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ABSTRACT NO.: 1
Preliminary report of ocular effects of stereotactic radiosurgery
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Purpose: To preliminarily report the ocular complications from stereotactic radiosurgery (SRS), as part of a prospective evaluation of outcomes for intra- and extracranial head neoplasia. Methods: Frameless SRS utilizes a 3-megavolt linear accelerator, which rotates about the patient, and custom software to deliver a single, highly conformal radiation dose to a neoplasm via 2–6 isocenters. Treatment planning is performed on a computer using fused CT and MR images of the neoplasm, localized in space by a custom oral plate that contains infrared light emitting diodes and markers. Radiation is delivered with 0.2 mm accuracy. The aim of this prospective study was to identify ocular complications after SRS intervention. A complete dilated ocular examination was performed before anesthesia, and at prescribed periods thereafter to identify early, intermediate and late complications, and if indicated by clinical signs. Results: Thirteen dogs and four cats were enrolled, and received a single dose of 1, 20–1, 750 cGy. Dogs averaged 8.3 ± 3.1 years. Neoplasms included adenocarcinoma (A/CA, 6), osteosarcoma (3), squamous cell carcinoma (2 cats) and lymphosarcoma (2). Seven dogs and two cats were euthanized for complications of their neoplasia, with survival of 27 ± 11 weeks. Dogs with A/CA have responded the best, with one dog recurrence-free at 3 years. Early ocular complications were infrequent and typically mild, including decreased lacrimation (often anhidrosis associated), mild keratoconjunctivitis, and blepharitis with blepharospasm. Periorbital alopecia and degeneration was occasionally extensive and ulcerated, and was temporary (1) or permanent (one dog). Intermediate complications included cataract in one eye. Late-term complications included gradual complete pigmentation that obscured the tapetal fundus OU without hemorrhage or refractoriness changes in the 1-year A/CA survivors. The symmetry OU probably implicates concurrent miosis. When radiation is possible. Other complications were rare. Conclusions: In contrast to ionizing radiations using 2–3 opposing beams and multiple fractionated doses for up to 4 weeks, SRS is delivered in a single session. Highly targeted dosage with steep gradients results in minimal irradiation of adjacent tissue. No eye shielding was used because of the surface-sparing effects of SRS and the rare inclusion of sensitive orbital contents. Minimal irradiation (mean: 90%) respectively. By contrast, application of lactoferrin following viral adsorption caused no appreciable inhibition of FHV-1 replication relative to control medium. To assess possible synergetic effects, the same concentrations of lactoferrin were added at combinations of 1 ml of FHV-1 replication following exposure of CRFK cells to lactoferrin prior to and during viral adsorption (90% inhibition) did not differ from that observed when lactoferrin was added to either step alone. Exposure of virus to lactoferrin during and following adsorption (95% inhibition) also had no additive effect compared with lactoferrin exposure during viral adsorption alone. Likewise, no synergistic effect was noted relative to maximal single-stage inhibition when lactoferrin was added at all three stages of the assay (93% inhibition). In all experiments, inhibition of viral replication was apparently independent of lactoferrin concentrations tested. Cytotoxic effects of lactoferrin on CRFK cells were not observed at any concentration. Conclusions: Bovine lactoferrin has a notable inhibitory effect on the in vitro replication of FHV-1 prior to and during, but not following viral adsorption. These findings strongly suggest that lactoferrin inhibits FHV-1 adsorption to the cell surface and/or penetration of the virus into the cell. Clinical effects of lactoferrin in acute or recurrent herpetic episodes in cats warrant investigation. Acknowledgements: Supported by grants from the American Society of Veterinary Ophthalmology and The UC Davis Center for Companion Animal Health. Commercial interest: None.

ABSTRACT NO.: 3
Primary glaucoma in Burmese cats
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Purpose: During the last 5 years we have diagnosed primary glaucoma in 11 Burmese cats. This retrospective study documents the clinical features and management of primary glaucoma in six of these affected Burmese cats during a period between 3 months and 4.5 years. Methods: Signalment, history, presenting ocular findings and clinical features were obtained from records between 1996 and 2001. A comparative examination, including gonioscopy of the iridocorneal angle (ICA) in the six affected Burmese cats and six control cats (four Burmese and two Domestic Short-hair), was made towards the end of the study. Results: Six affected Burmese cats had a 1- to 8-week history of either unilateral (n = 6) or bilateral (n = 2) red eye, photophobia and reduced visual acuity. All cats were older (7–10.3 years). By contrast, no apparent cause for the glaucoma, a diagnosis of feline primary glaucoma was made. All affected eyes (n = 8) received topical antiglaucoma therapy: 2% dorzolamide (n = 7), 0.5% timolol maleate (n = 1) and 0.005% latanoprost (n = 1). Topical 0.5–1.0% prednisolone acetate (n = 8) was used also. Six eyes were treated surgically with transcleral diode laser cyclophotocoagulation (n = 5) or transcleral cyclocryotherapy (n = 2). One eye was excised with implantation of a dura mater implant. Of the 11 remaining seven gonioscopic eyes, six had normal IOP (15–25 mmHg) as a result of continuous medical and surgical therapy. Only one gonioscopic blind eye, which was poorly managed, had an elevated IOP (55 mmHg). Gonioscopy in all glaucomatous eyes (n = 10) revealed the presence of either an open narrow (n = 8) or a closed ICA (n = 2). Two
control Burmese cats also had an open narrow ICA. Conclusions: The Burmese cat appears to be predisposed to primary open narrow-angle glaucoma. Early recognition of its clinical signs and continuous medical and surgical management controlled IOP and maintained vision in six of the eight glaucomatous eyes. Commercial interest: None.

ABSTRACT NO.: 4
Assessment of quality of life in blind dogs
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Purpose: To assess quality of life in blind dogs. Methods: Medical records were reviewed of 29 dogs which were blind due to bilateral enucleation (5) or sudden acquired retinal degeneration syndrome (SARDS) confirmed by eletrotoretinography (24). Signalment, time of onset of ocular disease to vision loss and other disease processes were evaluated from the medical records. A questionnaire was used to assess quality of life via telephone interviews with owners. Questions included temperament change, behavioral change, response to commands, any safety precautions taken if the animal was still walked and if they were on or off leash and how this may have changed following blindness, if the pet still enjoyed exercising, if they would warn people their dog was blind and whether the pet reacted any differently to prey from other people. The owners’ view of the pet’s quality of life and whether or not the owner would want to have a blind dog again was asked. Cause of death was also determined. Results: Mean age of dogs affected was 9 years. Breeds included Cocker spaniel (2), Dachshund (2), Standard Poodle (2), miniature Schnauzer (3), Schnauzer (4), mixed breed (3) and one each of Fox terrier, Basenji, Sheltland sheepdog, Pug, Old English Sheepdog, Yorkshire terrier, Shih tzu, Brittany spaniel, Norwegian Elkhound, Springer spaniel and a Lhasa apso. Two dogs were intact males, six were neutered males, four were intact females, and 16 were spayed females. The owners of 23 of the dogs felt that their dog had a good quality of life, three believed that their dog had a poor quality of life and three owners said that their dog’s quality of life was poor due to some other disease process. The owners of the three dogs that thought their dog had a poor quality of life had their dog euthanized due to problems associated with blindness. One of the three had some other health problems as well. All other dogs which were euthanized or dead were euthanized due to blindness. Other factors which contributed to their blindness. Conclusions: Most dogs have a good quality of life after they become blind, although a small number of owners feel that their dog’s quality of life was poor. Commercial interest: None.

ABSTRACT NO.: 5
Topical nepafenac inhibits posterior segment neovascularization
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Purpose: Topical ocular delivery of 0.5% nepafenac (COX-2/II inhibitor) inhibits posterior segment inflammation in rabbits, as compared to marketed NSAIDs. Systemically administered COX-II inhibitors block tumor-related neovascularization (NV) in animals. We evaluated topical nepafenac for potential antiangiogenic activity in three models of posterior segment NV. Methods: The effects of topical ocular administration of vehicle, nepafenac (0.03–0.5%), Voltaren® (0.1% diclofenac), or Aculair® (0.5% ketorolac tromethamine) were compared in rats and mice with oxygen-induced ischemic retinopathy (OIR), and in mice with laser-induced rupture of Bruch’s membrane and choroidal NV (CNV). In two different laboratories (Alcon/Vanderbilt), preretinal NV was produced in rat via an OIR paradigm (JON 2002, 42: 283). In the rat OIR model, topical delivery of QID OU from P12-17 in room air, where retinas were harvested at P17 and preretinal NV was measured by image analysis. Laser-induced CNV was produced in mice by inducing a rupture of Bruch’s membrane (Am J Pathol 1999, 154: 1743). Beginning 24 h prior to laser and continuing for 14 days, mice received topical 0, 0.1, or 0.5% nepafenac QID OU. At 2 weeks postlaser, choroidal flat mounts were used to quantify the CNV. Results: Topical nepafenac provided between 29% and 60% inhibition of preretinal NV in the rat (0.1%, P = 0.03) and mouse (0.1%, P = 0.004) OIR models, where topical delivery of vehicle, diclofenac, or ketorolac had no effect. Moreover, topical nepafenac inhibited retinal VEGF protein levels by 60% at P18 in the rat OIR model (P = 0.04). Topical nepafenac inhibited laser-induced CNV by 70% vs. vehicle in mice (0.1%, P = 0.004). Mice treated topically with 0.5% ketorolac for 14 days had high mortality, but showed no difference in CNV from vehicle treatment at 7 days postlaser. Topical diclofenac had no effect on CNV. Conclusion: The robust efficacy of nepafenac against both pre- and subretinal NV following topical ocular delivery suggests that this novel NSAID may be useful for treating angiogenesis-dependent ocular disease in humans. F. Binsman, Holt, & Kapin, C. Penn, Takahashi, & Camacho.

ABSTRACT NO.: 6
Assessment of retinal degeneration in outbred albino mice
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Purpose: To document the incidence of spontaneous retinal degeneration in 10 strains of albino mice. Methods: Five hundred and twenty mice (260 each sex) were enrolled in a 12-week study at 4 weeks of age, n = 30 per sex for eight strains: Crl:CFW(SW )BR, Tac:(SW ), T. clev.Hat(II), Hsd:ICR(II), Crl:CD-1(CRBR), Crl:CF-1 BR, Hsd:NSA(CR-1), Hsd:ICR(CD-1), and n = 10 per sex for two strains: FVB/NJ(CRBR) (positive control) and C57BL/J (negative control) female mice. Vendors included Harlan Sprague Dawley, Charles River Laboratory, Jackson Laboratory and Iaconic. All animals were examined by indirect ophthalmoscopy weekly by the same observer after instillation of 0.5% tropicamide. Mice were housed in the same room at 18–26°C under 12 h of artificial illumination and 12 h darkness. Prior to study termination blood was collected from all mice for hemogram and serum chemistry profile. Animals were euthanized by CO2 asphyxiation. Eyes were removed and fixed in Davidson’s solution prior to processing for light microscopy. Slides stained with hematoxylin-eosin were evaluated by a veterinary pathologist. Results: Incidence of retinal atrophy on histopathologic examination at termination was 100% in the positive control and 0% in the negative control strains. Incidence in other strains was 98.3% in Crl:CFW(SW)BR, 80% in Tac(SW), 75% in T. clev.Hat(II), 43.3% in Hsd:ICR(CD-1), 1% in Crl:CF-1 BR, and 0% in Hsd:ICR(CF-1 BR), Hsd:NSA(CF-1), and Hsd:ICR(CF-1). Gender differences were present only in strain Hsd:ICR(CD-1), in which 56.7% of males and 30% of females were affected. Hematologic and clinical chemistry values were normal. Conclusion: The incidence of retinal degeneration occurring by 4 months of age is widely variable among 10 commonly available outbred strains of mice. Commercial interest: None.

ABSTRACT NO.: 7
Light and electron microscopic evaluation of canine cornea following CO2 photokeratotomy
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Purpose: To determine using light and scanning electron microscopy if treatment with CO2 photokeratotomy alters the corneal endothelium in healthy dogs. Methods: Eight surgery laboratory dogs were determined to be free of ocular abnormalities on examination by slit-lamp biomicroscopy and indirect ophthalmoscopy. Under general
anesthesia, the left eye of each dog was treated in a quadrant from 12 to 3 o’clock with the CO2 laser, in a defocused mode. The right eye served as a control. Dogs were placed into four treatment groups receiving an average laser power of 0.3, 0.1, 0.06 or 0.04 Watts. A 0.8-mm tip was used for groups treated with 0.3 or 0.1 Watts and the NovaScan handpiece, designed to limit thermal damage, was used for groups treated with 0.04 or 0.06 Watts. Following euthanasia, right and left corneas including a 2-mm scleral rim were aseptically harvested and fixed in commercial grade Karnovsky’s fixative. One piece of cornea was processed routinely, embedded in Embed 812 resin, sectioned at 1 μm, stained with toluidine blue and evaluated with the light microscope. A separate piece of each cornea was routinely processed and examined with a JEOL 6400 scanning electron microscope (SEM) at 20kV.

Results: No changes in keratocyte number or morphology were detected by light microscopy. SEM indicated that endothelial cell morphology of control eyes was within normal limits. Multiple punctate inclusions were detected by light microscopy. SEM indicated that endothelial cell morphology and corneal thickness. Commercial interest: None.

ABSTRACT NO.: 8
Correction of eyelid coloboma in four cats using subdermal collagen and a modified Stades technique

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Purpose: To determine the efficacy of this technique in the treatment of eyelid coloboma in the cat. Methods: A prospective clinical trial using a two-step surgical technique involving the use of subdermal collagen (Safos Stades), was developed to restore the integrity of the affected eyelid. Seven eyes of four cats were included in the study.

Results: The surgical outcome was deemed to be the same or better in the affected eyelid compared to the contralateral normal eyelid surgical techniques.

Conclusion: The use of subdermal collagen and a modified Stades technique is a viable alternative in the treatment of eyelid coloboma in the cat. Supported by McChan Medical Inc., Toronto, Ontario. Commercial interest: None.

ABSTRACT NO.: 9
Evaluation of a foldable acrylic vaulted intraocular lens in canines following phacoemulsification

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Purpose: To evaluate several factors involving the use of the PFI 14 lens in the canine species after phacoemulsification was performed, including foldable vaulted, anterior chamber, posterior capsule opacification and refractive state.

Methods: Thirty-one eyes of 19 patients underwent phacoemulsification followed by implantation of a 14-mm, acrylic, foldable, vaulted intraocular lens. Patients were drawn from a referral population at a private ophthalmology clinic. A standard phacoemulsification technique was used and patients were examined on day 1, 7, 14 and 28.

Results: Twenty-eight of the 31 eyes were deemed to be a success based on a positive menace response and the presence of a clear visual axis. One eye had to be removed at day 7 due to endophthalmitis, one eye was blind due to precipitates on the intraocular lens, and one lens had to be removed due to decentration caused by a posterior capsular tear. Of the 28 successful eyes, all had an aqueous flare score of no greater than mild (mild, moderate, severe), normal intraocular pressure, normal centration within the pupil, no posterior capsular opacification and a positive menace response. Seven eyes of four patients were examined by streak retinoscopy to determine their refractive state. All eyes were found to be slightly under-corrected at +0.75 D, except for patient 4 whose eyes were +1.25 D. Average follow up time was 1.63 months.

Conclusion: The ph 14 lens is well tolerated, has a low posterior capsular opacification rate in the short term and brings the canine eye close to emmetropia. Supported by Aventix Animal Health. Commercial interest: None.

ABSTRACT NO.: 10
Ocular and visceral leishmaniosis in a domestic cat

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Purpose: To describe the clinical features, pathologic findings, treatment and outcome associated with leishmaniosis in a cat. Methods: An adult, spayed female Domestic Short-haired cat was referred to the UAB Veterinary Teaching Hospital for the evaluation of a bilateral ocular disease. Historical complaints included 8 months’ history of stomatitis and 1 month of bilateral anterior uveitis and weight loss. One week prior to referral, a deep stromal corneal ulceration on the left eye was detected. The referral veterinarian obtained a positive serum toplasmosis Ig G titre and started the treatment (Clindamycin 25 mg/kg PO sid, prednisolone 5 mg/cat aid PO and bilateral chloramphenicol-dexamethasone drops qid). Physical examination showed hepatomegaly, moderate diffuse gingivitis and marked proliferative faucitis. Initial ophthalmic examination revealed a bilateral deep stromal ulceration with exudative hypertensive panuveitis.

Results: CBC, biochemistry and urinalysis revealed hyperproteinemia with polyclonal hyperglobulinemia, glucosuria and proteinuria. After several blood and urine glucose determinations, diabetes mellitus (DM) was diagnosed. For the other alterations, differential diagnosis included lymphosarcoma, FIP, fungic infection, bartonellosis, ehrlichiosis, leishmaniosis, cholangiohepatitis complex and reactive hepatopathy due to DM. The systemic treatment was enrofloxacin and ultralent insulin (0.5 μ/kg sc. bid). Eye topical treatment consisted of tobramycin (1 drop qid), atropine ointment (bid) and topic dorzolamide (1 drop tid). We also administered oral prednisolone 5 mg/kg every other day to control the posterior uveitis. Two days later the animal presented a bilateral melting corneal keratitis with deep stromal ulceration progressing to corneal perforation in a few hours. The corneal cytology was aseptic. The patient was painful and bilateral enucleation was performed. Serologic tests for FeLV/FIV and Ehrlichia canis were negative. Leishmaniosis serum titres were positive and toxoplasmosis slightly positive. Bone marrow aspirate and PCR were negative in blood. We started the treatment with allopurinol (10 mg/kg PO bid). Histopathology showed large numbers of subcellular structures of the protozoan type similar to amastigotes of the genus Leishmania located in the entire eye’s structures (uvea, trabec, cornea, sclera and retina). Immunohistchemistry studies on ocular samples were positive for Leishmania. Six months after treatment the cat had increased in body weight and the owners agreed about the cat’s improvement.

Conclusions: From the small number of feline leishmaniosis cases reported it is possible that cats are resistant to present clinical signs of leishmaniosis. However, in endemic areas there is a high possibility of being infected and for that reason leishmaniosis should be included in the differential diagnosis of feline uveitis. To the authors’ knowledge this is the second description of panuveitis due to feline leishmaniosis, but it is the first one with associated melting keratitis. It is the first case of ocular and visceral feline leishmaniosis diagnosed in vivo and under systemic treatment. Feline leishmaniosis treatment is performed due to the small number of reported cases. The treatment of the predisposing cause and allopurinol seems to be a good therapeutic option. Commercial interest: None.

ABSTRACT NO.: 11
Cataract surgery considerations in a gorilla

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Purpose: To describe the presurgical, surgical and postsurgical considerations for cataract surgery in a gorilla.

Methods: We prepared for cataract surgery in a male, 19-year-old gorilla from the Barcelona Zoo. The gorilla was albino and had no other ocular disease. The gorilla was anaesthetized with ketamine and atropine for a total of 30 minutes. Anesthesia was maintained with propofol for an additional 30 minutes. The cataracts OU. Cataracts were at 45% opacification OD and 35% OS causing disturbance in vision. Because of the gorilla’s age (male gorillas live to about 37 years), anaesthesia methods and time are very important considerations. Pre-surgical and postsurgical considerations included the impossibility of administering eye drops or of doing any
IOP control or ophthalmic examination. It was also impossible to avoid self-trauma. After experiences from four other previous surgeries, we decided to perform a bimanual phacoemulsification technique unilaterally. Anesthesia was given using medetomidine-ketamine IM and was maintained with isoflurane and oxygen. A refractometer was used during anesthesia to determine IOL power. Preoperative treatment included tropicamide (1%), atropine (1%), gentamicin and dexamethasone (0.1%) eye drops every 10 min for 30 min OD. Results: Refractometry results were 14 D OD and 15.5 D OS. Head anatomy differs from dogs and cats and due to the presence of a prominent supraorbital crest, the corneal incision was performed lateral, at 9 o’clock. An anterior capsulorhexis 8 mm in diameter with subsequent viscoelastic hydration was performed. Divide and conquer bimanual phacoemulsification technique was performed without complications. The lens nucleus was soft and easy to remove. We decided to use an acrylic IOL, which was injected into the 3.2-mm corneal incision. After injecting the IOL, the corneal incision was closed with one simple interrupted suture using 9/0 nylon. Postoperative treatment consisted of gentamicin eye drops, 0.5-mL of methylprednisolone acetate subconjunctival injection, and oral antibiotic and anti-inflammatory medication for 10 days postoperatively. The anesthetist was reversed with atipamazole. After surgery the gorilla was kept isolated in low lumenation conditions for 24 h. The day after surgery the gorilla was visual and able to distinguish and select small pieces of his favorite fruits among his food. He had only some photophobia for the first day while the pupil was mydriatic. No signs of inflammation or discomfort were noted. Conclusions: Cataract surgery can be performed successfully in gorillas. As in other species, good quality of vision improves life quality. This is the ninth cataract surgery performed on a gorilla. Main considerations are pre- and postsurgical treatment, IOL power (similar to humans), general anesthesia and patient management. Commercial interest: None.

ABSTRACT NO.: 12
Measurement of high resolution ultrasound images: intraobserver and interobserver reliability
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Purpose: Recently, ultrasound probes with frequencies ranging from 20 MHz (high resolution ultrasound) to 60 MHz (ultrasound biomicroscopy) have been developed which allow imaging at resolutions which are comparable to low power microscopic views. High resolution ultrasound can be performed on awake animals and allows extensive evaluation of anterior segment structures for such things as tumors, cysts, scleral and corneal disease, and the effect of pharmacologic agents. The purpose of this study was to evaluate intraobserver and interobserver reproducibility of measurements of images obtained by high resolution ultrasound. Methods: Anterior segment images were obtained from eight eyes of four dogs using a computerized imaging program (NIH Image). Parameters evaluated were: corneal thickness, peripheral corneal thickness, peripheral iris thickness, termination of Descemet’s-iris distance, termination of Descemet’s-ciliary process distance, angle opening distance, iris-lens contact, and the maximum length, width and area of the ciliary cleft. The coefficient of variation (CV) of each observer was used to assess intraobserver reproducibility: CV of less than 10% was considered indicative of good reproducibility. Interobserver reproducibility was assessed by two way ANOVA. Results: The coefficient of variation was less than 10% for observer A for all parameters measured except ciliary cleft area (CV = 11.63%). CV was greater than 10% for observer B for the area rectangular area (18.51%) and ciliary cleft width (17.44%) and area (16.01%). Interobserver reproducibility was lower, with significant differences (P < 0.05) for five of the eleven parameters measured. Conclusions: Quantitative studies using high resolution ultrasound would allow, one experienced observer to accurately measure alterable parameters. Results of measurements of angle recess area and ciliary cleft width and area should be used with caution as small significant differences could be due to intraobserver variation. Commercial interest: None.

ABSTRACT NO.: 13
Histologic analysis of keratectomy specimens from horses undergoing corneal transplantation for stromal abscesses
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Purpose: Corneal transplants are typically performed in horses with stromal abscesses which remain painful and do not respond to medical treatment alone. This retrospective study was designed to investigate the frequency with which equine corneal stromal abscesses that are repaired with a corneal transplant are fungal in origin, and to use histology to test the hypothesis that fungal hyphae have an affinity for deep corneas, specifically Descemet’s membrane. Methods: Records of all equine corneal transplant cases at the University of Florida performed between 1995 and the present were examined. Records which showed histologic evidence of fungal infection in the cornea were selected for inclusion in this study. Keratectomy specimens were analyzed microscopically for location of fungal hyphae within the corneal stroma. The nature of corneal collagen as well as any cellular infiltrate in each specimen was characterized. Results: To date, 71 corneal transplants (including both penetrating keratoplasties and post-penetrating keratoplasties) have been performed at the University of Florida, and histology was performed on 62 of the keratectomies removed during transplantation. Of the 62 keratectomies, fungal elements were seen in 15 (24.6%). Nineteen of the 35 fungus-positive keratectomies (46%) had fungal hyphae deep within the cornea. In 12 of the 35 fungus-positive keratectomies (4%) fungal hyphae were found attached to or within Descemet’s membrane. Corneal collagen was typically degenerated with fragmented and hypereosinophilic fibers. Corneal stroma was generally either focially or diffusely edematous, and extensively infiltrated with mature and necrotic neutrophils, with fewer macrophages and lymphocytes. Fibroblasts were often necrotic, and contained plump hypochromatic nuclei. Neovascularization was occasionally seen. All specimens were characterized as moderate to severe suppurative or necrosuppurative keratitis with intralesional fungal hyphae. Conclusions: The majority of equine stromal abscesses, whether treated with a corneal transplant are fungal in origin, as confirmed by histology. Fungal hyphae appear to have an affinity for deep cornea, and Descemet’s membrane. Deep fungal infection may respond well to surgical intervention due to removal of infectious, inflammatory and necrotic material that is difficult to access medically. Commercial interest: None.

ABSTRACT NO.: 14
Examination of the embryonic rat eye utilizing osmium tetroxide staining
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Purpose: This communication describes the benefits of osmium tetroxide (OsO4) staining on the examination of the eye during the early stage of organogenesis of rat embryos. Enhancement of visualization of embryonic ocular tissues under a stereo-microscope would make morphologic screening for developmental anomalies more effective. Method: The structural details of the early development of the eye have been described utilizing various methods in the human, dog, mouse, hamster, chick and rat. Organogenesis of the eye begins with formation of the optic sulcus, the optic vesicle, and then development of the optic cup and lens placode. In rat embryos, the optic cup and lens placode are first identifiable on embryonic day 12 (ED 12). Scanning electron microscopy is a technique that has been used to study the morphology of the ocular tissues in experimental animals. Serial sections made from paraffin-embedded eyes for light microscopic examination are also used but do not easily allow reconstruction of the sections of ocular tissues into 3-dimensional images. The unstained surface ectoderm and neural ectoderm of the developing eye are also difficult to distinguish with the use of a binocular stereo-microscope. This is because the developing cells of the ocular tissues are small and translucent with characteristic shapes, large amounts of extracellular space and large cell volumes. The embryos were obtained by laparotomy on ED 12 and were stained with OsO4 for examination of the ocular tissues with a stereo-microscope, light microscope and scanning electron microscope. Results: The structural and morphologic details of the early development of the eye were clearly distinguished. The osmium-stained lens placode and the optic
cup were light and dark brown in color, respectively. The optic fissure was located in the inferotemporal aspect of the optic cup. Light microscopic examination revealed that ONH photoreceptors could provide superior parafoveal-embedded embossed sections. Scanning electron microscopic examination revealed the lens pit as a round opening between the lateral neural prominence and maxillary prominence. Conclusions: A rapid and selective technique by which the ocular tissues of rat embryos can be examined under a stereo-microscope was developed. This ONH staining method will provide a useful tool for research on organogenesis and development of eyes. Commercial interest: None.

ABSTRACT NO.: 15

Progressive retinal atrophy in 12 miniature Dachshund dogs
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Purpose: Progressive retinal atrophy (PRA) is a hereditary disease with progressive vision loss leading to total blindness in most breeds. It is one of the most common retinal diseases in dogs and cats. This study examined whether PRA was identified in miniature Dachshunds from Japan.
Methods: Twenty Miniature Dachshund dogs were examined at Rakuno Gakuin University Teaching Hospital from March 2000 to October 2001. Twelve dogs were suspected as having PRA after performing fundoscopy or electroretinogram examinations. Age at the first medical examination ranged from 3 months to 5.75 years (mean, 3.3 years). There were seven male and five female animals. Menace reflex, pupillary light reflex, tonometry and funduscopy were performed in all cases. Electroretinography (ERG) in four of these six dogs was performed in 10 cases. Results: Seven dogs had no menace reflex. Pupillary light reflexes were sluggish or incomplete in these same seven dogs. Intraocular pressure was within the normal range in all of the cases (9–25 mmHg). The following PRA signs were observed in six dogs: hyper-reflective tapetal fundus, attenuation of the retinal vessels and paleness of the retina. In these dogs were suspected as having PRA after funduscopy examination. Electroretinography (ERG) in four of these six dogs was severely reduced. PRA signs were not seen or were very slight in the other six dogs.

ABSTRACT NO.: 16

Effects of topical nipradilol and timolol maleate on intraocular pressure, blood pressure and pulse rate in dogs
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Purpose: b-Adrenergic antagonists like timolol maleate are used to treat glaucoma by, reducing the rate of aqueous humor formation. Side effects such as bradycardia, hypotension and effect on the respiratory system have been reported. Nipradilol was released for ophthalmic use in humans in 1999. Nipradilol is an a1 b-blocker with mildest side effects than other b-blockers used in humans. In this study the effects of nipradilol were compared to that of timolol maleate in dogs.
Methods: Twelve clinically normal dogs (nine Mongrels, two Beagles and one Akita) were used. 0.2% nipradilol (Group N) 0.5% timolol maleate (Group T) was administered in one eye and the physiologic saline was administered in the other. Twice-a-day administration of dosages (9 and 21 o'clock) were continued for a period of 28 days. Intraocular pressure (IOP) was measured prior and after the administration. Results: Both nipradilol and timolol maleate significantly (P < 0.01) lowered IOP starting on the second day through the entire final period. Maximal rate of decrease of IOP in Group N was observed on the 26th day (30.6%), and on the 7th day in Group T (27.1%). There was no significant difference in the decrease in IOP between the two groups. In Group N, BP and PR did not show any significant change through the 14th day. In Group T, the two parameters showed a significant (P < 0.05) decrease from the 7th day through the final period. C-value showed a significant (P < 0.05) rise from the 14th day in Group N, while Group T did not show any significant difference during the testing. Conclusion: Both nipradilol and timolol maleate are highly effective in lowering IOP in dogs. The effect was similar in both drugs. The result suggest that nipradilol lowers IOP by reducing aqueous inflow. BP and PR had a significant reduction in Group T, whereas no significant change occurred in Group N, which suggests that nipradilol produces few systemic side effects in dogs. Reduction of IOP using nipradilol is similar to that of the existing b-adrenergic antagonist timolol, and produces fewer systemic side effects in dogs. Nipradilol appears to be a useful drug for treatment of glaucoma in dogs. Commercial interest: None.
Treatments of surgery alone (n = 5): RR 60% (n = 3), NRR 40% (n = 2). Surgery and cryotherapy (n = 16): RR 37.5% (n = 6), NRR 31.1% (n = 5). Surgery and strontium (n = 7): RR 14.3% (n = 3), NRR 42.9% (n = 4). The cornea was involved in 17% (n = 22) of the sites. Thirty treatments were performed with fifteen treatments lost to follow-up. Treatments of surgery alone (n = 7): RR 57.1% (n = 6), NRR 14.3% (n = 1). Surgery and cryotherapy (n = 10): RR 30% (n = 3), NRR 40% (n = 6). Surgery and strontium (n = 8) NRR 37.5% (n = 3). One-hundred percent (n = 5) of the enucleations were lost to follow-up.

Conclusions: In all locations, except the palpebral conjunctiva and eyelid, surgery alone had the highest RR. Cryotherapy, iodium, and strontium had a lowering effect on this RR in all locations treated. Strontium at the limbus/sclera, cornea and eyelid had the highest NRR.

Commercial interest: None.

ABSTRACT NO.: 18

Flash electroretinography in standing horses using the DTL™ microfiber electrode

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Purpose: To develop a practical method for the recording of ERGs in sedated, standing horses with the DTL™ microfiber electrode.

Methods: One eye of each of 10 healthy horses (median age: 9.5 years, range: 4–18 years) was used. Mydriasis was achieved with topical 1% tropicamide, and an auriculopalpebral nerve block was performed with 2% lidocaine HCl. The horses were sedated intravenously with 1% tropicamide, and an auriculopalpebral nerve block was performed with 2% lidocaine HCl. The horses were sedated intravenously with 0.035 mg/kg ketamine HCl. The ERGs were recorded on the standing animal with the active electrode on the cornea (DTL™), the reference electrode near the lateral canthus, and the ground electrode over the occipital bone. The bandwidth was set between 0.3 and 300 Hz (high-pass filter set at 75 Hz for oscillatory potentials). The light intensities of the white strobe light were 0.03 cd/m² (scotopic) and 3 cd/m² (photopic and scotopic). Adapting light level for photopic recording was 10 cd/m². The light source was modified to achieve Gamma modulation. Fundus pictures were taken at 3000, 6000, and 12,000 Hz. Darkadapted responses were recorded. During the 20-min dark adaptation period the retina was stimulated every 5 s with the 0.03 cd/m² single flash. At the end of the recording session the cornea was stained with sodium fluorescein to check for abrasions.

Results: The median b-wave amplitudes and implicit times were: 18 μV and 13 ms (photopic), 43 μV and 63 ms (5 min dark-adaptation), 72 μV and 89 ms (10 min), 147 μV and 103 ms (15 min), 188 μV and 109 ms (20 min, 0.03 cd/m²), and 186 μV and 77 ms (20 min, 3 cd/m²). A steady increase in amplitude and implicit time was noted during dark adaptation. No oscillatory potentials could be isolated. The median amplitude of the photopic 30-Hz flicker was 25 μV, of the scotopic 10-Hz flicker (0.01 cd/m²) was 32 μV, and of the scotopic 30-Hz flicker (3 cd/m²) was 13 μV.

No corneal abrasions were seen in any of the eyes tested. Detomidine sedation allowed the researchers to perform the recordings on the standing horses without major artefacts.

Conclusions: The use of detomidine and DTL™ microfiber electrode allowed the recording of good quality ERGs. No adverse effects were noted. This protocol should permit the detection of functional problems in the retina without the risk involved with general anesthesia. Our study could be the basis for the development of a standard ERG protocol for horses.

Commercial interest: None.

ABSTRACT NO.: 19

Evaluation of the systemic and ocular effects of gene therapy using RAAVRPE65 in the Briard-Beagle null mutation dog

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Purpose: To evaluate potential systemic and local effects after recombinant adenovirus-associated virus (rAAV) gene transfer of retinal pigmented epithelium 65 (RPE65) subretinally in the Briard-Beagle dog affected with RPE65 null mutation.

Methods: Twelve dogs, homozygous for the defect and three controls were studied. Physical and ocular examinations were performed before treatment. One eye was injected subretinally with rAAVRPE65 and the other eye with a sham control. Serum chemistry profile, CBCs, urinalyses, and serum and urine creatinine and protein ratios were determined pretreatment and at monthly intervals. To determine B- and T-cell function, blood was drawn postoperatively for lymphocyte blastogenesis (LBT) testing using three different mitogens (Concanavalin A, Pokeweed mitogen, and Phytohemagglutinin) and repeated weekly. Mean values of test results were calculated from three replicate trials. Pre- and post-Parvo and adenovirus vaccination titers were measured as an additional test of immune competency. ELISA was performed in serum samples from all treated and control dogs to measure antibodies against rAAV. Data were analyzed by ANOVA with each dog as its own control.

Results: There were no significant differences in serum chemistry profile, CBC, urine analyses, and urine protein and creatinine ratios before and after surgery (P > 0.05). A mild lymphopenia developed 1 month post therapy in all animals after gene transfer but the change was not statistically significant (P = 0.3187). LBTs indicated normal T and B-cell function. All dogs had positive postvaccination titers. ELISA indicated twofold increase in rAAV titers. In the 28 surgically treated eyes, nine developed postoperative intracameral inflammatory reactions 2–6 days postoperatively. Only eyes treated with AAVRPE65 developed uveitis, which was graded 1–4. One case (grade 4) was refractory to treatment. Eight cases subsided after 4–12 weeks of systemic and/or topical anti-inflammatory treatment. Conclusion: No adverse systemic effects as monitored by routine clinical testing were found. A twofold increase in rAAV titers was not considered clinically significant. There is a risk for uveitis in conjunction with rAAV/RPE65 subretinal injection, probably a reaction against the RPE65 transgene. Supported by The Foundation for Fighting Blindness and the Missouri chapter of the society of Phi Zeta.

Commercial interest: None.

ABSTRACT NO.: 20

Evaluation of corneal® foldable intraocular lenses

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Purpose: To evaluate intraoperative and postoperative results of cataract surgery in dogs using a hydrophilic acrylic, foldable intraocular lens (IOL), and to compare results with use of a rigid, PMMA lens.

Methods: The study was conducted in two parts. Part one included 18 dogs undergoing bilateral cataract surgery in which one eye was randomly chosen to be implanted with a 6-mm biconvex optic (41 D), biplate haptic, hydrophilic acrylic, foldable IOL, and the fellow eye implanted with a 7-mm optic (41 D), one-piece, rigid PMMA lens. Intraoperative parameters and short-term results including postoperative inflammation, lens capsular opacification, and refractive state were evaluated and compared between the two eyes. Part two was a multicenter study in which 105 eyes from 88 dogs implanted with the corneal® foldable IOL were evaluated. Results: Postoperative inflammation, capsular fibrosis and overall postoperative outcome were comparable between the PMMA and the foldable IOL groups. Mean postoperative refractive state was +2.23 ± 0.81 D and +0.68 ± 0.78 D for the foldable IOL and PMMA IOL groups, respectively. In the multicenter study, 81% of eyes had an excellent/good outcome (mean follow-up interval 7.6 months, range 1–16 months). Mild to moderate fibrin formation occurred in 14% of eyes 1 day to 3 weeks following surgery, and in 70% of these cases the fibrin resolved without further complication. One or more postoperative complications (persistent anterior uveits, glaucoma, lens cortical regrowth, retinal detachment) occurred in 10% of eyes, and 12% of eyes had moderate to severe complications resulting in a fair to poor visual outcome.

Conclusions: Results of the study suggest comparable postoperative results can be obtained with PMMA and foldable IOLs. Both results showed postoperative inflammation and short-term capsular opacification. The corneal® IOL left a mean residual refractive error of +2.23 D, long-term refractive requires additional study. The multicenter study suggested a success and complication rate using this foldable IOL comparable to that reported previously for PMMA IOLs. Future study
of the effects of a square posterior optic edge design of foldable IOLs on posterior capsular opacification is needed. Support: Intracocular lenses were supplied by Dorrprota Corporation. Commercial interest: None.

ABSTRACT NO.: 21

The ocular immunosuppressive cytokine alpha-melanocyte stimulating hormone alters protein ubiquitination in T cells

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Purpose: Recently we have reported that the immunosuppressive neuropeptide alpha-melanocyte stimulating hormone (α-MSH) induces the activation of regulatory T cells (Treg cells) in mice. This induction requires the T cells to be primed and restimulated through their T cell receptor in the presence of α-MSH. The lymphokine profile of the α-MSH-induced Treg cells showed suppressed IFN-γ and enhanced TGF-β1 production compared to the cells subjected to α-MSH alone. We here investigated α-MSH expression for both of these lymphokines do not change. Therefore, we examined total mRNA through microarray gene expression of α-MSH-induced Treg cells relative to untreated, activated effector T cells.

Methods: Primed T cells were collected from popliteal lymph nodes of BALB/c mice 7 days after peptide immunization in the footpad. CD4+ cells were isolated and activated in vitro as antigen-pulsed APC with or without the presence of α-MSH. Total RNA was collected after 24 h and differential gene expression through microarray and q-chip analysis was performed. Also at 48 h ubiquitinated proteins were immunoprecipitated from total protein lysates and immunoblotted for specific proteins. Denaturing analysis revealed changes in the ubiquitinated proteins. Results: Nine genes were up-regulated by α-MSH, including a 3-fold up-regulation of message for an F-box protein. F-box proteins are a family of proteins that impart substrate specificity to ubiquitin-protein ligase complexes. Protein ubiquitination is part of the intracellular mechanisms of protein degradation. Immunoblots of ubiquitinated proteins from 48-h cultures of α-MSH-induced Treg cells demonstrated a 2-fold increase in 42–188 kDa ubiquitinated proteins and a 2.5-fold decrease in free ubiquitin. We have preliminary evidence that IFN-γ is ubiquitinated in the α-MSH-induced Treg.

Conclusion: The results suggest that α-MSH mediates a change in T cell functionality by altering the intracellular targets of ubiquitination. Supported by NIH grants 1R01EY01752 and 1R01EY13913. Commercial interest: None.

ABSTRACT NO.: 22

Development of a reverse transcriptase polymerase chain reaction to detect feline herpervirus-1 (FHV-1) latency associated transcripts in the trigeminal ganglia and corneas of clinically asymptomatic cats

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Purpose: Develop a reverse transcriptase PCR assay to detect latent FHV-1 in corneas and trigeminal ganglia of clinically asymptomatic cats. Methods: Both corneas and trigeminal ganglia were harvested from 21 cats necropsied at the Purdue Animal Disease Diagnostic Laboratory and 25 cats euthanized at a humane shelter. Cats had no recent history of respiratory or ocular disease and results of ophthalmic examinations were normal. Initial PCR detected FHV-1 DNA in the corneas and trigeminal ganglia. RNA was then isolated and a RT-PCR assay used to detect intermediate early transcripts and latency-associated transcripts. Results: FHV-1 DNA was detected in 44/92 (46.9%) corneas and 16/92 (41.3%) trigeminal ganglia. In many samples the RNA had degraded and RT-PCR was not possible. Of the samples subjected to RT-PCR, no (0/39) corneas and no (0/16) trigeminal ganglia were positive for the reverse transcription early transcript No. 8 (8/93 corneas, but 8/16 (25%) of trigeminal ganglia were positive for latency-associated transcripts. Conclusion: Results suggest that a high percentage of clinically asymptomatic cats have detectable FHV-1 DNA in the corneas and trigeminal ganglia. The RT-PCR assay was successful in identifying the transcripts and may serve as a tool to differentiate active and latent FHV-1 infections. Supported by ASVO grant. Commercial interest: None.

ABSTRACT NO.: 23

Duration of in vitro inhibitory activity of equine serum against equine tear film matrix metalloproteinases

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Purpose: Tear film proteinases are enzymes produced and released by corneal epithelial cells, stromal fibroblasts, leukocytes, and macrophage pathogens. Excessive levels of tear film proteinases in ulcerative keratitis can lead to rapid degradation of stromal collagen and extracellular matrix (ECM) to cause corneal ‘melting’. Two families of proteinases that affect the horse cornea include the matrix metalloproteinases (MMP) and the serine proteinases. Concentrations of MMP-9 and the serine proteinase neutrophil elastase (NE) were significantly higher in ulcerated horse eyes than normal horse eyes. Concentrations of MMP-2 were also elevated in ulcerated corneas. Treatment with known inhibitors of matrix metalloproteinases and other tear film proteinases is ongoing in an effort to inhibit MMP and NE activity in corneal ulceration. Binding of serum-derived alpha melanocyte stimulating hormone (α-MSH) to MMPs is extremely tenacious, rendering this circulating agent one of the strongest known inhibitors of MMPs. Both diiodium and calcium ethylenediaminetetraacetic acid, N-acetylcysteine (10–20%), and tetracycline and doxycycline can also inhibit mammalian collagenases.

Methods: Gelatin zymography was used to isolate and determine MMPs from horese tears. Horse serum (frozen, closed, and room temperature samples) was used to test inhibition of tear film MMP activity at baseline, and at days 1–7. Gels were scanned and image analysis utilized to measure inhibitory activity. Results: There was no difference in MMP inhibition between fresh serum (~90.0 ± 5.2% activity) and frozen serum (~90.8 ± 0.4% activity). No difference in MMP inhibition between the serum kept at room temperature (~90.0 ± 5.2% activity) or in the refrigerator (~90.6 ± 2.7% activity) was detected during the 7-day trial. Inhibitory activity of serum towards tear film MMPs did not significantly change over the 7-day test period. Discussion: We demonstrated high levels of in vitro inhibition of MMP activity from horse serum. The in vitro inhibitory efficacy of serum towards equine tear film MMP did not diminish after 1 week at room temperature. Blood drawn into dry, sterile containers containing no anticoagulants clot and yields serum that can be separated. The serum can be used at room temperature or refrigerated until needed. Commercial interest: None.

ABSTRACT NO.: 24

In vitro effects of EDTA, doxycycline, n-acetylcysteine, ilomostat, and α1-proteinase inhibitor on matrix metalloproteinase activity in the tear film of horses with ulcerative keratitis


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Purpose: In ulcerated horse corneas, tear film proteinase levels and activities are significantly elevated as a result of activation of matrix metalloproteinases (MMPs), elevated plasmin activity, and production of proteinases by inflammatory cells, keratocectes and infectious organisms. This tear film proteinase activity is believed to lead to excessive degradation of stromal collagen breakdown. Antiproteolytic compounds have thus been highly recommended for treatment of equine ulcerative keratitis. There is, however, no information available on the effects of various compounds on proteinase activity. The purpose of this study was to investigate the effects of EDTA, doxycycline, n-acetylcysteine, ilomostat, and α1-proteinase inhibitor on matrix metalloproteinase activity in the tear film of horses with corneal ulceration. Methods: Tears collected from 14 horses presented with ulcerative keratitis were pooled. Gelatin zymography was used to determine the MMPs present in the pooled tears (control samples) and to conduct inhibition tests of MMP activity (treated samples). The inhibitor

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components were added at the digestion phase of the zymography procedure (incubation of the gels at 37 °C for 24 h). Edetate calcium disodium (EDTA), dicyclosine, N-acetylcysteine (NAC), ilomostat, and tr-1-proteinase inhibitor (tr-1-PI) were used at concentrations of 0.2%, 0.1%, 10%, 0.1%, and 0.5%, respectively. The incubated gels were scanned with an imaging densitometer to produce an intensity profile curve of each band. The area under the intensity curve was then analyzed with image analysis software as a quantitative measure of proteolytic activity for the controls and treated samples. Results: The global proteolytic activity observed on the gels was reduced by 99.3%, 96.2%, 98.9%, 91.5%, and 93.7% when the gels were incubated with EDTA, dicyclosine, NAC, ilomostat, and tr-1-PI, respectively, in comparison to the control samples. Conclusions: We demonstrated a high level of in vitro inhibition of MMP's activity obtained with EDTA, dicyclosine, NAC, ilomostat, and tr-1-PI. Because these various compounds utilize different mechanisms to inhibit different families of the equine tear proteinases, a combination of these antiproteolytic agents may be indicated for corneal ulceration in horses. Commercial interest: None.

ABSTRACT NO.: 25  
Gene transfer in the RPE65 null mutation dog: relationship between construct dosage, visual behavior and electoretinographic (ERG) results  
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Purpose: To assess visual and electrophysiologic effects of gene transfer in RPE65 null mutation dogs and to correlate these findings with dosage of gene construct. Methods: Twelve Briard-Beagle dogs (11 females, 1 male) were affected congenitally and one Labrador retriever (normal controls) were studied. One eye in each affected dog with early onset blindness was injected subretinally with either a low dose (30–60 µL, n = 5) or high dose (70–100 µL, n = 6) of rAAV2.RPE65 genomic construct. Fellow eyes were treated subretinally (70–100 µL) with either rAAV2 green fluorescent protein (GFP) or balanced salt solution (BSS). Retinal function was measured pre- and postoperatively at 6–12 weeks under general anesthesia using simultaneous bilateral Ganzfeld full-field flash ERG. Objective and subjective dim light visual testing were performed between 6 and 11 months post-surgery in the two unaffected control animals, and in eight affected, but rAAV2.RPE65-treated animals. Statistical analysis was performed by paired t-test, whereby the mean difference between eyes for pre- and post-surgical ERG parameters, and the change in visual responses between treatment groups in dim and day light conditions, were compared. Results: Objective and subjective visual testing revealed that high dose rAAV2.RPE65-treated animals had better vision in day light than in dim light. Post-surgical high and low intensity scotopic ERG responses, photopic single flash and 30 Hz flicker recordings were obtained in all high dose rAAV2.RPE65-treated eyes and found to be significantly improved (P < 0.024) over those responses obtained during presurgical testing. A significant improvement was noted for the high intensity scotopic (a wave) response for the low dose rAAV2.RPE65-treated group. No significant improvements were noted between pre- and post-surgical ERG responses in the control group. Conclusions: High doses of rAAV2.RPE65 construct have a positive influence on ERG recordings as evidenced by a significant increase in scotopic and photopic ERG parameters following subretinal treatment with the transgene. This effect appears to be dose related as minimal changes were seen between pre- and post-surgical ERG responses in the low-dose group. The increase in ERG responses in the high-dose rAAV2.RPE65-treated group is positively associated with an improvement in day light vision when compared to dim light testing. These findings confirm functional improvement of rod and cone activity in RPE65-/- dogs after treatment with the transgene. Supported by the Foundation for Fighting Blindness. Commercial interest: None.  

ABSTRACT NO.: 26  
Ocular abnormalities in the Okarito Brown Kiwi (Apteryx mantelli ‘okarito’)  
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Purpose: To determine the prevalence and characterize the nature of ocular abnormalities in the Okarito brown kiwi, a unique population (subspecies) of kiwi limited to the Okarito forest, southern Westland, South Island, New Zealand. Methods: Retrospective review of field notes over a 9-year period and clinical ophthalmonic examination with refraction and external photography of 11 free ranging and four captive Okarito brown kiwi. All adults were of unknown age though minimal ages of 4–20 years were known. Juvenile birds were considered to be less than 4 years of age. Results: From a preliminary review of records: Fifty-eight kiwi were identified with ocular lesions in one or both eyes out of a monitored population of approx 160 birds. From clinical evaluations: Three of the four juveniles examined and three adults had normal eye exams. Ocular abnormalities (n = eyes affected) included: cataract (7), subluxated and luxated cataractous lenses (1) and vitreal opacity (1). Three birds in good physical condition had chronic ocular lesions associated with severe visual dysfunction. The mean net refractive state (9 birds) was +1.65 D. Conclusions: A high frequency of ocular lesions exists in this discrete population of kiwi. The nature and frequency of ocular lesions are suggestive of this population being aged which is compatible with a population model with a high incidence of chick and juvenile mortality associated with predation by introduced mammals. Studies have been initiated to investigate the impact of visual dysfunction on breeding success. Commercial interest: None.  

ABSTRACT NO.: 27  
Radio-frequency hyperthermia as a treatment for equine periocular sarcoids — 10 cases  
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Purpose: To retrospectively assess the success of radio-frequency hyperthermia as a treatment for equine periocular sarcoids. Methods/subjects: Radio-frequency hyperthermia was performed on 11 histologically confirmed periocular sarcoids in 10 equidae (eight horses, two mules) between 1998 and 2002. Masses were present between 3 and 24 months prior to presentation. Two to four sessions of radio-frequency hyperthermia were performed (Thermoprobe™ veterinary electro-surgical instrument; Ideal Instruments, Schiller Park, IL, USA), with a localized current field at 50° C and to a depth of 1–3 mm per site, was used for all treatments. Instrument probe tips were applied directly to tumor sites, with and without prior surgical debulking, for 30 s and 6–12 contact points per linear inch of tissue were made. Three castrated males, one intact male and six mares between 2 and 11 years of age (mean 3.27 ± 2.79 years) of mixed breeds were treated. Results: Thirteen periocular sarcoid tumors, seven OD, six OS, occurred primarily on the superior eyelid (77%). Between one and six treatments (1–6; n = 5; 2–6; n = 1) were applied at 2–4 week intervals. Three cases were treated with adjuvant therapy either concurrently (cisplatin), between treatments of hyperthermia (cryotherapy), or following initial hyperthermia treatment (Nd:YAG). Additional surgical debulking of tumors was performed in three cases (23%). Marked regression in tumor size after one or two treatments was noted in 9 of 10 cases (12 tumors). Follow-up periods of 4–42 months were available for eight cases (11 tumors). Ninety-one per cent of tumors (10/11 tumors) demonstrated no evidence of tumor regrowth after final hyperthermia treatment. Eight of 160 birds. From clinical evaluations: Three of the four juveniles examined and three adults had normal eye exams. Ocular abnormalities (n = eyes affected) included: cataract (7), subluxated and luxated cataractous lenses (1) and vitreal opacity (1). Three birds in good physical condition had chronic ocular lesions associated with severe visual dysfunction. The mean net refractive state (9 birds) was +1.65 D. Conclusions: A high frequency of ocular lesions exists in this discrete population of kiwi. The nature and frequency of ocular lesions are suggestive of this population being aged which is compatible with a population model with a high incidence of chick and juvenile mortality associated with predation by introduced mammals. Studies have been initiated to investigate the impact of visual dysfunction on breeding success. Commercial interest: None.  

Conclusions: Results of
this study indicate that equine pericellular sarcoids may be effectively treated using radio-frequency hyperthermia. Effectiveness of therapy, as measured by absence of recurrence during the follow-up period, appears enhanced by postsurgical debulking, but prior to wound closure, presumably allowing for improved penetration into affected tissue. Current recommendations for this treatment modality include initial surgical debulking with a minimum of five hyperthermia treatments, at 2–4 week intervals, the first treatment performed prior to wound closure. Commercial interest: None.

ABSTRACT NO.: 28
Preliminary findings of a canine frontal sinus valved glaucoma shunt
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Purpose: This study was conducted to evaluate the long-term efficacy of a commercially manufactured, frontal sinus valved glaucoma shunt (E. Benson Hood Laboratories, Pembroke, MA, USA) in maintaining normal intraocular pressure (IOP) in dogs with primary glaucoma. Methods: Selection criteria included dogs with acute primary glaucoma and goniodysgenesis having histologic confirmation of primary glaucoma via one eye requiring or having been previously enucleated or eviscerated with intraocular silicone prostheses for chronic primary glaucoma. The frontal sinus valved glaucoma shunt was implanted in the recently affected globe when glaucoma developed and was poorly controlled using antiglaucoma medications. Cicatization was confirmed by IOP greater than 30 mmHg and vision deficits. IOP was normalized preoperatively using standard topical antiglaucoma medications with the exception of pilocarpine. A routine anesthetic protocol was used. Both eyes were routinely surgically prepared and the dog was positioned in dorsal recumbency. A skin incision was made overlying the rostral compartment of the frontal sinus and a hole was made into this compartment using a Steinmann pin and Jacob's chuck. A 60-mm long valved glaucoma shunt of silicone tubing was designed and professionally manufactured. This shunt was seated into the frontal sinus hole. A bulbar conjunctival incision at 12 o'clock was made. The conjunctival and frontal sinus incisions were closed. Postoperative treatments, at 2–4 week intervals, the first treatment performed prior to wound closure.

Results: One dog (Jack Russell terrier) was included in this study. The dog's left eye was eviscerated with intraocular silicone prostheses for chronic primary glaucoma. The right eye received the frontal sinus valved glaucoma shunt. The dog has retained vision OD for 5 months; IOP in the prosthesis while the right eye received the frontal sinus valved glaucoma shunt. The dog has retained vision OD for 5 months; IOP in the prosthesis while the right eye received the frontal sinus valved glaucoma shunt. The dog has retained vision OD for 5 months; IOP in the prosthesis while the right eye received the frontal sinus valved glaucoma shunt. The dog has retained vision OD for 5 months; IOP in the prosthesis while the right eye received the frontal sinus valved glaucoma shunt. The dog has retained vision OD for 5 months; IOP in the prosthesis while the right eye received the frontal sinus valved glaucoma shunt.

Conclusions: None.

ABSTRACT NO.: 29
Characterization of retinal and optic nerve after acute ocular ischemia and stem cell transplantation in rats
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Purpose: To functionally characterize the status of the rat retina and optic nerve after acute elevation of intraocular pressure (IOP) and stem cell transplantation. Methods: Retinal ischemia was induced in 32 rats by acutely increasing the IOP (110 mmHg/60 min). Direct and consensual pupil light reflexes (PLR) were recorded from the unoperated eye, and electrotetrogram (flash and flicker ERG) were recorded from the operated and control eyes preoperatively and postoperatively. Adult rat hippocampal neuronal progenitors were transplanted in 13 rats (10 days after surgery), while eight rats received frozen progenitors as a transplant. Results: Preoperative values for the PLRmax (ratio = consensual/direct PLR, non-transplanted rats, n = 11) were 76.7 ± 2.6 (mean ± SEM, %). Twenty-four hours postoperatively the PLRmax was 15.2 ± 12.8; 10 days postoperatively 11.6 ± 9.8, 20 days postoperatively 26.5 ± 6.0, and 28 days postoperatively PLRmax was 33.27 ± 9.3. However, at day 35 the PLR was significantly recovered when compared to the 24-h postoperative values (PLRmax = 41.1 ± 7.3%, P < 0.01, repeated measures ANOVA). Forty-two days after surgery the PLR started to decrease once again in the operated eyes (PLRmax = 28.7 ± 5.9, n = 11). Electrotetrogram amplitudes (full field flash ERG) followed a similar pattern. Cone responses (flicker ERG) were measured 42 days postoperatively and revealed defects in operated eyes control eyes: 46.6 ± 2.9, frozen eyes: 46.8 ± 3.1 µV). Histologic analysis revealed ischemic damage to all retinal layers with the primary defects localized to central retina. Rats which received stem cell transplant did not significantly improve the PLR function compared to rats which received frozen (dead) cells as a transplant (P > 0.05, paired t-test). Conclusions: Acute ocular ischemia causes significant decrease in retinal function as measured by pupillary light reflex and electroretinogram, although over time the rat retina and optic nerve temporarily recovered function. A transplantation of neuronal progenitors (neuronal stem cells) did not improve or preserve the PLR function. Supported by an Interinstitutional Grant from the College of Veterinary Medicine-Iowa State University and the College of Medicine-University of Iowa and Glaucoma Foundation, NY.

Commercial interest: None.

ABSTRACT NO.: 30
Aerobic conjunctival flora of healthy dogs in Sao Paulo
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Purpose: To identify the microorganisms of the aerobic conjunctival flora of healthy dogs in Sao Paulo, Brazil. Methods: Transversal descriptive study. Seventy-eight dogs (Afghan Hound, American Pit Bull Terrier, Belgian Shepherd, Border Collie, Brazilian Terrier, Bichshund, English Cocky Spaniel, German Shepherd, Great Dane, Irish Setter, Maltese, Poodle, Rottweiler, Weimaraner, Yorkshire and mixed breeds) were selected. Samples were put onto thioglicolate broth, blood agar, chocolate agar and Sabouraud agar. The media were transported in plastic containers, kept at room temperature and processed within 28 days. Regardless of breed and age, a total of 78 samples (59.77%), angina (12.8%), Staphylococcus gama-hemolitic viridans (1.22%), and Proteus sp. (1.28%) were identified. No fungus grew in the Sabouraud agar during the 30-day storage. Analysis of the aerobic conjunctival flora of healthy dogs in Sao Paulo, Brazil

Conclusions: Aerobic conjunctival flora of healthy dogs in Sao Paulo, Brazil

Commercial interest: None.

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Effects of different dose schedules of ofloxacin on intraocular pressure and pupil size in the glaucomatous Beagle
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Purpose: Evaluate changes in intraocular pressure (IOP) and pupil size (PS) in glaucomatous dogs after instillation of 0.03% ofloxacin (Lumigan-Allergan, Irvine, CA, USA) once in the morning or evening, or twice daily in multiple dose studies. Animals studied: Eight Beagles with moderate stage of inherited primary open angle glaucoma.

Methods: Appplanation tonometry (IOP) and pupil size (PS) measurements at 8 am, 10 am, 12 noon, 2 pm, and 4 pm in eight glaucoma dogs. Methyleneblue (0.5%) as placed in the control eye and 0.005% ofloxacin (opposite drug eye) were instilled onto the second through to the fifth day with instillations in the morning (8:30 am), one time a day, or twice daily (8:30 am and 8 pm).

Statistical comparisons between drug groups included control, placebo, and both treatment eyes for individual dogs. Results: In the 8-am ofloxacin study, measurements at baseline IOP were significantly different from all groups. Significant changes in pupil size were noted after 4 days on topical instillation of ofloxacin at 8 am daily.

For the next 3 days, the mean ± SEM diurnal changes in baseline IOP for the placebo and drug eyes for the first day were 2.8 ± 1.1 mmHg and 3.1 ± 0.8 mmHg, respectively. Compared to the fellow placebo eye, the diurnal changes in IOP were significantly different. Significant changes in pupil size were similar to the IOP changes. The study was performed for 3 weeks, and significant changes were found to be similar to the first week. For the 4 subsequent days, the mean ± SEM diurnal changes in IOP for the placebo and drug eyes for the first day were 7.9 ± 1.4 mmHg and 4.0 ± 2.5 mmHg, respectively. The mean ± SEM diurnal changes in baseline IOP after 0.03% ofloxacin at 8 am once daily for the next 4 days were 25.0 ± 3.2 mmHg, 25.6 ± 2.9 mmHg, 25.3 ± 0.6 mmHg, and 26.0 ± 3.2 mmHg, respectively, and were significantly different from the control eye. Significant miosis also occurred starting 2 h post drug instillation.

Conclusions: Topical instillation of ofloxacin at 8 am daily had a greater impact on IOP and PS in glaucomatous dogs than placebo instillation. In this pilot study, ofloxacin aqueous humor concentrations did not exceed MIC90 for the majority of canine ocular contaminants but ofloxacin did exceed MIC90 for a moderate number of contaminants and would be a more appropriate prophylactic choice for canine cataract patients. Supported by ACVO Resident’s Research Grant and Cornell Dean’s Fund for Clinical Excellence.

Commercial interest: None.

ABSTRACT NO.: 33
Clinical application of ultrasound biomicroscopy in veterinary ophthalmology
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Purpose: To determine the value of ultrasound biomicroscopy (UBM) for the diagnosis and management of anterior segment diseases in clinical patients.

Methods: High frequency ultrasound biomicroscopy (50-MHz piezoelectric B-Mode transducer) was used with a lateral and axial tissue resolution of 50 μm and a penetration depth of 5 mm. The patients were examined under general anesthesia and the images were made in lateral recumbency with the eye oriented in a horizontal plane. The cornea was topically anesthetized with 0.5% proparacaine and stay sutures were placed around 5 mm away from the limbus at the 3 o’clock and 9 o’clock positions. An eye cup (20–26 mm in diameter) was inserted between the eyelids. The eye cup was sealed with methylcellulose at its base, and then filled with saline as a couplant. The transducer tip was inserted into the eye cup until it was immersed in the coupling solution.

Results: All anterior segment lesions of our clinical series (corneal melanoma, glaucoma, iris cysts and ciliary body tumor) could be clearly imaged by UBM. The orientation of the transducer perpendicular to the scanned area appeared to be critical in obtaining images of good quality. UBM was especially useful for the determination of the size, depth, and anatomical location of all lesions. For example, the corneal osequestrum was observed to involve all corneal layers and extend to Descemet’s membrane, information which would have been unavailable from slit-lamp biomicroscopy and other imaging techniques. The differentiation between solid and cystic lesions was easily made due to the characteristic internal acoustic pattern of those structures. Precise measurements of neoplastic lesions could be obtained and the tumor margins and extent of invasion were accurately determined. All information was helpful in planning and performing the surgical treatment. In the few cases where histopathology of the globe was available, the pathologic findings were favorably compared to the findings obtained by UBM.

Conclusions: High frequency ultrasound biomicroscopy is a valuable, noninvasive technique for the evaluation and diagnosis of anterior segment lesions in animals. Images of high resolution, similar to low-power microscopic sections, can be obtained. General anesthesia of the patients is necessary and the placement of stay
sutures helps to manipulate the globe during the scanning procedure.

Commercial interest: None.

ABSTRACT NO.: 34
The influence on nanoscale topography on cell behavior: why smaller is better
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Purpose: To engineer surfaces with nanoscale topographic features that mimic basement membrane and to evaluate the importance of these features on cell behavior. Methods: Using electron-beam lithography, silicone wafers were etched with grooves and ridges of various dimensions and coated with silicone oxide to achieve a uniform surface. A variety of cell types and assays were developed and used to characterize basic cell behaviors including orientation, adhesion, migration, differentiation, and cytoskeletal signaling. Results: Human corneal epithelial cells oriented parallel to grooves and ridges of nanoscale dimensions. In addition, this orientation was modified by environmental factors. Focal adhesion distribution occurred on large nanopatterned surfaces more commonly than on small nanopatterned surfaces. Exposure to shear stress conditions demonstrated human corneal epithelial cells form stronger adhesions on small vs. large nanopatterned surfaces. Furthermore, fish keratocyte migration and PC-12 cell differentiation was enhanced on nanopatterned surfaces. Expression of G-proteins, associated with cytoskeletal activity, was modified on nanopatterned surfaces. Conclusions: Biologic length scale features resembling the basement membrane modulate fundamental cell behaviors important to the maintenance of homeostasis and wound healing processes. Additionally, these findings have relevance to tissue engineering and the development of corneal protheses.

Commercial interest: None.

ABSTRACT NO.: 35
Effect of ammonia gas concentration and duration on meat-type chicken cornea
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Purpose: Determine the effect of increasing ammonia gas concentrations and duration of exposure on bruler chicken cornea. Methods: Two separate trials were conducted where 60-day-old, male, commercial broiler chicks were placed in each of eight environmentally controlled chambers on 10 cm of fresh, kiln dried pine shavings and supplied continuous food and lighting. Anhydrous ammonia was metered into six of the chambers to maintain 25, 50, and 75 p.p.m. (two chambers for each level). No ammonia was added to the remaining two chambers (controls). At the beginning of each trial, 10 birds were randomly selected from each chamber, permanently identified, and had weekly ocular examinations through the remainder of the study. The examiner was blinded to the chamber origin of each bird. At 4 weeks, ammonia treatment was stopped and birds were grown to market weights. Results: Birds exposed to 25 p.p.m. ammonia demonstrated keratitis at 3 weeks of exposure similar to keratitis observed in birds exposed to 75 p.p.m. ammonia for 1 week. No anterior uveitis was observed in birds from the 25 p.p.m. ammonia chambers. Severe keratoconjunctivitis and uveitis were observed in birds exposed to 50 p.p.m. and 75 p.p.m. ammonia for 1 week. Severity of the keratitis and uveitis tended to worsen dependent on duration of exposure and concentration of ammonia. Body weights were most affected by the 75 p.p.m. level; this group gained 75% of the control at 3 weeks of age, but had recovered to 90% of the control at 7 weeks. Conclusions: Birds exposed to low levels of ammonia gas demonstrate ocular disease and higher concentrations of ammonia gas increase the incidence of uveitis and reduce growth rates. Supported by USDA-ARS.

Commercial interest: None.

ABSTRACT NO.: 36
Effect of an inactivated vaccine against Leptospira interrogans on the frequency and severity of uveitis in horses with recurrent equine uveitis
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Purpose: The objective was to evaluate the effect of vaccination against L. interrogans on the frequency and severity of subsequent episodes of uveitis in horses with equine recurrent uveitis (ERU). Methods: The study was a randomized, double blind clinical trial. Patients were obtained by referral from private practitioners or by advertisement in local newspapers. Diagnosis of ERU was based on history and ophthalmic examination by a board certified veterinary ophthalmologist. Clients whose horses met our case definition were asked to sign a consent form after which the horse was randomly assigned to the vaccination or control group. Horses in the vaccinated group received 1 mL of an adjuvant only control group. Horses in the vaccination group received 1 mL of an adjuvant only control group. Horses in the vaccination group received an ophthalmic examination and serum was taken for antibody titers against six serovars of L. interrogans. Control horses received 1 mL of adjuvant only. Horses were vaccinated, given an ophthalmic examination and serum was taken for antibody titers against six serovars of L. interrogans on days 0, 28, 180 and 365. Clients were instructed to return for an examination at each of every 28 days to verify recurrent of uveitis. Reactions to the vaccine and recurrence during the 14-day post vaccination period were compared among treatment groups. Life table analysis was used to test the hypothesis that days to first recurrence after the second vaccination differed among treatment groups. The multivariate model included days to first recurrence as the dependent variable and treatment status, initial titer ≥ 400, active uveitis on entering study and interaction between initial titer and active uveitis on entering study as independent variables. Difference in geometric mean serum antibody titers against each L. interrogans serovar between day 0 and 28 and day 0 and 180 were evaluated with a paired t-test.

Results: A total of 64 horses were enrolled in the study. One horse in the vaccinated group and two horses in the control group had recurrences within 14 days of vaccination. Significant increase in antibody titer against L. interrogans was found on days 28 and 180 when compared to day 0 in the vaccinated group but not in controls. The proportion of horses in the vaccinated group that experienced one or more recurrences, 7/25 (30%), was lower than controls, 11/21 (57%) although the difference was not significant (P = 0.2). Days to first recurrence in vaccinated horses was longer than in control horses (P < 0.05). Conclusions: Data support vaccination against L. interrogans is safe and may reduce the frequency of recurrences of ERU. Supported by Fort Dodge Animal Health #47228.

Commercial interest: None.

ABSTRACT NO.: 37
Canine optic neuritis; 25 cases (1992–2001)
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Purpose: To identify signalment, clinical, etiologic and prognostic factors associated with optic neuritis in canines. Methods: A retrospective analysis was performed of the medical records of all canines that were diagnosed with optic neuritis at the University of Georgia, College of Veterinary Medicine between 1992 and 2001. A logistic regression method was used and analysis was performed under a 95% level of significance. Results: A review of the UGA-CVM medical records identified 25 dogs with the diagnosis of optic neuritis. Sixteen dog breeds were represented: three large breeds (n = 5), three medium breeds (n = 4), and 10 small breeds (n = 14). The ages ranged from 4.8 months to 11 years (mean 6.07 years). Ten male (16% intact, n = 8, 24% neutered, n = 6) and 15 female (16% intact, n = 4, 44% spayed, n = 11) were diagnosed with optic neuritis. Nineteen dogs (76%) presented with signs consistent with retrobulbar disease and 6 dogs (24%) presented with signs consistent with unilateral optic neuritis. Retrobulbar disease was diagnosed in 12 dogs (n = 8) of the dogs and 10 dogs (n = 12) of the cases had positive titers for one or more of the following infectious disease(s): Lyme disease (n = 5), canine distemper virus (CDV)
(n = 4), toxoplasmosis (n = 3), and Rocky Mountain spotted fever (RMSF, n = 2). A positive titer for an infectious disease correlated with the etiologic diagnosis in 25% (n = 5) of the total cases (CDV n = 4 and RMSF n = 1). Granulomatous meningoencephalitis (GME) was the etiologic diagnosis in 68% (n = 17) of the cases. Of the cases diagnosed with GME, 31% (n = 6) had a positive titer for one or more infectious agents. A meningioma (n = 1) was diagnosed in one dog and one dog was diagnosed with idiopathic optic neuritis (n = 1). Cerebrospinal fluid analysis (CSF) was performed in 80% (n = 20) of the cases. A significant correlation was made between CSF inflammatory response and visual outcome (P < 0.0250). One-hundred percent (n = 8) of the cases with normal visual field (NVS) and 80% (n = 16) of the cases with partial visual field (NV) demonstrated no significant differences between right and left eyes. However, in the two cases with absolute visual field (NV), visual field examination was performed in 16% of the cases and aided in determining the underlying etiology in 77.77% (n = 7) of the cases (MRI n = 1 and CT-scan n = 6). Antibiotic therapy was initiated in 72% (n = 18) of the cases and a positive response was observed in 5% (n = 1). Corticosteroid (CCS) therapy was initiated in 84% of the total cases (n = 21) and 90% (n = 19) regained vision. Of the total cases, 84% (n = 21) regained vision and in the four cases that did not regain vision, 50% (n = 2) did not receive CCS therapy. Conclusion: The most common etiology for optic neuritis in dogs is GME (68%). Infectious disease was positively correlated to optic neuritis in 20% of the total cases. A positive correlation exists between the CSF inflammatory response and visual outcome. Commercial interest: None.

ABSTRACT NO.: 38
Characterization of the pupil light reflex, electroretinogram and tonometric parameters in healthy rat eyes.
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Purpose: To characterize the pupil light reflex (PLR), electroretinogram (ERG) and nonparametric parameters in healthy rat eyes. Methods: Brown Norway rats were used for experiments. The PLR was evaluated with a computerized pupillometer (n = 27), ERGs were recorded simultaneously from both eyes (n = 27) and IOP was measured with a Tonopen (n = 15). Results: The analysis of the PLR parameters confirmed the consensual PLR was significantly smaller in amplitude (P < 0.01) and increased latency time (P < 0.001) compared to the direct PLR. Electroretinography (1600 ± 280 cd/m²) revealed a-wave amplitude of 207.2 ± 13 μV and the b-wave 5543 ± 28.4 μV. The flicker ERG recording revealed amplitudes of 40 ± 2.4 μV. The simultaneous recording of the flash and flicker ERG responses did not reveal significant differences between right and left eyes in all tested parameters (amplitudes P > 0.05, Paired t-test and latency times P > 0.05, Paired t-test). The results of the flash ERG showed no significant correlations between latency and amplitudes (P > 0.05, Paired t-test and latency times P > 0.05, Paired t-test) for flicker ERG responses. Tonometry measurements revealed that intracranial, but not halothane, anesthesia suppressed the IOP (nonanesthetized: 25.3 ± 1.0 mmHg; 1% halothane ± 30% NO: 26.2 ± 1.1 (P > 0.05); 1% isoflurane ± 30% NO: 20.1 ± 1.6 (P < 0.05)). Conclusions: Consensual PLR in rats has a relative deficit compared to the direct PLR. Isoflurane anesthesia has a suppressive effect on the IOP in healthy rat eyes. Supported by Interinstitutional Grant (College of Veterinary Medicine-Iowa State University and College of Medicine-University of Iowa) and Glaucoma Foundation, NY. Commercial interest: None.

ABSTRACT NO.: 39
Lamellar keratoplasty in dogs using equine fetal membrane as a graft experimental study
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Purpose: To evaluate the applicability of the equine fetal membrane (amniotic membrane, corion and alantoid) as a graft in lamellar keratoplasty in dogs. Methods: Nine mixed-breed dogs were used, according to the ARVO statement for use of animals in ophthalmic and vision research. Superficial keratectomy was performed with a 5-mm trephine and a 6-mm-in-diameter fragment of the fetal membrane that was sutured in place with 8-0 nylon simple interrupted sutures. Clinical exams were performed on days 2, 7, 15 and 60; afterwards the animals were euthanized and the eyes were emulated for histologic study. Results: Clinically, one could observe slight corneal edema close to the implant from the early phases until the middle stage of the investigation. The neovascularization appeared progressively, its higher intensity was observed at the intermediate phase, disappearing gradually. At 60 days, one could notice a macula at the surgery site. The histologic findings showed epitheplization and perfect integration of the graft to the receptor tissue at early stages; the cellular and vascular reactions were more intense in this phase. On day 15, the vascular elements were reduced in relation to the matrix and cellular elements. No inflammatory infiltrate in the graft or in the site of the suture was observed at any stage. Conclusions: The equine fetal membrane (amniotic membrane, corion and alantoid) can be useful as a graft in lamellar keratoplasty in dogs. Commercial interest: None.

ABSTRACT NO.: 40
Signet-ring amelanotic anterior uveal melanoma in a cat
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Purpose: We describe the clinical presentation, diagnosis and histopathologic identification of a signet-ring amelanotic melanoma in a cat. Methods: This is a retrospective study of a clinical case. Results: A 12-year-old, neutered male diabetic cat was presented for progressive enlargement of an iridal mass OD that had been present for approximately 3 weeks. The mass lesion was unresponsive to topical and systemic anti-inflammatory therapy and serologic titers for FIP and FeLV were negative. On admission, ophthalmic examination demonstrated a 4 ± 0.6 mm mass invading the lateral aspect of the right pupillary margin. The mass was causing moderate iritis at the edges of the lesion which appeared to extend to the periphery of the lateral iris OD. Aside from the iridal lesion OD, physical examination revealed only an overweight cat. A CBC and chemistry panel were unremarkable. Thoracic radiographs and abdominal ultrasonography did not demonstrate any evidence of metastasis. The owner elected further diagnostic work-up and elected an iridal biopsy to diagnose the cause of the mass lesion. Histopathology of a biopsy of the iridal mass confirmed the diagnosis of this subtype of melanoma. Because the mass invaded the posterior epithelium of the iris and appeared to invade the peripheral iris clinically, the eye was enucleated. Histopathology confirmed the diagnosis and demonstrated tumor cells invading into the ciliary body and the drainage angle and impinging on the scleral venous plexus. Repeat evaluation for metastasis 3 months after enucleation demonstrated splenic nodules. Cytologic evaluation of the nodules confirmed the diagnosis and demonstrated tumor cells invading into the ciliary body and the drainage angle and impinging on the scleral venous plexus. The splenic nodules had not grown on re-evaluation 1 month later. Nine months after enucleation, the cat has not developed any other ocular disease or clinical signs of metastasis. Conclusions: Amelanotic uveal melanoma is an uncommon diagnosis in any species and has only been reported in one other cat. That cat had diffuse clinical disease and died of suspected metastasis 5 months after enucleation. To our knowledge, signet-ring melanoma has not been reported in the eye of any veterinary species prior to this report. The signet-ring morphology is not known to have any prediction of biologic behavior but further cases need to be evaluated. This case demonstrates the importance of amelanotic melanoma as a diagnostic rule-out in cats with diffuse and/or focal nonpigmented iridal lesions. Commercial interest: None.

ABSTRACT NO.: 41
The effect of topical 1% morphine sulfate on pain and corneal wound healing in the dog
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Purpose: To evaluate the effect of topical 1% morphine sulfate (MS) on pain and corneal wound healing in dogs. Methods: Ten hounds
with normal ophthalmic exams underwent keratolony to create a 7-mm superficial corneal ulcer in the right eye. Six dogs received 100 μL 1% MS and four received 100 μL saline placebo TID beginning immediately after surgery. Dogs were scored before and 30 min after treatment daily for blepharospasm, hyperemia, epiphora and aqueous flare on a scale of 0–3. Aesthesiometer readings and pupil size were measured before and 30 min after treatment. Days to wound healing were recorded. Globes from seven dogs were evaluated histologically as compared with paired and unpaired t-tests.

Results: There was significantly less blepharospasm (P < 0.005) in dogs 30 min after receiving MS, while there was no difference in control dogs. Aesthesiometer filament length that produced a response was significantly less (P < 0.05) in dogs 30 min after receiving MS, while there was no difference in control dogs. Days to ulcer healing and histologic appearance did not differ between MS and control dogs. Conclusions: Topical 1% MS produced an analgesic effect in dogs with corneal ulcers and did not interfere with normal wound healing. Supported by Edna Jacobsen MS produced an analgesic effect in dogs with corneal ulcers and did not interfere with normal wound healing. Supported by Edna Jacobsen

ABSTRACT NO.: 42 Laser-induced mouse model of glaucoma
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Purpose: To develop an inducible and reproducible mouse model of glaucoma. Methods: We induced obstruction of aqueous humor outflow in adult C57Bl6 mice (n = 42) by combining injection of indocyanine green dye (ICG) into the anterior chamber, followed by dorsal laser treatment of the trabecular meshwork and episcleral veins enriched with the dye. Mice received either 60 or 100 laser applications. To evaluate aqueous humor flow, fluorophotometry was performed with a slit-lamp biomicroscope equipped with a high integration CCD camera. Fluorescence was measured at 15-min intervals after topical application of the dye. Consensual reponse being present in control and laser-cauterization treated animals. The function of the retina and optic nerve was evaluated with electroretinography and computerized pupillometry. The intraocular pressure (IOP) was measured with a modified Goldmann tonometer. Results: Fluorescein clearance was decreased in mice after laser-induced surgery (n = 6). A consensual pupillary response was present in control mice (n = 11), the indirect response being 4.7 ± 0.7% smaller than the direct; this allowed us to record the pupil of the unoperated eye in response to a light stimulus to each eye. Animals receiving laser treatments without ICG (n = 5) or ICG without laser (n = 5) did not develop relative afferent pupillary defects or ERG amplitude defects. Operated animals receiving 60 laser pulses (n = 8) with ICG had developed a relative afferent pupillary defect (consensual = 8 ± 0.35% of direct) 7 days after surgery, which increased to 20.6 ± 8.4% at 30 days and to 12.5 ± 3.8% by 90 days after surgery. ERG amplitudes were significantly decreased in operated eyes (P = 0.05, paired t-test). Animals receiving 100 laser pulses with ICG developed the severe defect. Fifteen days after surgery, the operated eyes had developed relative afferent pupillary defects (consensual = 9.8 ± 1.1% smaller than direct) and significant ERG amplitude defects (control eyes: a-wave = 20 ± 20 μV, b-wave = 50 μV, operated eyes: a-wave = 30 ± 10 μV, b-wave = 90 μV). Operated eyes had an almost complete relative afferent pupillary defect by 30 days postoperatively, with unchanged ERG amplitudes (operated eyes a-wave = 50 ± 10 μV, b-wave = 50 μV). Intracocular pressure measurement revealed significantly elevated IOP in operated eyes 14 days after laser surgery (control eyes: 18.2 ± 1 mmHg, operated eyes 16.2 ± 2.2 mmHg, P = 0.0003, paired t-test, n = 7). Histologic examination of the laser-cauterized eyes revealed presence of the corneal edema, anterior synchia, thinning of all retinal layers and optic nerve glucosidation with vacuolization of the retinal ganglion cell axons. Conclusions: Laser-induced mouse model of glaucoma is a reliable method for evaluation of visual function and aqueous humor outflow kinetics in mice. Diode laser treatment of the indocyanine green saturated trabecular meshwork and episcleral veins is an effective procedure for the induction of glaucomatous changes in mouse eyes. Supported by an InterInstitutional Grant from the College of Veterinary Medicine, Iowa State University, and from the College of Medicine, University of Iowa, and by a Research Incentive Award from Iowa State University. Commercial interest: None.

ABSTRACT NO.: 43 Ocular cryptococcosis in cats: nine cases
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Purpose: To describe nine cases of ocular cryptococcosis in cats. Methods: Medical records of cats with a diagnosis of cryptococcosis and ocular lesions from the College of Veterinary Medicine at The Ohio State University and from the College of Veterinary Medicine, Iowa State University were retrospectively reviewed. Results: Seventeen cases of systemic cryptococcosis were identified during the study period. Nine of 17 cases had confirmed ocular lesions. Mean age of the cats was 5.9 ± 3.7 years, and no apparent breed or gender predilections were identified. The presenting signs were variable, ranging from behavioural changes (n = 2), nasal discharge (n = 2), cataracts (n = 2), and hematuria (n = 1). Severe visual impairment was present in six cats, and two were avascular in one affected eye. Ophthalmic findings included bilateral diffuse choriorientinitis (n = 7), bullous retinal detachment (n = 4), anterior uveitis and hyphema (n = 4), vitreal infiltrates (n = 3), and nodular blepharitis (n = 2). One cat was IVF-positive, but the other eight patients were negative for FeLV and FIV. Concurrent renal failure was diagnosed in two cats. St. Jovian cat and active toxoplasmosis in another cat. Five patients were indoor/outdoor cats, but four were strictly indoors. Contact of one of the indoor cats to a pet bird was documented, potential exposure to soil from potted plants was not excluded for the other indoor cats. Oral fluconazole was used in four cats, and oral itraconazole was used in the other four cats as main drug and in maintenance as one cat. Two cats were euthanized shortly after diagnosis, one cat died from severe complications 1 months later, three cats showed improvement of ocular signs with regaining of vision in one blind cat, three cats improved systemically but remained blind in one or both eyes. Conclusions: Ocular lesions are a common manifestation of systemic cryptococcosis in cats, primarily manifesting as multifocal choriorientinitis. Immune status in regard to retroviruses does not seem to increase the susceptibility to cryptococcus. In this series of cats, it was not possible to identify any known risk factor, but treatment with either fluconazole or itraconazole was effective in some cases, with improvement and resolution of systemic signs and choriorientinitis. Commercial interest: None.

ABSTRACT NO.: 44 Physiologic changes in intraocular pressure of newborn Thomson gazelles. A unique animal model
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Purpose: In 2000 we reported the mean intraocular pressure (IOP) in the Thomson gazelle (Gazella thomsoni) to be 7.6 ± 1.6 mmHg. Though the study was conducted in anesthetized animals, it is reportedly the lowest IOP recorded in a mammalian species. The purpose of this study was to monitor IOP in alert, newborn gazelles, with the aim of evaluating physiologic factors that may affect IOP in this species. Methods: Six newborn Thomson gazelles were hand raised and habituated to handling by a single investigator (YT). This habituation enabled us to conduct tonometry in unanedated animals during the first 4 months of life, following which the animals were returned to the herd. During these 16 weeks, applanation tonometry was conducted twice a week, and a diurnal IOP curve was generated once a month. Changes in body weight and in intraocular dimensions (determined by ultrasound)
were monitored on a weekly basis. Results: Overall, 1177 averaged Tono-Pen readings were obtained from the six animals (three males, three females). A trend for progressive decrease in IOP with age was observed. Mean IOP (± standard deviation) during the first 2 weeks of life was 12.28 ± 4.7 mmHg. Mean IOP at age 15–16 weeks was 10.84 ± 1.64 mmHg (P = 0.05). Mean IOP in females (13.21 ± 3.72) was significantly higher than mean IOP in males (11.18 ± 3.45 mmHg) (P < 0.001). A significant diurnal trend was not observed.

Conclusion: The results of this study confirm that even in the unmedicated Thomson gazelle, IOP is extremely low. The decrease in IOP with age suggests that IOP in the adult gazelle may be lower than in newborns, reinforcing our earlier findings. Further studies are required to elucidate the anatomical and physiologic factors that may account for this low pressure, as well as for the gender and age differences. Investigation of the mechanisms governing aqueous production, drainage and equilibrium in the Thomson gazelle may contribute to our understanding of the pathogenesis of glaucoma.

Supported by an internal grant from the Hebrew University of Jerusalem, Israel. Commercial interest: None.

ABSTRACT NO.: 45

Findings from 16 consecutive cases of penetrating keratoplasty for deep stromal abscess in the horse (2001–2002)

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Purpose: To evaluate the clinical and pathologic findings, surgical procedure, visual outcome, and complications associated with 16 consecutive cases of penetrating keratoplasty for deep stromal abscesses in the horse.

Methods: Medical records of horses with a deep stromal abscess that were treated with penetrating keratoplasty between 2001 and 2002 were reviewed. Results: Sixteen cases were identified during the study period. Twelve of 16 horses presented during the fall/winter months. Mean age ± standard deviation was 11 ± 5 years. All horses presented for deep stromal abscess and had been treated medically for 1–8 weeks. One horse presented with decreased vision and corneal ulceration that were not related to the abscess. Two horses had melting corneal ulcers in the superficial cornea over their abscessed region. Most horses (81%) had a concurrent moderate to severe anterior uveitis with hypopyon. By cytoplasmic or histopathologic evaluation or microbial culture, fungi were identified in 8/16 eyes, bacteria in 2/16 eyes, mixed bacterial and fungal infection in 1/16 eyes, and no organisms were identified in 5/16 eyes. Tectonic corneal grafts, stored at ≈80°C, and sized between 5 and 12 mm in diameter were used. Three horses received a heterogenic (canine) graft and 13 horses received an allogenic graft. A full thickness section of cornea was removed with a corneal trephine, the donor graft sutured in the site with 8–0 or 9–0 vicryl, and a rotational pedicle conjunctival graft placed over the corneal graft. Mean follow-up interval was 6 months (range 4–52 weeks). All horses showed signs of graft rejection (i.e. edema, vascularization) and 6/16 horses had retraction of the conjunctival graft within 1–2 weeks postoperatively. Other complications included corneal graft dehiscence and iris prolapse 3/16 (19%), a slight decrease in graft size 3/16 (19%), focal anterior capsular/cortical cataract 4/16 (25%), and severe uveitis 1/16 (6.06%). Three horses had a second surgery to treat one or more of these complications. Horses receiving a heterograft had a statistically significant increased risk of graft failure and iris prolapse. Larger lesions and grafts tended to have more complications, such as uveitis and graft failure. Visual outcome was assessed as excellent in 13/16 (81%) of the cases. Conclusions: Use of heterografts was associated with a poorer outcome. A second surgery to repair corneal or conjunctival graft failure, if allowed by the owner, resulted in an improved outcome. The use of penetrating keratoplasty for deep stromal abscessation in the horse resulted in a visual outcome in 81% of cases and is an alternative technique to topical or systemic medical therapy, or other forms of surgical therapy. Commercial interest: None.

ABSTRACT NO.: 46

Idiopathic inflammatory orbital pseudotumor in two cats

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Purpose: To describe the clinical features, pathologic findings, and outcome associated with idiopathic inflammatory orbital pseudotumor in two cats. Methods: Medical records of two cats that were diagnosed histopathologically with diffuse orbital fibrosis with aggregates of inflammatory cells were retrospectively reviewed. Results: An 11-year-old castrated male and a 13-year-old castrated female Domestic Short-hair with clinical signs referable to an orbital mass lesion. Historical complaints included 1–2 months history of sneezing, ocular discharge and nonhealing corneal ulceration. Both cats were referred for a unilateral enlarging or fixed, immobile globe. Initial examination findings included exophthalmos, decreased ocular motility, protrusion of the nictitans, marked resistance to retroperfusion of the globe, periorbital redness and edema, lagophthalmos, and superficial corneal ulceration. Maxillary gingival hyperplasia was also present on the affected side. Both cats had a mild peripheral eosinophilia, negative FeLV/FIV serology, and normal thoracic radiographs. A diffuse hyperceregmentic, and an increased soft tissue opacity in the retrobulbar space and scleral thickening were seen on ultrasound and CT evaluation, respectively. Both cats were treated with exenteration of the orbit. Widespread and dense connective tissue with marked fibroplasia, multifocal lymphoplasmacytic infiltrate, and no evidence of neoplasia were present microscopically. The conjugal tissue and nictitans were also fibrotic. At 2 weeks and 3 months, respectively, exophthalmos was detected in the remaining eye. Local radiation using teletherapy, and systemic anti-inflammatory and immunosuppressive therapy failed to alter the progressive course of the orbital fibroplasia and both cats were euthanized.

Conclusions: Orbital pseudotumor is defined as any non-specific orbital inflammation without evidence of specific local or systemic causes. Idiopathic inflammatory orbital pseudotumor is a distinct clinicopathologic entity in the cat, with unilateral presentation that progresses to bilateral involvement, and multiple tissue involvement. The clinical course and pathology of the two feline cases presented here more closely resembles the fibrous/sclerotic form of orbital pseudotumor in humans. As the disease progresses, fixation of the orbital structures by fibrous tissue infiltration results. The poor outcome in the two cases presented here was due to the owners choosing euthanasia rather than exenteration of the remaining eye. As in humans, the fibrotic form of this disease does not appear to respond well to radiation therapy. Two horses had reassuring outcome and aggressive therapy earlier in the course of the disease, if possible, may be more beneficial. Further investigation into an inciting cause, such as an underlying pathogen, eosinophil degranulation products, or aberrant production of fibrogenic cytokines, is indicated. Commercial interest: None.

ABSTRACT NO.: 47

Ascorbic acid levels in plasma and aqueous humor of dogs with diabetic cataract

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Purpose: Diabetes is an important factor for cataract formation in dogs as well as in humans. In experimental models, the association between cataract formation in diabetic animals and oxidative stress has been described. Humans with diabetic cataract present lower total aqueous humor antioxidant status when compared to senile cataract patients. In addition, decreased levels of ascorbic acid in plasma were described for diabetic cataract in humans. In this paper we investigated the ascorbic acid levels in plasma and aqueous humor of dogs with diabetic cataract. Methods: We measured ascorbic acid levels in the plasma and aqueous humor from male or female diabetic dogs aged 7 years or over with cataract (n = 7) and compared with clear mixed breed dogs (n = 14). All animals were submitted to cataract lens extraction and the blood glucose levels were under control. High pressure liquid chromatography with UV detection was employed for ascorbic acid quantification. Statistical analysis of the results were performed using the Student's t-test. Results: The levels of ascorbic acid in aqueous humor and plasma from diabetic dogs were lower when compared with the clear dogs (P = 0.0643 for aqueous humor and P = 0.0972 for plasma). Conclusion: Our results suggest an association between plasma and aqueous humor ascorbic acid levels and cataract formation in diabetic dogs. Commercial interest: None.

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ABSTRACT NO.: 48
Clinical and histologic features of corneal repair with porcine small intestinal submucosal grafting
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Purpose: To describe the clinical and histologic features of corneal repair with porcine small intestinal submucosa grafting.
Methods: Partial thickness lamellar keratectomies were performed in the right eyes of 10 normal dogs of various breeds using an 8-mm trephine adjusted to 0.5 mm depth. Porcine small intestinal submucosa (SIS) grafts were placed over the lesions and sutured with 9-0 nylon sutures. All dogs were treated daily with slit-lamp biomicroscopy and scored for corneal opacification, vascularization, conjunctival hyperemia, chemosis, blepharospasm, discharge, and pupil size and symmetry. Five dogs were euthanized at 2 weeks and five dogs were euthanized at 4 weeks postoperatively. Both eyes were enucleated immediately following euthanasia and fixed in Bouin’s solution. Following routine processing and paraffin embedding, sections of the anterior segment were stained with hematoxylin and eosin and were evaluated by light microscopy and assigned scores for corneal fibrosis, vascularization and cellular infiltration. Scores for clinical parameters at 1, 2, 3 and 4 weeks were analyzed with nonparametric tests. Scores for histologic parameters were analyzed with the paired t-test. A P-value of < 0.05 was considered significant.
Results: Ten of 10 grafted eyes demonstrated negative fluorescein-dye uptake by day 14. Averaged weekly scores for blepharospasm, hyperemia, chemosis and ocular discharge all showed downward trends over the study period, but no significant differences were noted when comparing week 1 through to 4. However, there were statistically significant increases in corneal vascularization and opacification scores over the study period (P-values = 0.044 and 0.0001, respectively). No significant differences were found in histologic scores between the 2- and 4-week groups. Vascularization was first noted in all of the grafted corneas by day 10. Vascularization was mild in 5 of 10, moderate in 3 of 10, and marked in 2 of 10. Fibrosis was mild in 7 of 10, moderate in 2 of 10, and severe in 1 of 10. Corneal cellular infiltration was lymphocytic-plasmacytic in 7 of 10, absent in 2 of 10, and pyogranulomatous in 1 of 10. There was no evidence of graft material at 2 or 4 weeks. No clinical or histologic abnormalities were found in any of the control eyes.
Conclusions: Corneal wound healing with SIS occurred by epithelial hyperplasia, stromal vascularization, and fibrosis. SIS seems to be well tolerated and may be useful in corneal graft procedures. Commercial interest: None.

ABSTRACT NO.: 49
Glutamate redistribution and retinal degeneration in canine glaucoma
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Purpose: Glaucoma involves the progressive death of retinal neurons, especially ganglion cells, and loss of retinal function. Extracellular levels of the major neurotransmitter glutamate increase in some types of glaucoma, contributing to neuronal death and loss of function. The purpose of this study was to determine the immunocytochemical distribution of glutamate in glaucomatous and control canine retinas and assess if focal glutamate loss from neurons in damaged regions may contribute to progressive damage or altered neuronal function in these regions.
Methods: Retinas from clinical cases of angle-closure glaucoma in dogs were examined for retinal degeneration (13 retinas) and glutamate distribution (11 retinas). Vibratome (50-μm) and paraffin (3-μm) sections were stained with cresyl violet for morphology and a monoclonal antibody to glutamate was used with a Vectastain elite ABC kit for immunocytochemical localization of glutamate.
Results: Glutamate immunostaining was seen in all control and glaucomatous retinas, particularly in the inner nuclear and inner plexiform layers (INLs). Retinal sections also had regions with thinned inner nuclear layers (INL ≤ 15 μm), which spanned a range of 7–100% of the length of the section depending on severity. Immunostaining for glutamate indicated that the inner layers of control retinas contained very high concentrations of glutamate. In the thick regions of the INL (> 21 μm) of glaucomatous retinas, there remained control densities of immunostaining for glutamate. In the thinnest regions of the INL of glaucomatous retinas, significantly lower densities of glutamate immunostaining were seen (approximately 50% of controls). The thinning of INLs in the severely affected regions corresponded with the loss of density of staining in the INL suggest that large amounts of glutamate were lost from these regions. Conclusions: Angle closure glaucoma to the dog leads to an irregular thinning of the INL in addition to loss of retinal ganglion cells. Immunostaining suggests that intracellular glutamate content is selectively reduced in the more damaged regions. The decreased neuronal glutamate in the damaged regions may (1) be a result of release of neurotoxic glutamate into the extracellular fluid and (2) may also affect neuronal function in these regions. Whether or not intracellular glutamate losses precede and contribute to neuronal death via raising extracellular concentrations to toxic levels remains to be determined.
Commercial interest: None.
ABSTRACT NO.: 51
The effect of varying laser energy on semiconductor diode laser transscleral cyclophotocoagulation (TSCP) in the normal horse eye
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Purpose: To determine the acute histologic effect of diode laser TSCP on the pars plicata of the ciliary body with varying laser energies to find an energy level that would cause coagulation of the ciliary epithelium and stroma without marked architectural disruption and loss of anatomical integrity. Methods: TSCP was performed in ten eyes of five horses at 20 sites in the dorsotemporal quadrant, 4 mm posterior to the limbus. Laser energy was varied from 0.75 to 4 J (J) per site. In addition, power and time settings in three groups were varied such that one eye was treated with a longer time, lower power (LT/LP) setting and the other eye with a shorter time, higher power (ST/HP) setting. Eyes were enucleated immediately after euthanasia and evaluated histologically. Twenty slides were examined for each laser energy group and each slide was given a numeric grade of 0–10 based on the most severe lesion observed. Numerical scores were then averaged to give a score to each energy level group. Results: The following lesions were observed: no changes apparent, vascular congestion, pigment dispersion, epithelial coagulation necrosis, stromal coagulation necrosis, epithelial separation, vascular wall coagulation necrosis, epithelial disruption, scleral coagulation necrosis, and ciliary body disruption. The mean histologic score for each group was 2.2 (range 0–4). The LT/LP was 2.2 (range 0–4), the ST/HP was 2.2 (range 0–4) and the LT/HP was 2.8 (range 1–6). Conclusions: Initial settings for diode laser TSCP in the equine eye should be 2.25 J/site which is achieved using time/power settings of 1500 ms/1500 mW. This can be adjusted up or down, but 0.75 J/site does not cause sufficient damage, and 4 J/site disrupts the normal architecture. Differences in time vs. power settings were inconsistent and no conclusions can be made regarding time/power setting interactions. Funded by the Ohio State University Equine Research Funds and the Ohio State University Comparative Ophthalmology Research Funds. Commercial interest: None.

ABSTRACT NO.: 52
Methods and characteristics used in resident selection within the the American College of Veterinary Ophthalmologists
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Purpose: To determine the methods and criteria applied in the selection process for residents in training for the ACVO. Methods: Three different surveys were sent to three different populations of veterinarians. The first was used to survey ACVO members that select and train residents. The second was sent to ACVO members that do not select and train residents. The last survey was sent to veterinarians that had applied to residency programs. Results: The ACVO generally employ subjective evaluation techniques in selection of residents. The ophthalmologist(s) responsible for the training was the person primarily responsible for resident selection. They seemed on occasion to share the resident’s responsibility, that was intelligent, could communicate well, was hard working and worked easily with others. The most influential aspect of the candidate’s application was their knowledge of the program. The location of placement were sighted at the time of the last follow-up examination. The most common concurrent ocular disease pre or postsurgery is keratoconjunctivitis sicca in 1/9 dogs. Conclusions: Spontaneous lens capsule rupture associated with diabetes mellitus, cataract and rapid lens intumescence occurs in the canine. Early surgical intervention, prior to secondary complications of glaucoma and loss of retinal function is associated with a favorable outcome. IOL placement is still possible in some eyes. Long-term follow-up care and medication are required in these patients. Supported by OSU Comparative Ophthalmology Fund. Commercial interest: None.

ABSTRACT NO.: 54
Apoptosis and DNA damage in lens epithelial cells: normal vs. cataract
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Purpose: Apoptosis or regulated cell death is a method used by multicellular animals to rid themselves of excessive or damaged cells without inflammation. Apoptosis can be induced by the cell itself, nearby cell(s), or by external sources of DNA damage. Lens epithelial cells have been shown to be sensitive to such insults as UV light and hydrogen peroxide leading to cataractous changes. We compared normal and cataractous canine lens epithelial cells using reverse transcription-polymerase chain reaction (RT-PCR) in order to determine whether five apoptosis-associated genes were present or absent. Bel-7 is an apoptosis inhibitor, Caspase 3 is
up-regulated during apoptosis, c-Fos and c-Jun are pro-apoptotic transcription factors that are up-regulated prior to Caspase 3, and Gadd45 is a gene that is up-regulated in response to DNA damage.

Methods: Two sample populations were collected. Twelve normal anterior lens capsules were harvested from euthanized adult dogs from the local animal shelter. The interspace lens capsules from normal dogs were divided into two regions, central and equatorial. Lens capsules were immediately frozen at −80°C until processing. Five cataractous anterior capsule samples were collected during routine phacoemulsification cataract extraction and immediately frozen at −80°C until processing. Total RNA was extracted from capsules using TRIzol (Sigma) and frozen. RNA was quantitated by UV spectrophotometry, then standard one-tube RT-PCR was performed (Access RT-PCR, Promega). RT-PCR products were visualized using 1.5% agarose gel electrophoresis stained with ethidium bromide, then transferred to a nylon membrane for Southern blot analysis. Routine Southern blot analysis was performed using digoxigenin-labeled oligonucleotide probes for each specific gene to confirm RT-PCR results.

Results: Gadd45 was present in all cataractous samples, two (16.7%) of the central samples and one (8.3%) of the equatorial samples of the normal anterior epithelium. Bcl-XL was present in 73% of normal and 20% of cataractous samples. Caspase 3 was present in 100% of both normal and cataractous samples, though the bands were more intense in the normal samples. C-Fos was present in 100% of normal and 80% of cataractous samples. C-Jun was present in all normal and cataractous samples.

Discussion: The presence of Gadd45 in the cataractous and a few normal central samples confirms that DNA damage is occurring in these cells. The normal lens undergoes oxidative stress and DNA damage at all times and more so during cataractogenesis. Bcl-XL is a member of the Bcl family which has both activators and inhibitors of apoptosis. The presence of Bcl-XL, an inhibitor of apoptosis, indicates that normal LEC are better able to defend themselves against apoptosis compared to cataractous LEC. C-Fos and c-Jun transcription factors that can determine cell apoptosis. They may be up-regulated in the majority of samples because some level of apoptosis is occurring or going to occur in normal and cataractous lens epithelial cells. The presence of caspase 3 in all normal and cataractous samples and Bcl-XL suggests that there are cells undergoing apoptosis at all times. Conclusions: The results of this study conclude that apoptosis is occurring in normal and cataractous lens epithelial cells. We can also conclude that DNA damage is occurring in cataractous lens epithelial cells and this may be leading the cells to apoptotic death. The normal LEC may be able to prevent apoptosis and repair DNA damage better than cataractous LEC. Funded by the American Society of Veterinary Ophthalmology. Commercial interest: None.

ABSTRACT NO.: 55

Integrated hydroxyapatite orbital implant for use with a cosmetic cornecocular prosthetic after enucleation in a horse

S. Pizzirani,* L. C. Johnston,† N. R. Urdiales† and B. C. Gilger*

Purpose: To examine the pharmacokinetics of fusidic acid in feline tear fluid and ocular tissues following topical application of a single drop of fusidic acid.

Methods: A 5-year-old, castrated male, thoroughbred horse underwent right eye enucleation because of a penetrating injury 10 days before presentation and following endophthalmitis. The horse was a high performing athlete and the owners requested a highly cosmetic result. A 40-mm Hydroxyapatite (HA) orbital implant was placed in an homologous scleral shell collected from a cadaver eye 24 h before surgery. After the enucleation, the extraocular muscles were sutured into the scleral shell in order to allow movement of the prothetic globe. A conformer was specifically prepared and fitted to insert precisely into the conjunctival sacs to achieve a better cosmetic result. After surgery, the horse was treated with intravenous potassium penicillin G (2000 000 U q 12 h) and flumixin meglumine (500 mg q12h) for 24 h. After 24 h, oral sulfamethoxazole and trimethoprim (9600 mg q12 h) and flumixin meglumine (500 mg q12 h) was continued orally for an additional 8 days. The orbital conformer was removed once daily, the orbit lavaged with sterile saline, antibiotic ointment applied, and the conformer was replaced. Results: The horse was re-evaluated 4, 10 weeks and 6 months after surgery. The initial black conformer was replaced with the finished prosthesis and the final appearance allowed some movement of the eye and an excellent cosmetic appearance. At 6 months after surgery the horse appeared comfortable with the prosthesis, it was cosmetic, and the owner was able to easily replace and store for the prosthesis.

Discussion: Hydroxyapatite (HA) orbital implants, which are made from marine coral, are the most common type of implant used in humans. The HA implant allows vascular and fibrous tissue ingrowth from the host orbit into the implant therefore decreasing possibility of implant extrusion, implant infections, and allows enhanced healing of defects of overlying conjunctiva. Future studies may indicate the use of the HA implant permits motility and assists in the prevention of implant extrusion. Commercial interest: None.

ABSTRACT NO.: 56

Bilateral neuroepithelial choristomas of the optic disc in a cynomologous monkey (Macaca fascicularis): a case report

R. J. Jung,* V. Behrana Jensen,† T. W. Bouldin‡ and R. L. Peiffer, Jr†

Purpose: This case report describes bilateral neuroepithelial choristomas of the optic disc in a cynomologous monkey (Macaca fascicularis). The disease caused no apparent visual impairment, the lesions were nonprogressive, and histopathologic studies revealed the lesions to be consistent with neuroepithelial choristomas of the optic discs.

Methods: After initial detection of the optic disc lesions during routine screening examinations on colony animals, the ophthalmologic examinations with slit-lamp biomicroscopy and indirect ophthalmoscopy were performed at 1, 2, 4, 6 and 8 months from the initial examinations. Fundus photography was performed to document the appearance of fundus. Fluorescein angiography was performed 6 months after the initial examination. At the end of the eighth month the animal was humanely sacrificed. The eyes were removed and fixed in Davidson’s solution. The eyes were removed and fixed in Davidson’s solution for routine processing and paraffin embedment (FP) and necropy was performed. Results: Slit-lamp biomicroscopic examinations revealed no abnormalities in the anterior segment, lens, or anterior vitreous. Indirect ophthalmoscopy examination revealed bilateral, proliferative, white lesions with irregular fuzzy surfaces. The lesions were irregularly oval, 0.1–0.2 disc diameters in diameter, and appeared to be elevated with extension into the vitreous from the superior aspect of the optic disc. They obscured underlying retinal vessels. The optic discs appeared otherwise normal, and no abnormalities of the vitreous or retina were evident. The lesions remained unchanged throughout the period of observation and no signs of visual impairment were noted. Fluorescein angiography revealed no abnormalities in the blood–retinal barrier. Histopathology revealed that the lesion was composed of cells with oval basophilic nuclei and inconspicuous cytoplasm interspersed with large numbers of nerve fibers that stained positively with luxol fast blue. The lesion was identified as a neuroepithelial choristoma.

Conclusions: We have classified this proliferation of ependymal cells, neurons, and myelinated axons as a multiforme choristomatous process because of its bilaterality, nonprogressive course, and the well-differentiated morphology of the constituents. The descriptor ‘neuroepithelial’ accounts for both the neuronal and glial elements. ‘Choristoma’ is preferred to hamartoma because oligodendrocytes are not normally present in the prenatal optic nerve. Lesions such as this may occur occasionally in primates and pose no risk to the vision or health of the animal. Commercial interest: None.

ABSTRACT NO.: 57

Determination of the concentration of sodium fusidate in feline tear fluid and ocular tissues following topical application of fusidic acid

G. J. McLeLLan,* M. A. Cobb,t P. Lymburt and I. M. McLean6

Purpose: To examine the pharmacokinetics of fusidic acid in feline tear fluid and ocular tissues following topical application of a single drop of fusidic acid.
Fucithalmic® Vet. Methods: One 30 mg drop containing 1% fusidic acid formulated in a viscous carbomer base (Fucithalmic® Vet, LEO Laboratories Ltd, Buckinghamshire, UK) was applied to the left eye of 14 clinically normal, mixed-breed cats. Tear fluid samples were obtained from both eyes of three cats at 2 h, four cats at 6 h, three cats at 12 h and four cats at 24 h post-treatment. In all subjects, tear fluid samples were obtained by inserting a 6-mm diameter, Whatman AA filter paper disc in the inferior conjunctival sac for 60 s. In a further experiment, conjunctival and conjunctival tissue samples were obtained from both eyes of cats euthanized at timed intervals (two cats at each time interval) of 2, 6, 12 and 24 h after application of a single drop of fusidic acid to both eyes, and from one untreated, control cat. Fusidic acid activity was determined by disc diffusion assay for tear fluid samples and by cylinder plate assay for conjunctival and conjunctival tissue samples. ‘Oxford Staph’ NCTC 6571 was used as an indicator strain for both assays and standard curves were prepared using known concentrations of sodium fusidate. Results: The mean concentration of fusidic acid in the tear fluid and each of the ocular tissues is presented in the table below. Fusidic acid was not detected in any of the control samples.

<table>
<thead>
<tr>
<th>Time (h)</th>
<th>Tears (mg/L)</th>
<th>Conjunctiva (µg/g)</th>
<th>Cornea (µg/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 h</td>
<td>&gt; 2.49</td>
<td>&gt; 4.41</td>
<td>0.14</td>
</tr>
<tr>
<td>6 h</td>
<td>&gt; 4.41</td>
<td>&gt; 7.43</td>
<td>0.16</td>
</tr>
<tr>
<td>12 h</td>
<td>0.47</td>
<td>1.75</td>
<td>0.17</td>
</tr>
<tr>
<td>24 h</td>
<td>1.62</td>
<td>&lt; 0.14</td>
<td>&lt; 0.14</td>
</tr>
</tbody>
</table>

Conclusions: Following the topical application of a single drop of Fucithalmic® Vet to the lower conjunctival sac of normal feline eyes, fusidic acid reached concentrations in excess of the MIC90 of the Staphylococcus species typically isolated from feline conjunctivitis in the tear fluid at all time points except 12 h post-treatment and was readily detected at significant concentrations in the conjunctiva at all time points, with the greatest concentration being achieved at 24 h post-treatment. The support of LEO Animal Health is gratefully acknowledged. Commercial interest: None.

ABSTRACT NO.: 58
Follow-up study of cats previously diagnosed with post traumatic sarcocoea and possible effects on lifespan
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Purpose: The purpose of this study was to try and determine how the diagnosis of Post Traumatic Sarcocoea (PTS) in cats affects their lifespan and what histologic evidence might be used to help estimate survival.

Methods: The cats used in this study were taken from a database of cases submitted to the COPLOW lab with the diagnosis of PTS. Of the 44 cases selected from 1980 to early 2001, follow-up information was obtained from only 26. This information consisted of age at the time of diagnosis, whether the cat is still living or the time from diagnosis to death, and if there was any history of local recurrence or metastasis.

Histologically, the tumors were graded based on the amount of necrosis, mitotic index, and morphology. Any evidence of extraleral extension was also recorded.

Results: The cats ranged in age from 5 years to 19 years with a mean of 12 years. Only 7 of the 26 cats are currently still living. The time from diagnosis to the time of death ranged from as early as 2 months to as long as 3 years with a mean of 11 months. The cats with evidence of metastasis or local recurrence only survived an average of 7 months. The living cats had a mean time since diagnosis of 2 years with the longest being 5 years. In only 10 of the cases was the exact cause of death known. Nine of these cats died as a result of either local recurrence or distant metastasis. The other nine dead cats were known to be dead but the exact cause was not diagnosed.

There was evidence of extraleral extension in 16 of the 19 dead cats and in two of the seven living cats.

Conclusions: The diagnosis of post traumatic sarcocoea has serious consequences for the life span of cats. On average, cats had a mean survival time of only 11 months. This was decreased to 7 months in cases with known spread or recurrence of the tumor. This data, coupled with the average age of diagnosis of 12 years means a significantly decreased lifespan. Histologically, evidence of extraleral extension is an important factor seen in 19 of the 26 cats.

Detection and emulsification is crucial for the survival of the cat. An important consideration that warrants further study is the emulsion of the eye at the time of initial trauma prevent any neoplastic changes in the future. Supported by COPLOW. Commercial interest: None.

ABSTRACT NO.: 59
A spontaneous neovascular vitreoretinopathy with features of retinopathy of prematurity (ROP) in five cats
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Purpose: Experimental induction of a vitreoretinopathy useful as a model of human ROP has been documented in cats extensively. Neonatal kittens are exposed to ambient hyperoxia for several days then transferred to room air, develop a cessation of retinal periphery vascularization and neovascular sprouts into the vitreous which mature into a fibrovascular membrane in the central vitreous while the peripheral retinas avascular. This report documents a spontaneous neovascular vitreoretinopathy with similar features.

Methods: Five affected cats were identified from a pool of 2100 feline cases submitted to C.O.P.L.O.W. Morphologic characteristics were made from H&E and Alcan blue PAS stained slides and immunohistochemistry was used to evaluate expression of GFAP, and VEGF.

Results: Five cats, ranging in age from 3.5 months to 4 years were presented after enucleation due to blindness, glaucoma, and buphthalmia. Abnormalities were not reported in the other eye. All the submitted eyes had complete retinal detachment, fibrovascular membranes extending into the posterior vitreous adjacent to the retina, and an avascular peripheral retina. Glaucoma was due to preridal fibrovascular membranes and peripheral anterior synchia in all eyes. Both GFAP and VEGF were up-regulated in the retina and expressed in the preretinal neovascular membrane.

Conclusions: A bilateral vitreoretinopathy with features identical to these cases can be induced in kittens by exposing them to hypoxic conditions for 4 days followed by a return to room air. We do not know the neonal environment in any of the affected cats. A spontaneous neovascular vitreoretinopathy with features of ROP occurs in cats. Commercial interest: None.

ABSTRACT NO.: 60
The effect of modified medial canthoplasty on cases of corneal pigmentation in brachycephalic dog breeds
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Purpose: The objective of this study is to report the effect of a modified medial canthoplasty (MMC) surgical procedure on cases of corneal pigmentation in brachycephalic dog breeds.

Methods: Twenty-two MMC procedures were performed from April 2001 till March 2002. Five cases (10 eyes) were done for the purpose of the treatment of corneal pigmentation. They were in two Shih-Tzu, two Pugs, and one French Bulldog. Comparisons between before and after MMC were made on four parameters: corneal transparency, corneal pigmentation, corneal neovascularization, and discharge/epiphora. They were judged by four grades: significant improvement, some improvement, no change, or deterioration. Analysis periods after surgery were: two cases after 3 weeks, and one case each after 2 months, 3 months and after 6 months. The surgical technique is described as an application of a modified medial canthoplasty (MMC) on dog's epiphora by incising the medial palpebral ligaments. RESULTS: Significant improvements in corneal transparency were observed in eight eyes, and some improvement in corneal transparency observed in two. As to corneal pigmentation, four eyes had significant improvement, and two eyes had no change. There was no change in two eyes with respect to corneal neovascularization; significant improvements were observed among all eyes. The two eyes with no changes in corneal pigmentation and corneal neovascularization were in a 9-year-old male Pug with a short review time of 3 weeks after surgery.

Discussion: When we applied
MMC on ten eyes of five cases of brachycephalic breeds with corneal pigmentation, we confirmed no improvements in pigmentation and corneal neovascularization for two eyes of one case but improvement of cornea transparency, discharge and epiphora in all cases. The reason for those improvements were considered to be the reduction of the palpebral fissure at the medial canthus and the creation of a lacrimal lake that resulted in additional tear film formation and stability. The case with no improvement of pigmentation had the most severe corneal pigmentation. For both cases improvement should come after more time. We must still carefully review those cases where favorable results were not obtained. As to MMC, this is achieved by relieving the tension of the lower eyelids by incising the medial palpebral ligament. It is rather easy to adjust and reduce the palpebral fissure depending on the magnitudes of the symptoms. Accordingly, the MMC method can minimize the changes of facial appearance after the operation, and is expected to be a widely utilized clinical application of the treatment of ocular surface disorder in brachycephalic dogs.

Commercial interest: None.

ABSTRACT NO.: 61
Application of modified medial canthoplasty (MMC) for canine epiphora
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Purpose: Surgical treatment for dogs with epiphora was reported by Peiffer et al. in 1978 and Jensen et al. in 1979, but no additional surgical treatment has been reported since. The causes for epiphora not due to irregularity of the lacrimal punctum and lacrimal duct are considered to be problems with the formation of the lower eyelid margin, tension of the medial palpebral ligament, and cilia and hairs of medial canthus. In order to improve those factors we created a modified medial canthoplasty (MMC) technique by partially incising the medial palpebral ligament. In this report this treatment method and the result of the operation were presented.

Methods: Twenty-two cases of MMC were conducted between April 2001 and March 2002. Seven cases were done for the purpose of the treatment of epiphora. They consisted of four Shih-Tzu, one Miniature Dachshund, one Toy Poodle, and one Miniature Dachshund. Comparisons of the existence of discharge and epiphora before and after MMC were made. They were evaluated by four different graders. Some improvements, some improvement, no change, deterioration. The palpebral fissure length was also evaluated. We were unable to confirm lacrimal duct drainage by the water passage test at the time of surgery. The surgical technique as follows: (1) A small incision was made of the skin of the medial canthus. (2) The incision was continued along the zygomatic periosteum into the small incision was made of the skin of the medial canthus. (3) As needed, upper and lower eyelid incision was continued along the zygomatic periosteum into the orbital bone for the Shih-Tzu, about 2 mm of upper and lower eyelid margins were resected for the other cases. (4) Hair around the lacrimal caruncle and conjunctiva were removed. (5) Finally, an interrupted suture was done of the conjunctiva and skin using 6-0 absorbable surgical suture. Significant improvements of discharge were observed on all cases. As to epiphora, six cases had significant improvements but one case of Miniature Dachshund had some improvement. With respect to the four cases in the Shih-Tzu, the reduced palpebral fissure was observed. In the case of the Maltese, epiphora was decreased and there was no recurrence of hair cast observed. In the case of Maltese, epiphora was decreased and there was no recurrence of hair cast pigmentation afterwards for another year. Discussion: Medication function in all seven cases was improved after the surgery as the lacrimal punctum was opened to improve lacrimal drainage. The uniqueness of the MMC in the relief of the tension of lower eyelids toward the zygomatic periosteum aided the resolution of epiphora. Excluding the Shih-Tzu, symptoms were improved without shortening the palpebral fissure. This treatment is an effective method for epiphora of Maltese and Toy Poodles which does not require reducing the palpebral fissure. On the other hand, with respect to Shih-Tzu it can be considered that the reduced palpebral fissure results in the improvement of not only epiphora but also corneal exposure.

Commercial interest: None.

ABSTRACT NO.: 62
Evaluation of neomycin, polymixin B, dexamethasone ophthalmic ointment as a cause of abortion in llamas
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Purpose: To evaluate whether therapeutic dosages of topical dexamethasone-containing ophthalmic ointment will cause abortion in llamas and to determine if serum levels are detectable after treatment.

Methods: Eight llamas, at mid-gestation, were divided into two groups of four. The experimental group received neopolydex ointment in the left eye 3 times per day for 8 days, the negative control group received triple antibiotic ointment (TAB) in the left eye 3 times per day for 8 days. The llamas were observed until 2 weeks following the last treatment. A peripheral blood sample was drawn from each llama before every morning treatment, and every morning for 2 weeks following the last treatment. At the end of the study period, a positive control, those llamas that had not aborted received dexamethasone (0.5 mg–10.0 mg/llama) intravenously one time to terminate the pregnancy. Later, in late-gestation (because the fetuses in this study were required for another study), IV administration of dexamethasone and/or topical neopolydex were given in late gestation in the hope of inducing abortion in those that failed to abort. Serum was evaluated for dexamethasone by radioimmunoassay.

Results: Detectable serum levels of dexamethasone were found within 24 h of initiating treatment in the experimental group, and in all four llamas, levels were at or near baseline within 24 h of the last treatment. Dexamethasone was not detected in the serum of any from the control group. No abortions occurred following topical ophthalmic therapy in either group or after IV administration of dexamethasone. Six of eight llamas that received IV dexamethasone during late gestation aborted on days 5–7 of treatment. Two weeks after the IV injection, the two llamas that did not abort were treated with neopolydex ointment in one eye, 3 times per day for 8 days. Both llamas aborted during the 8-day treatment period.

Conclusions: Topical administration of dexamethasone containing ophthalmic ointment results in systemic absorption and detectable serum levels. The llama’s sensitivity to systemic administration of dexamethasone during pregnancy is well known, but sensitivity to topical preparations has not been documented. This study suggests that application of dexamethasone containing ophthalmic ointment can cause abortion in llamas and that llamas are most sensitive to the drug during late gestation.

Commercial interest: None.

ABSTRACT NO.: 63
Borzoi retinopathy
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Purpose: This study investigated the pathogenesis and heritability of Borzoi retinopathy.

Methods: Fifty-five Borzois were examined over 5 years. Serial ophthalmoscopical photographs documented lesions. Full field flash and flicker electroretinography were performed to evaluate retinal function. Fluorescein angiography was completed in affected dogs to characterize any vascular changes. Pedigrees were collected for Borzois and analyzed to determine if lesions may be inherited in a pattern consistent with a recognized mode of inheritance. A test-bred litter of six dogs was produced from two affected Borzois.

Results: Eleven affected dogs were identified and their ages ranged from 7 months to 5 years at diagnosis. The oldest affected dog examined was 6 years old. Serial ophthalmoscopical examinations revealed that lesions were not present in dogs less than 3 months old, but were usually present by 18 months of age. None of the affected dogs developed demonstrable visual deficits. Serial photographs demonstrated that none of the lesions were progressive. Results of electroretinographic testing were within reference ranges. Fluorescein angiography revealed a delayed, patchy filling of the choroidapillaris. Pedigree analysis excluded autosomal dominant and sex-linked modes of inheritance. Five-month-old dogs from the test-bred litter had similar-sized lesions at the time of submission of this abstract.

Conclusions: Focal lesions of Borzoi retinopathy are not progressive. Borzoi retinopathy is characterized by delayed, patchy chorioidapillaris filling. Retinopathy is not inherited as an autosomal dominant or sex-linked trait. Supported by Companion Animal Grant 7–78624.

Commercial interest: None.

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