ( $P = 0.025$ ). The horizontal inferior PL was  $1.5 \pm 0.2$  cm; horizontal corneal diameter (limbus to limbus) was  $0.1 \pm 0.1$  cm, which was significantly greater in males than in females ( $P = 0.023$ ). Adult animals had a significantly bigger horizontal corneal diameter than the younger animals. The mean IOP was  $10.9 \pm 2.4$  mmHg and it was significantly higher in males than in females ( $P = 0.015$ ). Three types of Gram-positive bacteria were identified; and the most frequent was *Staphylococcus spp.* (54%). The retina showed an avascular, nonapertal pattern with a pigmented area in all extension. The optic nerve showed a round or slightly oval shape covered with myelin, showing a light grey color, and does not present any vascularization. **Conclusions:** This study established normal ocular morphologic and diagnostic data for the giant anteater. **Support/Disclosure:** None.

**ABSTRACT NO.: 059****Modified schirmer tear test and rebound tonometry in blue-fronted amazon parrot (*Amazona aestiva*)**MSA Falcão,\* RV Monteiro,\* AP Oriá<sup>†</sup> and PD Galera\*<sup>\*</sup>Veterinary Medicine Department, College of Veterinary Medicine, University of Brasilia, Brasilia, DF, Brazil; <sup>†</sup>School of Veterinary Medicine and Zootechny, Federal University of Bahia, UFBA, Brazil

**Purpose:** To describe the modified Schirmer tear test (mSTT), intraocular pressure by rebound tonometry and palpebral fissure length (PFL) in healthy blue-fronted Amazon parrots (*Amazona aestiva*). **Methods:** Thirty-five healthy adult animals from a conservation breeding center in Brazil were used in this study. After clinical and laboratory tests, mSTT was conducted and measurements were taken of intraocular pressure (IOP) by rebound tonometry (Tonovet<sup>®</sup>) and palpebral fissure length (PFL) using a digital pachymeter in both eyes, under physical restraint. **Results:** Mean values of mSTT in OD and OS were  $6.4 \pm 0.1$  mm/min (range 1 to 20 mm/min), and mean IOP was  $6.2 \pm 0.1$  mmHg (range 4 to 12 mmHg), while PFL was  $10.1 \pm 0.1$  mm (range 8 to 13 mm). A moderate correlation was seen between mSTT and PFL for OD ( $r = 0.14$ ) and OS ( $r = 0.20$ ) according to the Pearson correlation test. **Conclusions:** The results provide ophthalmic tests reference values for *A. aestiva*. **Support/Disclosure:** None.

**ABSTRACT NO.: 060****Normal values for ophthalmic tests for the blue-and-yellow macaw (*Ara ararauna*)**

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**Purpose:** The aim of this study was to establish reference values for ophthalmic diagnostic tests in healthy blue-and-yellow macaws. The study was approved by the Ethics Committee and conducted in accordance with the ARVO Ethical Principles. **Methods:** We investigated 35 macaws (70 eyes), of undetermined sex, with an average weight of 1 kg, who were living in accredited captivity in the Federal District, Brazil. Tear production using the Schirmer tear test (STT), intraocular pressure (IOP) using a rebound tonometer, palpebral fissure length and normal conjunctival flora were evaluated. For inclusion in this study, the animals underwent a clinical and hematological evaluation. **Results:** The mean value found for STT was  $7.6 \pm 4.6$  mm/min in the right eye (OD) and  $6.6 \pm 4.4$  mm/min in the left eye (OS); palpebral fissure length was  $11.7 \pm 0.1$  mm OD and  $11.8 \pm 0.1$  OS. The STT showed a low positive correlation with palpebral fissure measurement for this species. Mean IOP was  $11.4 \pm 2.5$  mmHg OD and  $11.6 \pm 1.8$  mmHg OS, prior to anesthesia, and  $7.6 \pm 2.4$  mmHg OD and  $7.8 \pm 1.8$  mmHg OS after, showing a statistically significant difference between measurements before and after anesthesia. In this study, 84.1% of samples were positive for microbial growth. Bacteria, fungi and yeasts were isolated, and *Staphylococcus spp.* (21.9%) and *Bacillus spp.* (26.8%) were the most frequently isolated microorganisms. **Conclusions:** These ophthalmic reference values will be particularly useful in diagnosing pathological changes in the eyes of blue-and-yellow macaws. **Support/Disclosure:** None.



## ABSTRACT NO.: 061

Ophthalmic examination findings and intraocular pressures in wild-caught african giant pouched rats (*Cricetomys* spp.)AR Heller,\* EC Ledbetter,\* B Singh,<sup>†</sup> DN Lee<sup>‡</sup> and AG Ophir<sup>‡</sup>

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**Purpose:** To describe ophthalmic examination findings and intraocular pressures (IOPs) in wild-caught African giant pouched rats (*Cricetomys ansorgei* and *gambianus*) from Tanzania and Ghana. Giant pouched rats are of interest as pets and are trained to detect land mines and tuberculosis by olfaction. **Methods:** Under general anesthesia, slit-lamp biomicroscopy before and after pharmacologic mydriasis and indirect ophthalmoscopy were performed. Eyes were fluorescein stained and IOPs measured by rebound tonometry. **Results:** Twenty-six sexually-mature pouched rats (52 eyes) were examined, including 13 males and 13 females. The mean IOP ( $\pm$ SD) was 7.0 ( $\pm$ 2.6) mmHg. Fluorescein staining was negative in all eyes. One or more ocular abnormalities were detected in 17 rats (21 eyes). These ocular lesions included: palpebral margin defect with focal trichiasis ( $n = 2$  eyes), phthisis bulbi ( $n = 1$ ), corneal vascularization ( $n = 2$ ), persistent pupillary membranes ( $n = 5$ ), posterior synechiae ( $n = 1$ ), lens opacities ( $n = 16$ ), and multifocal chorioretinal scarring ( $n = 2$ ). Lens opacities included punctate pigment on anterior lens capsule ( $n = 3$  eyes), incipient anterior cortical opacities ( $n = 5$ ), incipient suture tip opacities ( $n = 2$ ), incipient nuclear opacities ( $n = 3$ ), immature cataract ( $n = 2$ ), and hypermature cataract ( $n = 1$ ). **Conclusions:** Ocular abnormalities were common in the evaluated population of giant pouched rats; however, most of the detected lesions were mild and believed to have minimal impact on vision. Rebound tonometry with the TonoVet<sup>®</sup> was a reliable and simple technique to measure IOPs in the rats. The most visually significant ocular lesions in the rats were suspected to be the result of trauma. **Support/Disclosure:** Supported by Army Research Project #65344-LS. None.

## ABSTRACT NO.: 062

## Septic vitritis, pectenitis, and retinal necrosis in a bald eagle

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**Purpose:** To describe the clinical appearance, ultrasound findings, vitreal cytology, and histopathology of septic vitritis, pectenitis, and retinal necrosis in a bald eagle. **Methods:** An adult male bald eagle was presented to The Raptor Center (TRC) at the University of Minnesota. The eagle was seen fighting with another eagle prior to presentation, and had multiple puncture wounds of his feet, chest, wrist, and head consistent with territorial battles. Ophthalmic examination included slit-lamp biomicroscopy, fundic examination, and bilateral ocular ultrasonography. Due to irreversible blindness in the right eye, the bird was euthanized. Vitreous paracentesis of the affected eye immediately after euthanasia was submitted for cytology and culture/sensitivity. The right globe was fixed in 10% buffered formalin for histopathology. **Results:** Ophthalmic examination of the right eye revealed upper eyelid laceration and posterior vitritis with possible retinal detachment. The left eye had no abnormalities. Ultrasound of the right eye revealed retinal detachment and a swollen pecten. Cytology of the vitreous revealed intralesional bacteria and inflammatory cells. Vitreous culture was negative. Histopathology revealed severe chronic, heterophilic, and granulomatous choroiditis and pectenitis with widespread retinal necrosis and intralesional gram-negative bacteria. Fibrous tunic penetration was not evidence in planes of section. **Conclusion:** Septic vitritis, pectenitis, and retinal necrosis should be considered in bald eagles with a history of territorial battle and head trauma. Microscopy may be more sensitive for the detection of organisms than culture because of fastidious organisms or techniques not optimized for avian pathogens. **Support/Disclosure:** None.

## ABSTRACT NO.: 063

Phacoemulsification in a 21 year-old Coscoroba swan (*Coscoroba coscoroba*): case reportJA Kleiner,\* D Pereira,<sup>†</sup> FJ Stipp,<sup>‡</sup> E Hatschbach<sup>§</sup> and ES Cirino<sup>¶</sup>

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**Purpose:** This case report documents a cataract surgery performed in a 21 year-old captive Coscoroba swan (*Coscoroba coscoroba*). **Methods:** Ophthalmic exam revealed a severe corneal opacity, pigmentary keratitis and extensive corneal vascularization in the right eye and a Morgagnian cataract and severe lens induced uveitis in the left eye and the animal was totally blind. Electroretinography showed good "a" and "b" waves during the quick-ret check protocol in the left eye and none in the right eye. Uveitis was controlled with both topical corticosteroids and non-steroidal anti-inflammatory eye-drops for almost two months before the surgery. Pupil dilation for the surgery was achieved using one drop (twice, 20 minutes apart) of pancuronium bromide on the cornea. Two handed phacoemulsification was done. Two percent hyaluronic acid was used to maintain the anterior chamber and capsulorrhexis was achieved using Utrata forceps after dyeing the anterior capsule using trypan blue. Lens material was very liquid and easily aspirated and ultrasound was used only in the central part (nucleus) of the lens. The main corneal incision was closed with two simple interrupted (10-0) nylon sutures and 0.1 ml of betamethasone dipropionate was injected subconjunctivally. Only topical therapy was used postoperatively and consisted of gatifloxacin, prednisolone and artificial tears for 25 days. **Results:** The patient regained vision on the same day of the surgery showing good navigation around the cage and positive menace response. No major inflammation or complications were observed after the surgery. **Conclusions:** To the

authors' knowledge this is the first report on phacoemulsification in a Coscoroba swan and a good outcome. **Commercial interest:** None.

## ABSTRACT NO.: 064

## Comparing clinical perception with histologic diagnosis for feline irides with melanotic change

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**Purpose:** To assess the proportion of Diplomates of the American College of Veterinary Ophthalmologists who could predict histologic diagnosis for feline eyes with melanocytic iridal changes when provided with only clinical data. To establish personal attributes and clinical parameters associated with correct prediction of histologic diagnosis. **Methods:** Diplomates completed a survey containing only clinical photos and data for six cats with confirmed histologic diagnoses of iris melanosis ( $n = 2$ ), early ( $n = 3$ ) or late ( $n = 1$ ) feline diffuse iris melanoma. Participating Diplomates predicted histologic diagnosis for each case, and graded their diagnostic confidence and the importance of clinical features in their decision-making. **Results:** Complete data were provided by 78 Diplomates. Histologic diagnosis was correctly predicted for 6, 5, 4, 3, 2, 1, and 0 clinical cases by 1.3, 14.3, 17.9, 20.5, 35.9, 10.3, and 0% of Diplomates, respectively. Considering data from all 78 participants, no significant association was detected between proportion of correct diagnoses and any personal attributes (period board-certified, self-reported confidence, feline caseload, practice type, number of ophthalmologists in practice). Median (range) confidence across all participants and cases was 7 (1–10) of 10. Number of correct diagnoses was significantly associated with self-reported emphasis on lesional thickness, clinical photo, temporal progression, lesional surface area, pupillary light reflex, intraocular pressure, and aqueous flare. **Conclusions:** This study suggests frequent discordance between histologic diagnosis and Diplomates' clinical diagnosis of feline iridal melanotic lesions despite generally high self-reported confidence. Some clinical parameters appear more useful for successful prediction of histologic diagnosis. **Support/Disclosure:** Supported by Merial Veterinary Scholars Program and NIH K08 EY021142. None.

## ABSTRACT NO.: 065

## Calibration of the TonoVet and Tono-Pen Vet tonometers in the porcine eye

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**Purpose:** The pig plays an increasing role in ocular drug delivery models but the most accurate tonometer in this species remains unclear. The purpose of this study was to evaluate the accuracy of TonoVet and Tono-Pen Vet tonometers in the *ex-vivo* porcine eye. **Methods:** Four freshly enucleated normal porcine eyes were cannulated with two 25 gauge needles; one connected via tubing to a mercury manometer calibrated continuous physiologic recorder (Dash 4000 Pro) and the other connected to a reservoir of Lactated Ringer's Solution on an adjustable stand. Triplicate IOP readings were taken with the TonoVet and then the Tono-Pen at 5, 10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80 mmHg. **Results:** Linear regression showed strong linear trends for both the TonoVet ( $r^2 = 0.969$ ) and Tono-Pen ( $r^2 = 0.983$ ). The TonoVet slightly underestimated IOP at lower pressures and slightly overestimated IOP at higher pressures ( $y = 1.092x - 4.0$  where  $y$  = tonometer reading,  $x$  = manometer reading and 4.0 = intercept). The Tono-Pen consistently underestimated IOP ( $y = 0.773x - 2.1$ ). These differences were statistically significant ( $P = <0.001$ , one-way repeated measures ANOVA). **Conclusion:** As in other species, both the TonoVet and Tono-Pen tonometers do not measure true IOP, however, the TonoVet more closely approximates true IOP in the pig eye than the Tono-Pen Vet. **Support/Disclosure:** None.

## ABSTRACT NO.: 066

## Intraocular pressure values assessed by rebound tonometry (TONOVET) in normal eyes of giant panda bears

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**Purpose:** To determine reference values for of intraocular pressure measured by a rebound tonometer (TONOVET) in clinically normal Giant Panda Bears. **Methods:** Eight clinically normal Giant Panda Bears (4 males and 4 females) without ocular abnormalities were used in this study. All animals were captured using a dart with intramuscular ketamine in doses ranging from 70–80 mg/Kg. All animals were transported to the surgical center deeply sedated and then were intubated following a short period of volatile gas mask anesthesia. Anesthesia was maintained using isoflurane and oxygen. Tonometry was performed by using a rebound tonometer (Icare<sup>®</sup> TONOVET, Helsinki, Finland) in dog mode in a horizontal position, placed perpendicularly to each of the animal eyes and with the a distance from the probe to the corneal surface of 4–8 mm. Statistical analysis was performed using a statistical Wilcoxon rank sum test with continuity correction. **Results:** No differences [do you mean no statistically significant differences were seen? They actually do seem fairly different from each other] were observed between the right and left eyes ( $P > 0.5$ ). The mean  $\pm$  SD IOP value for the right eye was 16.0  $\pm$  3.1 mmHg (range, 13–21 mmHg) and the mean  $\pm$  IOP value for the left eye was 13.4  $\pm$  3.2 mmHg (range, 8–18 mmHg). The mean  $\pm$  IOP value obtained for both eyes was 14.7  $\pm$  3.3 mmHg (range, 8–21 mmHg). No animal gender or age variations were analyzed due to small sample size. **Conclusions:** This study of eight Giant Panda Bears provided valuable information on normal intraocular pressure in this species. Knowledge of normal IOP reference values in Giant Panda Bears enables the clinician to evaluate corneal pathology and diagnose ocular changes like uveitis and glaucoma with greater accuracy.

## ABSTRACT NO.: 067

## Results of Schirmer tear test I in giant panda bears

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**Purpose:** To determine reference values for Schirmer tear tests I in clinically normal Giant Panda Bears. **Methods:** Eight clinically normal Giant Panda Bears (4 males and 4 females) without ocular abnormalities were used in this study. All animals were captured using a dart with intramuscular ketamine in doses ranging from 70–80 mg/Kg. All animals were transported to the surgical center deeply sedated and then were intubated following a short period of volatile gas mask anesthesia. Anesthesia was maintained using isoflurane and oxygen. Procedures in all Giant Panda Bears, Schirmer tear tests (STT) I were performed by using a sterile Schirmer tear test standardized strip (Schering-Plough Animal Health, Union, NJ, USA) placed in the lower conjunctival fornix for 1 min. Statistical analysis was performed using a statistical Wilcoxon rank sum test with continuity correction. **Results:** For each test (STT I), no differences were observed between the right and left eyes ( $P > 0.5$ ). The mean  $\pm$  SD STT I value for the right eye was  $15.9 \pm 4.5$  mm/min (range, 8–21 mm/min) and the mean  $\pm$  SD STT I value for the left eye was  $14.9 \pm 3.8$  mm/min (range, 7–19 mm/min). The mean  $\pm$  SD STT I value for both eyes was  $15.4 \pm 4.1$  mm/min (range, 7–21 mm/min). No animal gender or age variations were analyzed due to small sample size. **Conclusions:** This study of eight Giant Panda Bears provided valuable information on normal STT I in this species. Knowledge of normal STT reference values in Giant Panda Bears enables the clinician to evaluate corneal pathology and diagnose tear deficiency syndromes with greater accuracy.

## ABSTRACT NO.: 068

## Limb xanthogranuloma in a dog

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**Purpose:** To describe a case of adult-onset corneal limbal xanthogranuloma in a dog. **Methods:** A 10.6-year-old, female spayed American Pitt Bull Terrier was presented with a tan pink approximately  $7 \times 5 \times 3$  mm sized nodular limbal mass (OD). The lesion was first noticed by the owner and slowly enlarged over a period of 13 months. Lamellar keratectomy was performed and the specimen was submitted for histopathology examination. **Results:** The corneal stroma was replaced by a poorly demarcated exophytic sessile mass composed of lakes and individualized cholesterol clefts admixed with granulomatous inflammation with frequent large foamy macrophages and occasional multinucleated giant cells. These histiocytic cells stained positively for CD18 and IBA-1 by immunohistochemistry. The corneal epithelium was hyperplastic and there was subepithelial calcification. **Conclusions:** Based on the histopathologic characteristics, the mass was diagnosed as a corneal limbal xanthogranuloma. This is the first report of limbal xanthogranuloma in domestic animals. This dog was not diabetic with no evidence of dyslipidemia. The cause of xanthogranuloma in this case was unclear and no other lesions were noted in the skin. Monitoring the prognosis following lamellar keratectomy is in progress. **Support/Disclosure:** None.

## ABSTRACT NO.: 069

Conjunctival microflora of clinically normal Syrian hamsters (*Mesocricetus auratus*)

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**Purpose:** This study was performed to determined normal aerobic bacterial flora of the cornea and conjunctiva in the Syrian hamsters. **Methods:** 22 eyes of 11 Syrian hamsters were examined. For the collection of specimens, sterile micro-swab applicator was rolled over the corneal surface and mucosal surface of the ventral conjunctival fornix while avoiding contact with the surrounding skin or hair. Immediately after sample collection, microbiologic aerobic culture was initiated. For all the isolates, susceptibility to the commonly used antimicrobials was determined by means of Kirby-Bauer method. **Results:** Fourteen eyes (63%) showed bacterial growth and total number of 19 different species were isolated which belonged to 7 multiple genera of bacteria. Gram-positive bacteria were the most prominent with 83.3% (20/24) of isolates. The most commonly isolated bacterial organisms were *Staphylococcus xylosum* (5/24; 20.8%), *Streptococcus viridans* (4/24; 16.6%), and  $\beta$ -hemolysis streptococcus spp. (4/24; 16.6%), respectively. Gram-negative isolated bacteria were *Proteus* spp., *Escherichia coli*, *Citrobacter* spp. Antimicrobial susceptibility test showed that enrofloxacin, ciprofloxacin and chloramphenicol had good activity against bacterial flora of Syrian hamster. **Conclusions:** This is first report on the normal aerobic bacterial flora of the cornea and conjunctiva in the Syrian hamsters. Results of this study revealed that Gram-positive bacteria are the most dominant microorganisms of the normal ocular surface of healthy Syrian hamsters. **Support/Disclosure:** None.

## ABSTRACT NO.: 070

## Intralenticular spindle cell neoplasm with chondromatous differentiation in a cat

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**Purpose:** To report the first intralenticular spindle cell neoplasm with chondromatous differentiation in a cat. **Methods:** The right globe of a 16-year-old spayed female domestic long-haired cat was removed for the development of glaucoma following a protracted history of cataract and uveitis and submitted for routine histopathology. Hematoxylin-eosin and alcian-blue PAS staining and immunohistochemistry for smooth muscle actin and cytokeratin were performed and examined. **Results:** A spindle cell neoplasm with chondromatous differentiation was enclosed entirely within the intact lens capsule. The alcian-blue PAS stain revealed robust PAS-positive basement membrane formation associated with the neoplastic cells, typical of neoplastic lens epithelial cells and a homogeneous alcian-blue positive matrix surrounding neoplastic cells, typical of cartilaginous tissue. The immunohistochemistry revealed scattered cytokeratin positive cells and none of the cells expressed smooth muscle actin. The neoplasm was accompanied by liquefaction of cortical lens fibers. Additional lesions included mild lymphoplasmacytic anterior uveitis, fibrovascular membrane formation with synechiae and chronic secondary glaucoma. **Conclusions:** To the authors' knowledge, this is the first reported spindle cell tumor with features that are similar to a post-traumatic sarcoma arising from lens epithelial cells within an intact lens capsule. **Support/Disclosure:** None.

## ABSTRACT NO.: 071

The common agouti (*Dasyprocta azarae*) eye: morphological observations and selected ophthalmic diagnostic tests

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**Purpose:** To carry out a descriptive investigation of the common agouti (*Dasyprocta azarae*) eye and to perform selected ophthalmic diagnostic tests with the aim of establishing normal physiological values to be used as reference for this species. **Methods:** A total of 19 healthy agoutis were used. Selected ophthalmic diagnostic tests were performed including Schirmer's tear test I (STTI), analysis of the conjunctival bacterial microflora, corneal estesiometry, tonometry, B-mode ultrasonic biometry, fundus photography and gross and histological analysis. **Results:** Normal parameters found for the ocular diagnostic tests were: Esthesiometry:  $4.95 \pm 0.3$  cm; IOP:  $11.6 \pm 0.4$  mmHg; Palpebral fissure length:  $1.7 \pm 0.2$  mm; STTI –  $9.7 \pm 0.4$  mm/min; Corneal thickness:  $0.8 \pm 0.003$  mm; Anterior chamber depth:  $1.7 \pm 0.07$  mm; Lens thickness:  $5 \pm 0.05$  mm; Vitreous chamber depth:  $5 \pm 0.01$  mm and globe axial length:  $14 \pm 0.01$ . A pseudo-angioid retinal pattern with a pigmented optic disc was observed during fundic examination. The most frequent bacteria isolated were *Streptococcus* sp. (36.84%) followed by *Enterobacter* sp. (31.58%) and *Escherichia coli*, isolates (28.95%). No significant differences between left and right eyes or genders were found for any of the results. Gross evaluation of two eyeballs and subsequently optical microscopy examination confirmed the presence of melanocytic pigment granules found between the nerve fibers from the optic nerve. **Conclusions:** Reference data and morphologic observations obtained in this investigation might help veterinary ophthalmologists to diagnose ocular diseases in agoutis.

## ABSTRACT NO.: 072

Mode B ocular biometry and Doppler velocimetry of ophthalmic arteries from captive manatees (*Trichechus manatus manatus* – Linnaeus, 1758)

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**Purpose:** To assess the ocular biometry and physiology of ocular arteries from captive manatees (*Trichechus manatus manatus*) using Doppler velocimetry. **Methods:** Three healthy manatees (one male and two females) from a conservationist reserve located in Northeast Brazil, with ages from one to three years-old were examined. Topical anesthetic (Alcaïne®) was applied and subsequently conductive gel was used. Triplex and bidimensional echography was performed using a 7.5 Hz convex transducer and data were acquired with MyLab 30CV (Esaote® – Florence, Italy). Ocular biometry was obtained by calculating axial distances (in millimeters) of the anterior chamber (D1), lens (D2), vitreous chamber (D3) and ocular axial length (D4). Velocities (in cm/s) of systolic peak (Vp), end-diastolic velocity (EDV) and the mean of velocities (Vmn) were used to calculate the Doppler Resistance Index (RI) and Pulsatility Index (PI) from the ophthalmic artery and branches of the ophthalmic rete mirabile. Statistical analysis was performed between eyes and gender. Data are shown as mean ( $\pm$  SD). **Results:** Ocular biometric distances were obtained: D1 ( $0.23 \pm 0.05$ ), D2 ( $3.5 \pm 0.32$ ), D3 ( $11.4 \pm 0.64$ ) and D4 ( $16.6 \pm 0.30$ ). The parameters obtained from the analysis of the Doppler velocimetry are the following: Vp ( $22.3 \pm 4.46$ ), EDV ( $15.8 \pm 4.18$ ), IR ( $0.3 \pm 0.06$ ) and IP ( $0.36 \pm 0.08$ ). No significant differences were observed between eyes or gender. **Conclusions:** The present study contributes to the standardization of normal ocular biometric measurements as well as the establishment of physiological parameters for Doppler indices of ocular arteries for manatees. **Support/Disclosure:** None.



## ABSTRACT NO.: 073

## Primary corneal melanoma in a horse

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**Purpose:** To describe a case of primary corneal melanoma in a horse. **Methods:** A 13-year-old Missouri Fox Trotter gelding presented to the ophthalmology service at Iowa State University for a six-week history of blepharospasm, epiphora, and corneal ulcers of the left eye. Two irregular pale pink corneal masses were noted rising minimally from the dorsal corneal surface. Multifocal pinpoint areas of pigmentation were also noted over the corneal surface. No intraocular or adnexal disease was appreciated. Initial impression smear cytology of the masses was suspicious for neoplasia. Superficial keratectomy was performed along with adjunctive strontium-90 beta irradiation and subsequent topical mitomycin C chemotherapy. The corneal biopsy was submitted for routine histopathological evaluation as well as immunohistochemical staining. **Results:** Histologically there were clusters of pleomorphic neoplastic cells containing rare cytoplasmic brown granules in the corneal epithelium and stroma. Immunohistochemistry staining revealed strong immunoreactivity for vimentin and S100, weak immunoreactivity for keratin, and negative staining for melan-A, leading to a diagnosis of poorly-melanized melanoma. Following surgery and adjunctive therapy, there has been no recurrence of the neoplasm to date (4 months). **Conclusions:** Melanocytic tumors of the cornea are rare in all species, and are most commonly an extension of melanoma of the conjunctiva, limbus, or uveal tract. To the authors' knowledge, this is the first report of a primary melanocytic tumor affecting a horse cornea. **Support/Disclosure:** None.

## ABSTRACT NO.: 074

## Corneal changes in an avian keratoconus model

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**Purpose:** Altered corneal architecture in keratoconus (KC) is related to corneal thinning. The underlying pathophysiology is not well-defined. Extant animal models do not duplicate the disease in humans. In this study, we characterize the morphologic changes in archival samples of an avian model of keratoconus. **Methods:** Archived histologic sections of globes were examined microscopically. Available for examination were globes from affected and non-affected chickens: 4-weeks-old ( $n = 2$  each group), 8-, 16-weeks-old, and adult ( $n = 1$  each group). Representative digital images of axial corneal stroma were collected and the stromal area occupied by keratocytes was determined (Adobe Photoshop software). Thickness of the corneal epithelium and of Bowman's layer was measured at axial corneal sites using calibrated digital photomicroscopy. **Results:** Histologic features typical of keratoconus were present in affected birds, including conical distortion of the cornea, with progressive changes with age. Thinning of the corneal epithelium and Bowman's membrane, and reduction in the corneal stromal area occupied by keratocytes was observed subjectively. Marked enlargement of the lenticular cavity was observed in a 4- and a 16-week-old bird. A posterior subcapsular cataract with Morgagnian globules was present in the adult KC bird. **Conclusions:** Chickens and human beings have similar corneal morphology, including a well-defined Bowman's layer. Eyes from the avian keratoconus model have histologic changes similar to those described in humans. Lenticular changes were also observed in some KC eyes. Future molecular studies of archived paraffin embedded tissues will contribute pathophysiologic information. **Support/Disclosure:** None.

## ORAL ABSTRACTS

## ABSTRACT NO.: 75

## Results of the evaluation of the long-term effect of different therapies on pigmentary keratitis (PK) of the PUG

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**Purpose:** To compare the long-term effect of a simplified nasal canthoplasty technique (NCP) with and without corneal cryotherapy (CC) followed by topical therapy (TT) to TT as a sole therapy for pug PK. **Methods:** The simplified NCP technique is described. Four groups of pugs with PK were retrospectively evaluated: Group 1 ( $n = 18$ , mean follow up of 2.3 years) received TT only. Group 2 ( $n = 21$ , mean follow up of 2.9 years) underwent NCP and TT. Group 3 ( $n = 23$ , mean follow up of 1.9 years) underwent NCP, bilateral CC (Askina Freeze<sup>®</sup>, Braun) and TT. Group 4 ( $n = 15$ , mean follow up of 2.3 years) underwent NCP, TT and randomized unilateral CC. Parameters recorded for statistical evaluation on the initial and final examination included STT, Fluorescein test, pigment density and distribution. **Results:** Group 1 showed no PK improvement (8/18) and pigment progression (8/18) despite improvement of the tear film (17/18). In group 2 the pigment remained static (4/21) or worsened (9/21) in 70% despite tear film improvement (20/21), while pigment reduction was observed in 30% (7/21). In group 3 the pigment diminished (17/22) or remained static (5/22) while the tear film improved (21/22). In group 4 pigment diminished substantially in the eye treated with CC (14/15). **Conclusions:** The effect of the simplified NCP and TT in pug PK is superior to TT only. When extensive pigment is already present at initial presentation CC adds a positive effect to NCP and TT but pigmentation may return over time. **Support/Disclosure:** None.

## ABSTRACT NO.: 076

## Maintenance of vision in dogs with glaucoma using a baerveldt glaucoma drainage device

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**Purpose:** The aim of this study was to assess the use of a non-valved glaucoma drainage device (Baerveldt-350 mm<sup>2</sup>) to maintain vision and control intraocular pressure in dogs with glaucoma no longer controlled with medical management. Modifications were made to address hypotony and the fibroproliferative response post-operatively. **Methods:** The medical records of 28 dogs (32 eyes) undergoing placement of a Baerveldt-350 mm<sup>2</sup> glaucoma drainage device between September 2013 and February 2016 were reviewed, including 7 dogs (9 eyes) with primary glaucoma and 21 dogs (23 eyes) with secondary glaucoma. Modifications included intraluminal and extraluminal ligatures to control hypotony as well as oral prednisolone (Apex Laboratories Pty Ltd, Somersby NSW) and colchicine (Aspen Pharmacare Australia Pty Ltd, St Leonards NSW) to control post-operative fibrosis. Visual and surgical outcomes were recorded for all cases. **Results:** Average follow up after implant placement was 319 days (8 days to 890 days). Intraocular pressure was controlled in 24/32 (75%) eyes. Additional surgery to maintain intraocular normotension was required in 5/32 eyes (16%) with successful control of IOP maintained in 4 of these eyes. Of eyes that had vision before surgery, 67% (18/27) retained vision for the period of the study. **Conclusions:** Controlling hypotony and fibrosis following placement of a Baerveldt-350 mm<sup>2</sup> glaucoma drainage device showed an increased success rate compared to other reports using drainage devices in dogs and offers an alternative surgical treatment for maintaining vision in dogs with glaucoma. **Support/Disclosure:** None.

## ABSTRACT NO.: 077

Phacoemulsification of loggerhead sea turtles (*Caretta caretta*) associated with neurologic symptoms or severe debilitationAG Cook,\* SM Boylan,<sup>†</sup> HD Westermeyer,<sup>‡</sup> CA Harms<sup>‡</sup> and HB White\*\*Animal Eye Care of the Lowcountry, Mount Pleasant, SC, USA; <sup>†</sup>South Carolina Aquarium, Charleston, SC, USA; <sup>‡</sup>North Carolina State University, College of Veterinary Medicine, Raleigh, NC, USA

**Purpose:** To describe cataract removal using phacoemulsification in loggerhead sea turtles (*Caretta caretta*) following rehabilitation from neurologic symptoms or severe debilitation. **Methods:** Retrospective evaluation of loggerhead turtles with cataracts treated with phacoemulsification that presented to the SC Aquarium or NC Turtle Rehabilitation Center (2014–2016). **Results:** The records of 8 patients (16 eyes) presenting to two turtle treatment centers were reviewed. Age and sex were unknown, but the patients were estimated to be mature juveniles in all cases (40.2–80.5 kg; mean 58.1 kg). On admission, cataracts were present in 10/16 eyes, while in 6/16 eyes cataracts developed during hospitalization. Dense cataracts were present in all eyes at the time of surgery. Prior to surgery, only one of the affected turtles was able to catch live food. Common intraoperative findings were low intraocular pressure (which resulted in a very soft eye), very soft cataracts, and a large posterior capsular plaque. Placement of corneal sutures (in 12/16 eyes) resulted in copious accumulation of mucopurulent discharge or a focal abscess at the incision site, which only resolved after suture removal. Following surgery all turtles were able to successfully catch and eat live crabs. At the time of submission, 5/8 turtles were released (3 pending releases). The mean follow-up prior to release was 102 days. None of the released turtles have been readmitted or recovered. **Conclusions:** Loggerhead turtles have improved visual function following phacoemulsification to remove cataracts. **Support/Disclosure:** None.

## ABSTRACT NO.: 078

## Investigation of bacterial contamination of ocular fluids in canines undergoing cataract surgery by use of broad-range real-time PCR

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**Purpose:** To determine the frequency with which patients are bacterially contaminated during standard phacoemulsification (PE) cataract removal and IOL implantation by use of broad-range real-time PCR methods. **Methods:** 111 eyes from 73 dogs presenting for PE between April 2015 and January 2016 were enrolled in the study. 0.2–1 ml of conjunctival fluid (CF), aqueous humor (AH) prior to surgery, AH post surgery, and balanced salt solution (BSS) used in surgery were collected for broad-range real-time PCR. Extracted DNA was evaluated for bacterial universal rRNA based on known primers (F-CCTACGGGAGG-CAGCAG, R-ATTACCGCGGCTGCTGG) using SYBR Green-based assays. **Results:** 57 out of 398 samples (48 eyes from 43 patients) analyzed tested positive for bacterial DNA in at least one sample. 14 eyes experienced complications after surgery including hypohemia, excessive inflammation the day after surgery, 1 month recurrence of inflammation, post operative hypertension, development of glaucoma, and cellular infiltrate at the incision; 9 of these eyes had a positive sample. The patient with the highest detected level of DNA experienced hypopyon the day after surgery, however high levels of DNA did not always correlate nor did all the patients experiencing hypopyon have a positive PCR result. **Conclusion:** Broad range real time PCR is capable of detecting bacterial DNA in aqueous humor in the dog. Detection of DNA in samples was not strongly correlated with post operative complications and samples from patients over 13 years of age were most likely to have detectable bacterial DNA. **Support/Disclosure:** None.

**ABSTRACT NO.: 079****Incidence of peripheral neuropathies affecting the eye in diabetic patients post-phacoemulsification**BC Foote, TM Michau, A Welihozkiy and JM Stine  
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**Objective:** To report the incidence of peripheral neuropathies that affect the eye in diabetic patients post phacoemulsification, including Horner's syndrome, neurogenic keratoconjunctivitis sicca, and facial nerve paralysis. **Animals:** Medical records of 196 diabetic patients and 450 non-diabetics that underwent phacoemulsification at three BluePearl Florida locations, between 2004 and 2015, were reviewed. **Methods:** Information collected included signalment, diabetes mellitus, type of peripheral neuropathy, time to resolution or improvement of the neuropathy, relevant concurrent diagnoses, and time to follow up. Follow up information was obtained by re-examination of patients or telecommunications with referring veterinarian or the owners. **Results:** The incidence of peripheral neuropathies in the diabetic population was 12.24% (24/196 dogs), which was significantly higher than the incidence of peripheral neuropathy in the non-diabetic patient, at 0.67% (3/450 dogs) ( $P = 0.0001$ ). Of the 30 diabetic peripheral neuropathy cases, in 24 diabetic canines, there were 20 cases of Horner's syndrome, 5 neurogenic keratoconjunctivitis sicca, and 5 facial nerve paralysis. One of the 24 diabetic patients developed multiple neuropathies and bilateral disease and 5 additional diabetic patients developed bilateral peripheral neuropathies. Resolution was confirmed in 11 of 30 cases, at an average of 256 days, and improvement was found in 6 of the remaining 19 cases. Average follow up time after diagnosis was 351 days (0–1630 days). **Conclusion:** There is a strong correlation between diabetes mellitus and peripheral neuropathies that affect the eye, including Horner's syndrome, neurogenic keratoconjunctivitis sicca, and facial nerve paralysis, with a higher incidence in diabetic phacoemulsification patients than non-diabetic phacoemulsification patients. **Support:** None.

**ABSTRACT NO.: 080****Risk factors and incidence of retinal detachment in the Boston terrier and Shih Tzu post-phacoemulsification**

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**Objective:** To report the incidence of retinal detachment post-phacoemulsification in a population of Boston Terriers and Shih Tzu in the southeastern United States and investigate the associated risk factors. **Animals:** Medical records of 83 Shih Tzu and 52 Boston Terriers that underwent phacoemulsification between 2000–2014, with or without intraocular lens placement, were reviewed. For the control population, post-phacoemulsification data of 45 Labrador Retrievers, 73 Schnauzers, and 159 Bichon Frises was evaluated. **Methods:** Information collected included signalment, pre-operative complications, surgeon, concurrent diabetes mellitus, cataract stage, phacoemulsification time, surgical complications, post-operative complications, and duration of follow-up. Time to retinal detachment and detachment percentage at specified time points, as well as percentage of patients to develop glaucoma were assessed. Three months of follow up was required for study inclusion. Cases were excluded if surgical conversion to intracapsular lens extraction was required. **Results:** Boston Terriers and Shih Tzu had a retinal detachment rate of 7.69% (7/91 eyes) and 8.94% (11/123 eyes), respectively. Average follow up time was 785 days. There were no significant differences in retinal detachment rates between breeds. Boston Terriers and Shih Tzu had a glaucoma rate of 38% (35/91 eyes) and 34.93% (29/83 eyes), respectively. There were no significant differences in glaucoma rates between breeds. **Conclusion:** The Boston Terrier and Shih Tzu retinal detachment rates reported here are in agreement with previously reported non-breed specific rates. This population of Boston Terriers and Shih Tzu do have a higher glaucoma rate than previously reported non-breed specific rates. **Support:** None.

**ABSTRACT NO.: 081****Chronic keratopathy of chimpanzees in a wildlife preserve in Kenya**

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**Purpose:** To determine the etiology of corneal disease in captive chimpanzees. **Animals:** Sixteen chimpanzees with suspected corneal disease. **Methods:** Chimpanzees were anesthetized for physical and ophthalmic examination and collection of CBC and chemistry panel, conjunctival and corneal cytology, culture, conjunctival PCR, conjunctival and corneal biopsy. **Results:** The following clinical diagnoses were made: keratopathy in 9, ocular trauma in 2 and normal ophthalmic examination in 5 chimpanzees. For chimpanzees with keratopathy, age ranged from 11 to 35 years (mean = 23.4 years, median = 26 years); 6 were male, 3 were female; involvement was bilateral in 7, more severe OS in 5/7 and involved only OS in 2. Clinical features in all affected eyes ( $n = 16$ ) included chronicity, minimal to no blepharospasm, slight ventral paraxial to ventrotemporal location, corneal haze/edema with white spicules, and lack of uveitis. Additional corneal lesions were a granular texture and pearl-gray opacity (14/16), punctate or geographic fluorescein uptake (12/16), 20–90% depth stromal loss (12/16), yellow granular corneal infiltrate (9/16), presumed corneal stromal lipid (7/16), dense corneal stromal fibrosis (6/16), sparse inactive corneal vessels (5/16). Active corneal vascularization was not observed in any affected eye. Corneal and conjunctival cultures were unremarkable. Cytology of the corneal lesions found few inflammatory cells, rare bacteria and in 8/16 specimens, eosinophilic, basophilic or yellow granular debris. PCR and histopathology are pending. **Conclusions:** Based on clinical presentation and lack of cytologic or microbiologic evidence of infection, the main differential consideration for this degenerative keratopathy is solar/UV-induced keratitis. **Support/Disclosure:** Supported by The Ohio State University Nature Conservation Fund. None.

**ABSTRACT NO.: 082****Therapeutic outcomes in sards dogs with presence of normal day vision and completely absent retinal electrical activity**SD Grozdanic, H Kecova, M Chatzistefanou and T Lazic  
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**Purpose:** To evaluate therapeutic outcomes in SARDS dogs with presence of normal day vision and completely absent retinal electrical activity. **Methods:** Ten dogs of different breeds were evaluated using chromatic pupil light reflex testing (cPLR), electroretinography (ERG) and vision testing. Three patients did not receive any medical treatment, while 7 patients were treated with immunosuppressive drugs (cyclosporine, leflunomide, prednisone, mycophenolate). **Results:** All patients had characteristic clinical symptoms of SARDS characterized by absent cPLR response to red, positive response to blue light, completely extinguished ERG responses, and relatively unremarkable fundus appearance. Three patients which did not receive immunosuppressive therapy developed complete blindness within period of one to six months. One patient was treated with monodrug therapy (cyclosporine) and developed blindness in one eye within period of 3 months. Additional 5 patients treated with multiple immunosuppressive drugs remain visual (follow up time 6–34 months). One patient, who was treated with multiple immunosuppressive drugs was visual for the period of 6 months, however medical therapy had to be stopped due to pancreatitis development, which resulted in complete blindness in the left eye, and decreased, but still present day vision in the right eye. **Conclusions:** SARDS patients with still intact day vision have good prognosis for vision preservation if treated with two or more immunosuppressive drugs. Lack of treatment results in development of the complete blindness. **Support:** Sophie's SARDS Research Grant from Stoffers family. **Conflicts of interest:** None.

**ABSTRACT NO.: 083****Outer segmental glaucomatous retinopathy (OSGR): a comparison of dorsal and ventral retina in glaucomatous and normal dogs**

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**Purpose:** Describe changes affecting the outer retina in glaucomatous canine globes with comparison to normal, and formulate possible etiological explanation for findings. **Methods:** Seven normal and 12 globes with primary glaucoma and with morphologic preservation of the retina were studied with light microscopy. Measurements were obtained for total retinal thickness, and inner and outer layers in 3 symmetrically located areas in dorsal and ventral retinas. The amount of pigmentation in the underlying RPE and choroid was ordinarily scored. A Wilcoxon rank sum test was used to compare collected data. **Results:** Control retinas showed no significant difference between measurements in any location. In affected dogs the ventral retina was significantly thinner than dorsal. Dorsal retinal thickness in affected eyes was not different than normal, while ventral retina was significantly thinner. In affected eyes, no significance was noted in the inner layers between dorsal and ventral retina. A significant difference was noted between the dorsal and ventral outer retina in the middle area and near the optic nerve ( $P = 0.02$  and  $P = 0.006$  respectively). In these areas the difference in RPE pigmentation was also significant ( $P = 0.0003$  and  $P = 0.0002$  respectively). Areas of OSGR were mostly distributed in association with pigmented RPE, and plump pigmented cells were seen in the sub-retinal space and within retinal layers. **Conclusions:** Thinning of ventral retina in glaucomatous eyes is due mostly to outer retinal degeneration. OSGR affects pigmented areas and shows morphologic similarities with photic retinopathy. **Support/Disclosure:** None.

**ABSTRACT NO.: 084****Treatment of postoperative ocular hypertension (POH) with combined latanoprost 0.005% and atropine 1% ophthalmic solutions**

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**Purpose:** To 1) document latanoprost 0.005% and atropine 1% ophthalmic solutions as a combination treatment for POH post-phacoemulsification, and 2) examine the effects on pupil size, shape, and development of posterior synechiae. **Methods:** POH was defined as intraocular pressure (IOP)  $>25$  mmHg. The study included 14 dogs (23 eyes): 6 (9 eyes) received a combination of topical latanoprost and atropine (LA), 8 (14 eyes) received latanoprost only (L). Complete ophthalmic examinations, including tonometry, evaluation of pupil shape and size, and development of posterior synechiae, were performed on days 1, 7, and 21 postoperatively. Clinical follow-up was reported. **Results:** LA: IOP of 7/9 eyes (77.8%) remained normal (mean  $16.2 \pm 8.5$  mmHg [range: 6–52]) and 1/9 eyes (11.1%) developed posterior synechia and dyscoria. Of 27 LA eyes (9 eyes, 3 examinations) 9 had miosis (33.3%), 11 had mid-size pupils (40.7%), and 7 had mydriasis (26.0%). LA follow-up (180  $\pm$  86 days [range: 81–302]): a single dog developed anterior chamber fibrin within four weeks that resolved after tissue-plasminogen-activator injection. L: IOP of 12/14 eyes (85.7%) remained normal (mean  $14.4 \pm 6.4$  mmHg [range: 5–49]); 4/14 (28.6%) developed posterior synechia and dyscoria. Of 42 eyes (14 eyes, 3 examinations), 19/42 had miosis (45.2%), 16/42 had mid-size pupils (38.1%), and 7/42 had mydriasis (16.7%). L follow-up (733  $\pm$  261 days [range: 408–1044]): 2/14 eyes (14.3%) developed anterior chamber fibrin within four weeks; both were enucleated  $<1$  year due to iris bombe and glaucoma. **Conclusion:** Combined topical latanoprost and atropine for POH maintains normal postoperative IOPs and miotic to mydriatic pupils. No side-effects were identified. **Support/Disclosure:** None.



**ABSTRACT NO.: 085****Electroretinography is a prognostic indicator for return of vision in dogs undergoing retinal reattachment surgery**

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**Purpose:** To determine whether pre-operative electroretinography (ERG) recordings predict post-op visual performance in dogs undergoing retinal reattachment surgery (RRS). **Methods:** This 18-month prospective study included signalment, duration, cause and extent of retinal detachment, pre-operative visual status and pre-operative ERG. Rods and mixed rod-cone responses were recorded using the Retinographics BPM-100 prior to RRS in 2 referral clinics. Referring DACVO's assessed vision 2 months post-operatively. **Results:** Thirty dogs (40 affected eyes) aged 4 months to 12.1 years were included. The detachment was 150°–320° in 16/40 eyes and 360° in 24/40 eyes. Eight eyes of 7 dogs had previous cataract surgery. Most dogs had a genetic predisposition for retinal detachment. Mean duration of detachment prior to surgery was 24.5 ± 19.6 days. Pre-operatively, 34/40 eyes were blind, 2/40 visual, and 4/40 had severely diminished vision. Compared to normative ERG values in our hospital, pre-operative ERGs were classified as "normal" in 5/40 eyes, "attenuated" in 7/40 eyes, and "flat" in 28/40 eyes. Following RRS, the retina was fully reattached in all operated eyes. Two months post-operatively, 30/40 eyes were visual, 6/40 eyes had improved but subnormal vision and 4/40 were blind. Following RRS, normal or diminished vision was regained in all eyes with normal or attenuated pre-operative ERG's, but only in 58% of eyes with flat pre-operative ERG's (Linear-by-linear test,  $P = 0.03$ ). **Conclusions:** A recordable pre-operative ERG, even if attenuated, is correlated with return of vision in RRS, and is a favorable prognostic indicator. **Support/Disclosure:** None.

**ABSTRACT NO.: 086****Effect of 0.2% brimonidine and 0.2%/0.5% brimonidine-timolol on intraocular pressure in normal and glaucomatous equine eyes**

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Brimonidine is an alpha 2-adrenergic agonist that decreases aqueous humor production and may increase uveoscleral outflow. It has not been evaluated in normal or glaucomatous equine eyes. **Purpose:** (1) To evaluate the IOP-lowering efficacy and safety of brimonidine, alone and in conjunction with timolol, as a treatment for equine glaucoma by comparing IOP in normal equine eyes treated with brimonidine and brimonidine-timolol to control eyes, and (2) to evaluate brimonidine as a treatment for horses with glaucoma. **Method:** (1) Pupil size and conjunctival hyperemia were assessed twice daily and IOP was measured three times daily in both eyes of 16 normal horses throughout two 10-day study periods (brimonidine and brimonidine-timolol) followed by an 18-day washout period. One eye of each horse was treated with brimonidine or brimonidine-timolol while the opposite eye was treated with balanced salt solution. (2) IOP was measured over time in three glaucomatous horses treated with brimonidine. **Results:** There were no adverse effects and no significant changes in pupil size in normal equine eyes treated with brimonidine or brimonidine-timolol. Average IOP in normal equine eyes treated with brimonidine (25.6 mmHg) was statistically higher than in eyes treated with brimonidine-timolol (24.6 mmHg) or BSS (24.5 mmHg) however IOP differences were 1 mmHg or less. In horses with glaucoma treated with brimonidine, IOP decreased over time. **Conclusion:** Brimonidine and brimonidine-timolol were well tolerated but did not decrease IOP in normal horses. **Support/Disclosure:** Funded by CEH-15-08, NIH-K08EY021142. None.

**ABSTRACT NO.: 087****Collagenolytic keratitis in dogs; breed associations in two populations**

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**Purpose:** To identify breed associations for collagenolytic keratitis (CK) in two populations of dogs. **Methods:** Case records of CK patients were obtained from the Comparative Ocular Pathology Laboratory of Wisconsin (COLOW) and from the University of Wisconsin Veterinary Medical Teaching Hospital (UW) (2011–2015). CK association with Shih Tzus, other brachycephalic, and non-brachycephalic dog breeds were assessed with odds ratio (OR) estimates, 95% CIs, and associated Wald tests. **Results:** CK was diagnosed in 423/34 387 dogs (COLOW) and 65/2630 dogs (UW). Brachycephalic breeds were significantly over-represented in the COLOW (OR = 9.2, 95% CI [7.5, 11.3],  $P < 0.0001$ ) and UW (OR 11.0, 95% CI [6.5, 18.9],  $P < 0.0001$ ) cohorts. Shih Tzus were both the most commonly affected breed (COLOW, 114/408 cases with known breed; UW 17/65 cases), and significantly more likely to develop CK than non-brachycephalic breeds (COLOW, OR 12.8, 95% CI [10.0, 16.4],  $P < 0.0001$ ; UW, OR 13.0, 95% CI [6.7, 25.4],  $P < 0.0001$ ). Shih Tzus also presented a significantly increased likelihood of developing CK when compared to brachycephalic breeds in the COLOW cohort (OR 1.7, 95% CI [1.3, 2.2],  $P < 0.0001$ ) and although a similar trend was seen in the UW cohort (OR = 1.3, 95% CI [0.7, 2.4]), the difference was not of statistical significance ( $P = 0.44$ ), likely due to the smaller UW population. **Conclusion:** In these two populations, CK was significantly more common in brachycephalic breeds with evidence of particularly high rates in Shih Tzus. These results support our empirical hypothesis that Shih Tzus are predisposed to develop CK and justify further research to identify the predisposing factors. **Support/Disclosure:** Supported by

the Clinical and Translational Science Award (CTSA) program, through the NIH National Center for Advancing Translational Sciences (NCATS), grant UL1TR000427.

**ABSTRACT NO.: 088****Evaluation of bacterial isolates and antibiotic susceptibility in cats and dogs presented with ulcerative keratitis to a referring practice in New Orleans, LA between 2011 and 2015**

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**Purpose:** To assess the clinical characteristics and spectrum of bacteria isolated from suspected bacterial ulcerative keratitis and to evaluate patterns of antibiotic resistance. **Methods:** Medical records from patients with ulcerative keratitis between 2011 and 2015 were evaluated and clinical information from patients with an aerobic bacterial culture were collected and analyzed. **Results:** Thirty bacterial isolates were identified from 201 cases of ulcerative keratitis in 182 patients, 168 dogs and 14 cats, referred to an ophthalmology practice in the Mississippi Delta. The most common bacteria isolated were *Beta-hemolytic Streptococcus* sp (16%), *Pseudomonas aeruginosa* (14.4%), *Staphylococcus pseudointermedius* (13.6%) and *Escherichia coli* (8%). 3% of positive corneal swabs collected yielded fungal organisms. Among *Staphylococcus* sp, 37.5% were identified as methicillin-resistant. About 60% of patients exhibited other potential predisposing corneal and adnexal conditions, 43% were diagnosed with KCS and 33.9% had recent ocular/periorcular surgery. 69.9% of cases received prior topical antibiotic therapy, of these, a third had been prescribed two or more classes of antibiotics. 22.8% of cases received prior topical steroid therapy and 27.2% received prior topical NSAID therapy. **Conclusions:** Bacterial ulcerative keratitis more frequently affects dogs over 8 years old and, while rare in cats, only young and senior cats were represented in the sample. There was not an over-representation of brachycephalics among patients; however, a high number of Shih-tzus (37) were diagnosed with ulcerative keratitis. *In-vitro* antimicrobial susceptibility suggests that Bac-Neo-Poly combined with an aminoglycoside is a reasonable alternative to fluoroquinolones; and that cephalosporins and chloramphenicol may be effective adjunctive therapy on the common bacteria, except *Pseudomonas aeruginosa*. **Support/Disclosure:** None.

**ABSTRACT NO.: 089****OCT measures of central retinal preservation in PRA<sup>Cep290</sup> cats**

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**Purpose:** People with Leber Congenital Amaurosis (LCA) due to *CEP290* mutations show a distinctive pattern of degeneration with relative preservation of the central retina. Monitoring the extent of detectable ellipsoid zone by optical coherence tomography (OCT) has been established as a measure of disease progression. We hypothesized that PRA<sup>Cep290</sup> felines have the same pattern of degeneration characterized by relative sparing of the *area centralis* with corresponding maintenance of ellipsoid zone definition. **Methods:** OCT was performed at multiple time-points on 11 PRA<sup>Cep290</sup> cats ranging from 6 months to 10 years of age. Cross-sectional retinal images were collected from the *area centralis*, visual streak, and the dorsal and ventral periphery, and photoreceptor and inner retina layer thicknesses were measured. Thicknesses were compared across regions and age using paired *t*-tests. The ellipsoid zone was evaluated in each cat at each time-point and preserved ellipsoid zone was measured and compared over time. **Results:** PRA<sup>Cep290</sup> cats showed photoreceptor layer thinning over time in all regions. The *area centralis* and visual streak showed a slower rate of thinning than the peripheral retina with ellipsoid zone preservation that could be used to measure central retinal sparing, supporting the hypothesis. **Conclusions:** Central retinal preservation supports the cat as a model for human LCA<sup>CEP290</sup> and suggests that therapies targeting the central retina may provide the optimal treatment timeframe and therapeutic benefit. Measurement of preserved ellipsoid zone provides a valuable tool for monitoring central preservation and guiding treatment timing and localization. **Support/Disclosure:** Supported by The Grousbeck Family Foundation, Myers Dunlap Endowment, the CVM Center for Feline Health and Well-Being, and the Cotter Endowment. None.

**ABSTRACT NO.: 090****Identification of a novel gammaherpesvirus in two Reeves's muntjacs (*Muntiacus reevesi*) affected with keratitis**

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**Purpose:** The objective of this report was to describe a novel gammaherpes virus that was identified in two Reeves's muntjacs (*Muntiacus reevesi*) that also exhibited corneal disease. **Methods:** A mature Reeves's muntjac was examined for keratitis. A conjunctival swab was obtained from which a novel gammaherpesvirus was identified. Nested polymerase chain reaction amplification and sequencing of 472 base pairs of the DNA-dependent DNA polymerase gene were used. A second mature muntjac presented with ulcerative keratitis. A corneal swab cultured *Moraxella osloensis*. Conjunctival swab yielded the same novel gammaherpesvirus as the first case. Both muntjacs were housed in a captive, mixed species environment. **Results:** Bayesian and maximum-likelihood phylogenetic analyses indicated that the novel virus is in the subfamily *Gammaherpesvirinae* most closely related to the genus *Macavirus*. **Conclusions:** This report demonstrates active shedding of novel herpes virus concomitant with corneal disease in two Reeves's muntjacs. In *Gammaherpesvirinae*, the lytic cycle is considered to be rarely initiated. There are currently four genera in this recently-reorganized subfamily. The genus *Macavirus* contains the malignant catarrhal fever viruses, known to cause keratitis with corneal edema in cattle. *Macaviruses* have a tropism for B-lymphocytes. Most commonly, they cause inapparent infection in their reservoir hosts but fatal disease when infecting susceptible hosts. Novel virus identification is valuable in that it provides potential clinical targets, expands knowledge of host-virus coevolution, and offers phylogenetic data. Additional research is needed regarding the association of this virus with keratitis. **Support/Disclosure:** None.

**ABSTRACT NO.: 091****Topical Kinostat® clinically prevents cataracts in diabetic dogs**

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**Purpose:** A majority of dogs develop blinding osmotic bilateral cataracts within a year after diagnosis of diabetes mellitus (DM). To confirm in an extended clinical trial whether the topical aldose reductase inhibitor Kinostat® can statistically reduce the formation of cataracts in diabetic dogs, a randomized, masked, placebo controlled clinical trial (1/3 of dogs received placebo) was conducted under FDA IAND 11-785. **Methods:** Newly diabetic dogs of varying in sizes, breeds, and sex with only the presence equatorial vacuoles of less than 360° and no other ocular disease were recruited at Kinostat® Trial Group Locations (listed below) and were evaluated by board certified veterinary ophthalmologists at the time of enrollment and at 1, 2, 3, 6 and 9 months. The dog's owners administered the topical formulations TID. Dogs not developing cortical cataracts during the 9-month period were placed on long-term studies where they are receiving Kinostat® with continued required ophthalmic evaluations at 6-month intervals. **Results:** 134 out of 179 recruited diabetic dogs successfully completed the 9-month study. In the group receiving placebo 19 of 45 diabetic developed cortical osmotic cataracts compared to 12 of 88 dogs receiving Kinostat® (6 additional dogs developed apparent non-osmotic cataracts), confirming the initial proof of concept study (Vet. Ophthalmol. 13:363-8, 2010) that daily topical administration of Kinostat® to diabetic dogs significantly prevented cataract formation with 79.3% of dogs with lenses that remained clear or unchanged. **Conclusions:** Kinostat® is the first clinically established drug to prevent the development of diabetic cataracts and reduce the need for cataract surgery. Because Kinostat® meets an unmet medical need, the FDA has granted Kinostat® a fast-track Minimum Use in a Major Animal Species designation and commercial approval for 2017 is anticipated. **Support/Disclosure:** This study was supported by NIH SBIR R43EY018013-01A1; R44EY018013-02A; R44EY018013-2B and Nebraska SBIR Phase 2 Grant 16-01-054. Drs. Kador, Wyman and Paulos have financial interest in Therapeutic Vision, Inc. Kinostat® Trial Group: Animal Ophthalmology Clinic, Ltd. - Dallas, TX (TL Baldwin, R Munger, RD Ring); Eye Care for Animals - Annapolis, MD (J Hyman), Tampa, FL (ED Wolf), Tucson, AZ (R Merideth and E Moeller), San Diego (R Merideth), and Tustin CA (R Scagliotti); Gulf Coast Animal Eye Clinic of Houston - Houston, TX (MB Glaze, MK Herrmann, J Swanson); MedVet Medical and Cancer Center for Pets - Worthington, OH (T Webb); Tampa Bay Veterinary Specialists, Inc. - Largo, FL (TR Miller); Veterinary Eye Specialists of Nebraska - Omaha, NE (T McInlay); VetVision Fairfax, VA (K Corcoran).

**ABSTRACT NO.: 092****Phacoemulsification outcome in Boston terriers vs. non-Boston terriers – a retrospective study (2002–2015)**GM Newbold, WJ Kelch, T Chen, DA Ward and DVH Hendrix  
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**Purpose:** To assess visual outcome following bilateral phacoemulsification in Boston terriers as compared to other dogs. **Methods:** Medical records from 112 dogs (224 eyes) were reviewed. Eligible dogs included non-diabetic dogs undergoing bilateral phacoemulsification between 2002 and 2015 with at least 2 months follow up by a veterinary ophthalmologist. Descriptive and inferential statistics were done. **Results:** A total of 35 Boston terriers (BT = 70 eyes) and 77 non-Boston terrier dogs (NBT = 154 eyes), were eligible for inclusion. Of those returning for follow up, 11/35 (31.4%) BT developed visual deficits, with 12/70 eyes becoming blind (17.1%) within the first year post surgery, and 17/77 (22.1%) NBT developed visual deficits, with 19/154 eyes becoming blind (12.3%) within the first year post surgery. Cause of blindness was glaucoma (64.7% blind eyes BT, 69.4% blind eyes NBT), retinal detachment (17.6% blind eyes BT, 13.9% blind eyes NBT), phthisis bulbi with cause unknown (5.9% blind eyes BT, 8.3% blind eyes NBT), and perforation or undetermined (11.8% blind eyes BT, 8.3% blind eyes NBT). Neither hypermature cataracts nor postoperative hypertension were found to be a risk factor associated with blindness in either group of dogs. **Conclusions:** There was not a significant difference in outcome (blindness) between Boston terriers and non-Boston terriers when analyzed by eye within the first year post phacoemulsification. **Support/Disclosure:** None.

**ABSTRACT NO.: 093****Gene augmentation therapy of dayblindness in sheep caused by a novel missense CNGA3 mutation**

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**Purpose:** Recently, we reported successful Gene Augmentation Therapy (GAT) in dayblind sheep carrying a null CNGA3 mutation, with treated animals regaining cone function and photopic vision for more than four years. Here we report a novel missense CNGA3 mutation, and its characterization and treatment, in dayblind sheep. **Methods:** Animals were studied behaviorally, electroretinographically and histologically. The causative mutation was identified using deep sequencing, bioinformatics analysis and genotyping. Compound heterozygotes were born by mating with CNGA3 null mutation sheep. Sheep were treated with subretinal injections of a modified AAV5 vector carrying the human CNGA3 cDNA and a 2.1 kb red/green opsin promoter. **Results:** Affected animals passed a scotopic maze test, but passage time and number of collisions increased significantly in daytime. Light-adapted single-flash responses, flicker amplitudes and flicker fusion frequencies were significantly reduced. No abnormalities were observed in affected retinas, and cones were present.

Bioinformatics analysis revealed a deleterious amino acid substitution, p.G540S, at the CNGA3 GMP binding domain, with results confirmed by genetic concordance test. Five CNGA3 compound heterozygotes, carrying both the R236\* null and p.G540S missense mutations, were dayblind. GAT restored photopic vision and cone function in two affected p.G540S homozygotes. **Conclusions:** Most human CNGA3 achromatopsia patients carry a missense, rather than null, mutation. Thus, our results validate a naturally-occurring large animal model of this disease, and demonstrate that GAT can be effective even when endogenously-expressed mutated CNGA3 molecules might interfere with treatment. Large scale, long-term studies in this model may pave the way to GAT in CNGA3 achromatopsia patients. **Support/Disclosure:** Supported by The Joseph Alexander Foundation, The Israel Science Foundation (Grant 1257/15) and The Chief Scientist of the Israeli Ministry of Healthy (Grant 3-0000-11892). None.

**ABSTRACT NO.: 094****Etiologic investigation of congenital nuclear cataracts in a Holstein dairy herd**

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**Purpose:** To describe an ongoing disease investigation into congenital nuclear cataracts in a Holstein dairy herd in which toxic and infectious causes were previously ruled out. **Methods:** Ophthalmic examinations were completed on male (n = 30) and female (n = 249) animals in the herd age ranging in age from newborn to 10 years old. These included neuro-ophthalmic, direct transilluminator, biomicroscopic, and indirect ophthalmoscopic examination. Nutritional causes were investigated. Necropsies of 3 affected calves were performed and eyes of two affected calves were examined with light microscopy. Pedigree analysis was completed. DNA was evaluated for the NID1 deletion. **Results:** Ophthalmic examination identified nuclear cataracts, posterior lenticonus, iris to lens persistent pupillary membranes, and lenticular colobomata in 56/279 (20%) animals. Calves born to heifers had the lowest incidence of lenticular anomalies. The age of affected animals ranged from newborn to 8 years old. Lesions appeared to be non-progressive. Incidence of the anomalies was not influenced by month of birth. Light microscopic examination of affected globes demonstrated nuclear cataract with posterior lenticonus. Pedigree analysis did not support a simple autosomal inheritance. Polymerase chain reaction and sequence analysis for the NID1 gene deletion were negative. **Conclusions:** A multifactorial etiology of the congenital lenticular anomalies is suspected in this herd. Future evaluation of the influence of parity on development of the lesions is needed. **Support/Disclosure:** Supported by the WCVM Disease Herd Investigation Unit Grant. None.

**ABSTRACT NO.: 095****Spectral reflectivity of the canine tapetum**

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**Purpose:** To evaluate the spectral characteristics of the canine tapetum, both *in vivo* and *ex vivo*. **Methods:** Globes acquired from canines euthanized and donated to Tufts Cummings School of Veterinary Medicine (TCSVM) were used for this study. All globes were deemed to be free of ocular disease. Imaging occurred within 24 hours of humane euthanasia. *In vivo* imaging of the tapetum was performed using a custom optical apparatus, solitary white light emitting diode, and a multispectral imaging system (Nuance FX). Globes were subsequently hemi-sectioned, removing the vitreous and retina, for *ex vivo* imaging and histological assessment of the canine tapetum. *Ex vivo* imaging was performed using episcopic illumination via an inverted microscope (Olympus IX10) and the aforementioned multispectral imaging system. Spectral reflectance measurements were taken at 5 nm increments, with a wavelength range of 420–700 nm. Following *ex vivo* imaging tapetal sections were immersed in 10% formalin for routine histological processing. **Results:** A total of 8 dogs (16 eyes) of various breeds, with a median age of 3 years, have been imaged thus far. Multispectral imaging demonstrated maximum tapetal reflectivity was 60% at the spectral peaks. Spectral reflectance varied between dogs; however, spectral peaks were consistently noted at 490 nm, 530 nm, and 590 nm. Histological analysis demonstrated varying tapetal thickness, with a median cell layer of 6. **Conclusions:** This ongoing study provides new insights into the spectral characteristics of the canine tapetum and its potential role in canine vision. **Support/Disclosure:** Supported by the Tufts Collaborates seed grant program. None.

**ABSTRACT NO.: 096****Exfoliation syndrome and exfoliation glaucoma in dogs.****Are we missing something?**

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**Purpose:** To describe a case of bilateral glaucoma in a dog showing clinical and pathologic findings similar to those described in exfoliation syndrome (XFS) and glaucoma (XFG) in humans. **Methods:** An 11 year old CM American Cocker Spaniel was presented initially for a recurrent corneal epithelial erosion OS. At presentation, a rounded edge of the pupil OU and a whitish material on the anterior lens capsule OD with circumferential and radial distribution were incidentally noted. Seven months later the patient was enucleated OS because of acute congestive glaucoma. OD eventually developed unresponsive chronic glaucoma and was enucleated 29 months after initial presentation. Pathologic evaluation of both globes with H&E, PAS and Masson Trichrome was performed. OD was also studied with scanning (SEM) and transmission (TEM) electron microscopy. **Results:** The main histopathologic finding, besides those associated with glaucoma, was represented by deposition of PAS-positive extracellular material, 5–15 micron thick covering the ciliary processes OU. Exfoliating fibrillar material was also noted around the anterior lens equator. SEM



demonstrated a diffuse, disorganized extracellular, microfibrillar material covering the ciliary processes. Rare macrophages and activated platelets were occasionally present. TEM of the same area showed a material composed of randomly arranged, electron dense microfibrils with a periodic cross-banding. **Conclusions:** The examined extracellular material associated with the lens equator and ciliary processes in this canine patient has morphological characteristics similar to exfoliation material reported in human glaucoma cases. XFS and XFG are possible phenotypes of canine disease. These findings warrant future attention and characterization. **Support/Disclosure:** None.

## ABSTRACT NO.: 097

### Septic keratitis in dogs, cats and horses in Switzerland; causative bacteria and antibiotic susceptibility

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**Purpose:** To determine the frequency of the most common pathogens associated with septic keratitis in veterinary patients from Switzerland. Second objective: to analyze the susceptibility of the identified bacterial pathogens to antimicrobial agents. **Methods:** A review of 255 cultures and antimicrobial susceptibility reports from dogs, cats and horses with keratopathies that were presented to the University of Zurich Veterinary Medical Teaching Hospital between 2009 and 2013. Odds ratios for the risk of developing a septic keratitis were calculated for all dog breeds and the Persian cat breed. **Results:** 96, 29 and 31 positive cultures were obtained from 89 canine, 28 feline and 29 equine eyes, respectively. Repeat sampling accounted for the differences in numbers. Negative culture results were obtained in 50, 31 and 18 cases. Brachycephalic breeds had elevated odds ratios for the development of septic keratitis. Staphylococci and streptococci accounted for 66% of the isolates in dogs and 80% of the isolates in cats and horses. Both „natural“ resistance attributable to the mechanism of action of the antimicrobial agents and „acquired“ resistance were observed. **Conclusions:** Identified pathogens and their distribution as well as the elevated odds ratios for septic keratitis in brachycephalics are roughly consistent with previous studies. The observed pathogen resistance against antimicrobial agents is concerning and might be reduced by prudent and, where possible, targeted use of antibiotics, as well as the implementation of treatment alternatives. **Support/Disclosure:** None.

## ABSTRACT NO.: 098

### Evaluation of total protein concentration of fresh and cryopreserved equine amniotic membrane homogenate

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**Purpose:** To evaluate the total protein concentration in equine amniotic membrane homogenates (EAMH) cryopreserved for 1 year, 1 month and fresh EAMH. **Methods:** Equine amniotic membrane (EAM) were collected and processed as previously described and stored at -80°C. EAMHs were prepared from fresh EAM (G1), and from EAM cryopreserved for 1 month (G2), and 1 year (G3). EAMHs were prepared by resuspending 600 mg of the EAM in 3 ml of phosphate buffered solution (PBS, Gibco). Samples were homogenized for 3 minutes (Omni-TH Tissue Homogenizer), centrifuged at 10 000 rpm for 15 minutes, and the supernatant was collected (EAMH). EAMHs were kept under refrigeration at 4°C for one week. Total protein concentrations were evaluated on days 1, 3, 5 and 7 after thawing, utilizing a commercial Bradford Protein Assay Kit (BioRad®). Results were statistically evaluated with one-way ANOVA with repeated measures. **Results:** Total protein concentrations varied from 1.44 to 0.8 mg/ml in G1, from 0.97 to 0.78 mg/ml in G2 and from 0.84 to 0.75 mg/ml in G3. On day 1, total protein was significantly higher on G1 compared to other groups ( $P < 0.01$ ), however no significant difference was noted between groups on day 7. **Conclusions:** Fresh EAMH exhibited higher total protein concentration compared to cryopreserved EAMH on the first day after preparation. However, fresh samples exhibited a more dramatic decline on protein concentration over 7 days, compared to cryopreserved sample. **Support/Disclosure:** Supported by Wayne D. and Josephine H. Spangler Endowment Fund – Companion Animal Research Grant Program – University of Illinois. None.

## ABSTRACT NO.: 099

### Connexin43 (Cx43) protein expression in the normal and diseased canine cornea

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**Purpose:** Repair of the canine cornea following injury is often accompanied by fibrosis. Connexins are proteins that form gap junctions and hemichannels. Connexin43 gap junctions (GJ) are involved in intercellular communication and have been identified as influencing fibrosis. Antisense and mimetic peptide modulation of Cx43GJ has been shown to reduce scarring in the cornea and other tissues. Cx43 hemichannels play a role in inflammation and persistence of the inflammatory state in many tissues results in excessive fibrosis. The aim of the study was to identify if Cx43 protein was over-expressed in injured canine corneas and if so, could modulation of this expression improve corneal repair. **Methods:** Confocal laser scanning microscopy (CLSM) was used to obtain z-stacks of immunohistochemically labelled and nuclear stained corneal cryosections. Immunofluorescence of anti-Cx43 antibodies was measured using ImageJ software. Cx43 protein expression was quantified as the number ratio (GJ number/keratocyte) and average dot volume per nucleus (GJ volume in pixels/

keratocyte). **Results:** Cx43 protein was expressed in all normal corneas, particularly in the basal layers of the epithelium. Expression was less in the stroma and absent in the endothelial cells of Descemet's membrane. Cx43 protein expression by stromal keratocytes was characterised by a punctate pattern of distribution. Cx43 protein expression (both number ratio and average dot volume) was markedly increased in all injured vs. normal corneas. **Conclusions:** Connexin43 protein expression was markedly upregulated in injured canine corneas providing support for the hypothesis that targeting Cx43 gene and protein expression may benefit corneal repair. **Support/Disclosure:** Supported by the Canine Research Foundation, the John and Mary Kibble Trust and The University of Queensland Commercial Relationships: YN Vu, None; N Hamilton, None; DJ Whitworth, None; CR Green, None; and JD Wright, None.

## ABSTRACT NO.: 100

### In vivo vascular permeability of the snake spectacle using sodium fluorescein angiography

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**Purpose:** To assess snake spectacle vascular permeability using sodium fluorescein angiographic techniques (NAFI). **Methods:** Following intracardiac injection of 0.1 ml of 10.0% sodium fluorescein, passage of dye through the iris and spectacle vessels of 2 anesthetized healthy adult royal pythons (*Python regius*) was imaged at approximately 1/second (Canon DSLR) using fluorescent angiographic techniques coupled with a computer based image storage system. The images were assessed individually as well as on a manufactured video basis. Each snake was assessed during a non-shedding phase as well as during a shedding phase on at least 2 occasions. **Results:** Within 2-5 seconds post-injection, passage of the dye was readily visible as it first traversed the iris circulation followed almost immediately by passage through the spectacle vessels. No iridial leakage was evident during any of the sequences. Leakage was evident from the spectacle vessels during both the non-shedding and shedding ecdysis phases with markedly greater leakage during the shedding phase. No complications were encountered as a result of the angiographic procedures. **Conclusions:** We initially proposed the spectacle would exhibit impermeability to NAFI similar to that of the blood retinal barrier. However our results lead us to now propose that the spectacle barrier's dissimilar permeability is associated with the snake trans-epidermal water loss barrier and deserves further investigation, as does its relation to the clinical entity of 'retained spectacle'. **Support/Disclosure:** Supported by an Edward A. Dickson Emeriti Professorship, University of California, Davis, Emeriti Association 2015-16. None.

## ABSTRACT NO.: 101

### Antibacterial activity and safety of commercial cationic steroid antibiotics and neutral superoxidized water

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**Purpose:** To investigate the antibacterial activity and safety of three topical ophthalmic products (Ceragyn™ and Purishield™ – CSA Biotechnologies, Spanish Fork, UT; Vetericyc™ Plus – Vetericyc, Rialto, CA). **Methods:** Minimum inhibitory concentrations (MIC) in µg/ml were determined against 13 antibiotic resistant, ocular, bacterial isolates. For exposure assays, log 10<sup>6</sup> or log 10<sup>9</sup> colony forming units/ml (CFU) of Gram-positive and Gram-negative isolates were exposed to the products for 5 minutes simulating an eye drop's contact time. In cytotoxicity assays, the products at varying concentrations were evaluated with a murine macrophage cell line. Commercial ophthalmic solutions and analytic grade antibiotics were positive controls. The mean and SD were calculated for the exposure assay data. Cytotoxicity data were analyzed using one-way ANOVA, with post hoc Holm-Sidak's multiple comparisons test.  $P$ -values  $< 0.05$  were significant. **Results:** For MIC, Vetericyc™ Plus showed no inhibition for any organisms, while Ceragyn™ and Purishield™ showed inhibition similar to controls. For the exposure assays, all 3 products inhibited all growth at the lower density. Vetericyc™ Plus did not inhibit growth at the higher CFU. Ceragyn™ and Purishield™ demonstrated moderate bactericidal activity while the positive control completely inhibited growth of the high inoculum Gram-negative isolate. No bactericidal activity was demonstrated by any product or the positive control against the high inoculum Gram-positive isolate. Vetericyc™ Plus exhibited nonsignificant toxicity while Ceragyn™ and Purishield™ exhibited significant toxicity. **Conclusions:** Vetericyc™ Plus had minimal antimicrobial activity in these assays, while Ceragyn™ and Purishield™ had antibacterial and cytotoxicity profiles comparable to common topical ophthalmic antibiotics. **Support/Disclosure:** None.

## ABSTRACT NO.: 102

### Identification of novel lymphatic channels within the canine anterior UVEA using LYVE-1 and CD31

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**Purpose:** To demonstrate the existence of and characterize lymphatics in the canine anterior uvea with the use of specific lymphatic markers Lyve-1, Prox-1, and podoplanin, endothelial cell marker CD31, and basement membrane matrix marker collagen IV. **Methods:** Lymphatics from normal canine lymph nodes were used for validation of podoplanin. Serial sections of 5 normal canine eyes had immunofluorescent staining with the lymphatic markers, Prox-1 and Lyve-1 and the endothelial cell marker CD31. Sections were stained for collagen IV using traditional immunohistochemistry. Fluorescent microscopy was used to demonstrate the existence of lymphatic channels in the normal canine anterior uvea and differentiate blood vessels from lymphatics in slides double stained with Lyve-1 and CD31. **Results:** Sections double stained with Lyve-1 and CD31 had localization of lymphatic endothelium with Lyve-1 and independent blood vessel staining with CD31, thus differentiating between lymphatics and blood vessels. In four of five eyes, rare lymphatics were successfully identified in the peripheral iris and ciliary body. Mapping of lymphatic location was established to aid in future studies of lymphatic channels in canine eyes affected by various disease processes. **Conclusions:** The results confirm existence of lymphatic channels in the

peripheral uvea of canine eyes. This indicates possible presence of a novel uveolymphatic outflow pathway, which may play a role in aqueous humor outflow. Future studies will help elucidate the role of this proposed uveolymphatic outflow pathway and potentially develop novel treatment options for managing glaucoma. **Support/Disclosure:** Funded by ACVO Vision for Animals Foundation Grant VAF2015-02. None.

### ABSTRACT NO.: 103

#### Uveitis associated with *Borrelia* infection in 5 horses

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**Purpose:** To describe the clinical findings, diagnostics, treatments, outcomes, and histopathological findings of horses with uveitis associated with *Borrelia* infection. **Methods:** Retrospective medical record review with inclusion criteria of (1) horses presented to New Bolton Center between 1998–2015 (2) clinical signs of uveitis as diagnosed by a DACVO or resident in ophthalmology (3) the presence of argyrophilic spirochetes within affected ocular or neural tissue. **Results:** Five horses were included, two with bilateral uveitis. Blindness was observed in 4/5 horses (6/7 eyes), phthisis in 3/5 horses (4/7 eyes), and corneal ulceration in 1 horse (1 eye). Enucleation was elected in 2 horses (3 eyes). One bilaterally affected horse was euthanized due to poor visual prognosis. Three horses were euthanized due to progressive neurologic disease. One horse remains healthy nine months following enucleation. Pre-mortem diagnostics included Lyme Multiplex assay on serum (2 negative) and aqueous humor (1 positive) and *Borrelia* PCR on aqueous humor (1 positive) or neural tissue (1 negative). Histopathology of enucleated globes and/or complete necropsy was performed. Lymphoplasmacytic uveitis or endophthalmitis (3/5) often in conjunction with leptomeningeal vasculitis, leptomeningitis, ganglionitis and/or peripheral neuritis (4/5) with the presence of argyrophilic spirochetes (5/5) were common findings. **Conclusions:** *Borrelia* should be considered a differential for equine uveitis in endemic areas. Concurrent neurologic abnormalities should further implicate *Borrelia* as a causative agent. The best method for definitive diagnosis of *Borrelia*-associated uveitis requires further elucidation, particularly to differentiate from *Leptospira*. If neurologic signs are present or develop, prognosis is poor. **Support/Disclosure:** None.

### ABSTRACT NO.: 104

#### Anterior segment angiography of the normal equine eye: a pilot study comparing injection techniques

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**Purpose:** To assess and compare two injection techniques for conducting indocyanine green (ICG) and sodium fluorescein (SF) anterior segment angiography in the normal equine eye. **Methods:** Clinically healthy adult horses without significant ocular disease were imaged. Horses were sedated, intravenous jugular catheters were placed, and manual restraint was used to ensure proper positioning. Two injection techniques (intravenous vs. intra-arterial) were performed in the same horse 1 week apart. Intravenous injections of ICG (50 mg) and SF (10 mg/kg) were performed via the jugular catheter. Intra-arterial injections of ICG (1 mg) and SF (1 mg/kg) into the common carotid artery were performed with ultrasound guidance. Angiography was performed using an adaptor system [modified dSLR camera (Canon 7D), dSLR camera adaptor, and camera lens (Canon 60 mm/f/2.8)]. Imaging occurred at a rate of 3 images/second immediately following 0.25% ICG (Akorn Inc., IL) for 60 seconds, then at 2, 3, 4, and 5 minutes. Ten percent SF (Akorn Inc., TX) was administered 5 minutes thereafter and images were collected using the same imaging sequence. **Results:** Three female horses with a median age of 24 years were imaged. ICG angiography allowed visualization of the arterial, capillary, and venous phases. Visualization of the iris vasculature using SF was limited and extravasation was noted. No significant adverse events were observed utilizing either dye or injection technique. **Conclusions:** Anterior segment ICG angiographic images were obtainable using both injection techniques; however, increased visualization of the iris vasculature was noted via intra-arterial administration. Sodium fluorescein failed to allow clear assessment of the iris vasculature. **Support/Disclosure:** This study was partially funded by the Cummings School of Veterinary Medicine at Tufts University Companion Animal Fund. AJ LoPinto (None), CG Pirie (P), WA Tenney (None).

### ABSTRACT NO.: 105

#### The consequences of avian ocular trauma: histopathological evidence and implications of acute and chronic disease

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**Purpose:** To present a description and categorization of the histopathological lesions in avian ocular trauma. **Methods:** Histological slides of seventy-five birds diagnosed with ocular trauma at the Comparative Ocular Pathology Laboratory of Wisconsin (COPLOW) were reviewed. The type of trauma was classified by cause into either 1) suspected blunt trauma or 2) penetrating trauma and by duration into 1) acute or 2) chronic. **Results:** Blunt trauma was the most common source of trauma, and the most frequent lesions were observed in the retina (91%), with 71% of retinas having a tear or detachment and 46% of retinas showing chronic degenerative changes. Damage to the iris/ciliary body was present in 77% of cases. Corneal (17%) and lens (31%) lesions were relatively low. Acute traumatic events had a higher prevalence of readily identifiable discrete retinal tears/detachments (64%). Nearly all cases of chronic trauma exhibited chronic retinal pathology (93.7%), as well as a greater percentage of cartilage/bone pathology (71.4%), irido/cyclodialysis (51.9%), lens pathology (72.7%), and corneal damage (83.3%). However the incidence of iridocyclodialysis was roughly equivalent for acute and chronic blunt trauma. **Conclusions:** Ocular trauma can lead to profound acute and chronic pathology within the eye. Here we provide

insight into understanding ocular damage caused by trauma, which may help future studies suggest new therapeutic options and provide possible insight regarding the releasability of avian wildlife. **Support/Disclosure:** None.

### ABSTRACT NO.: 106

#### Tumor necrosis factor alpha (TNF $\alpha$ ), transforming growth factor beta 2 (TGF $\beta$ 2) and total proteins in the aqueous humor and serum of dogs with normal eyes

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**Purpose:** To establish TNF $\alpha$  and TGF $\beta$ 2 levels in aqueous humor (AH) taken from normal canine eyes and correlate them to their serum (S) levels, to the levels of AH and S total protein, and to age. **Methods:** 500  $\mu$ L of AH were collected from dogs deceased or euthanized for non-ocular reasons and free of clinical ophthalmic diseases. Five mLs of blood were also collected. TNF $\alpha$  and TGF $\beta$ 2 levels were measured by commercially available ELISA tests. AH and S proteins were determined by standard laboratory methods. Data were statistically analyzed by U-Mann-Whitney test and Spearman correlation index. Significance was considered when  $P \leq 0.05$ . **Results:** Twenty dogs (11 female and 9 male) were included. Fourteen different breeds were represented. Mean age was 110.5 ( $\pm 44.04$ ) months. Samples were also analyzed for 2 age groups of 73.3 ( $\pm 22.92$ ) and 147.7 ( $\pm 24.22$ ) months respectively. TNF $\alpha$  level means in AH and in S were 1.13 pg/mL and 1.26 pg/mL respectively ( $P = 0.36$ ). TGF $\beta$ 2 level means in AH and S were 1157.5 pg/mL and 52.4 pg/mL respectively ( $P = 0$ ). The highest correlation was found between TGF $\beta$ 2-AH and protein-AH levels ( $r = 0.62$ ). TGF $\beta$ 2-AH values in the older cohort were significantly more elevated than in the younger cohort ( $P = 0.045$ ). **Conclusions:** Both levels of TNF $\alpha$  and TGF $\beta$ 2 were measurable in the AH of normal canine eyes and serum. While TNF $\alpha$ -AH and TNF $\alpha$ -S were not statistically different, TGF $\beta$ 2-AH was significantly higher than TGF $\beta$ 2-S and also showed a positive correlation with the amount of total protein-AH. TGF $\beta$ 2-AH was significantly higher in older patients. **Support/Disclosure:** Supported by an internal grant at San Marco Veterinary Clinic. None.

### ABSTRACT NO.: 107

#### Evaluation of preserved multi-use ophthalmic preparations for bacterial contamination over a six week period of clinical use

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**Purpose:** To investigate whether multidose bottles of Dorzolamide HCl/Timolol Maleate (Bausch & Lomb Inc. Tampa, FL 33637), 1% Tropicamide Ophthalmic Solution (Akorn Inc Lake Forest, IL 60045), 0.05% Proparacaine Hydrochloride (Akorn Inc. Lake Forest, IL 60045), and OCuSOFT eyewash (OCuSOFT Inc. Richmond, TX 77406-0429) used in a clinical private-practice setting over a six week period will develop bacterial contamination. It has been recommended to discard all preserved ophthalmic solutions one month from their date of opening. This is not required by the USP or the FDA. **Methods:** Three representative bottles of each preserved ophthalmic solution were opened and aerobic cultures were obtained at that time. Each bottle was discretely labeled and used daily in the practice setting. Additional aerobic cultures were obtained at 2, 4, and 6 weeks after opening. The two sites cultured included two drops of the solution, and the tip along with the inside of the bottle cap at each time point. At the end of the study (6 weeks) the solution inside the bottle was also aseptically cultured. **Results:** There was no growth in any of the samples obtained at any time point during the 6 week study. **Conclusions:** This study supports the idea that preserved ophthalmic drops do not need to be discarded 1 month after opening and can at least be used for 6 weeks. Future studies would be warranted to determine at what time point bacterial contamination would most likely occur. **Support/Disclosure:** None.

### ABSTRACT NO.: 108

#### Effect of oral administration of robenacoxib on inhibition of paracentesis-induced blood-aqueous barrier breakdown in normal cats

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**Purpose:** To determine whether administration of oral robenacoxib lessens the degree of uveitis induced by anterior chamber paracentesis in normal cats. **Methods:** Twelve domestic shorthair cats were included in the study. Cats in the treatment group ( $n = 6$ ) received oral robenacoxib (6 mg/cat) once daily beginning 1 day before paracentesis-induced breakdown of the blood aqueous barrier (BAB), and continuing 1 day after paracentesis. Anterior chamber paracentesis was performed using a 30 g needle attached to a 1 mL syringe, and 100  $\mu$ L of aqueous humor was aspirated over 3–5 seconds. Anterior chamber fluorophotometry was performed in both eyes of each cat immediately before paracentesis (time 0), and at 6, 24, and 48 hours after paracentesis. A paired  $t$ -test was used to compare percent fluorescein increase in treatment vs. control cats at each time point. Values of  $P < 0.05$  were considered significant. **Results:** There was no statistically significant difference between the treatment and control eye at time 0 ( $P = 0.322$ ). When comparing the percentage of fluorescein increase between control and treatment groups, there was no statistically significant difference at any time point ( $P > 0.05$ ). **Conclusions:** Administration of oral robenacoxib did not decrease paracentesis-induced breakdown of the BAB in normal cats, as assessed by fluorophotometry. **Support/Disclosure:** Supported by a Kansas State University Mentored Clinical, Applied, or Translational Research Grant. None.



**ABSTRACT NO.: 109****Cyclooxygenase-2 expression in feline eyes with and without uveitis**

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**Purpose:** To evaluate cyclooxygenase-2 (COX-2) expression in feline eyes with and without uveitis and to investigate correlation with severity of inflammation. **Methods:** This case-control study of 51 globes included cases of lymphocytic-plasmacytic uveitis ( $n = 20$ ), neutrophilic uveitis ( $n = 13$ ), and diffuse iris melanoma with ( $n = 11$ ) or without uveitis ( $n = 7$ ); and 10 normal eyes. The severity of intraocular inflammation was histologically scored as absent (0), mild (1), moderate (2), or severe (3). Sections were immunohistochemically stained with rabbit polyclonal antibody directed against murine COX-2. COX-2 expression was scored from 0 to 12 considering extent and intensity of staining. Association between COX-2 expression and severity of inflammation was assessed with Spearman's rank correlation coefficient. **Results:** Normal and non-inflamed diffuse iris melanoma eyes did not show uveal COX-2 expression. Uveal COX-2 immunostaining was detected in 16/44 uveitic eyes: 11/20 with lymphocytic-plasmacytic uveitis, 4/13 with neutrophilic uveitis, and 1/11 with diffuse iris melanoma-associated uveitis. Uveal COX-2 expression was detected in 10, 5, and 1 eye(s) with severe, moderate, and mild inflammation, respectively. COX-2 expression was also identified in the cornea ( $n = 21$ ), conjunctiva ( $n = 1$ ), and vitreous chamber ( $n = 1$ ). There was a positive correlation between uveal COX-2 expression and the severity of uveitis ( $P = 0.0019$ ). **Conclusions:** Uveal COX-2 expression was only detected in eyes with uveitis. The severity of uveitis corresponded to increased expression of COX-2. COX-2 appears important in uveitis but not in diffuse iris melanoma. **Support/Disclosure:** Supported by OVC Pet Trust Grant 071891. None.

**ABSTRACT NO.: 110****Effect of long-term and repeat freezing on the stability of voriconazole solution**

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**Purpose:** To establish the stability of 1% and 5% voriconazole solution following long-term storage as well as repeat freezing at  $-20^{\circ}\text{C}$ . **Methods:** Voriconazole (Vfend, Pfizer Pharmaceuticals, New York, NY) 5% solution was prepared and a 1 mL aliquot placed in a 2 mL amber glass vial. Subsequently, the original voriconazole solution was diluted to 1% and 1 mL aliquots placed in both a clear and an amber 2 mL glass vial. The remaining large volume of 1% solution was stored in the commercial glass vial. All storage vessels were placed in a standard freezer at  $-20^{\circ}\text{C}$  for up to 1 year. On the day of analysis, solutions were thawed and analyzed for voriconazole content by high-performance liquid chromatography (HPLC). Following initial analysis, a portion of the voriconazole samples were frozen overnight at  $-20^{\circ}\text{C}$  and subsequently thawed and analyzed by HPLC. This overnight freeze/thaw and analysis process was then repeated a second time. **Results:** All solutions remained stable throughout the study period, regardless of concentration, volume or storage vessel. All solutions subject to repeat freezing also remained stable. **Conclusions:** Both 1% and 5% voriconazole solutions are stable when stored as a small aliquot at  $-20^{\circ}\text{C}$  for up to 1 year. In addition, 1% voriconazole solution is stable when stored in a larger volume in the commercial glass vial at  $-20^{\circ}\text{C}$  for up to 1 year. Lastly, 1% voriconazole solution appears stable through 3 freeze-thaw cycles. **Support/Disclosure:** Supported by OSU RAC grant. None.

**ABSTRACT NO.: 111****Validation of rebound and applanation tonometers in normal chinchillas (*Chinchilla lanigera*)**

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**Purpose:** To assess the validity of intraocular pressure (IOP) readings obtained with the TonoVet<sup>®</sup> and TonoLab<sup>®</sup> tonometers (ICare Oy, Vantaa, Finland), and Tono-Pen VET<sup>™</sup> tonometer (Reichert, Depew, NY) in normal chinchillas. **Methods:** The anterior chamber was cannulated *ex vivo* in one eye of each of 3 adult chinchillas and IOP was varied manometrically, in 5 mmHg increments from 5–40 mmHg and in 10 mmHg increments from 40–80 mmHg. At each IOP, three readings were obtained with each tonometer by a single unmasked observer in random order. Corneas were lubricated throughout the testing session with continuous drip irrigation using isotonic fluids. Data were analyzed by linear regression and Bland-Altman plots. Comparison between tonometers was made by one-way repeated measures ANOVA, with  $P < 0.05$  considered significant. **Results:** The Tono-Pen VET<sup>™</sup> and TonoVet<sup>®</sup> (in dog calibration mode, 'd') showed strong linear correlation with manometry ( $y = 1.031x - 3.014$ ,  $r^2 = 0.994$ , and  $y = 0.856x - 0.0695$ ,  $r^2 = 0.998$ , respectively) within the physiologic and clinically relevant range of IOP (0–50 mmHg). The TonoVet<sup>®</sup> 'd' displayed significantly greater precision over the full range of IOP than the Tono-Pen VET<sup>™</sup>, and both TonoVet<sup>®</sup> and Tono-Pen VET<sup>™</sup> were significantly more accurate than the TonoLab<sup>®</sup> tonometer. **Conclusions:** Both the Tono-Pen VET<sup>™</sup> and the TonoVet<sup>®</sup> provided clinically acceptable estimates of IOP in chinchillas. The TonoVet<sup>®</sup> provides accurate and precise IOP measurements, while Tono-Pen VET<sup>™</sup> derived measurements showed greater variability. Values obtained with the TonoLab<sup>®</sup> and TonoVet<sup>®</sup> (in "unspecified" calibration mode) were not accurate indicators of IOP in the chinchilla. **Support/Disclosure:** None.

**ABSTRACT NO.: 112****Comparison of topical 1% prednisolone acetate to 0.05% difluprednate in inhibiting paracentesis-induced blood aqueous barrier breakdown in dogs**TD Strong, RF Wehrman, G Ben-Shlomo and RA Allbaugh  
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**Purpose:** To compare the efficacy of topical 1% prednisolone acetate vs. 0.05% difluprednate in controlling paracentesis-induced blood aqueous barrier breakdown in healthy dogs. **Methods:** Young, healthy beagles were divided into four treatment groups and a control group. Treatment groups received 1 drop of 1% prednisolone acetate (Sandoz, Princeton, NJ) or 0.05% difluprednate (Alcon, Fort Worth, TX) to both eyes two or four times daily, while the control group received saline. Treatment was continued for five consecutive days, with controlled paracentesis being performed on the third day of treatment. Fluorophotometry was performed on day 3 immediately prior to and 20 minutes following paracentesis, as well as 24 and 48 hours after paracentesis. To control for individual variation between dogs, a relative measure of fluorescence (RF) was calculated, where the fluorescence of the paracentesed eye was divided by the fluorescence of the contralateral eye. **Results:** Combining all groups, RF differed significantly over time ( $\chi^2 = 59.331$ ,  $P < 0.001$ ). Within each treatment group, there was a significant difference in RF among the four time points. Maximal RF occurred 20 minutes following paracentesis and returned variably to near baseline levels 48 hours after paracentesis. Twice daily 0.05% difluprednate most rapidly returned relative fluorescence to baseline levels. Comparing all dogs receiving 1% prednisolone acetate to 0.05% difluprednate, there was no difference in RF at any time point. **Conclusions:** Both 1% prednisolone acetate and 0.05% difluprednate given at either two and four times daily proved near equally efficacious at mitigating paracentesis-induced uveitis. **Support/Disclosure:** Supported by ISU VCS research grant. None.

**ABSTRACT NO.: 113****Ophthalmic and ocular biometry findings from the screening of a geriatric rhesus macaque colony**

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**Purpose:** The purposes of this study were to determine the frequency and severity of ophthalmic abnormalities and obtain ocular biometry values from a population of geriatric rhesus macaques (*Macaca mulatta*) at the California National Primate Research Center (CNPRC). **Methods:** Rhesus macaques  $\geq 19$  years of age at the CNPRC received a comprehensive ophthalmic examination including slit lamp biomicroscopy, indirect ophthalmoscopy, streak retinoscopy, rebound tonometry, ultrasonic pachymetry, and A-scan ultrasound biometry. Statistical comparisons between genders were performed with a Student's *t*-test. Data are mean  $\pm$  SD. **Results:** Sixty-five rhesus macaques, 41 females and 24 males, aged 19–29.5 years were included. Male macaques were significantly older than females at  $23.5 \pm 2.7$  and  $21.6 \pm 2.8$  years, respectively ( $P = 0.01$ ); males weighed significantly more than females at  $14.2 \pm 1.5$  and  $9.7 \pm 1.9$  kg, respectively ( $P < 0.001$ ). Forty-six nonhuman primates (NHPs) had an ophthalmic lesion in at least one eye localized to the lens ( $n = 26$ ), fundus ( $n = 17$ ), cornea ( $n = 6$ ), and/or vitreous ( $n = 5$ ); 19 NHPs had mild nuclear sclerosis only. Cataracts ( $n = 23$ ) and drusen-like lesions ( $n = 14$ ) were the most common abnormalities observed. Mean refractive value was  $0.4 \pm 1.9$  D. Forty, 63 and 15 eyes were emmetropic, hyperopic and myopic, respectively; 12 eyes could not be measured. Mean intraocular pressure and central corneal thickness were  $19 \pm 4$  mm Hg and  $487 \pm 38$   $\mu\text{m}$ , respectively. Mean anterior chamber (AC) depth, lens thickness, vitreous length and axial globe length were  $3.5 \pm 0.26$ ,  $4.4 \pm 0.29$ ,  $12 \pm 0.78$ , and  $20 \pm 0.72$  mm, respectively; the AC was significantly deeper in females vs. males at  $3.6 \pm 0.24$  and  $3.4 \pm 0.26$  mm, respectively ( $P = 0.013$ ). **Conclusions:** A high incidence of ophthalmic lesions exists in geriatric NHP colonies which could serve as spontaneous disease models, particularly for cataracts and dry age-related macular degeneration. It is critical that geriatric NHPs utilized for visual acuity testing receive regular ophthalmic examinations. **Support/Disclosure:** Supported by the California National Primate Research Center, NIH grants K08EY021142, R01EY019970, R01EY016134 and P30EY12576. None.

**ABSTRACT NO.: 114****Effects of Ocu-GLO Rx<sup>™</sup> on the progression of golden retriever pigmentary uveitis**

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**Purpose:** To determine the effects of Ocu-GLO Rx<sup>™</sup> (Animal HealthQuest Solutions, Bellingham, WA) on the progression of Golden Retriever Pigmentary Uveitis (GRPU). **Methods:** Ten dogs with GRPU were enrolled. Examinations at 0, 3, 6, 9, 12, and 15 months consisted of slit-lamp biomicroscopy, indirect ophthalmoscopy, and standard and infrared photographs after pharmacologic dilation. Topical therapy was used at the ophthalmologist's discretion. Owners agreed not to change the dog's diet or supplements during the study period. Ocu-GLO Rx<sup>™</sup> was administered at the label dose beginning 3 months after enrollment. Using ImageJ software the surface area of the pigment deposition on the anterior lens capsule in the photographs was measured. The period from 0–3 months was a control for initial pigment progression. The period from 3–15 months was used to determine the effects of Ocu-GLO Rx<sup>™</sup> on pigment progression. The changes in the pigmented surface area from 0–3 months and 3–15 months were compared using a two-tailed, paired student's *t*-test. Significance was set at  $P < 0.05$ . **Results:** Six dogs are currently enrolled. Four dogs with 6 affected eyes have completed the study. Two dogs were started on Ocu-GLO Rx<sup>™</sup> after a one month control period due to visible increases in pigment deposition. There was no significant difference in the change in pigmented surface area between the control period and the treatment period ( $P = 0.08$ ). **Conclusions:** In this initial sample of dogs, no significant difference was seen in the surface area of pigment deposition in dogs

with GRPU treated with Ocu-GLO Rx™. **Support/Disclosure:** Supported by Animal HealthQuest Solutions. None.

### ABSTRACT NO.: 115

#### Canaliculorhinostomy in the dog and cat

K Berggren and N Wallin-Hakansson

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**Purpose:** To describe an adaptable method for nasolacrimal reconstruction preserving existing canaliculi. **Methods:** Ten dogs and two cats with nasolacrimal blockage were included. Etiologies included trauma, dacryocystitis, cysts and neoplasia. Through a medial epicanthal skin incision, soft tissues were dissected from the orbital face of the lacrimal bone. Tubing was placed down both canaliculi and further through a drill hole into the nasal cavity. Both ends of the tubing were advanced rostrally and brought out anterior to the premaxilla. The two free ends of the tubing were tied together subcutaneously. In cases with intranasal bony cysts a lateral rhinotomy was performed to remove part of the cyst. E-collars were used only until skin suture removal at two weeks. **Results:** In all patients a functional nasolacrimal drainage apparatus was created. Tubings were retained in all cases and removed at 4–6 months. Six of the dogs had brief mucoid to mucopurulent discharge from the eye at some point during the tubing retention time. Five of the dogs developed a minimal fistula draining a small amount of pus through the skin over the knot of the tubing. The two cats showed mild hyperemia and chemosis. All of the above ceased when the tubing was removed. Follow-up ranged from eight months to eight years (mean 3.4 years). **Conclusions:** The present technique shows promising results. Complications are mild. **Support/Disclosure:** None.

### ABSTRACT NO.: 116

#### Modified transfrontal orbitotomy for preplanned exenteration in the dog

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**Purpose:** To describe a modified transfrontal orbitotomy procedure for preplanned exenteration. **Methods:** Indications included intraocular lesions extending near the optic foramen or lesions extending into areas inaccessible by conventional exenteration. Six dogs were included; five with neoplasia and one with retro bulbar nodular fasciitis. To entirely remove lesions, exenteration was performed through modified transfrontal orbitotomy. The frontalis and temporalis muscles were elevated and retracted. Thereafter a 360 degree peritomy and zygomatic arch osteotomy were performed. When needed, zygomatic process osteotomy was done. The eyelids were folded forwards to expose the globe. The orbit was exenterated by blunt and sharp dissection. Osteotomies were closed with cerclage wires. Soft tissues and skin were sutured in a T-shape. **Results:** Modified transfrontal orbitotomy gave excellent access to remove orbital contents flush with the optic foramen and orbital fissure. Lesions extending posteriorly from the orbit proper also were accessed. Postoperative swelling and pain were limited. Five of six dogs remained free of recurrence. One dog experienced tumor recurrence involving the brain one year postoperatively. One dog had a mandibular fracture post operatively. Another suffered an abscess in the surgery area postoperatively which resolved with antibiotics. **Conclusions:** Transfrontal orbitotomy for planned exenterations offers excellent access for complete removal of orbital contents down to the optic foramen. Complications due to the surgical method are few and limited. **Support/Disclosure:** None.

### ABSTRACT NO.: 117

#### Assessment of topical therapies for improving optical clarity following stromal wounding in a novel *ex vivo* canine cornea model

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**Purpose:** To evaluate the effect of two topical anti-fibrotic medications, suberanolhydroxamic acid (SAHA) and 5-methyl-1-phenyl-2[1H]-pyridone (pirfenidone), on the degree of corneal haze following stromal wounding in the *ex vivo* canine cornea. **Methods:** Corneal rims were harvested from clinically normal globes of dogs ( $n = 24$  corneas). A 200  $\mu\text{m}$  deep stromal wound was created in each axial cornea with an excimer laser. Tissues were then cultured in a buffered DMEM/Ham's F-12 based medium and maintained at 37°C and 5% CO<sub>2</sub>. The control group ( $n = 8$ ) contained wounded, placebo-treated corneas. Treatment group 1 ( $n = 8$ ) received 6.6  $\mu\text{g}/\text{mL}$  (25  $\mu\text{M}$ ) SAHA topically every 6 hours for 21 days. Treatment group 2 ( $n = 8$ ) received 200  $\mu\text{g}/\text{mL}$  (1.08 mM) pirfenidone topically every 6 hours for 21 days. Each cornea was fluorescein-stained and photographed every 6 hours until full epithelialization occurred. Wound area ( $\text{mm}^2$ ) was calculated for each cornea to assess epithelialization rate. All corneas were also photographed at 0, 7, 14, and 21 days to record changes in optical clarity (haze). Day-21 images of each cornea were analyzed for differences in pixel intensity values between wounded (haze) and unwounded (non-haze) regions. A threshold filter was also used to isolate haze pixels and calculate haze surface area ( $\text{mm}^2$ ) for each day-21 cornea. **Results:** The mean epithelialization time was 52 hours in the control group, 45 hours in the SAHA group, and 43.5 hours in the pirfenidone group, revealing no significant difference ( $P = 0.4$ ). The median difference in pixel intensity between haze and non-haze areas was 22 in the control group, 6 in the SAHA group, and 8 in the pirfenidone group, showing a significant difference between the control group and treatment groups ( $P < 0.01$ ). The median haze surface area was 13.0  $\text{mm}^2$  in the control group, 5.6  $\text{mm}^2$  in the SAHA group, and 5.9  $\text{mm}^2$  in the pirfenidone group, which is significant ( $P < 0.01$ ). **Conclusions:** Stromal-wounded *ex vivo* canine corneas exhibited significantly greater optical clarity when treated with 25  $\mu\text{M}$  SAHA and 1.08 mM pirfenidone than when placebo treated at 21 days. There was no significant difference in epithelialization rate between groups. **Support/Disclosure:** Support: UF internal grants. None.

### ABSTRACT NO.: 118

#### Ocular morphology of dogs and cats with scleral rupture from presumed blunt trauma

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**Purpose:** We describe the gross and histologic features of the globes from dogs and cats that have scleral rupture because of presumed blunt trauma. **Methods:** The database of the Comparative Ocular Pathology Laboratory of Wisconsin (COPLOW) was searched for the term scleral rupture. Cases with features of a penetrating trauma were excluded as were cases inadequately sampled. The glass slide of each globe was examined and changes were recorded in the cornea, anterior uvea, lens, retina, sclera and episcleral tissues. When recorded the cause of trauma was noted and the time from trauma to enucleation. **Results:** 57 canine cases and 41 feline cases fit the criteria. There were 26 breeds affected and small breeds were over represented. 19 dogs and 6 cats had trauma less than 7 days and there was inadequate time to have a healing response. The typical pathology in both dogs and cats was a diminished globe size, anterior uveal disruption, lens rupture, retinal detachment and disruption, and a scleral rupture. The scleral rupture was typically at the equator. Collagen rich fibrous tissue proliferation extended from the scleral rupture and into the globe. Similar fibrosis was seen outside the globe as were pigmented cells, fragments of retinal tissues, fragments of uveal tissues or lens fragments. Cats, compared to dogs, often had a lymphoplasmacytic uveitis and cystic lesions on the iris epithelium. Corneal changes were surprisingly infrequent as was osseous metaplasia. **Conclusions:** The pathology of blunt trauma associated with scleral rupture supports a mechanism of sudden globe compression and a blow-out rupture of the sclera near the equator. Uveal disruption, lens rupture, retinal destruction were common and expulsion of intraocular tissues into the episclera was a typical feature. **Support/Disclosure:** None.

### ABSTRACT NO.: 119

#### Effects of the heat shock protein inhibitor, 17AAG, on corneal stromal haze using an *in vivo* rabbit phototherapeutic keratectomy model

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**Purpose:** 17-N-allylamino-17-demethoxygeldanamycin (17AAG) is an anti-fibrotic heat shock protein 90 (HSP90) inhibitor. We hypothesized that 17AAG would facilitate corneal epithelial wound healing and reduce formation of corneal stromal haze in an *in vivo* rabbit phototherapeutic keratectomy (PTK) model. **Methods:** Eighteen New Zealand White Rabbits received a 6 mm diameter, 100  $\mu\text{m}$  depth PTK in the axial cornea of the right eye (OD), and received either 100  $\mu\text{M}$  17AAG at six ( $6 \times$ ;  $n = 6$ ) or three times daily ( $3 \times$ ;  $n = 6$ ) or topical placebo (vehicle control;  $6 \times$ ;  $n = 6$ ) for 28 days. Corneal wound healing was monitored by assessment of epithelial wound size with fluorescein stain and semi-quantitative stromal haze scoring by an observer masked to treatment group as well as digital slit lamp biomicroscopy, ultrasonic pachymetry, and Fourier-domain optical coherence tomography (FD-OCT) at set time points. Statistical analysis was performed using a mixed-effects ANOVA model. **Results:** All corneal wounds were epithelialized by day 10; epithelial wound healing did not differ significantly ( $P = 0.89$ ) between the three groups. Interestingly, topical 17AAG  $6 \times$  had a significantly greater corneal stromal haze score ( $P = 0.02$ ) and stromal haze thickness as measured by OCT ( $P = 0.03$ ) vs. placebo. Scoring for conjunctivitis and uveitis as well as total central corneal thickness did not differ significantly between the three groups ( $P = 1.00$ ). **Conclusions:** These data demonstrate that 17AAG administered 6 times daily was well tolerated, but increased stromal haze in an *in vivo* rabbit PTK model. These data also reveal the importance of conducting *in vivo* studies using experimental models prior to conducting clinical trials in client-owned patients. Further studies to explore different doses as well as timing of topical 17AAG administration are warranted. **Support/Disclosure:** These experiments were funded by grants from the ACVO-Vision for Animals Foundation VAF2015-01, National Institute of Health K08 EY021142, R01 EY019970, R01 EY016134, and P30 EY12576, Center for Companion Animal Health, School of Veterinary Medicine, University of California, Davis. None.

### ABSTRACT NO.: 120

#### Iris biopsy to investigate feline iris hyperpigmentation

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**Purpose:** To assess the efficacy of iris biopsy in cats with iris hyperpigmentation in an attempt to differentiate iridal melanosis from early diffuse iris melanoma (DIM). **Methods:** Retrospective review of the medical notes of six cats with focal or diffuse iris hyperpigmentation that had undergone iris biopsy for histopathology. **Results:** Six cats (mean age 8 years) with unilateral iris hyperpigmentation of one month to four year duration, were included in the study. The biopsy procedure was performed under general anesthesia ( $n = 6$ ) with neuromuscular blockade ( $n = 5$ ) following pre-operative topical miotic therapy ( $n = 4$ ). One to six biopsy samples per eye were harvested from areas of hyperpigmentation. Complications were minor and transient: mild intra-operative hemorrhage ( $n = 3$ ), fibrin clot ( $n = 2$ ), corneal ulcer ( $n = 1$ ) and post-operative hypertension ( $n = 1$ ). The histopathology was consistent with iridal melanosis in three cases and with early DIM in two cases; the samples from one case were too small to be processed. Screening for signs of metastatic disease (thoracic CT and abdominal ultrasonography) was negative in the two cats with a preliminary diagnosis of early DIM. Subsequent enucleation and histopathology confirmed the initial diagnosis in both cases. **Conclusions:** Iris biopsy in cats with iris hyperpigmentation can be beneficial to differentiate iridal melanosis from early DIM and thereby justify the decision for early enucleation. **Support/Disclosure:** None.



**ABSTRACT NO.: 121****Efficacy of ahmed glaucoma valve to control non-responsive ocular hypertension or glaucoma post phacoemulsification and intraocular lens implantation in dogs**

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**Purpose:** To evaluate the efficacy of early implantation of Ahmed glaucoma gonioimplants to control non-responsive ocular hypertension or glaucoma after phacoemulsification and intraocular lens implantation surgery. **Methods:** Medical records of 20 dogs presented to Oftalvet-México in between 2013 and 2016 for cataract surgery and intraocular lens implantation that developed intractable acute ocular hypertension or glaucoma post-surgery, and received Ahmed valve implantation were reviewed. Data retrieved included age, sex, affected eye, clinical findings and type of cataract, preoperative intraocular pressure (IOP), irido-corneal angle appearance, phacoemulsification time, days elapsed between surgery and IOP elevation, clinical abnormalities, medication received, IOP readings and visual status after gonioimplant surgery. **Results:** Patients affected were breeds genetically predisposed to cataracts or glaucoma, presented non-controlled LIU and/or diabetic, chronic or reabsorbed cataracts. Iridocorneal angles were open to narrow with an average phacoemulsification time of 3.2 min. The median interval after phacoemulsification to gonioimplant surgery was 122 days (range, 8 to 547). Median IOP before cataract surgery was 10.76 mmHg (range 6 to 18 mmHg). Median IOP before the gonioimplant placement was 36.5 mmHg (range, 25 to 56 mmHg). Median IOP one month after the gonioimplant placement was 12 mmHg (range, 8 to 20 mmHg). Thirteen eyes were visual and 16 had IOP under 20 mmHg nine months after surgery. **Conclusions:** The use of Ahmed valve in patients with non-responsive ocular hypertension or glaucoma secondary to phacoemulsification with lens implantation surgery in dogs is effective to control intraocular pressure and maintain vision. **Support/Disclosure:** None.

**ABSTRACT NO.: 122****Prophylactic transpupillary diode laser retinopexy for prevention of retinal detachment in dogs**

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**Purpose:** To describe the use of transpupillary diode laser retinopexy (TPDLR) for prevention of retinal detachment (RD) in dogs at increased risk. **Methods:** 34 dogs (46 eyes) were included. Risk factors for RD included cataract in predisposed breeds (Bichon Frisé, Boston Terrier, Shih Tzu) (26 eyes), lens instability surgery (10), vitreous degeneration (3), retinal dysplasia (2), optic nerve coloboma (2), retinal coloboma (1), RD in fellow eye (2). The mean age was 5 years (range 0.25–12). TPDLR was performed with an indirect ophthalmology headset delivery system. Laser settings were recorded for tapetal fundus (TF) and non-tapetal fundus (NTF). For cases which underwent cataract or lens instability surgery, TPDLR was performed a few days after surgery, to better visualize retina across clear media. For pseudophakic eyes (25), the laser beam was directed both through and peripheral to intraocular lens in order to achieve a thorough retinopexy. The median follow-up time was 15.4 months (range 2–50). **Results:** The mean number of laser burns was 83 (range 38–136). The mean power/time settings were 359 mW (range 200–450)/354 mS (range 200–500) in TF and 269 mW (range 200–350)/259 mS (range 200–300) in NTF. No adverse side effects were observed. Vision was preserved in all eyes at follow-up, except one eye (lens luxation surgery) which developed glaucoma and RD 18 months after procedure. **Conclusions:** TPDLR is a safe procedure, done several days after lens surgery and seems to be effective in preventing RD in eyes at risk. **Support/Disclosure:** None.

**ABSTRACT NO.: 123****New discoveries in the behavior, histologic characteristics and treatment options for canine conjunctival melanoma**

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**Purpose:** To evaluate the clinical appearance, histopathologic characteristics and biologic behavior of canine conjunctival melanoma. **Methods:** This retrospective study evaluated 460 records from 1999 to present from the University of Illinois Small Animal Teaching Hospital. Fifteen cases were diagnosed with canine conjunctival melanoma either of the bulbar, palpebral or third eyelid conjunctiva. Signalment, affected eye, location, size, histologic diagnosis, histologic features, treatment and recurrence were recorded either through records from the University of Illinois, referring veterinarian records, and/or follow up phone calls to clients. **Results:** Mean age at presentation was 8.1 years (range 2 – 13 years), 47% (7/15) were mixed breed dogs and 53% (8/15) were castrated males. The right eye appeared slightly over-represented at 40% (6/15), both eyes at 33% (5/15), and the left eye at 27% (4/15). The bulbar conjunctiva was affected most at 57% (12/21), the palpebral conjunctiva at 33% (7/21), and the third eyelid conjunctiva or a combination of the bulbar, palpebral and third eyelid conjunctiva at 5% (1/21). Treatments included debulking and adjunctive cryotherapy (6/19; 32%), surgical excision (4/19; 21%), monitoring (6/19; 32%), enucleation (1/19; 5%), radiation therapy (1/19; 5%), and palliative medication (1/19; 5%). Among treated dogs, recurrence occurred in 18% (2/11) of animals, and these two cases had third eyelid involvement. **Conclusions:** Recurrence and metastasis of conjunctival melanoma in this study were much less than in previously reported studies. Treatments such as excision, debulking with cryotherapy, enucleation, and/or radiation may be curative, and biologic behavior may be location specific. **Support/Disclosure:** None.

**ABSTRACT NO.: 124****Mutation in DNA repair gene associated with squamous cell carcinoma of the nictitans in Haflinger and Belgian horses**

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A single base change (C to T) resulting in a missense mutation in damage-specific DNA binding protein 2 (DDB2) in which methionine is substituted for threonine at position 338 in the protein has been identified as a potential link between UV damage and the genetic risk for limbal squamous cell carcinoma (SCC) in Haflinger horses. Threonine at position 338 is conserved across 95 vertebrates, and the substitution of methionine for threonine may affect proper formation of the protein and thus interfere with DDB2 binding to damaged DNA. The Haflinger and Belgian breeds may both be overrepresented amongst horses with nictitans SCC. Previously, the Haflinger and Belgian breeds were shown to be genetically closely related, and to have similar DDB2 allelic frequencies. **Purpose:** To determine the association between the DDB2 mutation implicated in limbal SCC in Haflingers and SCC of the nictitans in Haflingers and Belgians. **Method:** DNA isolated from Haflingers and Belgians with SCC of the nictitans confirmed by pathology and clinically unaffected Haflingers and Belgians were genotyped to determine if the DDB2 polymorphism is associated with development of SCC of the nictitans. **Results:** Affected horses with confirmed pathology ( $n = 11$ ) and clinically confirmed unaffected horses ( $n = 45$ ) showed a strong but not perfect association between disease status and DDB2 genotype (Fisher's Exact Test,  $P = 6.98 \times 10^{-8}$ ). **Conclusions:** The missense mutation in DDB2 implicated in limbal SCC in Haflingers may increase risk of SCC of the nictitans, although additional genetic and environmental risk factors may be involved. **Support/Disclosure:** None.

**ABSTRACT NO.: 125****Collagen VIA2 deficiency leads to abnormal arrangement of corneal stromal lamellae and increased corneal opacity**

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**Purpose:** The ophthalmology service participates in the NIH-funded Knockout Mouse Project by screening mice with individual gene knockouts, identifying ocular phenotypes. A corneal phenotype was identified in young mice lacking the gene for collagen VIA2. **Methods:** Knockout C57BL/6j mice underwent pre- and post-dilated ophthalmic examinations by a masked researcher with specialty training in laboratory animal ophthalmology at post-natal week 16. Animals with unique identifiable abnormalities were flagged for further investigation, were euthanized and the globes were excised. The globes were processed for either routine histopathology or transmission electron microscopy. In addition, eyes were procured from a wildtype mouse in a similar fashion and processed for both histopathology and transmission electron microscopy. **Results:** Slit lamp examination identified a subtle white hazy multifocal corneal opacity present throughout the interpalpebral fissure and peripheral cornea in one cohort of mice that lacked the gene for collagen VIA2. No discernable difference was appreciated at the light microscopy level between knockout and wildtype mice; however, transmission electron microscopy revealed marked multifocal disorganization of the collagen fibrils and lamellae in the knockout animals. **Conclusions:** This is the first report documenting collagen VIA2 to play a role in arrangement of collagen fibrils within the corneal stroma. **None.**

**ABSTRACT NO.: 126****Equine corneal fibroblast differentiation in combination gene therapy**

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**Purpose:** To explore the degree of equine corneal fibroblast (ECF) to myofibroblast differentiation by altering the expression of the Smad genes either individually or in combination. Specifically to assess the ECF differentiation after (a) inhibiting Smad 2, 3 and 4, known pro-fibrotic genes, individually; (b) inhibiting the gene yielding the greatest potential based on the results from (a), in combination with upregulating Smad 7, a known anti-fibrotic gene, in comparison to Smad 7 individually. **Methods:** ECF cultures were generated from

healthy equine corneas. (a) All ECFs were transfected with plasmids to inhibit gene expression of either Smad 2, 3, or 4. All ECFs were then exposed to TGF- $\beta$ 1 for 72 hours. Immunohistochemistry and RT-PCR evaluating for alpha smooth muscle actin ( $\alpha$ -SMA) was quantified. (b) Following results from (a), the Smad knockout demonstrating the greatest anti-fibrotic response was utilized in combination with a plasmid upregulating Smad 7. All samples were cultured and analyzed in a similar manner to (a). **Results:** No significant difference in  $\alpha$ -SMA levels was present between individual genes in (a). Due to no significant difference, Smad 2 was randomly chosen for use in (b). The combination of downregulation and upregulation of Smad 2 and 7 respectively, did not result in a significant difference in the levels of  $\alpha$ -SMA from that of Smad 7 individually by any modality tested. **Conclusions:** Combination therapy utilizing different pro and anti-fibrotic Smad genes did not significantly alter ECF differentiation from that of Smad 7 individually. **Support/ Disclosure:** Supported by the University of Missouri Phi Zeta chapter. None.

### ABSTRACT NO.: 127

#### Initial survey of cytokines in normal canine tear film by multiplex analysis

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**Introduction:** There are no published data on cytokine values present in canine tears in veterinary literature. The purpose of this pilot study was to use a multiplexed assay to measure cytokines in normal canine tears. **Methods:** 25 dogs with no significant past medical history, and with normal physical and ocular examinations were included in the study. Stimulated tears were collected in capillary tubes from the right (OD) and left (OS) eyes and stored at -80 C until batch sample analysis was performed. The samples were analyzed utilizing Luminex multiplex beads on a Bio-Rad multiplex analyzer. These beads were validated for canine samples, and evaluated IL-2, IL-6, IL-7, IL-8, IL-10, TNF- $\alpha$ , and IFN- $\gamma$ . Based upon previous human studies, tears were initially evaluated at a 1:10 dilution. 8 random samples were later re-analyzed without dilution. **Results:** There were 10 males and 15 females, with an average age of 4.08 years  $\pm$  2.25 years. Diluting the samples 1:10 rendered all analytes undetectable (except IL-8). A repeat analysis of 8 randomly selected undiluted samples still demonstrated very low cytokine levels except for IL-8 (16/16 eyes) 2254  $\pm$  1677 ng/ml OD, 1095  $\pm$  786.8 ng/ml OS; and IFN- $\gamma$  (15/16 eyes) 13.37  $\pm$  13.08 ng/ml OD, 16.08  $\pm$  19.4 ng/ml OS. **Conclusion:** This pilot study is the first to analyze cytokines in canine tears. This study demonstrated that IL-8 is consistently detected in both diluted and undiluted samples. Based on these results, undiluted samples are superior to 1:10 diluted samples for evaluation of canine tears. **Support/ Disclosure:** Supported by the LSU VCS Corps grant. None.

### ABSTRACT NO.: 128

#### Topical insulin facilitates *in vitro* stromal wound healing in the diabetic environment

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**Purpose:** Previous studies have suggested that topical insulin therapy improves diabetic corneal wound healing in a rodent model. In the present study, canine corneal fibroblast cytotoxicity related to treatment with topical insulin was evaluated *in vitro*. The effect of topical insulin on corneal fibroblasts treated with varying concentrations of dextrose, simulating the diabetic ocular surface, was investigated to elucidate a potential role in canine corneal wound healing. **Methods:** Primary cultures of canine corneal stromal fibroblasts were treated with vehicle control, 1  $\mu$ , 2  $\mu$ , or 5  $\mu$  of human recombinant insulin for 48 hours. Cellular supernatants were harvested and subject to an LDH Cytotoxicity Assay. Fibroblasts cultures were pre-treated with 0, 0.92 mmol/L, or 12.0 mmol/L dextrose for 24 hours; cultures were subsequently treated with the same insulin doses from the previous experiment, and an artificial wound was created. Restoration of the monolayer was evaluated over time. **Results:** Fibroblasts treated with all concentrations of insulin showed no significant differences in percent cytotoxicity when compared to the vehicle control. Insulin-treated fibroblasts demonstrated significantly ( $P < 0.05$ ) increased healing rates compared to the vehicle control at 6 and 24 hours post wounding; at 24 hours this difference was not significant between the vehicle control and 5  $\mu$  treatment. **Conclusions:** This study indicates that at the concentrations evaluated, topical insulin is safe to the corneal stromal cells, and exogenous insulin facilitates corneal fibroblast wound healing *in vitro*. Topical insulin may serve as an adjunctive therapy for the diabetic canine cornea. **Support/ Disclosure:** Supported by The Ohio State University Internal Research Funds. None.

### ABSTRACT NO.: 129

#### Ocular adnexal squamous cell carcinoma with features of feline restrictive orbital myofibroblastic sarcoma: 18 cases (1990–2014)

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**Purpose:** To describe the clinical presentations and histopathology results of patients diagnosed with ocular adnexal or orbital squamous cell carcinoma (SCC), which possess clinical features similar to feline restrictive orbital myofibroblastic sarcoma (FROMS). **Methods:** A retrospective review of 49 cases was performed of patients with ocular adnexal or orbital SCC from the University of Georgia College of Veterinary Medicine and from the Comparative Ocular Pathology Laboratory of Wisconsin (1990–2014). Data recorded for the cases included signalment, ocular and systemic clinical signs, advanced imaging results, suspicion of FROMS and histopathological features of the tumors. **Results:** Eighteen cases (19 eyes) were identified and further divided into two groups. Group 1 consisted of 11 cases (12 eyes) of SCC with clinical features similar to FROMS. Clinical signs included corneal changes (12/12), eyelid/third eyelid thickening (8/12), restriction of ocular mobility (3/12), and exophthalmos or increased resistance to retropulsion (2/12). The submitting veterinarian in 5/11 cases noted a suspicion of FROMS. Group 2 consisted of 7 cases (7 eyes) of SCC with histopathologic tissue infiltration distribution similar to that also typical of FROMS. Clinical signs noted on the submission forms for these cases included corneal changes (5/7), eyelid/

third eyelid thickening (2/7), restriction of ocular mobility (1/7), and exophthalmos or increased resistance to retropulsion (1/7). **Conclusions:** SCC with ocular adnexal involvement may have many features similar to FROMS. In addition to FROMS, SCC should be considered a differential diagnosis in cats with restrictive ocular adnexal or orbital signs and corneal changes. **Support/ Disclosure:** None.

### ABSTRACT NO.: 130

#### A novel nictitating gland repositioning technique to treat glandular prolapse

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**Purpose:** To describe a novel surgical technique for treatment of prolapsed gland of the nictitating membrane (NM) that preserves glandular function and prevents recurrence. **Methods:** 1) The gland was separated from the cartilage, starting from the free margin of the NM and working toward the base. The medial end was left attached to the bulbar conjunctiva and underlying tissues to preserve its blood supply. 2) A perilimbal incision was made in the bulbar conjunctiva 5 mm from the limbus, and the scleral tissues were exposed widely to create a graft bed. 3) The NM gland flap was repositioned and sutured into the graft bed using 7-0 Vicryl. 4) The conjunctiva was closed with 9-0 Vicryl. **Results:** The procedure was performed in three American Cocker Spaniels. Case 1 was a 9-year-old neutered male with a left-sided NM gland prolapse that occurred 8 years before. After the procedure, there were improvements in corneal pigmentation and tear film. Case 2 was an 8-month-old female with bilateral prolapse of 3 weeks' duration. Case 3 was an 8-month-old male with bilateral prolapse of 3 months' duration. In all cases, STT I values increased post-operatively, and the NM gland flap was maintained in the same position. **Conclusions:** The short-term (2 to 15 months) outcome of this technique was favorable. Further studies including STT II and vital staining are necessary to determine the value of this technique for permanent correction of cherry eye and preservation of the NM gland function. **Support/ Disclosure:** None.

### ABSTRACT NO.: 131

#### Ocular and periocular hemangiosarcoma in six horses

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**Purpose:** To determine the characteristics of and prognosis for ocular and periocular hemangiosarcoma in horses. **Methods:** A retrospective medical record review from 2007–2015 was performed. Inclusion criterion was any horse with a histologic diagnosis of hemangiosarcoma located on any ocular or periocular tissue in an equine patient. Medical records were used to obtain the following information: signalment (age, sex, breed), ocular location (s) involved, duration of clinical signs, prior treatment, tumor size and location, medical and surgical treatment including post-operative chemotherapy, and outcome. Histopathology was reviewed by a board-certified pathologist. **Results:** There was no breed, age, or sex over-represented in included horses. Sites affected included the temporal limbus (3), third eyelid (2), and uvea (1). Histologic features in 6/6 cases included high cellularity, nuclear pleomorphism, and inflammation. With the exception of one horse with uveal hemangiosarcoma, 5/6 horses had lightly pigmented periocular tissues. 5/6 tumors had solar elastosis, indicating ultraviolet light-induced damage to sub-epithelial collagen. Treatment included surgical excision performed in all cases was successful in 4/6 cases. Three cases that received ancillary treatment with topical mitomycin C had no post-operative recurrence. **Conclusions:** Surgical excision may be associated with complete resolution of periocular and ocular hemangiosarcoma in horses. There was no known recurrence or metastasis in the majority of cases in this current study. Etiopathogenesis may include exposure to ultraviolet light. **Support/ Disclosure:** None.

### ABSTRACT NO.: 132

#### Effect of bone marrow-derived autologous mesenchymal stem cells and stem cell supernatant on equine corneal wound healing *in vitro*

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**Purpose:** To determine and compare the *in vitro* effects of autologous bone marrow-derived mesenchymal stem cells (MSCs) and mesenchymal stem cell supernatant (MSC-Sp) on wound healing capacity of equine keratocytes using a corneal scratch assay. **Methods:** Bone marrow aspirates and eyes were collected from normal, euthanized horses with subsequent isolation and culture of MSCs and stromal keratocytes. Keratocytes were culture-expanded in the culture well of transwell plates and then treated with an autologous MSCs suspension (dose: 2.5  $\times$  10<sup>7</sup>/100  $\mu$ L of media with the MSCs contained within the insert well), MSC-Sp solution, or naive culture media (control) for 72 hours. A linear defect in confluent keratocyte cell cultures was created (i.e., corneal scratch assay) to assess the cellular closure ("healing") over time. Three representative areas of the scratch in each culture were photographed at each time point and the scratch area was quantitated using image analysis software (ImageJ). **Results:** The mean scratch area was significantly less in equine keratocytes treated with MSCs (59 292  $\pm$  44 632 pixels) compared to the mean scratch area of cells treated with either MSC-Sp (109 989 mean  $\pm$  73 529 pixels) or control (106 050 mean  $\pm$  63 319 pixels) at 60 h ( $P = 0.04$ ) and 72 h ( $P = 0.01$ ) after scratching (ANOVA). **Conclusions:** The significant decrease in scratch area in equine keratocyte cultures treated with autologous MSCs compared to MSC-Sp or control treatments suggests that MSCs may substantially improve corneal wound healing in horses and that the presence of the MSCs themselves in the culture system is critical. **Support/ Disclosure:** Supported by ACVO Vision for Animals Foundation VAF2015-04. None.



**ABSTRACT NO.: 133****Effect of intrastromal injection of voriconazole on the healthy equine eye**KM Smith,\* MA Breshears,<sup>†</sup> LK Maxwell<sup>‡</sup> and MA Gilmour\*\*Department of Veterinary Clinical Sciences, Center for Veterinary Health Sciences, Oklahoma State University, Stillwater, OK, USA; <sup>†</sup>Department of Veterinary Pathobiology, Center for Veterinary Health Sciences, Oklahoma State University, Stillwater, OK, USA; <sup>‡</sup>Department of Physiological Sciences, Center for Veterinary Health Sciences, Oklahoma State University, Stillwater, OK, USA

**Purpose:** To compare the effect of intrastromal injection of 1% and 5% voriconazole on corneal morphology and intraocular drug exposure in normal equine eyes. **Methods:** Eight horses assigned to 1 of 4 treatment groups ( $n = 2$ ) underwent standing intrastromal injection of 1% voriconazole (Vfend, Pfizer, New York, NY) in one cornea and 5% in the other. Two control horses received sterile water injection in both corneas. Gross effects were assessed through periodic ophthalmic examination. One treatment group was euthanized at 1, 2, 3, and 7 days post-injection, with control horses euthanized 7 days post-injection. Aqueous humor (AH) samples were obtained and analyzed for voriconazole using high-performance liquid chromatography. One half of each cornea was analyzed by traditional histopathology and the other by scanning electron microscopy (SEM). **Results:** Corneal opacity developed during injection and was larger with 1% voriconazole and sterile water compared to 5% voriconazole. Control corneas were mostly clear by 24 hours and treatment corneas by 48 hours post-injection. Seven eyes developed corneal ulcers but all were healing/healed by time of euthanasia. Microscopic intracorneal inflammation was detected at 24 hours post-injection but resolved by 7 days. Corneal architecture was near-normal on SEM evaluation by 72 hours post-injection. AH voriconazole level was highest following injection of 1% voriconazole solution and cleared within 24 hours. **Conclusions:** Intracorneal injection of 1% or 5% voriconazole results in temporary alteration of corneal morphology. Injection of 5% voriconazole typically results in a smaller injection area and less intraocular drug exposure. **Support/Disclosure:** Supported by OSU RAC grant. None.

**ABSTRACT NO.: 134****Diamond burr tip analysis using scanning electron microscopy and energy dispersive x-ray spectroscopy**CB Spertus,\* JM Brown<sup>†</sup> and EA Giuliano\*\*College of Veterinary Medicine, University of Missouri, Columbia, MO, USA; <sup>†</sup>Electron Microscopy Core Facility, University of Missouri, Columbia, MO, USA

**Purpose:** To evaluate morphologic and elemental composition changes to the diamond burr tip after multiple uses using scanning electron microscopy (SEM) and energy dispersive x-ray spectroscopy (EDS). **Methods:** Three naïve burr tips were analyzed using SEM and

EDS. An 8 mm superficial ulcer was created on fresh porcine globes for diamond burr keratectomy (DBK). DBK was performed for 120 seconds within the ulcer using the Algerbrush<sup>®</sup> (Alger Equipment Company, Lago Vista, TX, USA). This protocol was repeated in triplicate using three 3 mm, medium grit burrs. The burrs were soaked in a 1:20 dilution of warm tap water mixed with Dawn soap (Procter and Gamble, Cincinnati, OH, USA) and cleaned using a soft toothbrush per manufacturer's recommendations. Burrs were dried with a hair-dryer and autoclaved (pre-vacuum cycle, 10 minutes sterilization, 20 minutes dry time). Burr tips were analyzed after 10, 25, and 50 DBKs, cleaning, and sterilization cycles by EM and EDS. **Results:** There was no subjective evidence of diamond particle damage or degradation after 10, 25, or 50 DBKs using manufacturer's recommended cleaning and sterilization protocols. SEM secondary electron imaging and backscatter electron imaging of the naïve burr tips and after 10, 25, and 50 uses demonstrated that there was a build-up of contamination on the burr tips. EDS analysis demonstrated that the contaminated areas were primarily composed of carbon, sulfur, and calcium. **Conclusions:** Although SCCED complications are rare after DBK, the build-up of contaminants may be a contributing factor. Additional cleaning protocols could be considered. **Support/Disclosure:** None.

**ABSTRACT NO.: 135****Ten cases of presumptive ocular post-traumatic sarcoma in dogs**CA Tusler,\* N Sheibani,<sup>†</sup> GC Shaw,\* RR Dubielzig\* and LBC Teixeira\*\*School of Veterinary Medicine, Comparative Ocular Pathology Laboratory of Wisconsin, University of Wisconsin Madison, Madison, WI, USA; <sup>†</sup>Department of Ophthalmology and Visual Sciences, School of Medicine and Public Health, University of Wisconsin Madison, Madison, WI, USA

**Purpose:** To identify and characterize cases of presumptive post-traumatic sarcoma in dogs. **Methods:** Cases of presumptive canine post-traumatic sarcomas were identified using the Comparative Ocular Pathology Laboratory of Wisconsin database. Inclusion criteria were the presence of a perilenticular fusiform-to-anaplastic neoplastic mass and a history or lesions consisted with trauma and/or longstanding eye disease. Patient data and clinical history were recorded. Sections of formalin-fixed-paraffin-embedded tissues were stained with H&E, alcian blue/PAS and immunohistochemically (IHC) for alpha-SMA, vimentin, pancytokeratin and melan-A. **Results:** Twelve eyes from 10 dogs met our initial inclusion criteria. The median age was 8.37 years (range 2–14). No sex or breed predilection was found. Ten out of ten cases presented a history of trauma or longstanding eye disease. Relevant additional microscopic features for the diagnosis of post-traumatic sarcoma included lens capsule rupture (4/12 eyes) and PAS-positive basement membranes surrounding individual neoplastic cells (11/12 eyes). On IHC 11/12 tumors were positive for vimentin, 10/12 for alpha-SMA, and 2/12 for pancytokeratin. All three tumors stained for melan-A were negative. **Conclusions:** We were able to successfully demonstrate 10 cases of canine intraocular sarcomas associated with trauma and clinicopathological features similar to post-traumatic sarcoma in cats. Immunologic testing to definitively demonstrate lens epithelial origin of the neoplastic cells is under development. **Support/Disclosure:** Supported by the McPherson Eye Research Institute. None.