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Veterinary Eye Institute

veterinaryeyeinstitute.com
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Thank You
2022 Planning Committee
Welcome to the 53rd Annual Scientific Conference of the American College of Veterinary Ophthalmologists

Introduction for Annual Conference Proceedings

David Ramsey, DVM, DACVO
Chairperson, ACVO Program Committee

ACVO Conference Attendee,

It is my pleasure to welcome you to the 53rd Annual Scientific Conference of the American College of Veterinary Ophthalmologists. Welcome to Palm Springs—the proverbial playground of the elite—movie stars and veterinary ophthalmologists! Palm Springs is also known as the golf and tennis capital of the world. The ACVO Planning Committee believes you will find this venue exceptional and inviting.

Last year, Dr. Bill Miller, ACVO Executive Director Ms. Stacee Daniel, and the entire ACVO Office Staff delivered an exceptional hybrid ACVO conference. Based on responses from the post-conference survey last year, the most commonly cited request by ACVO members about the conference format was the ability to be in-person, on-site, and face-to-face with colleagues, friends and vendors. The Planning Committee attended to your requests—here we are in person! There is no way to replace attendance at live presentations which permits in-person engagement of our audience with participant presenters during the meeting. We plan to deliver an impressive in-person conference. As is customary, all presentations will be recorded for reviewing after the conference and at a later date.

This year, the Board of Regents (BOR) approved a Planning Committee proposal to expand the number of members serving on the Planning Committee. The goal of this proposal is to improve the Annual Conference planning, preparation, and execution, and to create more memorable, enjoyable, and valuable educational experience for all attendees. The BOR approved the addition of a Vendor Representative as a liaison to enhance vendor experience and value and to improve attendee-vendor interactions. Also approved was the addition of a member of the Association of Veterinary Ophthalmic Technicians (AVOT) as a liaison with the Planning Committee. A decision was also made to add three other Diplomate members to make the Planning Committee more robust and able to accept increasing demands and responsibilities of the Planning Committee. It is our expectation that these new Planning Committee members will add substantial input, direction, communication and improvement to the Planning Committee, and subsequently, to the quality of the Annual Conference experience.

The Planning Committee selected 48 scientific podium presentations and 45 poster presentations this year which you will find interesting and informative. Poster presentation sessions will occur on Thursday and Friday and authors will be in attendance with their posters during the afternoon breaks to answer questions and for further intellectual discussion.
The Planning Committee also added a third In-Depth presentation this year for a total of three In-Depth presentations. We would like to thank our In-Depth speakers in advance for their time and commitment to this program. Dr. Brad Nadelstein will commence the In-Depth series by speaking about “Principles of Canine Vitreoretinal Surgery and Their Applications.” This presentation will be trailed by a number of scientific presentations on posterior segment ocular disease. Dr. Terah Webb will present the 2nd In-Depth lecture with a presentation and her experience using “Endolaser: Case Selection, Utility, and Post-Operative Care.” This In-Depth presentation will then be followed by a series of scientific presentations about surgical and medical treatments of glaucoma and laser treatment. Dr. David Maggs will then grace us with his knowledge and expertise about “Managing Feline Herpesvirus—One Bloke’s Opinion.” Dr. Maggs is a captivating, engaging, and entertaining speaker who is recognized internationally as an expert on Feline Herpesvirus.

Conference attendees will also be treated to the Master’s Course which will be presented by physician ophthalmologist Dr. Uday Devgan, also known as the “Cataract Coach” and “The Doctor’s Doctor.” Professor Devgan is an extremely popular speaker who will provide an entertaining series on “Challenges in Cataract Surgery.” His lectures will be enlightening and instructive with advice and techniques about contemporary cataract surgery, and some of the more challenging cases.

The General Veterinary Practitioners’ Course has been a popular and informative lecture series for primary veterinary care providers. Attendees of the General Veterinary Practitioners’ course will receive practical and contemporary information about relevant topics in ophthalmology. This year’s course has been assembled by ACVO Regent Dr. Kathy Good, who has worked attentively to amass an esteemed group of veterinary ophthalmologist speakers. The Planning Committee extends a special thank you to the GP Course presenters—Drs. Tanja Nuhsbaum, Rachel Allbaugh, Brady Foote, Seth Eaton, Kristina Vygantas, and Lucien Vallone—who will provide valuable diagnostic and therapeutic advice about ocular conditions to benefit the general practitioner. This course will be recorded and made available for purchase by any interested veterinarians in the future. All ACVO members will be provided a complimentary on-line link to these presentations and may share these lectures with veterinary students, interns and residents free of charge as a member benefit, three months post-event. Watch your emails for the announcement.

The scientific program this year will offer up to twenty-one hours of RACE-approved continuing education (CE) for attendees. Attendees who choose to attend the Master’s Course and the General Veterinary Practitioners’ Course will also receive additional RACE-approved CE. (Currently pending RACE approval.)

We are also pleased to provide this year’s Keynote speaker, Dr. Gus Aguirre, who is a Diplomate and founding member of the ACVO. Dr. Aguirre is internationally recognized for his substantial contributions to vision science research which have spanned over five decades. Dr. Aguirre’s Keynote presentation “From Dogs to DNA—From the Cage to the Bedside” will address the Molecular Genetic Basis of Retinal Disease, and gene-based and other therapies for translational application. Please refer to the conference schedule for specific times and dates for all presentations.

This year’s Residents’ Workshop will be guided by Dr. Elizabeth Giuliano who will provide an exceptional focus on Adnexal Surgery. Attendees will find Dr. Giuliano an entertaining and gifted speaker who will capture the attention of our residents and provide valuable information about surgical management of eyelid and adnexal conditions. She will also impart valuable information about how to properly prepare for the ABVO practical examination.
The Annual Meeting of Voting Members (AMVM) of the ACVO will be held in-person in Palm Springs—see your schedules for further details. Based on previous years’ experience and survey-based member preferences, on-line voting for ACVO officers was held prior to the AMVM and we will enthusiastically welcome our newest leadership to the ACVO during the AMVM! Should you have any pressing concerns that need be addressed during the meeting of the AMVM, we encourage attendees to reach out to a Board member or ACVO Regent in advance of the AMVM.

Meeting attendees who enjoy running will gather again to partake in the annual ACVO Fun Run. Participants will be adorned with a T-shirt prior to the run and pictures will be posted on the ACVO website in the future.

We welcome back and acknowledge our gratitude for the support of our sponsors and exhibitors. Please make time to visit our exhibitors and sponsors in-person in the exhibit hall and follow-up with them throughout the year for all your practice needs.

Finally, I would like to extend my sincere gratitude to all members of the Planning Committee and ACVO Executive Office members. The phrase “It takes a village...” could not be more accurate! The amount of time and resources necessary to organize, plan, design, coordinate, troubleshoot logistics, and produce a conference of this magnitude, is monumental and requires a number of people who are dedicated and passionate about producing a truly exceptional and memorable meeting for all attendees. I extend special acknowledgments and appreciation to Ms. Stacee Daniel, Jason O’Brien, Teresa Black and the rest of the ACVO staff for their tireless dedication, experience, ideas, attention to intricate detail, and skill set they bring to the ACVO. Without their support and expertise, this conference would not be possible. I also wish to thank the members of this year’s Planning Committee—Dr. Bill Miller, Dr. Kathy Good—words can’t adequately express their dedication and contributions, and giving of their free time for numerous Zoom meetings held on evenings after work and on weekends. Their positive attitude and ambitious nature were fundamental to the successful and coordinated efforts to engineer this conference. I would like to thank the Resident Manuscript Award judges, meeting moderators, and many others who made this conference possible. Lastly, I would like to thank you, our colleagues, for choosing to attend this year’s ACVO Conference. A post-conference survey will be sent to all attendees following the conference—I appeal to you to complete this survey. Providing your feedback and member preferences will allow the Planning Committee to make the changes you want and meet the needs of our attendees for next year’s conference.

On behalf of the ACVO Planning Committee, welcome to Palm Springs and thank you for your attendance at this year’s Annual Conference! I look forward to seeing you again during our time together in Palm Springs.

Kindest regards,

David Ramsey, DVM, DACVO
Chairperson, ACVO Program Committee
ACVO
Diversity, Equity, & Inclusion

Thursday, October 27th
10:45am - 11:00am
Esmeralda 4

“Why Diversity, Equity, and Inclusion is important for each of us”

Come visit the ACVO DEI Committee Booth in the Esmeralda Foyer to learn more about this committee!
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WIFI INFORMATION

Complimentary WIFI

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Network: ACVO
Password: DECHRA22
### Tuesday, October 25, 2022

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>MONACO</td>
<td>ABVO Board Meeting</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>CORFU</td>
<td>ABVO Exam main room</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>BARCELONA</td>
<td>ABVO Exam room two</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>GIBRALTAR</td>
<td>ABVO Exam room three</td>
</tr>
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### Wednesday, October 26, 2022

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>MONACO</td>
<td>ACVO Board of Regents</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>SAN REMO</td>
<td>ABVO Residency Committee</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>ST. TROPEZ</td>
<td>ACVO Genetics Committee</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>TOULON</td>
<td>ABVO Credentials Committee</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>CORFU</td>
<td>ABVO Exam main room</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>BARCELONA</td>
<td>ABVO Exam room two</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>GIBRALTAR</td>
<td>ABVO Exam room three</td>
</tr>
<tr>
<td>9:00 a.m. - 5:00 p.m.</td>
<td>SARDINIA</td>
<td>ACVO Diversity, Equity, and Inclusion Committee</td>
</tr>
<tr>
<td>11:00 a.m. - 4:00 p.m.</td>
<td>ESMERALDA 5</td>
<td>Exhibit Hall Set-Up</td>
</tr>
<tr>
<td>3:00 p.m. - 8:00 p.m.</td>
<td>ROSE LAWN</td>
<td>Packet Pick-Up &amp; Walk-Up Registration</td>
</tr>
<tr>
<td>3:00 p.m. - 5:00 p.m.</td>
<td>CORSICA</td>
<td>ABVO MOC Committee</td>
</tr>
<tr>
<td>4:00 p.m. - 5:30 p.m.</td>
<td>CRYSTAL G, H</td>
<td>Teaching &amp; Learning</td>
</tr>
<tr>
<td>4:00 p.m. - 5:30 p.m.</td>
<td>CRYSTAL I</td>
<td>Telehealth in Veterinary Ophthalmology</td>
</tr>
<tr>
<td>6:00 p.m. - 8:00 p.m.</td>
<td>ESMERALDA 5</td>
<td>ACVO &amp; AVOT Welcome Reception</td>
</tr>
<tr>
<td>6:00 p.m. - 9:00 p.m.</td>
<td>ESMERALDA BOARDROOM</td>
<td>Speaker Ready Room</td>
</tr>
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### Thursday, October 27, 2022

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Event Description</th>
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</thead>
<tbody>
<tr>
<td>7:00 a.m. - 8:00 a.m.</td>
<td>ESMERALDA 5</td>
<td>Grab &amp; Go Breakfast in Exhibit Hall</td>
</tr>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>ROSE LAWN/FOYER</td>
<td>Packet Pick-Up &amp; Walk-Up Registration</td>
</tr>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>ESMERALDA BOARDROOM</td>
<td>Speaker Ready Room</td>
</tr>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>ESMERALDA 5</td>
<td>Exhibit Hall Open/Poster Session</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>CRYSTAL A, B, C</td>
<td>AVOT</td>
</tr>
<tr>
<td>8:00 a.m. - 9:00 a.m.</td>
<td>ESMERALDA 4</td>
<td>In-Depth, Retina</td>
</tr>
<tr>
<td>Brad Nadelstein, DVM, DACVO</td>
<td></td>
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</tr>
<tr>
<td>9:00 a.m. - 10:00 a.m.</td>
<td>ESMERALDA 4</td>
<td>General Session</td>
</tr>
<tr>
<td>Resident Manuscript Awards</td>
<td>Moderator: Dr. Victoria Lyons</td>
<td></td>
</tr>
<tr>
<td>10:00 a.m. - 10:45 a.m.</td>
<td>ESMERALDA 5</td>
<td>Break with Exhibitors</td>
</tr>
<tr>
<td>10:45 a.m. - 11:00 a.m.</td>
<td>ESMERALDA 4</td>
<td>ACVO Diversity, Equity, &amp; Inclusion</td>
</tr>
<tr>
<td>&quot;Why Diversity, Equity, and Inclusion is Important for each of us&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:00 a.m. - 12:00 p.m.</td>
<td>ESMERALDA 4</td>
<td>General Session</td>
</tr>
<tr>
<td>Moderator: Dr. Victoria Lyons</td>
<td></td>
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<tr>
<td>12:00 p.m. - 1:15 p.m.</td>
<td>SARDINIA</td>
<td>Attendees Lunch</td>
</tr>
<tr>
<td>on your own</td>
<td></td>
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<tr>
<td>12:00 p.m. - 1:15 p.m.</td>
<td>CRYSTAL I</td>
<td>ABVO Multi-Chair Lunch</td>
</tr>
<tr>
<td>by invitation</td>
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<tr>
<td>12:00 p.m. - 1:15 p.m.</td>
<td>SAN REMO</td>
<td>OFA CAER Exam Orientation Lunch</td>
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<tr>
<td>for New Diplomates</td>
<td></td>
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<tr>
<td>1:15 p.m. - 2:15 p.m.</td>
<td>ESMERALDA 4</td>
<td>Journal Editorial Lunch</td>
</tr>
<tr>
<td>Terah E. R. Webb, DVM, DACVO</td>
<td></td>
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</tr>
<tr>
<td>2:15 p.m. - 3:15 p.m.</td>
<td>ESMERALDA 4</td>
<td>General Session</td>
</tr>
<tr>
<td>Moderator: Dr. Louise O’Leary</td>
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</tr>
<tr>
<td>3:15 p.m. - 4:00 p.m.</td>
<td>ESMERALDA 5</td>
<td>Break with Exhibitors</td>
</tr>
<tr>
<td>Visit Poster Presenters in the Exhibit Hall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00 p.m. - 5:00 p.m.</td>
<td>ESMERALDA 4</td>
<td>Improving Consistency on OFA Exams</td>
</tr>
<tr>
<td>an Interactive Presentation</td>
<td></td>
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</tr>
<tr>
<td>5:00 p.m. - 6:00 p.m.</td>
<td>ROSE LAWN</td>
<td>ACVO Happy Hour</td>
</tr>
<tr>
<td>All attendees/exhibitors welcome</td>
<td></td>
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</tr>
<tr>
<td>6:30 p.m. - 9:00 p.m.</td>
<td>SANTA ROSA</td>
<td>VAF SUNDOWN SOIREE</td>
</tr>
<tr>
<td>6:30 p.m. - 8:00 p.m.</td>
<td>CAVA</td>
<td>MedVet Resident Dinner</td>
</tr>
<tr>
<td>by invitation</td>
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</tbody>
</table>
**Friday, October 28, 2022**

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Event Description</th>
</tr>
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<tbody>
<tr>
<td>7:00 a.m. - 8:00 a.m.</td>
<td>ESMERALDA 5</td>
<td>Grab &amp; Go Breakfast in Exhibit Hall</td>
</tr>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>ESMERALDA FOYER</td>
<td>Packet Pick-Up &amp; Walk-Up Registration</td>
</tr>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>ESMERALDA BOARDROOM</td>
<td>Speaker Ready Room</td>
</tr>
<tr>
<td>7:00 a.m. - 4:00 p.m.</td>
<td>ESMERALDA 5</td>
<td>Exhibit Hall Open</td>
</tr>
<tr>
<td>7:00 a.m. - 4:00 p.m.</td>
<td>ESMERALDA 5</td>
<td>Poster Session</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>CRYSTAL A, B, C</td>
<td>AVOT</td>
</tr>
<tr>
<td>8:00 a.m. - 9:00 a.m.</td>
<td>ESMERALDA 4</td>
<td>In-Depth, Feline Herpesvirus David J. Maggs, BVSc, DACVO</td>
</tr>
<tr>
<td>9:00 a.m. - 10:00 a.m.</td>
<td>ESMERALDA 4</td>
<td>General Session, Moderator: Dr. Braidee Foote</td>
</tr>
<tr>
<td>10:00 a.m. - 10:45 a.m.</td>
<td>ESMERALDA 5</td>
<td>Break with Exhibitors</td>
</tr>
<tr>
<td>10:45 a.m. - 12:00 p.m.</td>
<td>CRYSTAL G, H, I</td>
<td>ACVO Career Fair, All attendees welcome</td>
</tr>
<tr>
<td>10:45 a.m. - 12:00 p.m.</td>
<td>ESMERALDA 4</td>
<td>General Session, Moderator: Dr. Vanessa Holly</td>
</tr>
<tr>
<td>12:00 p.m. - 1:30 p.m.</td>
<td>SARDINIA</td>
<td>Attendees Lunch, on your own</td>
</tr>
<tr>
<td>12:00 p.m. - 1:30 p.m.</td>
<td>MOUNTAIN VIEW</td>
<td>MPOC Lunch, by invitation</td>
</tr>
<tr>
<td>12:00 p.m. - 1:30 p.m.</td>
<td>INDIAN WELLS GOLF RESORT</td>
<td>Epicur Pharma Resident Lunch, by invitation</td>
</tr>
<tr>
<td>1:30 p.m. - 3:00 p.m.</td>
<td>ESMERALDA 4</td>
<td>General Session, Moderator: Dr. Enry Garcia</td>
</tr>
<tr>
<td>3:00 p.m. - 3:45 p.m.</td>
<td>ESMERALDA 5</td>
<td>Break with Exhibitors, Visit Poster Presenters in the Exhibit Hall</td>
</tr>
<tr>
<td>3:45 p.m. - 5:00 p.m.</td>
<td>ESMERALDA 4</td>
<td>General Session, Moderator: Dr. Enry Garcia</td>
</tr>
<tr>
<td>6:30 p.m. - 8:30 p.m.</td>
<td>OLIVE GROVE</td>
<td>Evening in the Olive Grove, pre-purchased tickets required by 10/26/2022</td>
</tr>
</tbody>
</table>
### Saturday, October 29, 2022

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30 a.m. - 8:00 a.m.</td>
<td>HOTEL LOBBY</td>
<td>Fun Run &amp; Walk</td>
</tr>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>ESMERALDA BOARDROOM</td>
<td>Speaker Ready Room</td>
</tr>
<tr>
<td>7:30 a.m. - 3:00 p.m.</td>
<td>ESMERALDA FOYER</td>
<td>Packet Pick-Up &amp; Walk-Up Registration</td>
</tr>
<tr>
<td>7:30 a.m. - 8:30 a.m.</td>
<td>ROSE LAWN</td>
<td>Breakfast Buffet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seating provided</td>
</tr>
<tr>
<td>8:00 a.m. - 10:30 a.m.</td>
<td>CRYSTAL A, B, C</td>
<td>Residents’ Workshop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Open to all attendees</td>
</tr>
<tr>
<td>8:00 a.m. - 5:30 p.m.</td>
<td>CRYSTAL G, H, I</td>
<td>General Practitioners Session</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Additional registration fee</td>
</tr>
<tr>
<td>8:30 a.m. - 9:30 a.m.</td>
<td>ESMERALDA 4</td>
<td>ACVO Annual Meeting of Voting Members (AMVM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACVO Members Only</td>
</tr>
<tr>
<td>9:30 a.m. - 10:30 a.m.</td>
<td>ESMERALDA 4</td>
<td>ABVO Diplomates Meeting</td>
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<td></td>
<td></td>
<td>following AMVM</td>
</tr>
<tr>
<td>9:30 a.m. - 10:45 a.m.</td>
<td>ROSE LAWN</td>
<td>Break</td>
</tr>
<tr>
<td>10:45 a.m. - 10:55 a.m.</td>
<td>ESMERALDA 4</td>
<td>ACVO Memorial Slideshow</td>
</tr>
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<td>Silent</td>
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<tr>
<td>11:00 a.m. - 12:00 p.m.</td>
<td>ESMERALDA 4</td>
<td>Keynote Presentation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gustavo Aguirre, VMD, PhD, PhD(hc), DACVO</td>
</tr>
<tr>
<td>12:00 p.m. - 1:00 p.m.</td>
<td>ESMERALDA 5</td>
<td>Lunch Buffet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seating provided</td>
</tr>
<tr>
<td>1:00 p.m. - 2:30 p.m.</td>
<td>ESMERALDA 4</td>
<td>General Session</td>
</tr>
<tr>
<td></td>
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<td>Moderator: Dr. Kayla Banks</td>
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<tr>
<td>1:30 p.m. - 4:30 p.m.</td>
<td>CRYSTAL A, B, C</td>
<td>Vitreous Society</td>
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<tr>
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<td></td>
<td>Open to all attendees</td>
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<tr>
<td>2:30 p.m. - 2:45 p.m.</td>
<td></td>
<td>Break</td>
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<tr>
<td>2:45 p.m. - 5:15 p.m.</td>
<td>ESMERALDA 4</td>
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<td>Moderator: Dr. Kayla Banks</td>
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<tr>
<td>5:15 p.m.</td>
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<td>Close of General Conference</td>
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Sunday, October 30, 2022

7:00 a.m. - 8:00 a.m.  |  ESMERALDA 4  |  Masters’ Course Breakfast  
8:00 a.m. - 12:00 p.m. | ESMERALDA 4  |  Masters’ Course  

Additional registration fee

Thank You!

Thank you to those diplomates who volunteered their time to help moderate the General Sessions, judge the Resident Manuscripts, and organize extra courses:

**Manuscript Judges**
- Dr. Candace Auten
- Dr. Sean Collins
- Dr. Drew Enders
- Dr. Allison Hoffman
- Dr. Brian Leonard
- Dr. Andrew Lewin
- Dr. Annie Oh
- Dr. Shin Ae Park
- Dr. Sami Pederson

**Session Moderators**
- Dr. Kayla Banks
- Dr. Braidee Foote
- Dr. Enry Garcia
- Dr. Kathy Good
- Dr. Vanessa Holly
- Dr. Victoria Lyons
- Dr. Louise O’Leary
- Dr. David Ramsey

**Special Course Organizers**
- Dr. Caroline Betbeze
- Dr. Kathy Good
- Dr. Brad Nadelstein
- Dr. Bill Miller
- Dr. Chantale Pinard
- Dr. David Ramsey
- Genetics Committee
- DEI Committee

*Notice: The offering of this material is intended only as voluntary continuing education and does not in any way suggest nor guarantee its acceptance as qualifying mandatory continuing education by any individual state. ACVO has attempted to design this program to meet the strictest state guidelines, but requirements may vary between licensing boards. It is the individual veterinarian’s responsibility to determine and comply with their individual state requirements.*
NEW FOR 2022 - Please check the conference schedule for new days and times for many ACVO meetings and events. Breaks have been expanded to 45 minutes on Thursday & Friday in the exhibit hall. The exhibit hall will be closed on Saturday, be sure to visit early!

ON-SITE INFORMATION GUIDE - Please visit www.acvoconference.org or download the ACVO Conference App for the most up to date conference info. You’ll be able to locate everything you need to know while at the conference, such as schedules, maps, digital proceedings, digital posters, exhibit hall info, and daily announcements. QR code for the APP is on page 7.

MEETING SPACE WIFI is available to all attendees. Sponsored by Dechra Veterinary Products.

Network: ACVO
Password: DECHRA22

 PACKET PICK-UP & REGISTRATION DESK - The packet pick-up location is located on the Rose Lawn and the registration desk is in the Esmeralda Foyer.

MEETING ROOMS - The main ACVO General Sessions, Exhibit Hall & Posters are in the Esmeralda Ballroom. Please consult the map of the facilities on page 17, on www.acvoconference.org, or the Conference App to determine the exact location of each meeting room.

VIN CYBER CAFE - The Veterinary Information Network (VIN) will have computer stations set up Esmeralda Foyer by the Exhibit Hall. All attendees are welcome to use this complimentary service.

SPEAKER READY ROOM - Available Wednesday evening through Saturday, in the Esmeralda Boardroom. Individual times are posted on the main schedule.

WELCOME RECEPTION - Join us on Wednesday evening from 6:00pm-8:00pm for appetizers and drinks in the Exhibit Hall, Esmeralda 5. This is a great opportunity for you to catch up with colleagues and chat with vendors before the conference gets underway. You will need to wear your badge to this event. One drink ticket is included in your attendee packet.

HAPPY HOUR - ACVO & MedVet are hosting a Happy Hour immediately after the conclusion of the Thursday General Session. Join your friends and colleagues to catch up with some casual conversation before you head to dinner or the VAF fundraiser! One drink ticket is included in your attendee packet.

FRIDAY EVENING IN THE OLIVE GROVE: 6:30pm-8:30pm; drinks begin at 6:30pm and dinner begins at 6:45pm. ACVO customized the locally sourced menu with the chef to provide this unique, outdoor dining experience. Enjoy live music under the stars with local wines, craft brews and the Renaissance Esmeralda’s specialty: Mocktails!

Tickets must be pre-purchased by 8:00 pm on Wednesday, October 26th at the registration desk.

ACVO ANNUAL MEETING OF THE VOTING MEMBERS - New Diplomates who have passed ABVO exams in 2022 should plan to attend just prior to this meeting to be welcomed as a Diplomate and to receive their certificate; family may briefly attend. This year the meeting will be held Saturday, from 8:30am-9:30am in Esmeralda 4. We will begin the sign-in process at 8:00am.

WEAR YOUR NAME BADGE - REQUIRED FOR SECURITY/ACCESS - Always wear your name badge to attend any ACVO events. It is your ticket into the conference lectures, exhibitor hall and happy hour.
FLOOR PLAN

WELCOME PACKET PICK-UP
Rose Lawn

GENERAL SESSION
Esmeralda 4

EXHIBIT HALL
Esmeralda 5

POSTER SESSION
Esmeralda 5
Saturday, October 29th
6:30 am in the hotel lobby

The ACVO Fun Run will begin at 6:30am on Saturday. Plan to meet your fellow runners at 6:15am in the Renaissance Hotel Lobby for a casual start. Light refreshments will be available in the hotel lobby after the event.

Maps are located on the conference App, the conference website, and will be available at the registration desk if needed. Please note that the registration desk will not be open during the Fun Run on Saturday.

You may pick up your shirts any time Thursday, Friday, or Saturday at the main registration desk.

Pre-registration is required to receive a shirt. If you are not registered, you may run with the group at no cost, but T-shirts will not be available.

Co-Sponsored by:

an-vision
Sontec Instruments

CAREER FAIR

Friday, October 28th
10:45 am - 12:00 pm
Crystal G, H, I

The Career fair will provide a connection point for those seeking a residency, internship, or employment positions with those who are seeking to fill such positions.

This event will provide an opportunity for ABVO-approved residency programs and employers that currently have an ACVO Member working for them, to promote their opportunities to all attendees.

Sponsored by:

thrive
PET HEALTHCARE
TEACHING & LEARNING

Wednesday, October 26th
4:00 pm - 5:30 pm
Crystal G, H

Organizers: Dr. Caroline Betbeze & Dr. Chantale Pinard

The ACVO Teaching and Learning meeting hosts topics that specifically focus on veterinary ophthalmology education. It provides a venue for ophthalmologists to share teaching and learning strategies, and to hear education presentations from outside speakers with an expertise in general and clinical education.

This year, we will speak on teaching challenges in veterinary ophthalmology and will have a round table discussion on the same topic, specifically including discussion topics:

- Balancing teaching of students, interns, and residents
- Increasing interest of residents in university careers
- Re-engaging intrinsic motivation of students in their final year

Sponsored by:

TELEHEALTH IN VETERINARY OPHTHALMOLOGY

Wednesday, October 26th
4:00 pm - 5:30 pm
Crystal I

Focus Group meeting on Telehealth in Veterinary Ophthalmology

Note from organizing Diplomate. With telehealth becoming more formalized and prominent, it is important that our college has established best practices for virtual care in veterinary ophthalmology - for our patients/clients, our referring population, and for our profession. These best practices will differ somewhat between specialties, and thus establishing our needs and standards as a college is important moving forward. Our specialty, above all others, has many attributes that are particularly fitting for telehealth, and we have the opportunity to be the pioneers and leaders in non-radiology, veterinary specialty virtual care. We will start with an open discussion about the current state of telehealth in Veterinary Ophthalmology, including current practices, concerns, and successes. Following, we will transition to a discussion aimed at establishing "best practices" for telehealth in our college. Ultimately, the contents of the discussion will be used to develop a survey for our greater college to assess where we stand and where we should go regarding telemedicine in ophthalmology.
Thursday, October 27th
8:00 am - 9:00 am
Esmeralda 4

“Principles of Canine Vitreoretinal Surgery and their Applications”

Whether you are a veterinary ophthalmologist interested in exploring the viability of starting to perform retinal re-attachment surgery at your office, or if you simply are interested in learning more about retinal surgery in order to better inform clients about referral to a retinal surgeon, this presentation will provide practical and realistic information about the field of canine vitreo-retinal surgery.

We will first discuss which cases are appropriate cases to consider performing retinal re-attachment surgery on to achieve both anatomic and functional success. The discussion will then move on to cover the principles of vitreo-retinal surgery and their application to canine patients. Lastly, we will review the specific equipment needed, the steps of the procedure, and then demonstrate through videos how the procedure is performed. A substantial portion of time will be allotted to an informal discussion where questions are welcome.

Brad Nadelstein DVM, DACVO

Having served as the primary mentor for Animal Eye Care’s residency program and ophthalmology internship program for over 20 years, Dr. Nadelstein has extensive experience in clinical and didactic training. Dr. Nadelstein has lectured at the ACVO Vitreous Society, the VAF/ Bausch and Lomb advanced phacoemulsification course, Resident phacoemulsification course and the ACVO annual meeting in addition to other speaking engagements.

Dr. Nadelstein has been performing pars plana vitrectomy and retina re-attachment surgery since 2000 and worked with several physician retinal surgeons to develop technique and gain experience. This has led to the development of one of the busiest tertiary retinal surgery referral practices in the country. Having published the largest cases series of canine retinal re-attachment surgeries to date and performing over 1,000 retina re-attachment surgeries, his experience in the field of canine retinal surgery has attracted ophthalmologists from both the United States and other countries to come study and learn retinal surgery in Virginia Beach.

Sponsored by:
This lecture will focus on the collective thoughts and experiences of veterinary ophthalmologists that have performed endolaser cyclophotocoagulation for over a decade; providing guidance on case selection, intraoperative findings and surgical protocols, postoperative care options and success rates based on breed and presumed type of glaucoma.

**Terah E. R. Webb, DVM, DACVO**

Dr. Terah Webb is a board-certified Veterinary Ophthalmologist at MedVet Columbus as well as the Pharmacy Committee Chair for all MedVet locations. She has been a part of the ophthalmology team since 2003 under Dr. Milt Wyman. Dr. Webb attended The College of Wooster where she earned a Bachelor of Arts with Honors in 1998 and The Ohio State University where she earned her DVM in 2002. Following her graduation from veterinary school, Dr. Webb completed a rotating internship at Carolina Veterinary Specialists in Greensboro, NC and a three-year combined Residency in Ophthalmology at MedVet Columbus and The Ohio State University College of Veterinary Medicine.

Dr. Webb became a board-certified Diplomate of the American College of Veterinary Ophthalmologists in 2006. With Dr. Dineli Bras at MedVet, Dr. Webb and she were the first veterinarians to perform endolaser cyclophotocoagulation in small animals. Dr. Webb is a former board member and leader of the Glaucoma Consortium within the Vision for Animals Foundation. In her free time she enjoys travel and spending time with her family watching her son play hockey in Columbus and throughout the Midwest region.
INTERACTIVE DISCUSSION

Thursday, October 27th
4:00 pm - 5:00 pm
Esmeralda 4

Hereditary Eye Disease
Improving Consistency on OFA Exams: An Interactive Discussion

Are you confident in marking lesions you see on an OFA screening examination on the form? What about the grey areas where you are less certain?

This interactive session open to all attendees will be moderated and presented by a panel of members of the ACVO Genetics committee. The session will pose questions to the audience about marking the OFA form correctly, and the Genetics committee’s “take” on best practices. We will include details on how/where it is recommended to mark certain lesions on the OFA form.

Goals of the session include:

1. A fun, lively session to promote engagement in this subject from ACVO members and attendees.

2. To provide clarity and improve overall consistency in recording known or possible hereditary eye diseases in dogs.

Audience participation/polling will be conducted via "Kahoot" and potential attendees are encouraged to download the free Kahoot app on their phones if they wish to participate that way: https://kahoot.com/home/mobile-app/

Come play along with your colleagues and friends, and there will be a prize for the attendee with the most points at the end of the session!
“Managing Feline Herpesvirus – One Bloke’s Opinion”

Managing cats with suspected herpetic disease remains one of the most frustrating and controversial topics for all of us – ophthalmologists, our referring vets, and of course our feline patients and their owners. Sometimes it seems that despite increasing availability of highly sensitive PCR assays, a clinically reliable diagnosis remains all the more elusive. And famciclovir’s been great, but what’s the dose? As listserv discussions often remind us, everyone’s got their preferred approach to the diagnosis and management of feline herpetic disease and, in this session, I’ll share mine – punctuated with cases and people who taught me along the way, and underpinned by an evidence-based philosophy.

David J. Maggs, BVSc, DACVO

Following graduation from the University of Melbourne in 1988, David spent 5 years in mixed practice throughout Australia, England, Scotland, and Wales. He then completed small animal and equine internships at Colorado State University, and a research fellowship and comparative ophthalmology residency at the University of Missouri. He joined the faculty at the University of California-Davis in 2000 where he is one of 7 ophthalmologists with 5 ophthalmology residents in training. He is an author of Slatter’s Fundamentals of Veterinary Ophthalmology (now in its 6th edition) and has served on the ACVO Credentials Committee and as the ABVO Chair. David’s major interests are feline herpesvirus and ocular surface disease.
RESIDENTS’ WORKSHOP

Saturday, October 29th
8:00 am - 10:30 am
Crystal A, B, C

It is with great pleasure that Dr. Giuliano will be speaking at the 2022 ACVO resident forum. She recognizes that audience members will have considerable variability in their knowledge and surgical skill set based on their years of experience in veterinary ophthalmology. To that end, the goal is to provide a personalized, yet practical approach in this continuing education seminar, with the express aim of bringing “something to everyone” whether you are a prospective resident, a resident currently in training, or a mentor involved in resident training. The 2022 ACVO resident forum will be divided into two broad topics:

Part 1: Adnexal surgery – how to optimize surgical success with so many options

Part 2: ABVO Practical Examination – precious pearls to help you prepare!

Please join Dr. Giuliano for a practical, thought-provoking presentation that will have applicability to all years of your residency training program and beyond. Questions and comments will be welcomed in the discussion periods. (Notes will not be provided)

Elizabeth A. Giuliano, DVM, MS, DACVO

Dr. Giuliano received a Bachelor of Science with honors from Cornell University in Ithaca, New York in 1991 and her DVM degree from the University of Wisconsin-Madison in 1996. Following graduation from veterinary school, she completed a small animal rotating internship at the Animal Medical Center in New York City in 1997 and remained in private practice in midtown Manhattan the following year. In 1998, she returned to the University of Wisconsin-Madison to complete a Comparative Ocular Pathology Fellowship. Since July 1, 1999, Dr. Giuliano has been a member of the College of Veterinary Medicine at the University of Missouri where she completed a residency in veterinary ophthalmology and a Masters of Science degree. She is currently a tenured Professor of the department of Veterinary Medicine and Surgery at the University of Missouri and Section Chief of their comparative ophthalmology service.

She has authored over 100 articles and textbook chapters. Dr. Giuliano is a dynamic, engaging speaker and has lectured extensively in the academic setting and at national and international meetings. She is the recipient of numerous teaching awards, including three Golden Aesculapius Teaching Awards, the Gold Chalk Award, the Dadd Award, and was Western Veterinary Conference’s “Educator of the Year” (2018).
GENERAL PRACTITIONERS’ COURSE

Saturday, October 29th
8:00 am - 5:30 pm
Crystal G, H, I

This course is presented to provide ophthalmic education to non-boarded veterinarians that are interested in improving their ophthalmic knowledge for practice; when and how to treat, and when referrals are recommended.

(Separate registration required. Visit the registration desk to register.)

Applied Ophthalmology for General Practitioners

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<td>8:00 am</td>
<td>Dr. Tanja Nuhsbaum</td>
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<tr>
<td>9:00 am</td>
<td>Dr. Rachel Allbaugh</td>
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<tr>
<td>10:00 am</td>
<td>Break</td>
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<tr>
<td>10:15 am</td>
<td>Dr. Lucien Vallone</td>
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<tr>
<td>11:15 am</td>
<td>Dr. Lucien Vallone</td>
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<td>12:15 pm</td>
<td>Lunch</td>
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<td>1:15 pm</td>
<td>Dr. Braidee Foote</td>
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<td>2:15 pm</td>
<td>Dr. Kristina Vygantas</td>
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<tr>
<td>3:15 pm</td>
<td>Break</td>
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<tr>
<td>3:30 pm</td>
<td>Dr. Seth Eaton</td>
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Rose Lawn with General Conference Attendees

“Ocular Adnexal Pearls”

“Feline Ophthalmology – Practical Tips for Diagnosing and Treating Common Cat Conditions”

“Smartphone Ophthalmology”

“Dry Eye is Everywhere! You Just Need to Know Where to Look”

Esmeralda 5 with General Conference Attendees

“Corneal Ulcers - Why is it not Healing”

“Fundus Exam: A Review of Techniques and Common Diagnoses”

“Untangling Uveitis: Dealing with Intraocular Inflammation”
**KEYNOTE SPEAKER**

**Saturday, October 29th**
11:00 am - 12:00 pm
Esmeralda 4

“*From Dogs to DNA; from the Cage to the Bedside*”

Dr. Aguirre will present progress made in identifying genes/mutations responsible for inherited retinal degenerations in dogs, and discuss how knowing the molecular basis for the diseases informs on the mechanisms responsible for progressive photoreceptor degeneration leading to blindness, and permits developing cell/gene specific therapies.

**Gustavo Aguirre, VMD, PhD, PhD(hc), DACVO**

Gustavo D. Aguirre is Professor of Medical Genetics and Ophthalmology at The School of Veterinary Medicine, University of Pennsylvania, and works with dog models of inherited eye and retinal degeneration. His lab focuses on model identification, disease gene discovery, establishing disease metrics and defining molecular pathways linking the gene and mutation to the disease, and developing gene-based and other therapies for translational applications.

Dr. Aguirre earned his undergraduate, veterinary, and doctoral degrees at the University of Pennsylvania, where he also completed a residency in ophthalmology before serving as a post-doctoral fellow at the Wilmer Ophthalmological Institute of the Johns Hopkins University School of Medicine. He joined the faculty at Penn in 1973 where he rose to hold joint professorial appointments in the Veterinary and Medical Schools, and returned to Penn in 2004. Between 1992-2004 he was the Caspary Professor of Ophthalmology at the James A. Baker Institute of Cornell University. His work has been supported by the NIH, FFB and other organizations. Dr. Aguirre has received numerous awards among which are an honorary Doctor of Philosophy degree from the Faculty of Mathematics and Natural Sciences, University of Göteborg, Sweden, The Foundation Fighting Blindness Trustee Award, Scientist of the Year, Heart SightMiami/Foundation Fighting Blindness Award, O.N.C.E. International Prize for R&D in Biomedicine and New Technologies for the Blind, the Alcon Research Institute Award, and he was a co-recipient of the Paul Kayser International Award in Retina Research. He is a Fellow of Association for Research in Vision and Ophthalmology, the College of Physicians of Philadelphia, the American Association for the Advancement of Science, and is a member of The National Academy of Medicine. In 2017, he received the 2017 Proctor Medal from the Association for Research in Vision and Ophthalmology for outstanding research in basic or clinical sciences as applied to ophthalmology, and in 2020 was co-recipient of the Sanford and Sue Greenberg Prize to End Blindness 2020.

*(Notes will not be provided).*

**Sponsored by:**

**VERITAS**
Saturday, October 29th
1:30 pm - 4:30 pm
Crystal A, B, C

All attendees are welcome to attend - Concurrent with the General Session

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<td>1:45 pm</td>
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<td>2:00 pm</td>
<td>Dr. Cameron Whittaker</td>
<td>“Lens Luxation Surgery - We Have to Do it Better, But How?”</td>
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<td>2:15 pm</td>
<td>Dr. Kelly Caruso</td>
<td>“Retinal Reattachment Surgery - What Referring Ophthalmologists Need to Know”</td>
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<td>Dr. Allison Hoffman</td>
<td>“ECP - Pars Plana Approach”</td>
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<td>2:45 pm</td>
<td>Dr. Allison Hoffman</td>
<td>“A curious case of PHTVL in a Cane Corso”</td>
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<td>3:00 pm</td>
<td>Dr. Siniša Grozdanić</td>
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<td>3:15 pm</td>
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<td>Dr. Ron Spatola</td>
<td>“Vitreous Sampling Technique During Pars Plana Vitrectomy”</td>
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<td>Break</td>
<td>Panel discussion about the future of Vitreo-Retinal surgery</td>
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CONFERENCE APP

Check out the Conference App
Interactive Schedules/Add to Calendar
Featured Speakers
Exhibit Hall Floor Plan & Sponsors
Preview Digital Posters
Wifi Password
Hotel Floor Plan
Sunday, October 30th
8:00 am - 12:00 pm
Esmeralda 4

“Challenges in Cataract Cases”

This is a video series of challenging cataract cases (in humans) where we show highlights from the best of the 1500 videos from CataractCoach.com.

Format will be a few minutes of video (shown at 2x, 3x, 4x) and then a few minutes of discussion for each case (about 10 cases total).

Cases will be selected to emphasize surgeries that have the most overlap with veterinary cases (white cataracts, dense cataracts, capsule complications, etc).

(Notes will not be provided)

(Separate registration required. Visit the registration desk to register.)

Uday Devgan is ranked as the number one eye surgeon in southern California and number three in the USA (out of more than 10,000 ophthalmologists). He is in private practice, specializing in cataract and refractive surgery, at Devgan Eye Surgery in Los Angeles and a full partner at Specialty Surgical Center in Beverly Hills, California. He is honored to have performed cataract surgery for more than 50 fellow eye surgeons and he knows that this personal recognition from your peers is far more important than a celebrity endorsement. Patients from all over the USA (and from other countries) fly to Los Angeles to have their cataract surgery with Dr. Devgan.

Dr. Devgan is also passionate about teaching ocular surgery, particularly cataract surgery, to the next generation of ophthalmologists. He has previously served as full clinical Professor of Ophthalmology at the Jules Stein Eye Institute at the UCLA School of Medicine as well as Chief of Ophthalmology at Olive View-UCLA Medical Center and has been actively involved in resident surgical teaching for over two decades. Dr. Devgan is humbled to have been honored with the annual ophthalmology faculty teaching award at UCLA / Jules Stein Eye Institute an unprecedented five times. He continues to mentor former residents after the culmination of their training and is proud to say that he has directly mentored nearly 200 residents over the course of thousands of ocular surgeries.
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**EXHIBIT HALL**

Thank you to our Exhibitors & Sponsors!

The Friday afternoon break is the last time to visit the exhibitors.

There will be no Exhibit Hall on Saturday!
# GENERAL SESSION SATURDAY

**Saturday, October 29, 2022**

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<td>8:00am-10:30am</td>
<td>Elizabeth A. Giuliano DVM, MS, DACVO</td>
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<td>11:00am-12:00pm</td>
<td>Gustavo Aguirre, VMD, PhD, PhD(hc), DACVO</td>
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**INFECTIOUS DISEASE/UVEA & GENERAL OPHTHALMOLGY**

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<td>Lynne Sandmeyer DVM, DVSc, DACVO</td>
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<td>Karin Handel DVM</td>
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<td>Nicole Himebaugh DVM, BS</td>
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<td>Micki Armour VMD, DACVO</td>
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<td>Jendaya O’Grady DVM</td>
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## GENERAL SESSION SATURDAY

### Saturday, October 29, 2022

### PHARMACOLOGY

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## WEDNESDAY

**Welcome Reception**  
6:00 pm - 8:00 pm

## THURSDAY

**Breakfast**  
7:00 am - 8:00 am  

**AM Break**  
10:00 am - 10:45 am  

**Lunch on own**  
12:00 pm - 1:15 pm  

**PM Break**  
3:15 pm - 4:00 pm

## FRIDAY

**Breakfast**  
7:00 am - 8:00 am  

**AM Break**  
10:00 am - 10:45 am  

**Lunch on own**  
12:00 pm - 1:30 pm  

**PM Break**  
3:00 pm - 3:45 pm

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Breaks have been expanded to 45 minutes on Thursday & Friday to add additional time in the Exhibit Hall.  
*The exhibit hall will be closed on Saturday.*

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PALM SPRINGS, CA | OCTOBER 26-29

ACVO 2022 CONFERENCE PROCEEDINGS
The products identified below were submitted by vendor companies for attendee cross reference. Vendor products are represented only if the vendor supplied the requested information to the ACVO or had previous records on file. Please see the complete vendor list, following this cross reference page, for a full list of participating vendors and their product descriptions. The ACVO does not endorse any product or company by publishing this listing or other.

ACVO Members can find all vendors updated in the Vendor Marketplace on DACVO.org!

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IN-DEPTH SPEAKER

Thursday, October 27, 2022

8:00 am

Brad Nadelstein, DVM, DACVO

“Principles of Canine Vitreoretinal Surgery and their Applications”
Principles and Practice of Canine Vitreoretinal Surgery

1. Principles of vitrectomy, flattening and reattachment

- Vitrectomy - vitrectors and vitreous, removal of adhesions, freeing up of retina
- Flattening of retina - vitrectors and vitreous, removal of adhesions, freeing up of retina
- Perfluorocarbons - understanding perfluorocarbons, retinal flattening
- Endolaser retinopexy - understanding the laser, retinal adhesions
- Silicone oil exchange - properties of silicone oil, retinal tamponade

OK, got the concept of how it works, but who’s a good candidate?

2. Assessment for candidacy for referral for retinal reattachment surgery (RRsx) and success rates

- Types of retinal detachments (RDs) that are amenable to RRsx
- 2 types of success, anatomic and functional
- Factors affecting success
- Difficult cases

If I want to start doing RRsx, how do I start?

3. What you need- Instruments, Equipment, supplies, staff and time

**Instruments** - not a lot of specialized instruments - plug pullers (if not using trochar system), diamond dusted membrane scratcher, larger selection of eyelid speculums, light pipes and endoprobles

**Equipment** - a. Vitrectomy unit - posterior segment machine (most use) or anterior segment machine with step up module (Mid Labs) with nitrogen gas capabilities. Advantages/disadvantages of options.
   b. Visualization system - indirect (most use) - BIOM (Oculus), ROLS or Merlin (Volk), OFFSIS (Topcon), Resight (Zeiss). With some still using wide angle Contact systems AVI (advanced Visual Instruments), ROLS (Volk) and others. Also, Heads Up 3D viewing systems are also being used now - Ngenuity (Alcon), Artevo (Zeiss), Sony HD Medical Display and others.
   c. Fiberoptic light source (incorporated in to post. segment machines). Can have separate light source as well. Wide angle fiber optic light pipes
   d. Laser unit - 810 Diode vs. 532 nm argon green laser, laser probes
   e. Oil Exchange system (built in to Post Seg machine) or manual with
Leveen Syringe

**Supplies** - Typical intraocular supplies. Additional supplies needed: Silicone oil (most using 5000 c.s now), perfluorocarbon liquid (PFO or PFD), plug pullers, some specific suture

**Staff** - be sure you have adequate staff who are well versed in set up and equipment- consider human retinal surgeon tech or vet tech/assistant with posterior segment surgery experience to start

**Time** - Patience - DO NOT rush this surgery. Leave enough time, especially when first learning the procedure.

### 4. Specific steps - IN ALL STEPS, OCULAR HYPOTONY MUST BE AVOIDED!

- a. premedication (consider blood pressure), positioning (for both the patient and for YOU)
- b. canthotomy and peritomy
- c. sclerotomies - location and options
- d. anterior vitrectomy
- e. posterior vitrectomy and membrane removal/retinectomy - freeing up the retina
- f. flattening with perfluorocarbons
- g. Laser retinopexy
- h. PFO/Silicone oil exchange.
- i. Closing sclerotomes
- j. Closing peritomy and canthus

Post Operative management
IN-DEPTH SPEAKER

Thursday, October 27, 2022

1:15 pm

Terah E. R. Webb, DVM, DACVO

“15 Years of Endolaser: Case Selection, Utility, and Postoperative Care”
15 Years of Endolaser: Case Selection, Utility & Postoperative Care

ACVO 2022 Conference

Terah Webb, DVM, DACVO

How long have you been performing endolaser?
38% 10-15 years
35% 5-10 years
24% 1-5 years
3% <1 year
>25 years, 17 years

What type of Endolaser unit do you have?
69% E4 with Iridex
31% E2

When faced with a primary glaucoma case in a dog with a natural lens in its normal position, I tend to perform
40% phaco/IOL/ECP
30% gonio first, then when fails phaco/IOL/ECP
22% phaco/IOL/ECP/gonio
8% other - depends on case, transscleral
0% ECP alone

Comments:
Breed will dictate what approach for many people
Gonioscopy and/or Ultrasound Biomicroscopy - utility in determining need and success? See abstracts this year

I perform ECP using what type of approach
Limbal
One responder - pars plana sometimes
Comments:
With a single incision can reach 270+ degrees with a curved probe

My ECP technique is different between primary and secondary glaucoma cases
60% No
40% Yes
Comments:
Primary glaucoma usually treat more aggressively (more of the ciliary body and/or more degrees)
Glaucoma within a month post-IOL- treat less degrees - tend to go phthisical/over respond, especially small dogs (poodle, doodle, yorkie)

When I perform ECP, I treat this part of the ciliary body
85% heads and tails
12% heads
3% tails
Comments:
Aggressive treatment of the tails will cause retinal edema
Slow controlled burn, start from the base and head toward the tail to allow better base ablation
I perform ECP on this many cases per year (average)
48% less than 5
26% 5-10
14% 10-15
9% 15-20
3% 20+

Which of these play a factor in deciding how many degrees you treat a patient using ECP
52% Number of, or reliance on, medications
52% Breed
48% Primary vs. secondary
21% Gonio & UBM
18% Coat color
15% Gonioscopy
3% UBM of ciliary cleft/ICA
Comments:
Most aim for 270 degrees at least
Human studies show >300 degrees for effective aqueous production decline

I will use ECP “prophylactically” in patients I feel are predisposed to postop lens surgery glaucoma
50% Yes
50% No
Comments -
90-270 degrees (most 220-270)
See this year’s abstracts - Boston Terriers
Experience is that you do more harm than good in most cases

I recommend ECP when
66% failing multiple meds
15% failed gonio implant
10% at the first recorded high pressure
9% failing one med
Comments: We truly don’t know when is the “right” time

I quote the following as success rate for controlling IOP for 1 year with endolaser on primary glaucoma cases
35% 70-80%
21% 50%
18% 80-90%
14% depends on the case
12% I don’t quote a number, just educate on the procedure
Comments:
So many variables - presumed type of glaucoma, breed, lens size and position
I quote the following as success rate for controlling vision for 1 year with endolaser on primary glaucoma cases:

- 35% 70-80%
- 24% 50%
- 18% I don’t quote a number, just educate on the procedure
- 9% 80-90%

Comments:
21 various comments on this topic - <50%, 50-70%, 65-70%, depends on case

I will perform ECP on blind eyes as a comfort procedure:
- 94% No
- 6% Yes

I use the following intracamerally at the completion of surgery:
- 69% Dexamethasone
- 47% TPA
- 22% Carbachol
- Nothing - 3 responders
- Triamcinolone
- Triamcinolone with moxifloxacin
- Subconjunctival triamcinolone

Comments:
Aqueous turnover, are we doing anything or just making ourselves feel better? Some dogs still have air bubbles the next day so maybe there is less outflow with less production

I hospitalize patients overnight post-ECP:
- 50% Yes
- 50% No

Comments:
24hr to 5 days without spike before release (most 72 hours)

I measure IOP postop:
- 34% Q24h
- 18% Every few hours for 6-12hr then taper
- 15% Q2h
- 15% Q4h
- 7% Q6h
- 7% Q8h
- 4% Every hour

Comments:
They will go up the first night, sometimes into the 40-50 range if visco is left in. Educate owners on trend of pressure not hour-by-hour IOP

On average I will get this many uses out of an ECP probe before it needs serviced/polished/replaced:
- 56% 12+ uses
- 19% 8-12 uses
- 25% 4-8 uses

Comments:
Try not to touch the iris going intraocular, hold the tip to clean with weck cells, gas the probes, get them polished
My routine postop ECP medical care for 24 hours postop includes:

- Ofloxacin 71%
- NPG 11%
- Tobramycin 6%
- Dorzolamide 37%
- Dorzolamide-Timolol 63%
- Timolol 6%
- Latanoprost 20%
- Prednisolone Acetate 91%
- Dexamethasone or NP Dex 6%
- Diclofenac 34%
- Flurbiprofen 3%
- Artificial Tears 51%
- Oral NSAID 31%
- Oral Prednisone 86%
- Oral Antibiotic 69%
- Others: Amlodpine, Moxifloxacin, Durezol, Loteprednol, Nepafenac, OcuGlo travoprost, chloramphenicol

Comments:
Pred ace q2h, Diclofenac q2h, Ofloxacin q6h, Dorz-Tim q8h, Optixcare 6h, PO Amoxi-Clav or Ciprofloxacin, PO prednisone or carprofen

I use the endolaser unit to perform these additional functions/surgeries:

- 72% Transcorneal iridal lasering
- 48% Uveal cyst treatment
- 38% Ciliary body mass treatment
- 31% Intraocular retinopexy
- Other: epibulbar melanoma, locating dropped nuclear pieces intraop
POSTER SESSION
**Purpose.** To characterize clinical features and examine clinicopathologic correlates in boxers and Labrador retrievers histologically diagnosed with ocular/uveal melanosis at COPLOW. **Methods.** COPLOW submission forms and reports for affected boxer and Labrador globes were reviewed. Digital surveys were issued to submitting veterinarians requesting clinical follow-up data and contralateral (non-enucleated) globe status, where applicable. **Results.** Fifty-two eyes of 48 boxers (28F/20M) and 38 eyes of 37 Labradors (18F/19M) were included. Median [IQR] ages of affected boxers and Labradors were 10.0 years [8.0-11.0] and 10.0 years [7.8-12.0], respectively. Affected globes were glaucomatous at enucleation in 42/48 boxers and 26/37 Labradors. Uveitis was clinically diagnosed in globes from 8 boxers (6 with hyphema) and 13 Labradors (6 with hyphema). Melanocytic uveal neoplasia was clinically suspected in globes from 9 boxers and 20 Labradors, and histologically confirmed in 2 and 11 globes, respectively. Overall, iris melanoma/melanocytoma was observed arising from uveal melanosis in 9/52 boxers and 13/38 Labradors. When specified by submission data and/or follow-up survey, 15/30 boxers and 12/22 Labradors had non-cystic iris hyperpigmentation in the contralateral eye at enucleation. Three boxers developed contralateral non-cystic iris hyperpigmentation 0.5-70.0 months following enucleation. Delayed contralateral hyperpigmentation was not reported in the 6 Labradors where survey results were available. **Conclusions.** Clinical features of uveal melanosis bear similarity between boxer and Labradors. Bilateral disease may be more commonly recognized in boxers, and concurrent uveal neoplasia more common in Labradors. Uveal melanosis in these breeds appears clinically distinct from ocular melanosis of Cairn terriers. **None.**
IN VITRO PHOTODYNAMIC THERAPY ON OCULAR MELANOMA CELLS (TG Guimarães1,2,3, GTAP Carvalho4, FVMamede4, KM Cardoso1,2, CM Marto1,3,5, R Teixo1,3,5, NAM Pereira6, MPineiro6, TMVDPinho e Melo6, NML Alexandre2,7, MF Botelho1,3,5 and M Laranjo1,3,5) 1University of Coimbra, Coimbra Institute for Clinical and Biomedical Research (iCBR) area of Environment Genetics and Oncobiology (CIMAGO) and Institute of Biophysics, Faculty of Medicine, Coimbra, Portugal; 2University of Évora, Mediterranean Institute for Agriculture, Environment and Development (MED), Évora, Portugal; 3University of Coimbra, Center for Innovative Biomedicine and Biotechnology (CIBB), Coimbra, Portugal; 4OftalmocenterVet, Ribeirão Preto, SP, Brazil; 5Clinical Academic Center of Coimbra (CACC), Coimbra, Portugal; 6Coimbra Chemistry Centre (CQC) and Department of Chemistry, University of Coimbra, Portugal; 7Department of Veterinary Medicine, School of Sciences and Technology, University of Évora, Évora, Portugal.

**Purpose.** To evaluate the effect of newly developed Ring-fused chlorins on cell proliferation of ocular melanoma.

**Methods.** Human cell line MP-41 and a canine primary culture were subjected to the photosensitizers at concentrations between 0.5-1000 nM for 24 hours. The cells were irradiated with 10J (λ>570nm). Control groups included: untreated cells and cells submitted only to the administration vehicle (dimethylsulfoxide). The cytotoxicity (MTT) assessment was performed 24 hours after photodynamic therapy (PDT).

**Results.** The dihydroxymethyl ring-fused chlorin (PS1) was the most active, with an IC50 value of 95.1 nM. The dihydroxymethyl-Pt(II) ring-fused chlorin (PS3) also showed promising photodynamic activity with an IC50 value of 114.8nM in MP-41 cells. These chlorins also showed highly satisfactory results in canine cells, with IC50 of 0.6nM for the PS1 and 2.2 nM for PS3. The dicarboxylic acid ring-fused chlorin (PS2) and dicarboxylic acid Pt(II) ring-fused chlorin (PS4) were less efficient in both ocular melanoma cells. PDT had a direct effect on ocular melanoma cell metabolic activity. High activity was obtained at very low concentrations.

**Conclusion.** Satisfactory outcomes were achieved using new photosensitizers, particularly PS1 and PS3. The photosensitizers used are promising, particularly PS1 and PS3. This approach might become an option in treating eye melanoma in medicine and veterinary medicine. Supported by FCT, Portugal, SFRH/BD/139319/2018, SFRH/BD/116794/2016, UID/NEU/04539/2019, UIDB/04539/2020, UIDP/04539/2020 and POCI-01-0145-FEDER-007440. **None.**
FACTORs ASSOCIATED WITH CORNEAL CONJUNCTIVAL GRAFTING FAILURE AT FOUR VETERINARY REFERRAL CENTERS: 2015-2021 (MA Mironovich, 1 RT Carter, 1 Y Chun, 1 BC Foote, 2 DVH Hendrix, 2 AC Lewin, 1 C Liu, 1 C Rogers, 3 EM Scott, 3 MR Telle 4) School of Veterinary Medicine, Louisiana State University;1 College of Veterinary Medicine, University of Tennessee;2 Veterinary Medicine and Biomedical Sciences, Texas A&M University;3 College of Veterinary Medicine, Mississippi State University.4

**Purpose.** To investigate risk factors associated with conjunctival graft failure in dogs. **Methods.** Medical records of 203 dogs (229 eyes) that underwent conjunctival graft repair for corneal ulcerations from 2015 to 2021 were reviewed. A successful outcome was defined as graft integration with globe retention at last post-operative examination; vision status was considered separately. Factors evaluated included: age, brachycephalic conformation, ulcer depth, ulcer location and size, culture/cytology results, biomaterial use, suture type/pattern, surgeon experience, surgery on opposite eye of surgeon handedness and concurrent ocular conditions. **Results.** The rate of conjunctival graft failure was 11% (25/229 eyes). Graft failure was significantly associated with ulcer depth with an odds ratio of 2.24 higher (p<0.01) with each increased depth level (superficial stromal < deep stromal < descemetocele < perforation). Brachycephaclus had a significantly higher graft failure rate (odds ratio 4.13, p<0.01). Surgery on the opposite eye relative to surgeon handedness was significantly associated with an increased rate of graft failure (odds ratio 3.08, p<0.01). Graft failure was significantly associated with use of biosynthetic material and an increased frequency of topical medications post-operatively; however, this is likely due to overrepresentation of perforations within this subset of dogs. At last follow-up, 87% of dogs had vision. No other factors were associated with graft failure. **Conclusions.** Depth of ulceration, brachycephalic conformation, and surgery on the opposite eye relative to surgeon handedness were significantly associated with increased risk of graft failure. These factors should be considered when determining prognosis for corneal ulcerations requiring surgical intervention. **None.**
COMPARISON OF CONJUNCTIVAL PEDICLE FLAP ADHERENCE BETWEEN TISSEEL® FIBRIN GLUE, ETHYL CYANOACRYLATE, RESURE® HYDROGEL SEALANT, AND CONVENTIONAL SUTURING WITH 8-0 VICRYL® (POLYGLACTIN 910) SUTURE (EM VerHulst¹, RM Rodriguez¹, IP Herring¹, AR Kemper², and RV Ramos¹) 1. Department of Small Animal Clinical Sciences, Virginia Maryland College of Veterinary Medicine, Virginia Tech; 2. Department of Biomedical Engineering and Mechanics, College of Engineering, Virginia Tech.

**Purpose.** To compare the tensile strength of conjunctival flap fixation to cornea by Tisseel® fibrin glue, ethyl cyanoacrylate adhesive, ReSure® hydrogel sealant and 8-0 Vicryl® suture. **Methods.** Ex-vivo porcine globes deemed free from ocular disease were included in the study. Following a 500-micron restricted depth keratectomy, conjunctival pedicle flaps were secured to the corneal defects with either the bioadhesives Tisseel® or ReSure®, synthetic adhesive, ethyl cyanoacrylate, or 8-0 Vicryl® suture. The harvested corneo-conjunctival flap interfaces were clamped to an accelerometer and potentiometer device, and loaded under video surveillance until the point of failure. The peak load was determined for each test and used to compare between sample types. **Results.** 40 ex-vivo porcine eyes underwent conjunctival pedicle flap surgery with 6 being omitted for immediate dehiscence. Of the 34 tests included in analysis, 10 conjunctival flaps were secured with suture, 10 with cyanoacrylate, 8 with ReSure® hydrogel sealant, and 6 with Tisseel® fibrin glue. A significant increase in tensile strength was recorded between sutured flap fixation when compared with cyanoacrylate glue (P=0.02474), ReSure® hydrogel sealant (P= 0.00000), and Tisseel® fibrin glue (P= 0.00002). Cyanoacrylate was significantly stronger when compared with ReSure® hydrogel sealant and Tisseel fibrin glue (P=0.01194 and 0.01798 respectively). There was no significant difference in strength between the bioadhesives ReSure® hydrogel sealant and Tisseel® fibrin glue (P=0.95675). **Conclusions.** Conjunctival pedicle flap fixation using 8-0 VICRYL® suture showed significantly greater tensile strength in comparison with the ReSure®, Tisseel®, or cyanoacrylate adhesives. Supported by VMCVM Veterinary Memorial Fund. **None.**
USE OF CAPSULAR HOOKS DURING PHACOEMULSIFICATION OF UNSTABLE LENSES IN DOGS
(JA Kleiner, 1 A Cunha, 2 S Basso, 3) Vetweb Veterinary Ophthalmology. Curitiba – Brazil; 1 Adriano Cunha Veterinary Ophthalmology; 2 Basso Veterinary Hospital; 3

**Purpose.** The gold standard surgical treatment of cataracts in dogs is phacoemulsification. Lens instability attributable to zonulopathies may be encountered intraoperatively and may result in substantial complications. Stabilization of the lens intraoperatively may avoid the necessity of larger corneal incisions or converting to intracapsular lens removal. **Methods.** Medical records of 36 dogs that developed lens instability intraoperatively during phacoemulsification cataract surgery were reviewed. All eyes required use of lens capsular hooks to stabilize the lens followed by anterior vitrectomy. **Results.** In eyes with lens subluxation (15 anterior and 21 posterior), the lens was stabilized using an ophthalmic viscosurgical device and lens capsular hooks. In all eyes, there was no need to increase the 3.2 mm main clear corneal incision. Retained lens fragments into the vitreous cavity were recovered by pars plana vitrectomy and phacofragmentation in 4 eyes. In 3 eyes, glaucoma developed 4 to 6 months after the surgery and visual acuity was compromised. In one eye, a focal retinal detachment developed due to a traction fibrous vitreous band partially affecting vision. In most instances, eyes remained sighted after the procedure (follow up of 2 years) with little intraocular inflammation and normal intraocular pressure. **Conclusions.** Phacoemulsification in unstable lenses has a high success rate when the proper technique is employed. **None.**
Purpose. To evaluate the frequency of retinal detachments following prophylactic transpupillary retinopexy (PTPRP). Methods. Medical records of dogs that received a PTPRP between 2014 and 2021 were retrospectively analyzed. Data collected included age, sex, breed, reason for retinopexy, laser power setting, number of retinal burns, follow up duration, and outcome. Laser power settings were increased until retinal burns could be visualized. Burns were made 360° around the retina in a double row. Results. Fifty-seven cases (75 eyes), 28 males and 29 females, had PTPRP performed. The average age was 8 years (4 months-14 years). Most common breeds were Shih tzu (n=12), Bichon (n=5), Yorkie (n=4) and Miniature Poodle (n=5). Reasons for PTPRP were severe vitreal degeneration (n=64), retinal detachment in the contralateral eye (n=24), capsular tear with escaped lens material during phacoemulsification (n=6), intracapsular lens extraction (n=2), and lens luxation during phacoemulsification (n=2). Average power setting was 302.6mW (206-500mW), average number of retinal burns was 229.6 (35-921) and average follow up time was 670 days (14 -1862 days). In addition, five dogs had a barrier-pexy performed in the contralateral eye, due to partial detachment. Retinal detachment occurred in 3/75 (4.0%) of eyes that received a PTPRP at the final examination. Of the patients with retinal detachment in the contralateral eye (n=25), no retinal detachment was noted at the last follow up examination. Two partial detachments that had barrier-pexies had progressed at the final examination. Conclusions. These results demonstrate that PTPRP may be beneficial in decreasing the risk of retinal detachment in selected dogs. None.
Purpose. To determine whether temporal changes in iridocorneal angle morphology occur post-phacoemulsification and whether such changes are associated with post-operative glaucoma development in dogs. Methods. Client-owned dogs presenting for surgical removal of cataract by phacoemulsification were included. Eyes underwent serial anterior segment imaging using a retinal imaging camera (RetCamTM). Images of iridocorneal angles were obtained in four quadrants pre-operatively and at prescribed time points up to one year post-operatively. Angle width and pectinate ligament abnormalities (PLA) severity were incorporated into a ZibWest Angle Index score for each eye at each timepoint, and scores were compared over time. Results. 40 patients dogs have been enrolled to date, and five patients dogs (10 eyes) have been measured through the 6-9 month post-operative timepoint and are reported here. A statistically significant difference in ZibWest Angle Index was observed between the following: pre-operative & 3-4 months post-operative (p=0.0027); pre-operative & 6-9 months post-operative (p=0.0009); 1-2 weeks post-operative & 3-4 months post-operative (p=0.0328); 1-2 weeks post-operative & 6-9 months post-operative (p=0.0117); 3-6 weeks & 6-9 months post-operative (p=0.0453). Though not always statistically significant, a decrease in ZibWest Angle Index was observed at each subsequent timepoint. Conclusion. Serial imaging of the iridocorneal angle post-phacoemulsification reveals a temporal decrease in ZibWest score even in non-glaucomatous eyes. Supported by the Virginia-Maryland Regional College of Veterinary Medicine Veterinary Memorial Fund. None.
FACIAL MORPHOLOGICAL CHANGES OF MODIFIED MEDIAL CANTHOPLASTY IN BRACHYCEPHALIC DOG BREEDS. (A Saito and H Iwashita) Triangle Animal Eye Clinic, Tokyo, Japan.

**Purpose.** Medial canthoplasty is one of the treatments for brachycephalic ocular syndrome. Since 2002, modified medial canthoplasty (MMC) has also been reported. This study aimed to investigate the facial morphological changes pre- and post-MMC surgery. **Methods.** Three brachycephalic dog breeds (Shih-Tzu, Pug, and Pekingese) that received MMC between March 2021 and April 2022 were studied. Distance from the medial canthus to the nasal fold (DMN) and to the superior and inferior lacrimal punctum (DSP and DIP) were measured pre- and post-MMC under general anesthesia the day of surgery. **Results.** The study included 36 eyes of 18 dogs (five Shih-Tzus, eight Pugs, and five Pekingese) with a mean ± standard deviation (SD) age of 4.4 ± 3.2 years. Mean ± SD of DMN pre- and post-surgery was 2.5 ± 1.6 mm and 6.4 ± 1.2 mm, respectively. Mean ± SD of DSP pre- and post-surgery was 2.3 ± 0.8 mm and 2.4 ± 0.2 mm, respectively. Mean ± SD of DIP pre- and post-surgery was 5.2 ± 0.9 mm and 2.4 ± 0.2 mm, respectively. Mean ± SD of DMN significantly increased post MMC (P < 0.01), whereas that of DIP significantly decreased (P < 0.01). **Conclusions.** MMC is an effective surgical procedure to increase DMN and decrease DIP in brachycephalic breeds. None.
HOMOLOGOUS AND HETEROLOGOUS CRYOPRESERVED CORNEA FOR FULL AND PARTIAL THICKNESS PENETRATING KERATOPLASTY IN DOGS: A MULTICENTER TRIAL (A Kuner, 1 D Cremonini, 1 FLC Brito, 1 JLV Chiurciu, 1) 1, Faculdade Qualittas - São Paulo, SP.

**Purpose.** To evaluate corneal healing and outcome in dogs treated with homologous and heterologous corneal grafts for deep and full-thickness corneal ulcers. **Methods.** Medical records of 12 dogs from three different referral centers were reviewed. All dogs had severe ulcerative keratitis with indication for surgical intervention. Homologous (canine) or heterologous (porcine) corneal grafts were used. Samples were collected in sterile conditions using the subconjunctival technique and properly disinfected prior to placement in Tobramycin 0.3%, frozen and stored at −20°C. The harvested corneal tissue was used on demand within 1–12 months after cryopreservation. Six of the 12 dogs received homologous frozen corneal grafts and the remaining six dogs received heterologous grafts. A temporary nictitating membrane flap was used in the 6 dogs that received homologous grafts and hospitalized for 7 days. Topical antibiotics and cycloplegia were used according to surgeon’s preference. Surgeon one and two initiated topical steroids on day 7, surgeon three on day 14. Follow up period was 3 months to 1 year. **Results.** Despite differences in post-op therapeutics, all eyes followed the same healing pattern: an initially intense vascular phase and edema around day 7 and gradual recovery of transparency after topical steroid use. No intra-operative complications were noted. Ulcers healed in 11/12 eyes. **Conclusions.** Homologous and heterologous grafts behaved similarly postoperatively. Both grafts were considered efficient in terms of tectonic support and transparency recovery. **None.**
RETROSPECTIVE ANALYSIS OF 144 EYELID MASSES IN 126 CANINES TREATED WITH SURGICAL EXCISION AND ADJUNCTIVE CARBON DIOXIDE (CO2) LASER ABLATION (GA Sánchez, SS Erlichman, RE Merideth, PM Barrett) Eye Care for Animals, Tucson AZ

**Purpose.** To evaluate the prevalence and recurrence rates of canine eyelid masses treated with surgical excision and adjunctive carbon dioxide (CO2) laser ablation. **Method.** Medical records from Eye Care for Animals Tucson, AZ were retrospectively reviewed from 2017 to 2022 to identify canine patients with eyelid masses that underwent surgical excision with adjunctive CO2 laser ablation. Eyelid masses submitted for histopathology were evaluated by either Antech Diagnostic Laboratories or Arizona Veterinary Diagnostic Laboratory. Histopathological diagnosis and recurrence rates were analyzed. **Results.** One hundred and twenty-six canines were identified, with OD affected in 39.7% of cases, OS 50.8% and OU 9.5%. A total of 144 masses were excised, of which 101 were submitted for histopathology. Prevalence of eyelid masses were adenomas 43/101(42.6%), epitheliomas 22/101(21.8%), papillomas 11/101(10.9%), benign melanoma/ melanocytoma 11/101(10.9%), glandular hyperplasia 4/101(3.96%), chalazion 3/101(2.97%), cutaneous histiocytoma 2/101(1.98%), and a single of each: mast cell tumor, squamous cell carcinoma, poorly differentiated carcinoma, malignant melanoma, and mixed adenoma/papilloma. Recurrence was noted in 12/144(8.3%), with an average time to recurrence of 49.2 weeks. Of the recurrent tumors, there were two papillomas (16.7%), one adenoma (8.3%), one epithelioma (8.3%), one mixed adenoma/papilloma (8.3%). Four recurrent masses were removed but not re-submitted for histopathology, while three were left intact. **Conclusion.** Benign canine eyelid tumors were more commonly observed than malignant tumors. Excision with adjunctive CO2 laser has a low recurrence rate of 8.3%, demonstrating its utility in veterinary ophthalmology. **None.**
ANTERIOR SEGMENT ANGIOGRAPHY IN ADAMTS10 MUTANT DOGS WITH OPEN-ANGLE GLAUCOMA (ADAMTS10-OAG). (RA Pytak III, CG Pirie, AM Komáromy) Department of Small Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University.

**Purpose.** To evaluate anterior segment angiographic findings in hypertensive glaucomatous ADAMTS10-OAG eyes (n=9) compared with normotensive control eyes (n=4). **Methods.** Anterior segment angiography was performed under general anesthesia following intravenous injection of indocyanine green (ICG;1mg/kg) and sodium fluorescein (SF;20 mg/kg) using a Heidelberg Spectralis® confocal scanning laser ophthalmoscope. Time to onset of iridal angiographic phases and the presence/severity of dye leakage into the iris stromal and/or aqueous humor were recorded. Group findings were compared, and multiple linear regression analysis was performed to identify potential factor associations with disease status. **Results.** Time to onset of all angiographic phases visualized using ICG were significantly prolonged, while time to onset of SF leakage into the aqueous humor was significantly reduced in glaucomatous eyes compared with control eyes. Only glaucomatous eyes (n=9) demonstrated evidence of SF stromal leakage. Mean intraocular pressure (IOP) and age were significantly higher, while mean pulse was significantly lower in glaucomatous eyes compared with controls. Blood pressure and ocular perfusion pressure were not significantly different between groups. Multiple linear regression analysis, controlling for age, IOP, and pulse demonstrated glaucoma was not predictive of the time to onset of any angiographic phase, stromal, or aqueous humor leakage. However, pulse was a significant factor contributing to the severity of aqueous humor leakage. **Conclusions.** A compromised vascular supply to the anterior segment exists in eyes of dogs with ADAMTS10-OAG. These observations warrant further exploration of what role altered perfusion and/or disruption to the blood aqueous barrier may play. Supported by NIH grant R01-EY025752. Conflicts: None.
VALIDATION OF THE EYETELEMED IOPVET INDENTATION TONOMETER FOR USE IN DOGS
(LE Kapeller,1 A Cabble,1 AL Anderson,1 CD Harman,1 FR Lawrence,2 AM Komáromy1) College of Veterinary Medicine,1 Center for Statistical Training & Consulting,2 Michigan State University.

Purpose. To assess accuracy of intraocular pressure (IOP) readings from the eyeTelemed IOPvet indentation tonometer. Methods. 54 eyes from 28 beagle dogs were used in conducting this study - 23 ADAMTS10-mutant beagle dogs with open-angle glaucoma (ADAMTS10-OAG) and five normal controls. For each dog, IOP readings of both eyes were first measured in mmHg with the Reichert Tono-Vera® rebound tonometer; an average of three measurements were made with the assistance of the instrument’s alignment system. The data was obtained and recorded by Person 1, who concealed the results from Person 2. Subsequently, proparacaine HCl 0.5% ophthalmic solution was administered for ocular surface anesthesia, and Person 2 then estimated the IOP using the eyeTelemed IOPvet device. Instead of numbers, this instrument provided the results as green (normal; ≤20 mmHg according to the manufacturer), yellow (elevated; 21-30 mmHg), or red (high; >30 mmHg). Sensitivity, specificity, and positive and negative predictive values to identify IOPs below and above 30 mmHg were calculated. Results. 265 IOP measurements were made with both the IOPvet and Tono-Vera® tonometers, respectively. The IOPvet was safe, well-tolerated, and easy to use with dogs. The instrument had a high specificity (99%) and positive predictive value (94%). Sensitivity (13%) and negative predictive value (50%) were low. Conclusions. Because of its affordability, the IOPvet may allow wider availability of IOP estimates for veterinary patients. Our very low-sensitivity results demonstrate that the instrument requires species-specific calibration to identify dogs with IOP >30 mmHg. Supported by NIH grant R01-EY025752. None.
Purpose. To compare the ability of aqueous humor (AH) from dogs with and without a mutation in the ADAMTS10 gene causing primary open-angle glaucoma to catalyze or inhibit collagenolysis. Methods. AH samples from 4 eyes from wild-type dogs, 3 eyes from heterozygous dogs, and 37 eyes from homozygous dogs were used. Samples were first analyzed using a fluorescein-based collagen degradation assay, and results compared with control wells loaded with clostridial collagenase. Samples were then evaluated using the same assay with recombinant activated matrix metalloproteinase-2 (MMP-2) added to wells. For the second assay, results were compared with MMP-2 control wells with no AH added. Results. For the protease activity assay, relative fluorescence (RF) for AH from wild-type dogs was 8.3 +/- 1.1% compared with control collagenase, while RF for heterozygotes was 7.6 +/- 1.3%, and RF for homozygotes was 8.6 +/- 1.7% that of control collagenase. For the MMP-2 inhibition assay, RF for AH from wild-type dogs was 97.6 +/- 6.6% compared with MMP-2 controls, while RF for heterozygotes was 90.4 +/- 10.0%, and RF for homozygotes was 85.9 +/- 13.2% that of MMP-2 controls. Differences between groups were not statistically significant. Conclusions. AH from dogs with ADAMTS10 mutations does not appear to differ from AH from similarly-aged wild-type dogs in its ability to catalyze collagenolysis or inhibit MMP-2. These results differ from those previously reported for dogs with primary angle-closure glaucoma. Further work is needed to establish the role of proteolysis and its inhibition in different types of canine glaucoma. Funding source: Tufts University Cummings School of Veterinary Medicine Department of Clinical Sciences startup funds and NIH grant R01-EY025752. None.
RETROSPECTIVE REVIEW OF A SINGLE PHARMACOLOGIC CILIARY BODY ABLATION PROTOCOL FOR GLAUCOMA IN DOGS (2017-2022) (SL Howard, EB Belknap) Blue Pearl Veterinary Partners, Gwinnett, GA USA

**Purpose.** To evaluate long-term efficacy of intravitreal injection using a consistent protocol for gentamicin and dexamethasone sodium phosphate (DSP) (VetOne, Boise, ID) in eyes with end-stage glaucoma. Pre-operative prognostic indicators of success were also evaluated. **Methods.** Medical records from 2017-2022 were reviewed for eyes of dogs with end-stage glaucoma that were treated under chemical restraint by one clinician with intravitreal 25mg gentamicin and 0.4mg of DSP with minimum of 3 months follow-up. Aqueocentesis was performed after the injection, all hypotensive medications were discontinued on day 12, and topical anti-inflammatory treatment continued long-term. Signalment, glaucoma type, pre-procedure medications, intraocular pressure (IOP), and post-procedure outcome data were recorded. Success was defined as an IOP <20 mmHg at the time of last recheck examination. **Results.** Data were collected from 121 dogs (130 eyes). Ninety-three eyes (71.5%) had primary glaucoma, while 37 (28.5%) were secondary. Cocker Spaniel was the most common breed (n=15), while Golden Retrievers with pigmentary uveitis (n=11) were second. Mean IOP prior to procedure was 35.6 mmHg, mean IOP for initial follow-up was 9.2 mmHg (mean 0.6 months), and mean of the last IOP was 14.8 mmHg (mean 9.2 months). The overall success rate of pharmacologic ablation was 94%. The most common complications included phthisis bulbi (48%) and ulcerative keratitis (23.0%). Uncontrolled IOP resulted in enucleation in 8 dogs (6.2%). **Conclusions.** Pharmacologic ablation using this methodology and consistent protocol has an overall high success rate in lowering IOP to <20 mmHg in end-stage glaucomatous canine eyes long term. **None.**
EVALUATION OF CANINE CILIARY CLEFT AREA USING ULTRASOUND BIOMICROSCOPY (UBM) AS INTRAOCULAR PRESSURE CHANGES AFTER ADMINISTRATION OF 0.5% TROPICAMIDE-0.5% PHENYLEPHRINE (SE Park, 1 DH Kim, 1 YS Goh, 1 HM Kim, 1 KM Park, 1) Laboratory of Veterinary Ophthalmology, School of Veterinary Medicine, Chungbuk National University Cheong-ju, Korea.

Purpose. Intraocular pressure (IOP) may increase after the administration of a mydriatic; even the administration of short-acting mydriatics does not preclude the risk of an acute ocular hypertension episode. The objective of this study was to investigate the cause of the increase in IOP after instillation of 0.5% Tropicamide-0.5% Phenylephrine(Santen Mydrin-P Eye Drop, Santen Pharm Korea, Chung-buk) eye drops using Ultrasound biomicroscopy (UBM). 

Methods. Client-owned dogs evaluated at the Veterinary Medical Teaching Hospital of Chung-buk University hospital in Korea, and determined to have normal eyes, were included in this study. Following ophthalmic examination, IOP and UBM were measured in both eyes before and 30 minutes after topical administration. Anterior segment parameters, including the area of ciliary cleft (CCA), length of the ciliary cleft (CCL), the width of the ciliary cleft (CCW), iridocorneal angle (ICA), and angle-opening distance (AOD), were measured by UBM. 

Results. There were no significant changes in CCL and AOD before and 30 minutes after administration of 0.5% Tropicamide-0.5% Phenylephrine, although there were significant changes in CCA and CCW. Moreover, IOP had a negative correlation with the degree of change in CCA. 

Conclusion. 0.5% Tropicamide-0.5% Phenylephrine may affect the ciliary muscle and accordingly, the ciliary cleft decreases and causes an increase in IOP (3.0±3.122, paired t-test, p = 0.02). The degree of post-mydriatic IOP changes is thought to be related to the degree of change in CCA. This may indicate that the capacity of CCA changes represents the capacity of IOP changes in the anterior segment. Supported by RIS through the NRF of Korea. 

None.
EVALUATION OF BACTERIAL ISOLATES, ANTIMICROBIAL SUSCEPTIBILITY, AND CLINICAL CHARACTERISTICS IN DOGS WITH INFECTIOUS ULCERATIVE KERATITIS IN TEXAS, USA. (A Yoon, 1 LV Vallone, 1 SP Collins, 1 J Wu, 2 S Flores, 2 S Welch, 2 SD Lawhon, 2 AS Rogovskyy, 2 and EM Scott, 1) Department of Small Animal Clinical Sciences, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University; 1 Department of Veterinary Pathobiology, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University. 2

**Purpose.** To determine the most common bacterial isolates, corresponding antibiotic susceptibility, and clinical characteristics in dogs with infectious ulcerative keratitis (IUK) in Texas. **Methods.** Medical records of dogs diagnosed with IUK at Texas A&M Veterinary Medical Teaching Hospital were reviewed (2015-2021). Reports were included in the study if bacterial culture and susceptibility results from corneal samples were available. **Results.** A total of 101 eyes from 93 dogs were included in this study. Bilateral corneal ulcers were present in 8/93 dogs. Brachycephalic breeds (42/93) and concurrent keratoconjunctivitis sicca (24/93) were common in dogs with IUK. The distribution of IUK dogs across seasons were as follows: Spring (17/101, 16.8%), Summer (43/101, 42.5%), Fall (20/101, 19.8%), and Winter (21/101, 20.7%). An infectious organism was identified in 12/28 corneal cytology samples (8 bacterial, 3 fungal, 1 mixed). Positive bacterial cultures were obtained from 63/101 (62%) ulcers sampled, with 40 bacterial organisms identified. The most common isolated bacteria were Staphylococcus pseudintermedius (21/101, 21%), Streptococcus canis (15/101, 15%), and Pseudomonas aeruginosa (12/101, 12%). Fungal organisms were identified in 2/101 bacterial cultures. Outcome information is available for 87/101 eyes. A successful outcome of globe retention with or without vision was documented in 45/50 eyes treated medically and 37/37 eyes treated surgically. Susceptibility pattern analysis is pending. **Conclusions.** Corneal bacterial culture is an essential diagnostic tool that should be utilized in every case of infectious ulcerative keratitis to guide appropriate treatment. None.
IN VITRO ANTIBACTERIAL EFFICACY OF AUTOLOGOUS CONDITIONED PLASMA AND AMNIOTIC MEMBRANE EYE DROPS (KM Yates, RL Fontenot, NK Stilwell, CM Betbeze) 1 Department of Clinical Sciences; 2 Department of Pathobiology and Population Medicine, Mississippi State University College of Veterinary Medicine

Purpose. To determine in vitro antibacterial efficacy of equine and canine autologous conditioned plasma (ACP) and amniotic membrane extract eye drops (Vetrix, Inc Cummings, GA) (AMEED) against aerobic bacteria. Methods. Canine (n=4) and equine (n=4) blood were steriley collected, pooled for each species, and processed using Arthrex ACP® Double-Syringe system. Platelet counts were performed on ACP and pooled blood. AMEED were obtained from a commercial source. A medical records search (2013-2022) identified aerobic bacteria cultured from canine and equine corneal ulcers at Mississippi State University College of Veterinary Medicine (MSU-CVM). Ten of the most commonly isolated bacteria for each species were collected from cultures submitted to the MSU-CVM Microbiology Diagnostic Service and frozen at -80°C. The Kirby-Bauer disk diffusion method was used to determine the sensitivity of these isolates to ACP and AMEED. Bacterial isolates were plated onto Mueller-Hinton + 5% sheep blood agar and blank sterile disks saturated with 20 µl of ACP or AMEED were tested in duplicate. Imipenem disks served as positive controls and blank disks as negative controls. Zones of inhibition were measured at 18 hours. Results. ACP platelet counts were 1.06 and 1.65 times higher than blood for equine and canine samples, respectively. Growth of a multi-drug resistant Enterococcus faecalis was partially inhibited by canine and equine ACP. AMEED did not inhibit growth of any isolate. Conclusions. Canine and equine ACP partially inhibited Enterococcus faecalis growth in vitro. Further studies using isolates specifically from corneal ulcers and varying concentrations of ACP are warranted. Supported by the Veterinary Student Research Initiative Grant, Mississippi State University College of Veterinary Medicine. None.
VISUAL FIELDS OF THE ALBINO RAT, COMMON FERRET, AND NORTHERN TREE SHREW (JM Morris, 1 M Sedigh-Sarvestani, 2 and BA Moore, 1) College of Veterinary Medicine, University of Florida, Gainesville, Florida, USA; 1 Max Planck Florida Institute for Neuroscience, Jupiter, Florida, USA.

Purpose. To describe the visual fields of three common model species in vision science as a means to better understand the organization of their visual perceptual experience and contribute to continued studies of visual processing. Methods. Visual fields were measured using an ophthalmoscopic reflex technique in six northern tree shrews, four common ferrets, and four albino rats. Animals were anesthetized and the midpoint between their eyes was centered inside a spherical space. A rotating arm was manipulated in 10-degree increments around the head. At each increment, a direct ophthalmoscope was used to visualize the limits of the retinal reflex for each eye, the overlap being the extent of the binocular visual field. Results. Maximum binocularity was 69° +/- 1.6° in the ferret, 90° +/- 3.1° in the rat, and 57° +/- 4.3° in the shrew, located at 10° above, 40° above, and at the horizontal plane, respectively. Binocularity extended 160°, 200°, and 180° in the sagittal plane in the ferret, rat, and shrew, respectively, from at least below the nose to above the head in all animals. Conclusions. Establishing the extent of the visual field accessible to the retina provides insight into the egocentric perceptual experience of animals. Overhead binocularity in these animals enhances anti-predatory vigilance in a natural setting. In describing the visual field, we provide a reference for the representation of the visual space in different cortical regions, many of which represent specific subregions of the visual field. None.
INVESTIGATION OF OPHTHALMIC LESIONS FROM TRAUMATIC INJURY IN RAPTORS (Al Cubb, 1 LV Vallone, 1 SM Hoppes, 1 and EM Scott, 1) Department of Small Animal Clinical Sciences, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University. 1

**Purpose.** To describe the clinical ophthalmic findings and outcome of raptors presented for veterinary evaluation with traumatic injury. **Methods.** Medical records of free-living raptors presented to the Texas A&M Veterinary Medical Teaching Hospital (2016-2019) with known or suspected blunt or penetrating trauma that received a complete ophthalmic examination were reviewed. **Results.** Twenty-four raptors were included comprising 14 owls (7 juveniles, 7 adults), 9 hawks (3 juveniles, 6 adults), and 1 adult eagle. Blunt trauma was the most common cause of injury in 21/24 raptors. Ocular lesions were detected in 21/24 birds with 14/21 affected bilaterally and 7/21 affected unilaterally. The most common ophthalmic findings included traumatic uveitis, retinal tears, cataracts, corneal ulcers, and cyclodialysis. Most raptors retained vision in at least one eye (23/24) and were discharged to a rehabilitation center (19/24), with only 5/24 euthanized prior to rehabilitation for the extent of their ocular and non-ocular injuries. Of the 19 raptors discharged to a rehabilitation center, 8 were successfully released, 7 were euthanized, and 4 were lost to follow-up. **Conclusions.** A full ophthalmic evaluation in raptors is crucial to assess ocular morbidity and visual prognosis to ultimately determine eligibility for future release. **None.**
OPHTHALMIC FINDINGS IN A HERD OF TURKMEN HORSES (SM Rajaei, 1 H Faghihi, 1 and ZZ Bolandnazar, 2) Ophthalmology Section, Negah Veterinary Centre, Tehran, Iran; 1 Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.

Purpose. To determine normal ocular parameters and to describe ocular findings in a herd of Turkmen horses. 

Methods. Fifty-four Turkmen horses (33 mares and 21 stallions) were examined. Complete ophthalmic examination was performed in all horses. 

Results. Means (SD) of STT of right and left eyes were 22.0(4.9) mm/min and 21.6(4.4) mm/min, respectively. Means (SD) IOP of right and left eyes were 26.0(4.3) mmHg and 25.3(3.9) mmHg, respectively. Mean (SD) age of horses was 5.7(4.6) years (range: 1-17 years). Six different ocular disorders were observed: Conjunctivitis, Haab’s striae, corneal fibrosis, corpora nigra atrophy, cataract and inactive choroiditis. In total, 11 eyes (10.1%) of 10 horses (18.5%) had ocular lesions. Loss of vision was not detected in horses examined. 

Conclusions. This study reported ocular findings in a herd of Turkmen horses. A minority of horses in the herd had ocular lesions suggesting a history of corneal ulceration, uveitis and glaucoma. None
AN OUTBREAK OF EQUINE HERPESVIRUS 1 (EHV-1) AND OBSERVED UVEITIS IN A HORSE (CE McIntosh, LE Page, and RA Allbaugh) Department of Veterinary Clinical Sciences, Lloyd Veterinary Medical Center, Iowa State University, College of Veterinary Medicine, Ames, IA.

**Case description.** An 11 year-old Arabian mare presented for breeding management. In June 2021, an outbreak of EHV-1 (reportable disease) affected the Lloyd Veterinary Medical Center, with numerous inpatients exposed. **Clinical findings.** This mare developed anterior uveitis OU shortly after being diagnosed with EHV-1 and subsequently developed changes consistent with heterochromic iridocyclitis with secondary keratitis (HIK).

**Treatment and outcome.** Aggressive medical management was implemented using topical and systemic therapies. Severe corneal edema and inflammation could be effectively controlled with these therapies, but signs would recur with medication tapering. Clinical decisions were driven by the client’s requirement to have the horse home as soon as possible and off all medications. Multiple procedures were performed: 1) a suprachoroidal triamcinolone injection with low dose intravitreal gentamicin OS, 2) a keratectomy and complete Gundersen flap OS, and 3) an enucleation OS due to severe fungal keratitis with the globe submitted for histopathology. **Clinical relevance.** There is limited information on ocular findings associated with EHV-1. This mare developed anterior uveitis, pigmented keratic precipitates, corneal edema, and chorioretinal lesions. Additionally, there is no universally accepted and definitive treatment for HIK in horses; therefore, treatment methodologies and clinical results vary widely. This mare initially responded well to treatment, but an appropriate medication tapering schedule was unable to be implemented, so there was recurrence of clinical signs. A more positive outcome may have been possible in this case were it not for the aggressive and accelerated treatment/tapering schedules. **None.**
ASSOCIATION BETWEEN VACCINATION AND HERPETIC DISEASE IN CHEETAHS (ACINONYX JUBATUS) UNDER MANAGED CARE (ME Marino, MA Mironovich, NE Ineck, SB Citino, JA Emerson, DJ Maggs, LM Coghill, EJ Dubovi, RC Turner, RT Carter, and AC Lewin) Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University; White Oak Conservation; Surgical and Radiological Sciences, School of Veterinary Medicine, University of California Davis; Bioinformatics and Analytics Core, University of Missouri; Population Medicine and Diagnostic Sciences, College of Veterinary Sciences, Cornell University; Birmingham Zoo.

**Purpose.** Feline herpesvirus type 1 (FHV-1) is endemic in managed cheetahs and can cause severe ocular disease. Modified live vaccines (MLV), produced for use in domestic cats, can be used preventatively in managed cheetahs and have been occasionally anecdotally linked to disease. This study used viral genome analysis to identify sources of FHV-1 infection in managed cheetah populations.

**Methods.** FHV-1 DNA was extracted from ocular, pharyngeal and nasal swabs of ten managed cheetahs with or without upper respiratory tract disease, and from a MLV (Purevax Feline 3, Merial, Inc., Athens, GA, USA) used in these populations. Extracted DNA underwent full genome sequencing by Illumina Miseq. FHV-1 genomes isolated from vaccinated cheetahs, MLV, and previously sequenced domestic cat isolates underwent phylogenomic and recombinational analyses.

**Results.** FHV-1 genomes isolated from vaccinated cheetahs and the MLV were near-identical (99% homology). The MLV and eight cheetah isolates grouped into a clade including isolates previously sequenced from North American domestic cats. The remaining cheetah isolates were not associated with an existing clade. Further recombinational analyses suggested the likely origin of these latter viruses was recombination between isolates from Australian domestic cats and cheetahs.

**Conclusion.** FHV-1 DNA of likely vaccinal origin was detected at epithelial surfaces of recently vaccinated cheetahs, with or without respiratory disease. This suggests that this MLV may revert to virulence in some cheetahs. These data also provide evidence of horizontal viral transmission among domestic and non-domestic Felidae. This information can guide FHV-1 prevention programs and vaccination strategies utilized in managed cheetah populations. Supported by the Morris Animal Foundation (Summer Scholars Program), a Louisiana State University School of Veterinary Medicine VCS Corp Grant and Start-Up funds (Lewin) and White Oak Conservation.

None.
CANINES ON THE COUCH: TV WATCHING HABITS OF PET DOGS (FM Mowat, 1,2 C Ersoz, 1 M Buesing, 1 MM Salzman, 1) Department of Surgical Sciences, School of Veterinary Medicine, University of Wisconsin-Madison 1; Department of Ophthalmology and Visual Sciences, School of Medicine and Public Health, University of Wisconsin-Madison 2

**Purpose.** Visual attention tests using grating stimuli can assess visual acuity and contrast sensitivity in preverbal children. In preliminary dog studies, we found that presentation of standard grating stimuli resulted in rapid habituation. We sought to understand what video-based content dogs engage with the most, to ultimately develop a visual attention test for dogs with less likelihood of habituation. **Methods.** We constructed a dog owner survey in Qualtrics, and performed content validation with 10 dog owners and 10 veterinarians. The survey was disseminated to dog owners worldwide via press and social media. The survey contained questions regarding demographics, screen availability and interaction, and content of interest; four videos were presented to dogs with owners rating interest and tracking. The study was exempted from IRB and IACUC. **Results.** 729 responses were collected over a period of one month; 89% from dog owners in the United States. Female dogs represented 50% of the population and purebred dogs 52%. The most common screen for dogs to watch was television; most dogs watched from between 4-8 feet away. Interaction time was predominantly short (<5 minutes). Animals were the most common group of subjects that dogs paid attention to (80%); dogs were the most common animal of interest. Of the 4 presented videos, interest was deemed greatest to a dog subject, and least to a moving vehicle. **Conclusions.** We will use this information to generate content for presentation to dogs in the laboratory, to attempt to develop a visual tracking and/or attention test for dogs. Supported by NIH grant EY028628.
CHARACTERIZATION OF THE BOVINE BACTERIAL OCULAR SURFACE MICROBIOME IN INFECTIOUS BOVINE KERATOCONJUNCTIVITIS (HB Gafen,1 NE Ineck,1 CC Liu,1 C Taylor,2 M Luo,2 C Scully,1 MA Mironovich,1EM Scott,3 M Leis,4 D Hernke,5 RT Carter,1 and AC Lewin 1) Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University;1 Department of Microbiology, Immunology, and Parasitology, Health Sciences Center, Louisiana State University;2 Department of Small Animal Clinical Sciences, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University;3 Department of Small Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan;4 Department of Environmental and Population Health, Cummings School of Veterinary Medicine, Tufts University.5

**Purpose.** Infectious bovine keratoconjunctivitis (IBK) causes economic losses and animal welfare concerns globally. IBK, inconsistently associated with *Moraxella bovis*, ranges in severity with variable treatment efficacy. The bovine bacterial ocular surface microbiome (OSM) is poorly characterized; the purpose of this study is to compare the bacterial OSM between normal and IBK-affected cattle. **Methods.** Herds with clinical signs of IBK were identified. Eyes were categorized as “normal,” “active IBK,” or “inactive IBK” by a veterinarian. The conjunctival fornix was sampled using one swab for DNA extraction and a second for bacterial culture. **Results.** Samples were collected from 354 cattle (708 eyes: 228 active, 93 inactive, 387 normal) in 8 US States. Angus (218/354) and Holstein (115/354) were the most common breeds. 290/354 were female and 332/354 were under one year of age. In cattle with active or inactive IBK, lesions were most often unilateral (161/241). 476 bacterial cultures were performed; *M. bovis* was cultured in 7/228 active IBK eyes, 1/89 inactive IBK eyes, and 1/159 normal eyes. **Conclusions.** Angus and Holstein cattle, cattle under 1 year of age, and female cattle were most common in this study. IBK lesions were most often unilateral. The frequency of positive *M. bovis* culture was low in animals with active IBK. Supported by USDA AFRI grant no. 2020-67016-31467. None.
ACVO 2023
Boston, Massachusetts | Boston Park Plaza | September 20 - 23, 2023

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Savannah, Georgia | Westin Savannah Harbor | October 23 - 26, 2024
COMBINATION PHACOEMULSIFICATION AND PARS PLANA VITRECTOMY FOR RETINAL RE-ATTACHMENT SURGERY IN THE SIBERIAN HUSKY BREED (TM Chen,1 JS Sapienza,1 B Nadelstein,2 K Kim,1 S Palmer 2); Long Island Veterinary Specialists, Plainview, NY USA;1 Animal Eye Care Associates, Virginia Beach, VA USA.2

**Purpose.** To report the success rate and complications of combined phacoemulsification and pars plana vitrectomy (PPV) for treatment of cataracts and retinal detachment in Siberian Husky dogs. **Methods.** Medical records of Siberian Husky dogs undergoing combined phacoemulsification and PPV with a minimum 2 months follow-up were reviewed. Preoperative, surgical, and postoperative data reviewed included menace response, electroretinogram (ERG) and ocular ultrasound results, area of retinal detachment, stage of cataract, visual outcome, and complications. **Results.** Seventeen eyes of 16 dogs were evaluated, with a median postoperative follow-up of 8.9 months (range 2.2-42.0 months). The mean age at time of surgery was 1.7 years. All had partial retinal detachments with positive dazzle and acceptable ERG (when measured). Ten had hypermature cataracts, 4 had mature cataracts, and 3 had immature cataracts. All eyes had vision 2.2 months postoperatively, but 2 eyes became blind due to glaucoma at 27 and 41 months after surgery, respectively. Silicone oil migration was observed in 8/17 (47.0%) eyes. Corneal endothelial degeneration was observed in 2/17 (11.8%) eyes, glaucoma in 2/17 (11.8%) eyes, and both corneal endothelial degeneration and glaucoma in 1/17 (5.9%) eyes. Other complications included retinal re-detachment (n=2), vitreal hemorrhage (n=1), and hyphema (n=1). **Conclusions.** Despite concurrent retinal detachment, select Siberian Husky dogs can have successful restoration of vision with the combination of phacoemulsification cataract surgery and PPV retinal repair. Silicone oil migration is the most common complication postoperatively. Future investigation to study complications is warranted. **None.**
RETINAL NERVE FIBER LAYER THICKNESS IN NORMAL RHECUS MACAQUES (MACACA MULATTA) WITH AND WITHOUT AN OPA1 MUTATION. (TT Nguyen1, A Moshiri2, BD Story1, R Chen3,4, S Park1, S Kim1, KP Roszak1, Stout5, J Rogers3, SM Thomasy1,2) 1 Dept. of Surgical & Radiological Sciences, School of Veterinary, Medicine, University of California, Davis, Davis, CA 2 Dept. of Ophthalmology & Vision Science, School of Medicine, University of California, Davis, Davis, CA 3 Human Genome Sequencing Center, Baylor College of Medicine, Houston, TX 4 Dept. of Biochemistry & Molecular Bio, Baylor College of Medicine, Houston TX 5 Cullen Eye Institute, Baylor College of Medicine, Houston, TX.

**Purpose.** Autosomal dominant optic atrophy (ADOA) is a degenerative disease of retinal ganglion cells primarily due to mutations in OPA1 that has no treatment. We identified rhesus macaques (Macaca mulatta) with an OPA1 p.A8S mutation that causes similar disease in humans. We hypothesized that retinal nerve fiber layer (RNFL) thickness in rhesus macaques heterozygous for this OPA1 mutation (OPA1 Het) would have a decreased RNFL thickness in comparison to wildtype (WT) controls. **Methods.** Thirteen OPA1 Hets and 113 WT controls underwent ophthalmic exams and optical coherence tomography of the peripapillary retina. Peripapillary RNFL thickness between the two groups were statistically compared using a two-way analysis of variance and Sidak’s multiple comparison test. **Results.** Mean ± SD (range) RNFL thickness was 108 ± 9 (85-131) μm in the 113 WT controls; age ranged from 4 months to 29 years. Peripapillary RNFL thickness was significantly lower in the 13 OPA1 Hets (96 ± 10 μm) versus 13 age-, sex-matched WT controls (108 ± 11 μm). Nine OPA1 Hets (3-29 years of age) demonstrated a decrease in RNFL thickness in at least one region in comparison to age-matched WT controls while four OPA1 Hets (1-14 years of age) exhibited no obvious phenotype. The superonasal and temporal regions were significantly thinner in the aforementioned 9 OPA1 Hets versus 9 age-, sex-matched WT controls. **Conclusions.** Rhesus macaques heterozygous for an OPA1 mutation demonstrate a variable, incompletely penetrant phenotype of RNFL thinning consistent with ADOA in humans. Supported by the National Institute of Health T35OD010956, U24EY029904, P30EY012576 and the CNPRC Base Grant from the NIH Office of the Director, OD011107. **None.**
PROGRESSIVE RETINAL ATROPHY IN BERGER PICARD DOGS (F. Ortiz, GR Kick, K Donnelly, EA Giuliano, L Hansen, GS Johnson, ML Katz) 1) College of Veterinary Medicine, University of Missouri – Columbia; 2) Department of Ophthalmology, School of Medicine, University of Missouri – Columbia

**Purpose.** Progressive retinal atrophy (PRA) in Berger Picards presents with variability in onset and progression. We hypothesize there is more than one form in Picards, with a single mutation underlying each. To test this hypothesis, whole genome sequence (WGS) analysis is being performed on affected and unaffected dogs.

**Methods.** Review of ophthalmic records of 463 Picards identified 18 diagnosed with PRA; the remainder were clinically unaffected. WGS was performed on selected dogs to identify candidate disease risk variants. All dogs in the cohort were genotyped for a candidate disease variant identified with WGS. Ophthalmic examination, fundus imaging, and electroretinography were done on one affected dog and one unaffected dog.

**Results.** A missense variant unique to Picards in SLC1A7 was homozygous in the WGSs from 2 Picards with PRA. Among 445 unaffected and 18 affected dogs, only one of the affected dogs was homozygous for the reference allele, whereas 46% of the unaffected dogs were homozygous for this allele (P<0.001). This suggests that the Picard-specific SLC1A7 variant is associated with some forms of PRA in this breed. In the one affected dog homozygous for the reference allele, funduscopy demonstrated hyperreflectivity and vascular attenuation consistent with PRA. Electroretinogram responses in this dog were reduced compared to an unaffected dog.

**Conclusions.** The SLC1A7 variant may be a risk factor for PRA in Picards, though other genetic factors likely underlie the disease in this breed. WGS analysis of samples from additional affected dogs is likely to identify additional disease risk loci. Supported by a BioNexus KC Patton Trust grant. *None.*
CABP4 GENE AUGMENTATION RESTORES VISION IN WHIPPETS WITH AUTOSOMAL RECESSIVE RETINAL DEGENERATION (B Beckwith-Cohen1, Winkler PA1, Occelli LM1, Sun K1, Montiani-Ferreria F2, Marinho LF2, Lee A3, Hauswirth W4, Petersen-Jones SM1) Department of Small Animal Clinical Sciences, Michigan State University;1 Department of Veterinary Medicine, Universidade Federal do Parana, Curitiba, PR, Brazil;2 Department of Neuroscience, The University of Texas at Austin, Austin, TX, United States;3 University of Florida, Gainesville, FL, United States.4

Purpose. To evaluate vision restoration in CaBP4-mutant whippets treated with canine CaBP4 (dCaBP4) or human CaBP4 (hCaBP4) gene augmentation therapy. Methods. Subretinal injections of dCaBP4 (n=8) and hCaBP4 (n=4) were performed in 12 eyes of 7 affected dogs. Outcomes were assessed via visual behavior (in a range of scotopic and photopic conditions), including obstacle course and 4-choice test, electroretinography (ERG), retinal imaging (including fundus photography), optical coherence tomography (OCT), OCT-A and fluorescein angiography as well as immunohistochemistry (IHC). Outcomes were compared between treated and untreated regions (bleb/non-bleb), treated eyes to untreated affected eyes (n=4) and normal controls (n=4), or pre and post treatment assessments. Results. Treated dogs with either dCaBP4 or hCaBP4 showed improved performance when navigating visual behavior tasks. Treated dogs also showed marked and comparable restoration of the ERG b-wave, preservation of total retinal thickness and outer retinal layer morphology in treated areas seen on OCT, and normalization of synaptic morphology in the outer plexiform layer seen on IHC. Conclusions. A naturally occurring mutation in CaBP4 is successfully treated with gene augmentation therapy using both human and canine gene-based constructs; thus, paving the way for translational therapy to treat human CaBP4 retinopathy. Supported by Myers Dunlap Endowment for Canine Health, NIH grant NEI EY027285, CVM Endowed Research Funds, Vision for Animal Foundation VAF2022-1. None.

Thursday Presenting 9:45am
Purpose. To structurally and functionally characterize the retinal phenotype in an English Springer Spaniel (ESS) lineage of dogs, DNA tested as genetically affected for the RPGRIP1 variant associated with cone-rod dystrophy (cord1-PRA). Methods. Closely related homozygous affected (RPGRIP1ins/ins; n=6; 2.2-14.7y) and heterozygous (n=1; 10.4y) ESSs underwent ophthalmic evaluations including indirect ophthalmoscopy, electroretinography (ERG), and optical coherence tomography (OCT). Fundus was imaged using RetCam. Scotopic and photopic full-field ERGs were performed using a hand-held portable device. Selected RPGRIP1ins/ins dogs (5y and 9y) underwent OCT under general anesthesia. ONL was measured based on the OCT B-scan images by manual segmentation. Results. Of the six affected dogs, the four younger dogs (2.2-9y) had no noticeable visual impairment per the owner and had normal central fundus. However, examination of the far peripheral fundus revealed dark changes in reflectivity starting along the dorsal tapetal-nontapetal junctions in all genetically affected dogs. As well, cone 29Hz flicker amplitudes were reduced in the affected (18-61μV) compared to carrier (81μV) dogs. OCT confirmed reduced ONL thickness (superior, inferior mid-periphery) in the affected dogs at five (28.1, 23.0μm) and nine (27.5, 26.8μm) years of age. Conclusion. ESSs affected by cord1-PRA based on DNA testing may not show visual impairment and exhibit apparently normal central fundus for many years. However, early disease may be detected in the far peripheral retina and by cone ERG. The structural and functional retinal phenotype is progressive and generally age-dependent, although individual variations are observed even within the related dogs, indicating that modifiers may be affecting disease expression. Supported by AKC Canine Health Foundation, ESSFTA, Van Sloun Foundation, NEI/NIH EY-006855, Foundation Fighting Blindness. NONE.
Purpose. The retina in dogs with sudden acquired retinal degeneration syndrome (SARDS) undergoes rapid outer retinal atrophy, but the underlying pathophysiology is poorly understood. Considering the importance of choroidal perfusion in outer retinal oxygen delivery, we hypothesized that choroidal ischemia may contribute to outer retinal atrophy in SARDS. Methods. Two masked evaluators quantified patent choriocapillaris blood vessels (PV) containing red blood cells in 5 micron-thick hematoxylin and eosin (H&E)-stained dorsoventral sagittal eye sections from 13 dogs with SARDS, 26 age/breed-matched normal controls, and 13 age-matched dogs with progressive retinal atrophy (PRA). Counts were represented per millimeter of retinal length. The extent of photoreceptor degeneration was calculated by counting nuclei of the outer nuclear layer (ONL) in central and peripheral retinal regions. Results. Dogs with SARDS and PRA had decreased PV/mm retina compared with normal dogs (one-way ANOVA p=0.003 and 0.047). There was no difference between dogs with SARDS versus PRA (p=0.539). There was a positive linear correlation between the number of ONL nuclei and PV/mm retina in dogs with PRA (R²=0.562, p= 0.003), but no correlation in dogs with SARDS (R²=0.105, p=0.304) or the controls (R²=0.003, p=0.801). Conclusions. Dogs with SARDS and PRA have histological evidence of decreased choriocapillaris perfusion. In PRA, but not SARDS, the decreased perfusion is associated with the degree of photoreceptor degeneration. This finding might support choriocapillaris ischemia as a cause rather than a consequence of photoreceptor damage in SARDS. Supported by the ACVO VAF (VAF2020-A) and the McPherson Eye Research Institute Kenzi Valentyn Award. None.
ROLE OF TGWIP ON THE MIGRATION OF TOXOPLASMA GONDII INTO THE EYE (V Rozo 1, S Park 1, P Morales 2, LO Sangare 2, DA Solis 2, SM Thomasy 1,3, J Saeij 2, BC Leonard 1) 1 Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California, Davis, Davis, CA, 95616, USA; 2 Department of Pathology, Microbiology and Immunology, School of Veterinary Medicine, University of California, Davis, Davis, CA, 95616, USA; 3 Department of Ophthalmology & Vision Science, School of Medicine, University of California, Davis, Davis, CA, 95616, USA

**Purpose.** Toxoplasma gondii (T. gondii) is the leading cause of infectious blindness worldwide. Preliminary studies demonstrated that loss of the TgWIP gene of T. gondii resulted in impaired systemic dissemination in mice. The current study focused on the role of TgWIP in migration of T. gondii. **Materials and Methods.** Knockout T. gondii parasites (∆TgWIP) were generated using CRISPR-Cas9. CD-1 mice were infected with 200,000 parasites/mouse: wildtype (WT) intravenously (IV) (n=5), WT intraperitoneally (IP) (n=5), ∆TgWIP IV (n=5), ∆TgWIP IP (n=5). Mice underwent clinical examination, fundus imaging, fluorescein angiography (FA) and optical coherence tomography (OCT) at baseline and 7 days post-infection. An in vitro blood-retinal barrier was developed with polarized ARPE-19 cells grown on the underside of Transwell inserts to mimic the natural orientation of T. gondii infection. Transepithelial resistance (TEER), FITC-dextran permeability and ZO-1 staining were used to confirm proper polarization. **Results.** Mice infected with ∆TgWIP parasites had more pronounced dilation of the retinal vasculature, extravasation of fluorescein on FA, and dilation of the choroid on OCT at 7 days post-infection compared with mice infected with WT parasites. TEER measurements (30-40 ohms), minimal FITC-dextran passage between cells and positive ZO-1 staining at cell-cell junctions were consistent with a polarized monolayer of ARPE-19 cells. **Conclusions.** Overall ∆TgWIP infected mice demonstrated increased vascular dilation and permeability. This suggests that TgWIP functions to limit the host inflammatory response. Additionally, the developed ARPE-19 in vitro model can be used to study the effects of T. gondii on the blood-retinal barrier. Supported by NATIONAL EYE INSTITUTE R21 EY031799.

None.
TREATMENT OUTCOMES FOR BLIND DOGS WITH SUDDEN ACQUIRED RETINAL DEGENERATION SYNDROME (SARDS) IN THE PERIOD 2012-2022. 1,2 S.D. Grozdanic, 2S. Luzetskii, 2S. Djukic, 2I. Lakic, 1T. Lazic; Animal Eye Consultants of Iowa, North Liberty, IA; 2Oculus, Belgrade, Serbia

**Purpose.** To describe treatment outcomes in blind SARDS dogs from Iowa and North Dakota. **Methods.** SARDS dogs (n=40) of different breeds were evaluated using chromatic pupil light reflex testing (cPLR), electroretinography (ERG), and vision testing (menace testing, cotton ball tracking and visual maze testing in dim and bright light conditions) before and after treatment. Data were analyzed only for dogs with a minimum follow up of 3 months post treatment by authors. Data from dogs from other states and not seen by authors for re-evaluation were not included. Two dogs were treated with systemic immunosuppressive drugs (SIDs) and subconjunctival steroid injection only, while 38 dogs were treated with intravitreal IVIg injection and SIDs (cyclosporine, leflunomide, prednisone, mycophenolate). **Results.** Post-treatment follow up time was 11.4±3.2 months (mean±SEM, minimum 3 months, maximum 120 months). Dogs treated with subconjunctival steroid injection and SIDs did not recover any vision. IVIg+SIDs treatment resulted in recovery of visual navigation skills in 65.7% (25/38) of treated dogs, menace response in 29% (11/38) and cotton ball tracking in 18.4% (7/38) of treated dogs. Subconjunctival hemorrhage post intravitreal injection was the most frequent complication (76%, 29/38 dogs). Most frequent systemic complications observed were soft stool or diarrhea (19.4%, 7/38 dogs). One patient died 14 months after treatment (died in sleep, no necropsy performed). **Conclusions.** Intravitreal IVIg combined with SIDs is potentially effective and safe treatment for SARDS dogs. Conflicts of interest: None.
SAFETY AND EFFECT OF DIODE LASER PERIPHERAL IRIDOPLASTY AND GONIOTOMY IN NORMAL DOGS AND DOGS WITH ADAMTS10-OPEN ANGLE GLAUCOMA (OAG) – A PILOT STUDY (KR Quantz,1 CD Harman,1 AL Anderson,1 KL Koehl, 1 DG Sledge,2 AL Gerras,2 AM Komáromy1) Department of Small Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University;1 Department of Pathobiology and Diagnostic Investigation, College of Veterinary Medicine, Michigan State University.2

**Purpose.** To investigate the safety and effect of transcorneal diode laser peripheral iridoplasty and minimally invasive goniotomy on the ciliary cleft width (CCW) and intraocular pressure (IOP). **Methods.** Six purpose bred research dogs (11 eyes) were included in this prospective pilot study. Preoperative baseline diagnostics included gonioscopy (n= 11 eyes), ultrasound biomicroscopy (UBM) (n= 11 eyes), baseline diurnal IOP (n= 11 eyes), pneumotonography (n=7 eyes), and fluorophotometry (n=7 eyes). Treatment groups included regional transcorneal diode laser peripheral iridoplasty (n=10) and minimally invasive goniotomy with a 27 gauge needle (n=2). One eye received both treatments separated by an interval of 8 months. All dogs were monitored 3 months postoperatively. At the conclusion of the study eyes were submitted for routine histopathology. **Results.** All treated animals developed mild-moderate anterior uveitis. Dogs receiving goniotomy developed mild hyphema immediately following treatment. There was no significant treatment effect found for IOP, pneumotonography, or fluorophotometry following either treatment. Two dogs had increased in the width of the ciliary cleft at the first follow-up UBM measurement; however, no other timepoint yielded a significant change between baseline and post-treatment measurements. Histopathology revealed that eyes treated with goniotomy developed fibrosis and collapse of the iridocorneal angle. Eyes treated with peripheral iridoplasty exhibited homogenization of collagenous stroma, loss of stromal cells, and interstitial accumulation of free pigment and melanin-laden macrophages. **Conclusion.** Treatment with iridoplasty and goniotomy did not have a significant effect on parameters commonly used for glaucoma therapy and may not be a viable treatment strategy for canine glaucoma. Supported by the Vision for Animals Foundation grant VAF2021-4, MSU-CVM Endowed Research Funds, and NIH grant R01-EY025752. **None.**
EVALUATION OF POTENTIAL RISK FACTORS FOR DEVELOPMENT OF OPEN ANGLE GLAUCOMA AFTER PHACOEMULSIFICATION MEASURED BY ULTRASOUND BIOMICROSCOPY. (Dong-Hee Kim, Yeongseok Goh, Hyemin Kim, SangEun Park, Kyung-Mee Park*), Laboratory of Veterinary Ophthalmology, School of Veterinary Medicine, Chungbuk National University Cheong-ju, Korea

**Purpose.** The aim of this study is to evaluate changes in the ciliary cleft and anterior segment after cataract surgery and to identify the cause of glaucoma in affected canine eyes. **Methods.** Ultrasound Biomicroscopy (UBM) data obtained from dogs that visited Veterinary Medical Teaching Hospital of Chungbuk University hospital in Korea were analyzed. Dogs that underwent cataract surgery were examined with UBM before and three months after cataract surgery using phacomulsification, and were divided into groups with or without glaucoma to observe post-operative complications. In this research, only pre-operative open iridocorneal angle is included in gonioscopy. Measurements of ciliary cleft parameters, including the area of the ciliary cleft (CCA), length of the ciliary cleft (CCL), width of the ciliary cleft (CCW), iridocorneal angle (ICA) and angle-opening distance (AOD), were obtained using a UBM. **Results.** There was no significant difference in ICA and IOP between post-operative group and pre-operative group. All ciliary cleft parameters including CCA, CCW, CCL, and AOD in the post-operative group were significantly different from the pre-operative group. In addition, there were significant differences in all ciliary cleft parameters between post-operatives groups with and without post-operative glaucoma. **Conclusions.** Cataract surgery may influence the contractility of the ciliary muscle, and accordingly, ciliary cleft decreases. Since the ciliary cleft is a passage for the aqueous humor, reduction of CCA can be a risk factor that causes glaucoma after phacoemulsification. Supported by RIS through the NRF of Korea. **None.**
MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION (MP-TSCPC) IN CANINE GLAUCOMA; EVALUATING FLUENCE AND 20 SECOND SWEEP SURGICAL VELOCITY (V Benitez-Vera, 1 D Bras, 2)
Angell Animal Medical Center; 1 Ophthalmology Department, Centro de Especialistas Veterinarios de Puerto Rico; 2.

**Purpose.** To report preliminary results of MP-TSCPC utilizing the new P3® probe and a 20s/sweep technique(20s/s) compared with 10s/sweep(10s/s) velocity. **Methods.** Sixteen eyes were treated with MP-TSCPC. Ten eyes were treated with the original P3 probe at 10s/s and six eyes were treated with the novel P3 probe at 20s/s. Laser parameters consisted of 2800mW, 31.3% duty-cycle, and 120s/hemisphere. Complete ophthalmic examinations and IOP were recorded over 6 months(m). Good surgical outcome was considered if IOP was <20mmHg and patients were sighted. **Results.** Mean preoperative IOP for the 10s/s and 20s/s groups were 37.1mmHg and 51mmHg respectively. Mean postoperative IOPs (10s/s, 20s/s) were: 1m (7.5mmHg, 11.6mmHg), 3m (7.4mmHg, 32.6mmHg), 6m (7.6mmHg, 13mmHg). IOP was controlled in all eyes 1m postoperatively. A significant difference in IOP control was observed at 3m and 6m in the 10s/s group (100%, 70%) vs the 20s/s group (67%, 33%). All eyes treated with 10s/s were sighted at 3m postoperatively and 80% at 6m postoperatively. There was a significant decrease in vision preservation at 6m postoperatively in the 20s/s group; (10s/s; 80%, 20s/s; 33%). Both procedures had a low rate of complications. **Conclusions.** MP-TSCPC can be an effective treatment for canine glaucoma. The 20s/sweep protocol is successful in lowering and controlling IOP up to 3 months postoperatively, it is safe, and does not increase complication rates. While fluence is an important factor to be considered in the treatment of glaucoma by MP-TSCPC, decreased velocity did not offer better surgical outcomes when compared with the 10s/sweep protocol. None.
Purpose. To describe the clinical and histopathologic features of American (AB), English (EB), and French Bulldogs (FB) that were enucleated due to intractable glaucoma with concurrent uveal cysts. Methods. Retrospective review from the archives of the Comparative Ocular Pathology Laboratory of Wisconsin and Texas A&M Veterinary Medical Teaching Hospital (2011-2021). Results. Fifty-two bulldogs met the inclusion criteria (18 AB, 15 EB, 19 FB). Affected dogs were older with median ages of 6.9 (AB), 7.8 (EB), and 8.9 years (FB). Clinical information was available for 32/52 dogs. All dogs had clinical signs of glaucoma, with uveal cysts detected in 10/12 AB, 5/10 EB, and 4/10 FB, and anterior uveitis documented in 5/12 AB, 3/10 EB, and 3/10 FB. Histopathologically, goniodysgenesis was identified in 9/18 AB, 10/15 EB, and 6/19 FB, while remaining dogs had secondary glaucoma from chronic uveitis. Preiridal fibrovascular membranes were present in most eyes (14/18 AB, 14/15 EB, 14/19 FB). Pigment dispersion within the iridocorneal angle was a common feature in all breeds (14/18 AB, 15/15 EB, 17/19 FB). Uveal cysts were mostly associated with the ciliary body and thick-walled (more than one cell layer thick). Fewer eyes had thin-walled cysts of a single cell layer (4/18 AB, 5/15 EB, 6/19 FB). Cyst fragments trapped in the iridocorneal angle were present in 5/18 AB and 4/19 FB. Conclusions. Although mostly incidental findings in bulldog breeds, uveal cysts may contribute to intraocular inflammation and disruption of the iridocorneal angle increasing the susceptibility for primary or secondary glaucoma. None.
IN-DEPTH SPEAKER FRIDAY

Friday, October 28, 2022

8:00 am

David J. Maggs, BVSc, DACVO

“Managing Feline Herpesvirus – One Bloke’s Opinion”
Managing cats with suspected herpetic disease remains one of the most frustrating and controversial topics for all of us – ophthalmologists, our referring vets, and of course our feline patients and their owners. Sometimes it seems that, despite increasing availability of highly sensitive PCR assays, a clinically reliable diagnosis remains all the more elusive. And famciclovir’s been great, but what’s the dose? As listserv discussions often remind us, everyone’s got their preferred approach to the diagnosis and management of feline herpetic disease and, in this session, I’ll share mine – punctuated with cases and people who taught me along the way, and underpinned by an evidence-based philosophy. After considering the many approaches I might use to provide a skeleton for this session, I decided on a “FAQ format” – thereby addressing the most common consult questions I get from Diplomates and GPs around the world.

**Laboratory testing.**
Questions about virologic testing come in all forms: What does a positive FHV-1 PCR really mean? I was certain this cat had herpes but the PCR was negative! I thought the cat likely had Chlamydia but the PCR respiratory panel suggested calicivirus! Should I even run a lab test? Is a negative FHV-1 PCR test meaningful? Which lab is the most reliable? What’s the best point in the disease syndrome to test? The fact that veterinarians have so many questions about the diagnosis of herpetic disease likely arises from a justifiable lack of trust in how well laboratory results match our clinical suspicion.

This is easily explained by understanding a few simple truisms regarding FHV-1:
1. We have fabulous infectious agent tests for FHV-1; we do not have a single infectious disease test for herpetic disease
2. There is very wide variation in results among PCR assays (Table 1)
3. Up to 50% of cats without ocular disease can shed FHV-1 at their ocular surface.

**Table 1.** Reported PCR detection rates for various tissue types, pathology, and sample types. (Results are reported on a per eye or per sample basis; not a per cat basis)

<table>
<thead>
<tr>
<th>Tissue and Pathology</th>
<th>PCR Detection Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Swab/brush</td>
</tr>
<tr>
<td>Normal cornea</td>
<td>6%</td>
</tr>
<tr>
<td>Normal conjunctiva</td>
<td>3%, 6%, 8%, 20%, 31%</td>
</tr>
<tr>
<td>Sequestrum</td>
<td>27%</td>
</tr>
<tr>
<td>Feline eosinophil keratitis/conjunctivitis</td>
<td></td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>10%, 14%, 18%, 24%,</td>
</tr>
<tr>
<td>Diseased but not specified</td>
<td>18%, 25%, 29%, 33%,</td>
</tr>
</tbody>
</table>
There are other confounding issues too:

1. Vaccine virus can become latent in the trigeminal ganglia and subsequently be shed at the ocular surface,\textsuperscript{23} and no current PCR assay differentiates vaccine from wild-type virus.\textsuperscript{1}
2. Other herpesviruses can be stimulated to reactivate by \textit{non-herpetic} disease.\textsuperscript{24-26} This also seems biologically likely for FHV-1.

Therefore, whenever virus is detected in a cat with disease, there are at least 4 possible explanations (only the last of which is desired by the clinician submitting the test):

1. Its presence is \textit{coincidental} (i.e., unrelated to the disease process of interest)
2. Its presence is a \textit{consequence} of the disease process of interest
3. It is \textit{vaccine} virus
4. It is the \textit{cause} of the disease process of interest

Given the predictably high rate of false-positive (particularly with serology and PCR) and false-negative test results (particularly with virus isolation and immunofluorescent antibody assays), I now no longer conduct laboratory tests for FHV-1 (or other ocular surface pathogens) in individual cats with keratoconjunctivitis.\textsuperscript{27} Rather, I resort to good old-fashioned clinical acumen. My diagnostic “tests” now are (i) the history and clinical exam findings followed by (ii) response to therapy. This requires acceptance of a couple of critical facts: first I have to be willing to be wrong when making an educated guess regarding the etiological diagnosis and, second, I have to conduct the absolute best therapeutic trial (more on that below) while simultaneously asking for excellent owner adherence and compliance in executing that trial.

**What’s your favorite antiviral drug?**

Let’s “start at the end” and say that my favorite antiherpetic drug for cats is famciclovir. I think that its safety profile is better than cidofovir,\textsuperscript{28,29} as well as acyclovir and its prodrug valacyclovir (which are fatally toxic in cats),\textsuperscript{30,31} but maybe not safer and more effective than ganciclovir.\textsuperscript{32,33} Plus, I think that its efficacy is second to none,\textsuperscript{34,35} but we need more head-to-head clinical trials to establish that. When given at the appropriate dose, famciclovir’s special attributes (relative to topically applied agents) are its ability to presumably reach appreciable concentrations in all vascularized tissues where FHV-1 may reside (conjunctiva; uvea; eyelids and facial skin; neovascularized cornea; peripheral nerves (and maybe CNS?); and oral, nasal, and respiratory mucosa), and to achieve therapeutic concentrations in the tears\textsuperscript{36,37} as well as plasma.\textsuperscript{37} And (when given at appropriate doses) it does all of this for prolonged periods of the day, which is essential for therapeutic success with any virostatic compound.

Since all antiviral compounds available to date are virostatic, the implications of this warrant further discussion. Being virostatic means that they:

1. Typically require frequent administration to be effective (Cidofovir is the exception because it forms an intracellular reservoir; not because it’s virucidal)
2. Should be initiated as early as possible in the disease course
3. Have no effect against the latent virus
4. Are more likely than virucidal drugs to induce viral resistance when given at inadequate doses\textsuperscript{38}

For more information regarding when to use an antiviral drug, which drug when, and the pros and cons of each I refer you to our comprehensive review article.\textsuperscript{29}
So, what’s the famciclovir dose?
Since we know that selecting the right dose of famciclovir determines efficacy; safety; tear, plasma, and – likely – tissue concentrations of the drug; client cost; likely compliance and adherence; and (socially most important) induction of drug-resistant viral strains, then deciding “what’s the dose” to the best of our ability is critical. While the current answer is easy – 90 mg/kg PO BID – explaining the justification for this requires more work and some “joining of the dots” (and I am not sure that the current answer will always be the answer!). Firstly though, let’s admit 2 things: 1) some of this argument relies on an approach perhaps best labelled as “If A = B and B= C, then A = C”. Unfortunately, until more pharmacokinetic work is conducted, and/or more modeling is done on data already collected, this is the best we have. 2) Famciclovir pharmacokinetics are nonlinear and complex, and PK work is expensive and consumptive of time and resources. With those two provisos in mind, I’ll attempt to summarize here the peer-reviewed data available at the time of writing.

Famciclovir (Famvir® and generic) is a highly bioavailable prodrug of penciclovir, which – once absorbed – is metabolized to penciclovir. In humans this metabolism is complex; requiring di-deacetylation to BRL42359, in the blood, liver, or small intestine, with subsequent oxidation to penciclovir by aldehyde oxidase in the liver.40-42 Neither famciclovir nor BRL42359 has any in vitro antiviral activity against FHV-1,29 therefore complete metabolism to penciclovir is required. However, hepatic aldehyde oxidase activity in cats is about 2% of that seen in humans and lower than in any other species reported to date.43 Therefore, presumably due to saturation of the hepatic oxidase, famciclovir pharmacokinetics in the cat are extremely complex and nonlinear (i.e., doubling of famciclovir dose does not lead to doubling of plasma penciclovir concentration)37 As a result, very high plasma concentrations of BRL42359 accumulate in the cat.37 Fortunately, this compound demonstrates very little cytotoxicity in vitro.29 Table 2 summarizes the pharmacokinetic data available to date for penciclovir in tears and plasma of cats receiving one of numerous famciclovir dose regimens. Tissue concentration data are not yet available.

### Table 2. Maximum (C\text{max}) and minimum (C\text{ss(min)}) penciclovir concentrations in tears and plasma, and time to plasma and tear C\text{max} (T\text{max}) in cats administered a variety of famciclovir doses at various dose frequencies.

<table>
<thead>
<tr>
<th>Famciclovir dose</th>
<th>Dose frequency</th>
<th>Plasma [PCV] (ng/mL) C\text{max}</th>
<th>Plasma PCV T\text{max} (h)</th>
<th>Tear [PCV] (ng/mL) C\text{max}</th>
<th>Tear PCV T\text{max} (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-18 mg/kg\textsuperscript{44}</td>
<td>BID</td>
<td>330</td>
<td>5.3</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>TID</td>
<td>680</td>
<td>3.8</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>30 mg/kg\textsuperscript{37}</td>
<td>BID</td>
<td>2010</td>
<td>1.3</td>
<td>305</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>TID</td>
<td>1755</td>
<td>1.7</td>
<td>395</td>
<td>2.0</td>
</tr>
<tr>
<td>40 mg/kg\textsuperscript{37}</td>
<td>BID</td>
<td>1945</td>
<td>2.3</td>
<td>375</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>TID</td>
<td>2210</td>
<td>2.5</td>
<td>750</td>
<td>2.6</td>
</tr>
<tr>
<td>90 mg/kg\textsuperscript{37}</td>
<td>BID</td>
<td>2720</td>
<td>2.7</td>
<td>680</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>TID</td>
<td>2015</td>
<td>2.7</td>
<td>555</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Abbreviations:** BID: twice daily; C\text{max}: maximum observed drug concentration; C\text{ss(min)}: minimum observed drug concentration during the dosing interval at steady state; FCV: famciclovir; ND: not done; PCV: penciclovir; TID: thrice daily; T\text{max}: time to C\text{max}.

In addition to knowledge of these pharmacokinetic data, recommendation of an appropriate famciclovir dose requires knowledge of:
1. Whether penciclovir concentrations in plasma, tears, or the infected tissues themselves are most relevant
2. An appropriate target penciclovir concentration based on in vitro IC50 (which ranges from 304 to 3500 ng/mL). 29,45-47
3. Whether the targeted IC50 should be exceeded by the trough or the peak penciclovir concentrations, and for how long.

Together, these uncertainties have led to much controversy about the optimum famciclovir dose in cats, with reported doses ranging from 8 mg/kg once daily48 to 140 mg/kg thrice daily.35 The following data are provided to inform dose selection.

In the first masked, placebo-controlled efficacy trial, cats experimentally inoculated with FHV-1 and given approximately 90 mg famciclovir/kg thrice daily per os achieved an approximate peak plasma penciclovir concentration of 2100 ng/mL.34 Relative to control cats, treated cats had significantly reduced clinical signs, decreased serum globulin concentrations, reduced histologic evidence of conjunctivitis, decreased viral shedding, and reduced serum FHV-1 titers, as well as increased goblet cell density.34 A subsequent study showed that administration of a single dose of 40 mg/kg to uninfected healthy cats achieved nearly identical plasma penciclovir concentrations to those achieved with a single dose of 90 mg/kg.49 A third study20 revealed that cats receiving 40 mg/kg thrice daily had tear penciclovir concentrations likely to be effective against FHV-1 (using a target IC50 of 304 ng/mL)51 for at least 3 hours after each dose (i.e., for ≥ 9 hours/day). In the most comprehensive pharmacokinetic study to date, healthy cats were administered famciclovir at 30, 40 or 90 mg/kg twice or thrice daily, and plasma and tear famciclovir, BRL42359, and penciclovir concentrations were measured.37 This resulted in the recommendation that cats should receive 90 mg famciclovir/kg twice daily because this regimen achieved comparable plasma and tear penciclovir concentrations to those achieved with 90 mg/kg thrice daily, whereas the lower doses tested did not result in adequate tear penciclovir concentrations, even when administered thrice daily.

Perhaps most revealing so far, are data from a retrospective study comparing outcomes when famciclovir was administered to client-owned cats with presumed herpetic disease at approximately 40 (n = 33 cats) or 90 mg/kg (n = 26 cats) thrice daily.35 Cats in the 90 mg/kg group showed significantly greater and faster improvement than did cats in the 40 mg/kg group. As a result, median duration of therapy required for clinical improvement was significantly longer in cats administered 40 versus 90 mg/kg. The reduction in treatment duration with the higher famciclovir dose was estimated to decrease overall client costs due to a reduction in total famciclovir administered, not to mention a potential reduction in the number of recheck examinations required, and reduction in patient and client stress. Adverse events (most commonly gastrointestinal) potentially attributable to famciclovir were reported in 17% of cats receiving 40 or 90 mg famciclovir/kg thrice daily, but the prevalence was not different between the 2 dose groups.35 These data, suggest that 90 mg/kg TID is effective (economically and clinically). Meanwhile, pharmacokinetic data37 suggest that tear and plasma penciclovir concentrations are similar whether cats receive 90 mg famciclovir/kg 2 or 3 times daily. Therefore, taken together, data from these 2 studies35,37 suggest that 90 mg famciclovir/kg twice daily is likely to be effective for treating cats with herpetic disease. Until there are peer-reviewed data to the contrary, this is what I will continue to recommend and do.

It is important to point out that all studies to date have used commercially available famciclovir in pill form (albeit sometimes ground up and added to capsules for easier or more accurate dosing of small cats/kittens). Recent evidence makes it clear that there are major concerns with compounded
formulations of famciclovir, and at this stage compounding cannot be recommended. Given the need for hepatic metabolism, use of transdermal famciclovir is also likely contraindicated or, at the very least, requires thorough pharmacokinetic validation.

This cat’s sick/old/young/has reduced renal function... do I have to change the famciclovir dose/dosing interval?

There is a paucity of data to answer these questions, but that same retrospective clinical study (although reporting relatively few cats), and the famciclovir product insert (although describing almost exclusively human data) help somewhat. Our experience, as described in the clinical retrospective using 40 or 90 mg famciclovir/kg PO TID, is further supported by more recent administration of famciclovir at 90 mg/kg PO BID to over 200 kittens in a clinical trial in progress (data not shown). I am now of the opinion that there is no increased risk in using this drug at 90 mg/kg PO BID in very young kittens. Not only have we reported using famciclovir in kittens as young as 12 days, we have shown that side effects occur more commonly in older cats than in juvenile cats. By contrast, I am aware of no peer-reviewed data in cats to guide dosing in renal insufficiency. The famciclovir datasheet and clinical reports suggest that humans with decreased glomerular filtration rate receive famciclovir at an increased dose interval; not a change in dose, and I have used this advice in my clinical patients and those on which I consult with no apparent adverse events reported to date.

Assessing all in vivo tolerance data for famciclovir, this drug appears to be markedly safer than acyclovir or valacyclovir - the only other systemic antiviral drugs to be orally administered to cats. However, patients receiving famciclovir should be closely monitored, and assessment of a complete blood count, serum biochemistry panel and urinalysis should be considered in cats with known intercurrent disease or cats expected to receive famciclovir for long periods.

For how long should I use an antiviral drug? Should I taper the dose as I see improvement?

When answering (and asking!) this question, it’s important to realize that there is not a single herpetic disease syndrome. For example, young kittens with typically self-limiting upper respiratory disease and conjunctivitis after primary herpetic exposure will almost always need a shorter course than would an adult cat with chronic, widespread, and severe herpetic dermatitis. And so (like every other antimicrobial), I advise that an antiviral course be continued until the patient is normal/no longer has evidence of active disease, then continued for a period determined by how challenging it has been to achieve resolution, then that the antiviral drug be “stopped cold” and the patient monitored for recurrence, treating any recurrent signs early and for a longer period beyond normality than initially trialed. There are a minority of cats that may need long term pulse therapy. The most important point is that (like all antimicrobial drugs) the famciclovir dose should NEVER be tapered as disease resolution is seen. Tapering of a virostatic drug is a sure way to induce drug-resistant strains of FHV-1 (and I don’t want to be a veterinary ophthalmologist in a world in which we caused famciclovir to no longer reliably control feline herpetic disease!).

If famciclovir is that good should I concurrently use a topical antiviral? Do I need to prescribe anything else?

When famciclovir is administered at 90 mg/kg PO BID, I do not believe that topical antivirals are necessary since this dose achieves effective tear penciclovir concentrations for many hours a day (certainly much longer than does even the most frequent application of ophthalmic solutions). However, consideration should be given to other topical (and possibly systemic) agents necessary to provide required supportive care. For example, since no antiviral drug is also antibacterial, an antibiotic should be administered in addition to the antiviral drug if indicated.
Perhaps of most importance is the use of topical hyaluronate as a mucinomimetic supplement to antiviral therapy (and sometimes as a sole therapy) for cats with herpetic disease. There is growing evidence that, although many cats with herpetic syndromes may have epiphora and increased STT values, this likely reflects a reduction in tear film quality and a resultant unstable tear film evident as measurable reductions in tear film break-up time (TFBUT), mucin content of the tear film, and conjunctival goblet cell density (GCD). The change in GCD is an excellent example of metaherpetic disease. Following primary experimental infection in cats, TFBUT and GCD remain abnormal for at least 1 month following infection, despite apparent normalization of clinical and histological examination findings. Thus FHV-1 infection induces persistent qualitative tear film abnormalities that are not detected without measurement of TFBUT or GCD. This suggests that topical mucinomimetic therapy with hyaluronate should continue after apparent clinical recovery from FHV-1 infection and until TFBUT has returned to normal. Despite the remarkable antiviral efficacy of famciclovir, it does not reduce this marked goblet cell depletion. Therefore, I routinely prescribe a high quality (preferably preservative-free) hyaluronate for sole (and often chronic) use or in addition to any antiviral drug.

Can I use immunomodulators (corticosteroids, NSAIDs, cyclosporine/tacrolimus) in cats with herpetic disease?
Mark Nasisse wrote an excellent review article/opinion piece weighing the multiple considerations one must make when assessing the dangers and virtues of immunomodulation in herpetic disease. In short, I believe that they should be avoided in situations where antiviral drugs alone are likely to be effective. Therefore, my standard approach is to trial an antiviral and hyaluronate at first to help justify that the patient has “earned” an immunomodulator. In particular, I believe that immunomodulators in general and corticosteroids in particular should be avoided in kittens undergoing primary exposure to FHV-1 as they markedly worsen and prolong disease. I also try to avoid using immunomodulating agents of any type if I believe that the cytolytic form of herpetic disease (characterized by ulcerative corneal/conjunctival disease) is predominant. There are 2 common consults I receive under this heading. The first regards feline eosinophilic keratitis where I am a firm believer in first trialing an antiviral alone and then adding a systemic steroid (subcutaneous triamcinolone). We have published our preferred protocol. The second typical consult regards the cat with uveitis requiring topical or systemic steroid use and in whom a herpetic recrudescence occurs or is feared. Again, I think pre-emptive treatment with famciclovir (for its systemic effects) rather than any topical antiviral agent is wise.

If I think I have got recognition and treatment of the common herpetic syndromes “down” in my practice, what am I overlooking?
Neurotrophic keratitis! A recent case report as well as a prospective assessment of corneal sensitivity and tear film test results in FHV-infected versus uninfected cats introduce the concept that neurogenic KCS/neurotrophic keratitis may result from metaherpetic destruction of CN V axons leading to reduced or absent corneal sensitivity - with a consequent inability to reflexively tear in a normal manner, and reduced axonal flow of trophic factors to the cornea – with a consequent alteration in corneal health and healing. This can be established diagnostically by performing corneal aesthesiometry. But another highly practical assessment involves assessment of the nasolacrimal reflex done via measurement of a STT during and following stimulation of the patient’s olfactory nerve by having them inhale 70% alcohol. In the prospective study, compared to FHV-1-naïve cats, cats exposed to FHV-1 had significantly higher clinical scores (0.2 ± 0.4 vs. 4.6 ± 2.8) and response to nasolacrimal stimulation (7.8 ± 10.8% vs. 104.8 ± 151.1%), and significantly lower corneal sensitivity (2.9 ± 0.6 cm vs. 1.4 ± 0.9 cm), STT-1 (20.8 ± 2.6 mm/min vs. 10.6 ± 6.0 mm/min), and TFBUT (12.1 ± 2.0 s vs. 7.1 ± 2.9 s). Furthermore, confocal microscopy revealed that all parameters evaluated for corneal nerves (e.g., nerve fiber length,
branching, occupancy) were notably but not significantly lower in herpetic vs. control cats \( (P \geq 0.268) \). In sum, cats exposed to FHV-1 had signs suggestive of corneal hypoesthesia and quantitative/qualitative tear film deficiencies when compared to cats naïve to the virus. The authors concluded that these may be signs of metaherpetic disease, as reported in other species. I think that this may be the leading cause of chronic, superficial, nonhealing ulcers in cats (i.e., what we would call an “indolent ulcer” if we saw it in a dog).

**What does the future hold for improved diagnosis and treatment of feline herpetic disease?**

I believe that we will continue to see new antiviral drugs developed for humans infected with the analogous herpes simplex virus (HSV-1), and that some of these drugs may be effective against FHV-1 and safe in cats. I hope that future clinician-scientists will carefully and sequentially trial these drugs for in vitro efficacy, ocular and systemic tolerability/assess their pharmacokinetics in normal cats, and then study their safety and efficacy in masked, placebo-controlled prospective trials. I also see the day when we will have access to one or more FDA-approved antiviral drugs developed specifically for cats infected with FHV-1. Topical drugs/additives which increase contact time, and subconjunctival implants that release drug slowly into the conjunctiva and over the corneal surface will be of use for many drug classes but none more-so than virostatic antiviral agents. And “Oh, what I’d give for a safe virucidal agent that could penetrate the trigeminal ganglia” as this could represent a cure for herpetic disease! I also believe that, as a group, we need to gain better recognition of what I think is a multitude of subtle tear film disorders for which FHV- features prominently in the pathogenesis. Only then will we have a handle on how to treat chronic superficial corneal erosions, neurotrophic keratitis, and corneal sequestra “higher up” their pathogenic tree. And perhaps the most overlooked but known management strategy includes stress relief was taught to me by Terri McCalla. I hope that, as a profession, we can become more adept and willing to interview/survey our feline clients regarding known stressors in their cat’s life and attempt to ameliorate these so as to reduce our reliance on chemicals with side effects and which merely suppress the virus rather than treating the underlying pathophysiology. (On that note, please limit the use of E-collars in cats to those in which they are absolutely essential!)

It would be remiss of me not to finish with some important acknowledgments of those so critical in stimulating my interest in herpes virology and in cats, in guiding me to form these opinions I have shared here, and those who have taught me so much along the way. I have shared their work above but some warrant special mention. I will be forever indebted to Mike Lappin with whom I wrote my first herpes manuscript (and there’s been many more together since), to Mark Nasisse who saw the frightened intern presenting the abstract of that paper at the Rhode Island ACVO meeting and invited me to do a research fellowship with him, and to Jeff Michell who taught me how to think like a scientist while in that fellowship. Truly great residents are those who teach their mentor, and Lionel Sebbag and Sara Thomasy fall squarely into that category. Lionel, you have broadened the way I think about the ocular surface, and Sara (ably assisted by Ted Whitem, Andrew Woodward, and Lionel), the world is a much better place for cats, cat owners, and veterinarian thanks to your tireless work on famciclovir pharmacokinetics. And I would be remiss in not thanking Jim Jones for steering you in our direction, Sara. The future is in good hands.
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Efficacy of Topical Dexmedetomidine in Dogs Treated for Spontaneous Chronic Corneal Epithelial Defects (SCCEDs) as Determined by a Client-Assessed Novel Pain Scoring System (EA Latham, RL Davis)

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Purpose. To prospectively determine the efficacy of dilute dexmedetomidine (Akorn, Lake Forest, IL) used topically as a novel analgesic in dogs with SCCEDS. Methods. 37 dogs diagnosed with SCCEDS were included. Clients enrolled their dogs with informed consent. The study consisted of two treatment groups (high dose dexmedetomidine (50µg/mL) and low dose dexmedetomidine (25µg/mL) diluted in sterile saline) and a placebo group (sterile saline) with clients masked to their dog’s group. Dogs were treated with diamond burr debridement and routine aftercare, consisting of gabapentin, topical antibiotics, and contact lens placement. The trial drop was used twice daily for five days post procedure. A subjective pain scoring system (1-5 scoring) was developed using four categories (squinting, rubbing, behavior, discharge) to assess daily pain levels and was completed by the clients. All dogs were routinely evaluated 10-14 days after initial presentation. Statistical evaluation was performed to compare groups. Results. No significant difference was noted between groups in any of the pain categories. Healing times and contact lens retention were not significantly different between groups. There was no difference in corneal granulation after ulcer healing. No side effects were noted. The average healing time for all groups was 14.2 days. Compliance failure resulted in exclusion of 34% (19/56) of dogs. Conclusions. Dilute dexmedetomidine used topically at concentrations of 50µg/mL and 25µg/mL did not improve client-assessed pain scoring for five days after treatment of SCCEDS in dogs. This model may have use in the clinical setting for prospective client-assessed studies; however, client compliance is a limiting factor.

None.
EFFECT OF DIAMOND BURR DEBRIDEMENT DURATION ON THE HEALING OUTCOMES OF SPONTANEOUS CHRONIC CORNEAL EPITHELIAL DEFECTS: PRELIMINARY RESULTS (PA Wilcox, EJ Miller, GM Newbold, AL Bessler, HL Chandler, AJ Gemensky-Metzler) Department of Veterinary Clinical Sciences, The Ohio State University.

**Purpose.** To determine the effect that diamond burr debridement (DBD) duration has on healing outcomes of canine spontaneous chronic corneal epithelial defects (SCCEDs). **Methods.** Twenty-four dogs with SCCEDs were included. Dogs underwent cotton-tipped applicator debridement of the ulcer surface followed by fluorescein dye application. Ulcer surface area (mm2) was then calculated using ImageJ software. Dogs were randomly assigned into one of two groups: Group 1 (n=13) was debrided for 1.0s/mm2 versus 1.5s/mm2 duration for group 2 (n=11). Total DBD duration was calculated for individual dogs based on group assignment and ulcer surface area. Dogs were re-evaluated at 1 and 2 weeks post-DBD to determine healing outcomes and possible complications secondary to DBD. A healed outcome was defined by negative fluorescein dye retention. **Results.** Mean ulcer size was 60 ± 29.28mm2 and 59 ± 25.05mm2 and duration of debridement was 60 ± 29.28(s) and 85 ± 35.14(s) for group 1 and 2, respectively. Neither ulcer size nor duration of debridement were significantly different between groups. At the one-week exam, more corneas eyes had healed in group 2 (8/11) versus group 1 (7/13). At the two-week exam, Group 2 had a greater percentage of corneas eyes healed compared to group 1 (8/11; 73% versus 8/13; 62%); however, the difference was not significant (p=0.562). Overall, 62.5% (15/24) of dogs had healed within one week post-DBD. **Conclusions.** Longer DBD duration did not significantly affect SCCED healing outcome; however, more than sixty percent of the SCCEDs were healed within one week following DBD. Supported by VCA Inc. **None.**
A RETROSPECTIVE INVESTIGATION ASSESSING TIME TO REGRESSION FOR CANINE INTRACORNEAL HEMORRHAGE (Y Aoki, 1 2 N Nito, 1 K Mitsumoto, 1 CE Plummer, 2 and H Tsujita 1) Veterinary Ophthalmology Specialized Clinic, Osaka, Japan; 1 College of Veterinary Medicine, University of Florida.2

**Purpose.** To evaluate the time to regression of intracorneal hemorrhage (ICH) in different locations in the cornea and the effects of therapeutic intervention on time to regression of ICH in dogs. **Methods.** Retrospective study. Twenty-four dogs (24 eyes) diagnosed with ICH were included. Medical records of dogs diagnosed with ICH were examined for time from initial observation to regression of ICH, and the type of topical and systemic medications administered. ICH location was divided into four regions: nasal, temporal, dorsal, and ventral. The time to regression in each area was compared. Additionally, time to regression of ICH was compared between groups treated with or without topical anti-inflammatory agents. Data were analyzed using Mann-Whitney U test; p-value < 0.05 was considered significant. **Results.** Time to regression of ICH localized to the dorsal cornea (59.88±33.69 days) was significantly shorter than ICH in the other three areas (nasal: 107.83±11.79 days (P=0.039), temporal: 107.67±9.99 days (P=0.045), ventral:125.80±16.48 days (P=0.034)). Although there was a trend toward more rapid regression of ICH treated with topical anti-inflammatory agents (74.00±45.41 days) compared with those left untreated (92.67±56.12 days), the difference was not statistically significant (P=0.208). **Conclusions.** Clinical course and rate of regression of ICH may vary with location in the cornea. Topical anti-inflammatory agents did not affect the rate of ICH regression. **None.**
MULTIMODAL OCULAR IMAGING OF KNOWN AND NOVEL CORNEAL STROMAL DISORDERS IN DOGS

(S. Park1, Lionel Sebbag2, Bret A. Moore3, M. Isabel Casanova1, Brian C. Leonard1, Nicole L. Daley1, Kirsten A. Steele4, Jennifer Y. Li5, Christopher J. Murphy1,5, Sara M. Thomasy1,5). 1Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California-Davis, Davis, CA, USA; 2Koret School of Veterinary Medicine, Hebrew University of Jerusalem, Rehovot, Israel; 3Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, Gainesville, FL, USA; 4Eye Care for Animals, Reno, NV, USA; 5Department of Ophthalmology & Vision Science, School of Medicine, University of California-Davis, Sacramento, CA, USA

Purpose. To show advanced ocular imaging features of three different corneal stromal disorders that can be encountered in veterinary ophthalmic clinical practice. Methods. Ophthalmic examinations were performed in 3 dogs showing different stromal opacities. Fourier-domain optical coherence tomography (FD-OCT) and in vivo confocal microscopy (IVCM) were performed following topical anesthesia. Results. Lipid deposition in case 1 appeared as needle-shaped hyperreflective lines on IVCM, which was confirmed with histology. In case 2, glycosaminoglycan (GAG) accumulation by mucopolysaccharidosis was associated with diffuse stromal hyperreflectivity and depletion of keratocytes on IVCM. Corneal calcium degeneration was presumed to be secondary to the GAG accumulation. In case 3 showing posterior corneal stromal opacities without evidence of inflammation, FD-OCT showed hyperreflective particles scattered in the middle and posterior corneal stroma. IVCM revealed that keratocytes contained hyperreflective punctate deposits and the number of enlarged keratocytes with these deposits increased towards the posterior stroma. The bilateral, non-inflammatory nature and unique appearance with IVCM was similar to pre-Descemet corneal dystrophy described in humans. Conclusions. In vivo multimodal corneal imaging facilitated instantaneous microstructural analysis and could aid in vivo characterization of under-recognized conditions. Imaging findings, however, can be non-specific and should be complemented with other gold standard methods of definitive diagnosis. Supported by NIH grants R01EY016134, P30EY12576 and the Jane-Lin Fong Ophthalmic Clinical Trial Support Fund. None.
RESPONSE TO LEFLUNOMIDE FOR SCLERITIS AND EPISCLERITIS IN THE DOG: A CASE SERIES
(SR Vig, 1 KM Burling, 1 VN Lyons, 1 and C Munevar, 2) Animal Eye Specialists, Campbell, CA, USA; 1 Animal Eye Center, Rocklin, CA, USA. 2

Purpose. The objective of this study was to review outcomes of dogs with scleritis and episcleritis in dogs treated with leflunomide (written prescription). Methods. This was a retrospective case series. Medical records were reviewed for dogs with a diagnosis of scleritis or episcleritis that received treatment with leflunomide and had at least one follow-up visit. Client-owned dogs with spontaneously occurring scleritis and episcleritis were included. All statistics were descriptive. Results. Six dogs met the inclusion criteria, two of which were confirmed on biopsy. Five of the six dogs had been medically treated previously but were refractive to treatment. The remaining dog was controlled with a topical steroid, but this was discontinued and leflunomide was prescribed because of corneal degeneration. Improvement in clinical signs was noted in all dogs treated with leflunomide. One dog had mild improvement, one had significant improvement, and four dogs were fully controlled. Among the four dogs that were controlled, one was prescribed leflunomide monotherapy and three were receiving concurrent topical and/or oral medications. Adverse effects included lymphopenia and hepatopathy, although concurrent use of topical and/or oral steroids may have contributed to hematologic abnormalities in several dogs. Leflunomide was discontinued in one dog due to lymphopenia, although it was later re-started due to worsening of clinical signs after discontinuation. Conclusions. Leflunomide appears to have therapeutic value as a treatment for refractory scleritis and episcleritis. Dogs should be monitored closely for adverse effects. Limitations include retrospective design and small sample size. Larger prospective studies are indicated. There is no financial interest or conflict.
CORNEAL SENSITIVITY IN DOGS AND CATS WITH PHTHISICAL EYES (VF Perez, 1 MD Armour2)
Friendship Hospital for Animals; 1 Armour Veterinary Ophthalmology2

**Purpose.** To evaluate corneal sensitivity of dogs and cats with phthisis bulbi and to investigate the correlation between corneal sensitivity and cause for phthisis bulbi, as well as estimated duration an eye has been phthisical. **Methods.** Five dogs with unilateral or bilateral phthisis bulbi secondary to chronic ocular disease or a cyclodestructive procedure were included thus far. Medical records were used to determine and estimate the cause and chronicity of phthisis bulbi, respectively. Corneal touch threshold (CTT) for each phthisical eye was measured using a Cochet-Bonnet aesthesiometer in central, nasal, dorsal, temporal, and ventral regions of the cornea when possible. The diameter of the phthisical cornea was subsequently measured using castroviejo calipers. Elevation of the nictitans precluded measurements of some corneal regions and diameters. Statistical methods used to evaluate the data set. **Results.** Six phthisical eyes were evaluated. Median CTT was 15.9, 10.3, 13.1, 15.9, and 13.1 g/mm² for central, nasal, dorsal, temporal, and ventral regions, respectively. The median corneal diameter of the phthisical eyes was 11 mm. Correlation between corneal sensitivity and phthisis secondary to ciliary body ablation versus chronic disease cannot be determined without more candidates. Correlation between corneal sensitivity and duration that the eye has been phthisical will be recorded when the statistical analysis is complete. **Conclusions.** Preliminary data show dogs with phthisical eyes have higher CTT values and therefore diminished corneal sensitivity as compared with previously published CTT values of dogs with normal-sized globes. **None.**
NON-HEALING CORNEAL ULCERS AS A HALLMARK CLINICAL SIGN OF PINNIPED KERATOPATHY

(CMH Colitz, 1 RR Dubielzig 2) All Animal Eye Care; 1 Comparative Ocular Pathology Laboratory of Wisconsin

Purpose. To describe the clinical findings and compare them with histopathological findings in pinnipeds with indolent corneal ulcers as part of Pinniped Keratopathy. 

Methods. Clinical ophthalmic evaluation and surgical findings, and photographs of pinnipeds with indolent corneal ulcers (n=50), were evaluated and compared with corneal epithelium and globe histopathology reports (n=15).

Results. Every cornea with Pinniped Keratopathy evaluated had a nonadherent corneal epithelium either overlying opacities or surrounding larger, deeper lesions. This feature has been consistent in all eyes evaluated both clinically and histologically. Specifically, the epithelial lesions had thinning, separation and non-attachment, disorganization, loss of partial to entire epithelial layers, and a hyalinized acellular zone (HAZ) was present in the subepithelial anterior corneal stroma.

Conclusions. Indolent corneal ulcers are a hallmark clinical sign of Pinniped Keratopathy and are supported by histopathologic evidence of a HAZ. Clinical signs typically develop early in the disease and persist unless addressed aggressively with medical therapy, debridement with burr keratotomy, and surgical intervention if necessary. Environmental influences (prolonged exposure to UV light, water quality, pool enclosure parameters) are known risk factors that induce corneal epithelial cell disruption and stromal abnormalities. Further investigation will be necessary to determine their influence in Pinneped Keratopathy.

None.
EFFECT OF ANDROGRAPHOLIDE ON THE INDUCTION OF HUMAN BETA-DEFENSIN 3 EXPRESSION (DEFB103) BY CORNEAL EPITHELIAL CELLS. Sanskruti S. Potnis, Melinda Quan, Theint Aung, Sara M. Thomasy, Christopher J. Murphy, Brian C. Leonard

**Purpose.** Microbial keratitis is a significant disease amongst human and veterinary patients, and novel therapies are required to treat the prevalence of antibiotic resistant microbes. The purpose of this study was to evaluate the *in vitro* induction of human beta-defensin-3 (DEFB103/hBD3) expression in immortalized human corneal epithelial cells (hTCEpi) by an herbal compound, andrographolide. **Methods.** hTCEpi were grown as subconfluent monolayers and treated with andrographolide in a range of concentrations for 24 hours. MTT viability and proliferation assays were used to determine the toxicity of andrographolide. hTCEpi cells were treated with the highest concentrations that did not affect cellular viability for 24 hours. Total RNA was isolated and reverse transcription quantitative PCR (RT-qPCR) was performed to determine the expression of DEFB103. EGFR inhibitors, AG-1478 and gefitinib, were used to block andrographolide-EGFR dependent upregulation. Peptide expression for hBD3 was assessed using ELISA. **Results.** Treatment with andrographolide was tolerated at concentrations less than 121.5 µM. There was a marked dose dependent upregulation of DEFB103 mRNA expression that was most pronounced with andrographolide concentrations of 50 mM (75-fold), 75 mM (290-fold) and 100 mM (475-fold), that was confirmed at the peptide level by ELISA. Induction of DEFB103 expression by andrographolide was inhibited with EGFR inhibitors, AG-1478 and gefitinib, independently. **Conclusion.** This study demonstrated marked upregulation of DEFB103 expression with andrographolide through the EGFR signaling pathway. Future studies will focus on extending these findings to animal models and potential use as a novel therapeutic approach for the treatment of microbial keratitis. Supported by NIH grants K08EY028199, UC Davis Center for Comparative Animal Health and OD010956. **None**
INVESTIGATION OF THE ANTI-INFLAMMATORY EFFECT OF INTERLEUKIN-1 RECEPTOR ANTAGONIST PROTEIN (IRAP) ON CANINE KERATOCONJUNCTIVITIS SICCA (KCS): A PILOT STUDY. (K Jones, 1 J Peraza, 2 K Wotman, 2 D Frisbie, 3 MdL Henriksen, 2) College of Veterinary Medicine and Biomedical Sciences, Colorado State University; 1 Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University; 2 Orthopaedic Research Center, College of Veterinary Medicine and Biomedical Sciences, Colorado State University.

**Purpose.** To compare the short-term anti-inflammatory effect of three serum types on KCS: autologous equine serum (eq-Serum), equine IRAP (eq-IRAP), and canine IRAP (ca-IRAP). **Methods.** Three research dogs diagnosed with KCS and treated with ophthalmic lubrication TID lifelong were included in this pilot-study. Each dog was treated for three-days TID OU with eq-Serum (Day: 1-3), eq-IRAP (Day: 4-6), and ca-IRAP (Day: 7-9), with a 30-day washout between eq-IRAP and ca-IRAP. Clinical parameters (discharge, conjunctival hyperemia, chemosis) were scored on days 0, 3, 6, 9. Schirmer tear test (STT, mm/min) was measured, and tears were collected on these same days. The tears and the three different serum types were analyzed with ELISA (MyBiosource, Inc.) for the concentration (pg/mL) of IL-1beta (tears), eq-IL-1Ra, and ca-IL-1Ra (three serum types). For statistical analysis, a one-way ANOVA was used with p<0.05 considered significant. **Results.** All three serum types were well tolerated in the three dogs. Subjectively, dogs treated with ca-IRAP displayed decreased discharge, conjunctival hyperemia, and chemosis. Objectively, no differences in STT or IL-1beta in tears were seen between the groups (p-values >0.05). The highest concentration of IRAP was found in ca-IRAP analyzed for ca-IL-1Ra (299.7pg/mL). Eq-IRAP contained 183.4pg/mL when analyzed for eq-IL-1Ra, and 84.6pg/mL when analyzed for eq-IL-1Ra. Eq-Serum did not contain eq-IL-1Ra nor ca-IL-1Ra. **Conclusion.** The ELISA results revealed that ca-IRAP has the highest concentration of ca-IL-1Ra. Clinically, ca-IRAP appeared to have the best anti-inflammatory effect, but this effect could not be found in quantitative data. Future long-term studies are needed to prove the anti-inflammatory effect of topical IRAP. Funded by the Young Investigator Award Program in the Kenneth W. Smith Professorship in the Center for Companion Animal Studies at Colorado State University.
Purpose. To propose a non-surgical treatment for superficial corneal epithelial inclusion cysts (CEIC), while describing clinical and diagnostic features using ultrasound biomicroscopy (UBM) and optical coherence tomography (OCT). Methods. Three dogs with elevated corneal masses were evaluated. Complete ophthalmic examination and UBM and/or OCT were performed. Results. A smooth, fluctuant, and painless mass protruding from vascularized cornea was present in 3 eyes of 3 dogs, 1 eye of which had 2 occurrences in different locations. Diagnostic imaging using UBM or OCT revealed an intrastromal cystic lesion surrounded by edematous stroma consistent with CEIC. All cysts were located in the corneal stroma with a sufficiently thick posterior stroma and endothelium below the cyst. One cyst was excised by superficial keratectomy and histopathological examination confirmed CEIC; this cyst later recurred. Among the original four cysts, two spontaneously ruptured due to fight or self-trauma and were no longer visible by the next recheck. The remaining two cysts were intentionally punctured using a 26-gauge needle under local anesthesia. In cytological examination of the drainage material, extracellular matrix and epithelial cells were predominant without signs of infection, supporting the diagnosis of CEIC. Topical prophylactic antibiotics were prescribed after drainage. All cysts that ruptured spontaneously did not recur during the 14-29 month follow-up period. Conclusions. Needle puncture could be a safe, simple, and effective treatment for superficial CEICs in dogs. Cysts that rupture spontaneously may not recur. Advanced diagnostic imaging such as UBM or OCT is helpful for determining cyst depth. Supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (2021R1I1A1A01058695). None.
INFECTIOUS ULCERATIVE KERATITIS IN HORSES IN TEXAS: CLINICAL FEATURES, SUSCEPTIBILITY PATTERNS, AND EMERGING ANTIBIOTIC RESISTANCE (S Johnson, 1 LV Vallone, 1 SP Collins, 1 J Wu, 2 S Flores, 2 S Welch, 2 S Lawhon, 2 A Rogovskyy, 2 and EM Scott, 1) Department of Small Animal Clinical Sciences, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University; 1 Department of Veterinary Pathobiology, College of Veterinary Medicine and Biomedical Sciences, Texas A&M University.

**Purpose.** To retrospectively describe the clinical features, laboratory findings, treatment, and outcome associated with infectious ulcerative keratitis (IUK) in horses in Texas. **Methods.** Medical records of horses diagnosed with IUK at Texas A&M Veterinary Medical Teaching Hospital were reviewed (2016-2021). **Results.** A total of 100 eyes from 96 horses met the inclusion criteria. An infectious organism was identified in 41/79 cytologic samples (18 fungal, 17 bacterial, 6 mixed), positive bacterial growth was reported in 67/100 bacterial cultures, and positive fungal growth was reported in 36/86 fungal cultures. The most common bacterial organisms cultured were Staphylococcus spp. (n = 27; 40.3%), Streptococcus spp. (n = 23; 34.3%), and Bacillus spp. (n = 19; 28.4%). The most common fungal organisms cultured were Aspergillus spp. (n = 10; 27.8%) and Fusarium spp. (n = 4; 11.1%). An infectious agent was identified by one or more modalities in 83/100 eyes for a diagnosis of bacterial keratitis (n = 37; 45%), mixed infection (n = 35; 42%), or fungal keratitis (n = 11; 13%). Outcome information is available for 99/100 eyes. Healing was achieved in 23 eyes (64%) that were managed medically and 37 eyes (59%) that were managed surgically. Susceptibility pattern analysis is pending. **Conclusions.** Corneal cytology, culture, and susceptibility testing remain essential in the diagnosis and treatment of equine infectious ulcerative keratitis. **None.**
PHARMACOLOGIC MYDRIASIS IN PINNIPEDS (Z. CALIFORNIANUS, P. VITULINA, AND H. GRYPUS): ASSESSMENT OF EFFICACY AND SAFETY. (AP Schenk, 1 AM Gaerig 1, C Boles, 1 KG Bailey, 1 MR O'Connor, 2 MJ Adkesson, 3) Eye Care for Animals, Chicago IL;1 Shedd Aquarium, Chicago IL;2 Chicago Zoological Society/Brookfield Zoo, Brookfield IL;3

**Purpose.** To assess the efficacy and adverse effects of topical mydriatics in pinnipeds. **Methods.** A prospective, masked, crossover study was conducted on 10 pinnipeds under professional care from three institutions. Participants’ eyes were randomly assigned to an experimental group or control group for the first phase via coin toss. During the experimental phase, 1% atropine and 2.5% phenylephrine in the treatment eye and a sham treatment of saline in the contralateral eye were applied four times over a 6-hour period. During the control phase, sham treatment was applied to both eyes. Pupil size estimation, rebound tonometry, and ambient lighting measurements were performed at baseline, 2-hour, 4-hour, 6-hour, 24-hour, and 72-hour post initial drop administration. After a two-week washout period, eyes were crossed over to the respective experimental or control group and the process was repeated. Mixed Models ANOVA with covariate light was used to examine the effect of treatment, light, time, phase, and eye on estimated pupil diameter and IOP. **Results.** Statistically and clinically significant mydriasis was observed in treatment eyes compared with sham treated eyes within 4 hours of administration through 24 hours with peak observed difference recorded at 6 hours (mean 5.1 mm, SE 1.38 treated versus 1.93 mm, SE 0.28 sham). Mydriasis resolved by 72 hours post administration. Photophobia was reported in 6 of 10 experimental eyes. **Conclusions.** Application of topical atropine and phenylephrine can facilitate pharmacologic mydriasis in pinnipeds. Photophobia in the treated eye was the only adverse effect. Supported by Eye Care for Animals resident research fund. None.
EFFECTS OF ARTIFICIAL TEAR WITH AND WITHOUT PRESERVATIVE ON THE CONJUNCTIVAL MICROFLORA OF RABBITS (H Faghihi,1 SM Rajaei,1 ZZ Bolandnazar, 2 N Panahi 3) Ophthalmology Section, Negah Veterinary Centre, Tehran, Iran; 1 Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran; 2 Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Razi, Kermanshah, Iran. 3

**Purpose.** To evaluate the effect of artificial tear drops containing benzalkonium chloride (BAK) on the bacterial flora in the conjunctival fornix of clinically normal New Zealand white rabbits. **Methods.** Thirty healthy New Zealand white rabbits with similar age (about 1-2 years) were used for this study. Slit-lamp examination was conducted and no external ocular disease was identified. Rabbits were randomly divided into two groups (treatment and control). In treatment group, 15 rabbits received artificial tear drops containing 0.01% BAK (Tearlose®) in both eyes, three times a day for 60 days. In the control group, the same artificial tear drops without preservative (Sinalone®) was administered in the same way as the treatment group. A total of 240 conjunctival swab samples were collected from both eyes of each rabbit for aerobic and anaerobic bacterial identification and isolation. Samples were collected on days 0, 15, 30 and 60. **Results.** An increase in the number of isolated bacteria in the treatment group was observed (one isolated bacteria on day 0 and 5 isolated bacteria on day 60). The number of isolated bacteria in the control group was also increased (5 isolated bacteria on day 0 and 6 isolated bacteria on day 60). **Conclusions.** There is a remarkable change in the number of the isolated bacteria in the treatment group after instillation of artificial tears containing BAK compared with control group treated with preservative-free artificial tears during 60 days. None
ASSESSMENT OF THREE ANTIVIRAL TREATMENTS IN SHELTER HOUSED CATS WITH FELINE HERPESVIRUS OCULAR DISEASE (MA Mironovich, 1 A Yoon, 2 M Marino, 1 NE Ineck, 1 C Liu, 1 RT Carter, 1 AC Lewin) School of Veterinary Medicine, Louisiana State University; 1 Veterinary Medicine and Biomedical Sciences, Texas A&M University. 2

Purpose. To compare the efficacy of cidofovir, famciclovir and ganciclovir for treatment of feline herpesvirus (FHV-1) ocular surface disease in shelter-housed cats. Methods. 133 shelter-housed cats positive for FHV-1 (using qPCR) with compatible ocular lesions were enrolled in a masked placebo-controlled clinical trial and received one of four treatment protocols: topical ophthalmic placebo + oral placebo (n=32), cidofovir 0.5% ophthalmic solution + oral placebo (n=32), famciclovir oral solution (90mg/kg) + topical ophthalmic placebo (n=32), or ganciclovir 0.15% ophthalmic solution + oral placebo (n=37). Cats received treatments twice daily for one week and were evaluated on Day 1 and Day 8 using a quantitative ocular scoring system, body weight and qPCR for FHV-1 viral shedding quantification. Results. Cidofovir significantly reduced viral shedding from Day 1 to Day 8 compared with placebo (p=0.024). Neither famciclovir nor ganciclovir reduced viral shedding compared with placebo. There was no significant improvement of ocular disease for any antiviral treatment compared with placebo. Overall, ocular lesions improved over the study period in 65-73% of cats. Juvenile cats (<1 year) that received cidofovir or ganciclovir had a significant increase in weight gain compared with placebo (p=0.025, p=0.023). Conclusions. Topical ophthalmic cidofovir significantly reduced ocular FHV-1 viral shedding and increased weight gain in juvenile cats housed in a shelter setting. Cidofovir shows potential as a treatment for FHV-1 ocular disease in shelter-housed cats. Famciclovir demonstrated limited efficacy for the treatment of FHV-1 ocular surface disease in this population of shelter-housed cats. Supported by a Morris Animal Foundation Grant (D20FE-305). None.
INVESTIGATION OF TOPICAL AMNIOTIC MEMBRANE SUSPENSION AND EXTRACELLULAR MATRIX SUBSTITUTE ON CORNEAL STROMAL WOUND HEALING IN AN INDUCED RAT WOUNDING MODEL

(H Lee, 1, WH Huang, 2, and CT Lin* 1,3) Institute of Veterinary Clinical Sciences, School of Veterinary Medicine, National Taiwan University 1; Graduate Institute of Molecular and Comparative Pathobiology, School of Veterinary Medicine, National Taiwan University 2; Department of Ophthalmology, National Taiwan University Veterinary Hospital, Taiwan 3.

Purpose. To investigate the therapeutic responses of topical amniotic membrane suspension and extracellular matrix substitute in surgically induced deep stromal ulcers in rats. Methods. Twenty-four rats were divided into 4 groups: control group (topical normal saline, TID, n=6); A group (topical amniotic membrane suspension, TID, n=6); E group (topical extracellular matrix substitute, Q2D, n=6); AE group (topical amniotic membrane suspension, TID; topical extracellular matrix substitute, Q2D, n=6). Lamellar keratectomy was used to induce deep stromal ulcer. Evaluations were performed by ophthalmic examinations, spectral domain optical coherence tomography (SD-OCT), histopathology, and immunohistochemistry of markers of corneal wound healing. One-way ANOVA and Dunnett’s test were used for statistical analysis. A p-value less than 0.05 was considered as statistically significant. Results. There was no significant difference in stromal thickness between groups (P>0.05) at both post-op day 3 and 7. The corneal opacity gradings and myofibroblast counts in E and AE groups were significantly much higher than those in the control and A groups (P<0.05) at day 7. The OCT images showed the stromal layers of the control group were more disorganized when compared with the three other groups at day 7. Conclusions. The findings from OCT images and histopathology suggested both topical agents could promote corneal stromal wound healing process. The stromal wound healing was significantly promoted through active myofibroblasts-mediated remodeling of extracellular matrix in the E and AE groups. None.
Purpose. To survey commonly used, sterile ophthalmic viscoelastic materials commonly used during routine cataract surgery for the presence of bacterial DNA and/or viable bacterial cells. Methods. Samples from three different ophthalmic viscoelastic manufacturers and three different production lots/manufacturer were collected for 16S ribosomal ribonucleic acid (rRNA) sequencing. DNA extraction, 16S rRNA library preparation, and sequencing was performed followed by assembly and sequence annotation. Other samples of viscoelastic material were collected for conventional aerobic and capnophilic bacterial culture. Statistical analysis was performed using Sigma Plot 14.0, MetaboAnalyst, and PAST software. Differences (p≤0.05) between sample collection sites in total DNA concentration, microbial richness, mean intra-group distances, positive standard culture, alongside all appropriate reagent controls were evaluated. Results. Culture yielded two isolates, identified as Staphylococcus epidermidis and Bacillus megaterium. 16S rRNA sequencing revealed no differences between brands in richness or overall composition. The most common bacterial DNA detected across all brands was Staphylococcus sp. and Cutibacterium sp. Conclusions. No brand-specific differences in bacterial DNA were detected in the viscoelastic materials. Staphylococcus and Cutibacterium were the dominant contributors to the bacterial DNA detected. Supported by ACVO Vision for Animals Foundation (VAF grant 2022-2) and the MU Phi Zeta chapter. None.
INCREASING DRUG CONCENTRATION AND REPEATED EYEDROP ADMINISTRATION AS STRATEGIES TO OPTIMIZE DOSING OF TOPICAL DRUGS IN DOGS (LE Page, 1 MA Kubai, 1 RA Allbaugh, 1 JP Mochel, 1 L Bedos, 1 MM Roy, 1 VL Broadbent, 1 L Sebbag 1, 2) Iowa State University, College of Veterinary Medicine 1; Koret School of Veterinary Medicine, The Hebrew University of Jerusalem 2

**Purpose.** To determine tear film kinetics with different drug concentrations and repeated eyedrop administration at various time intervals. **Methods.** Six healthy beagles underwent 6 experiments on separate days: single eyedrop administration (control) or two separate eyedrops administered at 30sec, 1min, 2min, 5min and 10min intervals. One eye received 0.3% fluorescein solution while the other received 1% fluorescein solution (based on concentrations of commercially available ophthalmic medications solutions), and tear fluid was collected with capillary tubes at 0, 1, 5, 10, 20, 30, 40, 50, 60, 90, 120, and 180min. Fluorescein concentrations were measured using automated fluorophotometry. **Results.** Tear film concentrations were significantly greater in all eyes receiving 1% solution compared with 0.3% in the control and all experimental groups (P < 0.001). Compared with control, tear film concentrations were significantly higher for up to 20min when repeating administration 30sec to 5min after the first drop (P ≤ 0.006). Compared with control, the highest increase in overall drug exposure in tear film (area-under-the-curve) was obtained with 2min and 5min intervals for 0.3% (+109-130%) and 1% solutions (+153-157%), while the highest increase in median precorneal retention time was obtained with 5min intervals for 0.3% (55min vs. 15min in control) and 1% solutions (50min vs. 25min in control). **Conclusions.** Higher drug concentration and repeated eyedrop administration can be utilized to optimize tear film concentration of therapeutics for canine eyes. For the latter, the optimal time interval between eyedrops is 2 to 5 minutes, improving overall drug exposure by up to 157%. **None.**
EVALUATION OF TOPICALLY APPLIED CROSS-LINKED HYALURONIC ACID (REMEND®) ON THE OCULAR SURFACE OF CLINICALLY HEALTHY DOGS (CE Plummer, 1 BC Martins, 2 C Bolch, 3 PS Martinez, 1 Carbia BE, 1 College of Veterinary Medicine, University of Florida; 1 School of Veterinary Medicine, University of California- Davis; 2 Institute for Vision Research, University of Florida; 3

**Purpose.** To evaluate the effects of a topically applied cross-linked HA (Remend Eye Lubricating Drops® - Bayer Animal Health) on the ocular surface of clinically normal dogs. **Methods.** Twenty dogs with normal ophthalmic examinations received tear ferning tests (TF-M7, TF-M5, and TF-R), Schirmer’s tear test I (STT-I), tear film breakup time (TFBUT), slit lamp biomicroscopy, indirect ophthalmoscopy and rose Bengal dye staining (RB) on the first day of examination (day 0), 1 week after initial examination (day 7), and 2 weeks after examination (day 14). Following examination and baseline testing, subjects received cross-linked HA (Remend®) two times a day (BID) on the right eye (OD). The left eye (OS) served as control and received saline BID. Tear fluid samples from both treated and control eyes were evaluated for HA levels by ELISA prior to and at several time points following treatment. **Results.** For the duration of the study, there was no statistically significant difference in aqueous tear production (STT-I) or RB retention between study and control eyes. There was a statistically significant improvement in TFBUT between study and control eyes on Day 7 (p<0.001) and Day 14 (p<0.001). There was a statistically significant improvement in TF-M7 scores (p<0.02112) and TF-R scores by Day 14 (p< 0.01097). HA was present in measurable quantities in the tear fluid at 30 minutes and one hour after topical application in treated eyes. **Conclusions.** Topically-applied cross-linked HA may improve tear quality, especially tear film stability, in dogs. Supported by Bayer Animal Health. **None.**
Purpose. To evaluate the in vitro efficacy and physical properties of combining antibacterial and antiviral drugs with a patented cross-linked hyaluronic acid (XHA) based eye drops. Methods. Several active pharmaceutical ingredients (Neomycin, Polymyxin B, Bacitracin, Gentamicin, Cefazolin, Ciprofloxacin, Gramicidin, Oxytetracycline, Tobramycin, Cidofovir, and Ganciclovir) were aseptically mixed with XHA, which with its unique extracellular matrix serves both as a delivery vehicle and eye lubricant. The resulting combined hydrogels were then evaluated for changes in physical properties (e.g. viscosity and shear thinning). Tobramycin hydrogels were evaluated for antimicrobial activity using a zone of inhibition assay. Ganciclovir hydrogels were tested for antiviral efficacy using a cytopathic effect assay (CPE) with Feline Herpesvirus 1 (FHV-1). Both were compared with the same drugs diluted in saline serving as controls. Results. The addition of active ingredients resulted in no significant changes to the viscosity or shear thinning profile of XHA hydrogels. Tobramycin hydrogel and tobramycin controls exhibited equivalent zone of inhibition against three strains of bacteria. XHA ganciclovir solution was found to have a 4.3 and 3.2 fold reduction of viral activity as compared with saline solutions of Ganciclovir. Conclusions. In vitro results suggest that both the unique physical properties (viscosity, shear thinning, and concentration) of XHA and efficacy of tested APIs are maintained or improved in the case of Ganciclovir. Future work will include target animal efficacy and disease state clinical studies along with application and dosing requirements based on potential synergistic effects from the XHA's increased residence time. Supported by SentrX Animal Care. E
AUTHOR INFORMATION

RP Rinaldi, ME Lassaline, E Holt
Department of Clinical Sciences and Advanced Medicine, School of Veterinary Medicine, University of Pennsylvania, Philadelphia PA

Purpose. To determine factors associated with owner compliance with ophthalmic medication instructions for their pet. Methods. Dogs and cats examined more than once by the Ophthalmology Service at Ryan Veterinary Hospital, University of Pennsylvania from June 2020 to June 2021 were included. Medication instructions given to the pet owner in the discharge summary for a first visit were compared with owner reports of the medications administered, and their frequency, as recorded at the second visit. Patient species, age, sex, eye affected, ocular disease being treated, medication prescribed, frequency of application, and time between first and second examinations were noted. The association between each of these factors and owner compliance (yes, no) was calculated using chi-square tests for categorical variables and t-test for interval-scaled variables. Results. The study covered 137 patients. Time between first and second examination was negatively associated with compliance (t=2.21, p=0.03), with compliant owners averaging 21 days between examinations, and noncompliant owners averaging 40 days. Patient species was also associated with compliance (X²=4.04, p=0.04), with dog owners (94/117, 80%) more likely to be compliant than cat owners (12/20, 60%). Patient age and sex, eye affected, ocular disease being treated, medication prescribed, and frequency of application were not associated with compliance. Conclusions. As time between examinations increases, owners may be less likely to follow medication instructions, suggesting further client education measures may be warranted, particularly for owners of cats. None.
EFFECT OF SUBCONJUNCTIVALLY INJECTED MESENCHYMAL STEM CELLS IN DIABETIC RAT MODELS
(JS Jung,1 HM Kim,1 YS Goh,1 HJ Lee,2 and KM Park1) Laboratory of Veterinary Ophthalmology, College of Veterinary Medicine, Chungbuk National University, South Korea;1 Laboratory of Veterinary Physiology, College of Veterinary Medicine, Chungbuk National University, South Korea. 2

**Purpose.** Ophthalmic diseases such as cataracts and retinopathy are well known as complications of diabetes mellitus (DM). The purpose of this study was to evaluate the effectiveness for delaying pathologic changes of the retina associated with DM of subconjunctivally injected mesenchymal stem cells (MSCs) in DM rat models.

**Methods.** DM was induced in rats by streptozotocin (STZ, 50mg/kg, Sigma, St. Louis. MO) intraperitoneal injection. A subconjunctival injection of MSCs (5*10⁵ cells in 3μl PBS) was performed OD; the same amount of PBS was injected subconjunctivally OS. The MSC-injected eyes in DM rats (Group 1) and the PBS-injected eyes in DM rats (Group 2) were compared with the eyes of the normal control group (Group 3). One month after STZ injection, electroretinographic (ERG) evaluation was performed and overall changes in the eye were observed using slit lamp biomicroscopy. **Results.** B wave amplitude level of Flash ERG was higher in Group 2 than in Group 1 or Group 3 but the result was not significant. Flicker amplitude level was also mildly higher in Group 2 than in Group 1 or Group 3. Incipient cataract was observed in all eyes of Groups 1 and 2. **Conclusions.** There were no significant differences in retinal function and cataract development between all groups. Longer term observational studies are planned. Research supported by the “Regional Innovation Strategy (RIS)” through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (MOE) (2021RIS0124). None.
NEGATIVE EFFECTS OF INTRAVITREAL INJECTION OF TACROLIMUS-PRE TREATED MESENCHYMAL STEM CELLS ON THE DIABETIC RETINOPATHY RATS (Yeong-seok Goh1, Hye-min Kim1, Hyun-jik Lee2, and Kyung-Mee Park1*) Laboratory of Veterinary Ophthalmology, School of Veterinary Medicine, Chungbuk National University; 1 Laboratory of Veterinary Physiology, School of Veterinary Medicine, Chungbuk National University. 2

**Purpose.** Intravitreal stem cell administration is considered as a treatment option for diabetic retinopathy, but its effectiveness is controversial. Some studies show that intravitreal injection of stem cells causes intraocular inflammation and decreases retinal function. In our preliminary study, we confirmed that tacrolimus-pretreatment increased the viability of stem cells in-vitro in hyperglycemic condition. The purpose of this study is to investigate the therapeutic effects of intravitreal injection of tacrolimus-pretreated stem cells in diabetic rats. **Methods.** Streptozotocin (Sigma, St. Louis, MO) was intraperitoneally injected at dose of 55mg/kg into three 8-week-old male Sprague-Dawley rats. Ten days after streptozotocin injection, 1X10^5 tacrolimus-pretreated mesenchymal stem cells (t-MSC) in 10μl of PBS were intravitreally injected to diabetic rats. After one month of streptozotocin injection, histology and electroretinography were performed to examine the retinal structure and function. **Results.** Mean implicit times and amplitudes of b-wave of dark-adapted full-field flash ERG were 57.5ms-85μV, 66.7ms-65μV, and 67.3ms-37.87μV in the normal control, diabetes control, and t-MSC injected group, respectively. Implicit time and amplitude of flicker ERG was 54.1ms-50.8μV, 80.9ms-31.93μV, 81.27ms-23.97μV, respectively. Cataract and inflammation in the t-MSC injected group were observed histologically. **Conclusions.** Intravitreal injection of t-MSC did not result in a beneficial therapeutic effect in diabetic retinopathy; conversely it resulted in a decline of retinal function. Supported by “Regional Innovation Strategy” through the National Research Foundation of Korea funded by the Ministry of Education. **None.**
INTRAVITREAL INJECTION OF MESENCHYMAL STEM CELLS DETERIORATE RETINAL FUNCTION IN EARLY STAGE OF DIABETIC RATS (HM Kim, 1 YS Goh, 1 HJ Lee, 2 and KM Park 1) College of Veterinary Medicine, Chungbuk National University; 1 Department of Veterinary Ophthalmology, 2 Department of Veterinary Physiology

**Purpose.** Diabetic retinopathy is an important disease that occurs in many diabetic patients and causes vision loss. Stem cell therapy is a reported treatment for this disease. The purpose of this study is to evaluate the effectiveness in preventing diabetic retinopathy of mesenchymal stem cells (MSCs). **Methods.** Eighteen eyes of twelve male Sprague Dawley rats were divided into three groups: Group 1- normal control group, Group 2- diabetes mellitus (DM) control group who received only PBS by intravitreal injection, Group 3- DM-MSC group who received 1˟10⁵ MSCs with PBS by intravitreal injection. Hyperglycemia was induced in DM rats by intraperitoneal injection with Streptozotocin (50mg/kg; Sigma Chemical Co., St. Louis, MO). **Results.** The average blood glucose levels of DM groups was 360±66mg/dL. Three weeks after MSC injection, the treatment efficacy was evaluated with electroretinography(ERG). In the B-wave amplitude, Group 1 (111±33μV) and Group 2 (110±44μV) maintained normal retinal function whereas Group 3 (51±31μV) had significantly decreased retinal function. In the flicker amplitude, the data of Group 3 (44±36μV) revealed significantly lower amplitudes than Group 1 (79±36μV) and Group 2 (63±24μV). H&E staining showed cataract and inflammation in Group 3 eyes. **Conclusions.** Intravitreal injection of MSCs may deteriorate the lens and retina. We recommend injecting MSCs by another route. Supported by Regional Innovation Strategy(RIS) through the National Research Foundation of Korea(NRF) funded by the Ministry of Education(MOE). **None.**
Purpose. Diabetic retinopathy is a major complication that greatly ruins the quality of life of diabetic patients due to permanent vision loss. Mesenchymal stem cell therapy is emerging as a promising treatment strategy. As our preliminary study, the function-modulated stem cells with tacrolimus were expected to significantly improve transplantation efficiency. The purpose of this experiment is to evaluate in vivo efficacy of tacrolimus pretreated mesenchymal stem cell with subconjunctival injection in a diabetic rat model. Methods. Diabetes mellitus (DM) groups were induced by intraperitoneal injection with Streptozotocin (STZ, 50mg/kg; Sigma, St. Louis, MO). Group 1, control group; Group 2, DM control group; Group 3, tacrolimus pretreated stem cell injection group with DM. Tacrolimus pretreated stem cells injected subconjunctivally 10 days after STZ injection. Treatment efficacy was evaluated with electroretinography (ERG). Results. The average blood glucose levels of all DM groups was 419±55.97 mg/dL. Group 3 showed a higher flash and flicker amplitude B level than group 1. Moreover, eyes injected with tacrolimus treated stem cells are maintained at a normal retinal function. Conclusions. The tacrolimus pre-treated stem cells showed efficiency for delaying the progression of the retinopathy in diabetic rat models. Subconjunctival injection did not induce inflammation or rejection in the eyes. Supported by Regional Innovation Strategy (RIS) through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (MOE). None.
INTRAOCULAR PRESSURE (IOP) AND AGING IN NORMAL CANINE EYES. (S Pizzirani,1,6 A Ciria,2,6 M Crema,4,6 F Maggio, 5 G Milani,3,6.) Tufts Cummings School of Veterinary Medicine, North Grafton, MA, USA;1 Ophthalmology Service, San Marco Clinica Veterinaria e Laboratorio, Veggiano (PD), Italy;2 Oculistica Veterinaria, Practice Limited to Veterinary Ophthalmology, Brescia, Italy;4 Ophthalmology Service, Tufts Veterinary Emergency Treatment and Specialties, Walpole, MA, USA;5 Ophthalmology Service, Ambulatorio Veterinario Bussolello, VR, Italy;3 Study Group “I Vitelloni”.6

**Purpose.** To compare IOP values in normal canine eyes of two different age groups and correlate them with iris changes (IC).

**Methods.** In a multicenter study, IOP was measured in triplicate readings with rebound tonometry in canine eyes considered normal after ocular examination. Dogs under 5 years (Group “Y”) and above 10 years (Group “O”) of age were included. Iris changes at the pupillary borders were scored according to previous studies (mild/1, moderate/2, severe/3). Parametric statistical methods were used to compare and correlate the results in the 2 groups.

**Results.** A total of 538 dogs (964 eyes) were included, with 275 dogs (499 eyes) in “Y” and 263 dogs (465 eyes) in “O”. One-way ANOVA of IOP values among 4 different readers was not statistically significant (p>.05). Paired IOP and IC values OD and OS were not statistically different (p>.05) and were averaged and used as independent values. Mean IOP was 18.26 mmHg (SD±2.14) in “Y” and 12.28 mmHg (SD±2.56) in “O”, and the difference was strongly significant (p<0.001). IC scores were 0.13 (SD±0.35) “Y” and 2.13 (SD±0.75) “O” and the difference was strongly significant (p<.001). Negative correlation between IOP and IC was not significant in “Y”, while it was strongly significant (p<.001) in “O”.

**Conclusions.** IOP decreases with age in normal canine eyes and it is statistically correlated to iris atrophy, with the latter indicating the anatomical disruption of the blood aqueous barrier. This study supports the theories of increased molecular inflammation in the anterior chamber as a cause of age-related hypotony in dogs.
QUANTIFYING SPHERE REFRACTIVE ERROR IN AGING DOGS SECONDARY TO NUCLEAR SCLEROSIS (JM Francis, 1 SA Pumphrey, 1) Department of Clinical Sciences, Tufts University Cummings School of Veterinary Medicine; 1

**Purpose.** To evaluate sphere refractive error in dogs with nuclear sclerosis. **Methods.** A prospective study was performed to identify dogs >5 years of age with and without apparent nuclear sclerosis. Dogs were included if no concurrent pathologies of the clear media of the eye were noted. Sclerosis was scored from absent to severe. Each dog was refracted by both investigators in horizontal and vertical meridians using a Welch Allyn 3.5V streak retinoscope and skiascopy bars. Values were averaged for each eye. **Results.** Refraction was performed on 118 eyes from 61 dogs. Mild sclerosis (41%) was most common, followed by absent (26%), moderate (23%), and severe (10%) sclerosis. Median age was 6.79 years for absent sclerosis, 9.08 years for mild sclerosis, 11.71 years for moderate sclerosis, and 12.18 years for severe sclerosis. Median refractive error was 0D bilaterally for absent, mild, and moderate sclerosis, and +0.5D OD and +0.75D OS for severe sclerosis. Refractive error ranged from +2.5D to -4.5D, with myopia >2.5D noted in a Toy Poodle, Toy Rat Terrier, Cardigan Welsh Corgi, and two Dachshunds. **Conclusions.** Nuclear sclerosis has been reported to induce visual derangements in people including significant myopia, but its effects on canine vision are less well characterized. This study found no significant refractive error associated with nuclear sclerosis in dogs > 5 years of age. More work is needed to evaluate the effects of aging on canine vision. Dogs with nuclear sclerosis with reported visual deficits may benefit from assessment of refractive error.
SUBJECTIVE ASSESSMENT OF COMpanion DOg VISION SHOWS AN AGE-RELATED DECLINE.
(CM Rogers, 1 H Lillesand, 1 L Russell, 1 C Ersoz, 1 A Kopydlowski, 1 FM Mowat, 1,2) Dept.
Surgical Sciences, School of Veterinary Medicine 1; Dept Ophthalmology and Visual Sciences,
School of Medicine and Public Health 2; University of Wisconsin-Madison, Madison, WI, USA.

**Purpose**: Validated human visual function questionnaires (VFQ) show robust decline in visual ability with aging, particularly in low lighting conditions. Dogs are an important companion species that share many risk factors for age-related diseases with their human owners. We sought to determine if a dog owner VFQ could identify age-related visual dysfunction. **Methods**: We used a previously validated dog VFQ, and a novel VFQ (based on the human low luminance questionnaire; LLQ) that asked about vision in different lighting conditions. The LLQ underwent a content validation process with veterinary ophthalmologists and dog owners. Responses from dog owners were analyzed using multivariate analysis (JMP 15.0) comparing age with VFQ/LLQ scores. **Results**: Response scores from owners of 94 female and 79 male dogs were collected. With the previously validated canine VFQ, there was a significant correlation with age in dogs (r=0.45, p<0.0001). For the LLQ, there was a significant correlation with age for visually mediated behavior in bright light (r=-0.33, p<0.0001), dim light (r=-0.35, p<0.0001) and in darkness (r=-0.39, p<0.0001). Additionally, there was a significant effect of age on both the transition from bright to dim light (p<0.0001) and dim to bright light (p=0.0009). **Conclusions**: Subjective (owner) assessment of visual function in dogs declines in association with age. Like aging humans, dim light vision subjectively declines with age and older dogs have difficulty transitioning between different lighting environments. Validation will be accomplished by analysis of electroretinogram amplitudes and/or peak times in a subset of dogs. Funded by K08EY028628 to FM. None.

Friday Presenting 9:30am
GENERAL SCIENTIFIC SESSION FRIDAY

PRIMARY CORNEAL SARCOMA IN THREE DOMESTIC PET RABBITS (ORYCTOLAGUS CUNICULUS) (ED Soler1, ES McCool1, N Di Girolamo1, J Brandão1, KE Fentiman1, R Taylor2, and A Hoffman3) 1College of Veterinary Medicine, Oklahoma State University; 2Comparative Ocular Pathology Laboratory of Wisconsin (COPLOW), University of Wisconsin; 3Eye Care for Animals, Pasadena, CA

Purpose. To describe clinical and histopathologic findings in three domestic rabbits diagnosed with primary corneal sarcomas submitted to COPLOW. Methods. The COPLOW database was searched for rabbits diagnosed with primary corneal sarcoma. Relevant historical information, clinical exam findings, and follow-up for each rabbit was obtained from the submitting veterinarian. Results. Three rabbits with corneal sarcoma were identified. Rabbits were 7-9 years of age and duration of clinical signs varied between 4 months and 8 years. Clinical signs were described as a progressive, proliferative corneal mass and keratitis in all rabbits, with a several year history of chronic ulcerative keratitis documented in one rabbit. Samples submitted were a keratectomy in one rabbit and entire globes in two rabbits. Histopathologic findings were consistent with poorly differentiated corneal sarcomas in all rabbits with variable associated keratitis. Clean margins were obtained with enucleated globes. Margins were considered dirty for the keratectomy and this rabbit was subsequently treated with beta-irradiation, with no evidence of recurrence at last follow up. Conclusion. This is the first report documenting primary corneal sarcoma in several rabbits. Given the extensive inflammation noted in two of the three corneas, this could represent neoplastic transformation secondary to chronic inflammation as is theorized in other species. One rabbit was housed outdoors, therefore it is speculated that increased UV exposure may have been a risk factor for corneal neoplasia in this rabbit. None.

Friday Presenting 9:45am
PSORIASIFORM LICHENOID-LIKE DERMATOSIS DESCRIBED IN A DOG TREATED WITH OPHTHALMIC TACROLIMUS 0.5%. (SM Spears 1, EP Locke 2, LM Messenger 3, EG da Silva 1, ES Storey 1). 1. Animal Eye Clinic of Pensacola, Pensacola, Fl; 2. Antech Diagnostics, Mississauga, ON; Antech Diagnostics, Fountain Valley, Ca.

Case Description. An 8-year-old neutered male French Bulldog was evaluated for keratoconjunctivitis in both eyes. Schirmer’s tear test measurements were 9mm/60s OD and 10mm/60s OS. Treatment with compounded ophthalmic tacrolimus 0.5% every twelve hours and Optixcare in both eyes three times daily was prescribed. Tear production was measured two months later. Clinical Findings. At two months, tear production had improved markedly, measuring 15mm/45s OD and 20mm/60s OS. During that time, the dog developed multiple periocular and facial papillomatous lesions. Lesions were excised and submitted for histopathology. Hyperplastic, lymphoplasmacytic lichenoid dermatitis with intraepidermal pustules, typical of psoriasiform lichenoid-like dermatosis, was diagnosed, a dermatopathologic condition associated with systemic cyclosporine administration. Treatment and Outcome. The dog was treated with amoxicillin clavulanate, and the tacrolimus concentration was decreased to 0.03%. After two weeks, the remaining papillomatous lesions resolved and tear production reduced slightly, but remained within the normal reference range. Eight months later, the dog continued to have normal tear production with no recurrence of the lesions. Clinical Relevance. When refractory keratoconjunctivitis sicca occurs, the concentration of topical ophthalmic tacrolimus is often increased with anecdotal success. This dog developed dermal lesions which were suspected to be associated with systemic cyclosporine administration after being administered 0.5% ophthalmic tacrolimus. Lesions may be considered a possible side effect of treatment with a higher concentration of topical ophthalmic tacrolimus, and therefore warrant further investigation. None.
LATERAL CANTHAL RECONSTRUCTION/LCR (“MILLER TECHNIQUE”) – A NOVEL SURGICAL PROCEDURE TO ADDRESS MACROBLEPHARON WITH LATERAL CANTHAL ENTROPION IN DOGS
(H Kecova, WW Miller, DM Lindley) Animal Eye Consultants, Elgin, Illinois

**Purpose.** To introduce a novel technique for treatment of macroblepharon and diamond eye in dogs. **Methods.** LCR was used in clinical patients to address eyelid malformations causing ocular surface disease. The lateral canthus was resected and a new canthus created with 2-layer closure. This technique was also used to address lateral canthal dermoids. **Results.** Seventy-five eyes of forty-two dogs were included. Procedure addressed macroblepharon and/or lateral canthal entropion (72 eyes of 39 patients) or dermoid (3 eyes of 3 dogs). LCR was done alone (n=38 eyes) or combined with an additional procedure (Hotz Celsus, wedge resection, cryoepliation, cherry eye repair) (n=37 eyes). All but 2 eyes had good to excellent functional and cosmetic outcome. Additional surgery (Stades Procedure) was needed in 2 eyes of 2 dogs (both English Bulldogs with severe uncontrolled allergies) to correct spastic entropion. Most common complications (cosmetic rather than functional) included slight undercorrection or overcorrection. Undercorrection was mostly encountered in giant breeds where pagoda resection was not done. Slight overcorrection loosened over time with a good cosmetic outcome. Two eyes of one patient (Bernese Mountain Dog with severe dry eye) developed dramatic granulation reaction to suture, which resolved after excision of the exuberant tissue. **Conclusions.** LCR is a simple yet effective surgery for macroblepharon and/or lateral canthal entropion. If done early, it prevents development of secondary eyelid malformation (“pagoda effect”) in giant breeds. If done after severe eyelid malformation has developed, combining this technique with concurrent pagoda resection is recommended to achieve ideal eyelid conformation. **None.**
CANINE EYELID RECONSTRUCTION USING A FREE LABIAL MUCOCUTANEOUS GRAFT FOLLOWING LARGE MASS RESECTION (WM Irving, 1 KA Caruso, 1 CJ Whittaker, 1 MJ Annear, 1 BD Reynolds, 1 PG McCarthy, 1 N Hamzianpour, 1 JS Smith, 1) Eye Clinic for Animals, Sydney, NSW, Australia; 1

**Purpose.** To describe a technique to repair the eyelid margins following large mass resection utilizing a free labial mucocutaneous graft. **Methods.** Masses of the upper eyelids were resected using en bloc sharp dissection. The size of the defect was measured using Jameson calipers, then a region of labial mucocutaneous tissue was harvested by sharp dissection from the mucocutaneous junction of the dorsal lip beginning immediately nasal to the oral commissure at a length of 150% of the defect and approximately 10-15mm wide. The donor tissue was stored in a bowl of sterile saline whilst the donor site was sutured closed using a single layer of 6/0 Vicryl in a simple continuous pattern. The free labial mucocutaneous graft was placed into the mass defect to ensure donor cutaneous tissue was adjacent and sutured to recipient cutaneous tissue and donor oral mucosa was adjacent and sutured to recipient conjunctiva. Simple continuous sutures using 7/0 Vicryl were used for these two layers with simple interrupted cardinal sutures used to secure the corners of the graft. **Results.** NOTE: Three dogs underwent free labial mucocutaneous grafting surgery for large upper eyelid masses. Complications were minimal with one dog exhibiting blepharospasm postoperatively from suture rubbing. All three dogs had some superficial graft necrosis but all healed well with excellent eyelid margin reconstruction with no signs of ocular discomfort. **Conclusions.** The procedure allows an excellent margin reconstruction with large defects with a fully functional eyelid without shortening the palpebral fissure. The technique is simple to perform and allows a mucocutaneous margin, thus avoiding secondary keratitis and exposure conjunctivitis. None.
CHARACTERISTICS OF A CANINE POPULATION AFFECTING ULTIMATE NEED FOR SURGICAL CORRECTION OF ENTROPION. (AC Sieve and CS Monk) BluePearl Specialty and Emergency Pet Hospital, Atlanta.

**Purpose.** To determine if the Shar-Pei breed is less likely than other breeds to require future surgical correction of congenital entropion when diagnosed at younger than one year of age and to define other characteristics that may significantly impact the need for surgical correction of entropion.  

**Methods.** Retrospective observational study of dogs diagnosed with entropion at three referral hospitals between July 2015 - July 2020 in which surgery was not performed until at least one year of age. Medical records were selected by searching the database for dogs with a temporary tacking procedure performed and/or diagnosis of entropion. Data collected included whether tacking procedure was performed, need for repeated tacking, breed, brachycephalic status, presence of concurrent corneal ulcers or allergies, and if surgical correction was recommended or performed. Statistical analysis was performed using SAS 9.4 (Cary, NC).  

**Results.** There were 72 dogs included in this study, 35 were Shar-Peis and 37 were dogs of various other breeds. Total percentage of dogs that required correctional surgery for entropion was 68% (49/72). 71% (25/35) of Shar-Peis required surgery, whereas 65% (24/37) of other breeds required surgery. Having at least one temporary tacking procedure significantly decreased the odds for needing corrective surgery by 94% (p<0.001). Other recorded variables did not significantly affect the need for surgery.  

**Conclusions.** Shar-Peis were not significantly different in their need for future entropion surgery compared with other breeds. However, having at least one temporary tacking procedure significantly decreased the odds of needing permanent entropion correction. No grant support.  

None.
DIAGNOSIS AND MANAGEMENT OF EYELID COLOBOMA/AGENESIS IN THE AZA SNOW LEOPARD (Panthera uncia) POPULATION (2000-2020). (AB Marlar,1 TA Georoff ,2 L Teixeira,3 N McClaren,4, and L Lyons 5) Marlar Veterinary Consulting, Arlington, TX; 1 North Carolina Zoo, Asheboro, NC; 2 Comparative Ocular Pathology Laboratory of Wisconsin (COPLOW), University of Wisconsin-Madison, Madison, WI; 3 Eye Care for Animals, Salt Lake City, UT; 4 Department of Veterinary Medicine & Surgery, College of Veterinary Medicine, University of Missouri - Columbia, Columbia, MO. 5

**Purpose.** To evaluate congenital ocular disease in captive Snow Leopards (SLs) and review trends in diagnosis and management of eyelid coloboma, thought to be a common and often symptomatic phenotype of multiple ocular coloboma (MOC). **Methods.** Medical records were reviewed for AZA Snow Leopard Species Survival Plan (SSP) cats between 2000-2020. SL’s with ocular disease were identified for further review. Those with confirmed eyelid coloboma were reviewed to identify trends in presenting signs, diagnosis and management. **Results.** 34/131 (26%) living SLs within the SSP have some congenital eye defect including eyelid coloboma. From 2000-2020, 73/332 (22%) studbook births were diagnosed with congenital ocular disease including eyelid coloboma (49/332). Suspected colobomata in neonates were often confirmed by a veterinary ophthalmologist. Symptoms occurred in 36/49 (73%) SLs with eyelid coloboma. Fundoscopic examination was reported in 18/49 (37%) SLs. Eyelid wedge resection was performed in 32/39 SLs, cryotherapy in 15/39 (some as sequential combination procedures) and 3 SLs had lip to lid reconstruction. Complications included wound dehiscence and corneal irritation/ulceration across all techniques. 14/39 (36%) SLs required revision. 12/39 (30.7%) required periodic monitoring/intervention. **Conclusions.** Congenital ocular disease is common in captive snow leopards. Cubs born with eyelid coloboma are often symptomatic. Thorough neonatal ocular examination should be considered, especially in symptomatic cubs. Interventions for eyelid coloboma are common. Complications and/or multiple interventions may be anticipated. Management of individual SLs involves collaboration between veterinary ophthalmologists and institutional management teams. This work is supported by the Vision for Animal Foundation (VAF2020-B). **None.**
Purpose. To describe the breed distribution of primary lens luxation (PLL) and zonular ligament dysplasia (ZLD) in the COPLOW database, including previously unreported breeds, and to investigate the presence of the ADAMTS17 mutation in these breeds. Methods. The COPLOW database was mined using the search terms “zonular ligament dysplasia” and “dysplastic zonular ligament protein” from the years 1989-2022. Results. 39 unique pure breeds and 25 mixed breeds were diagnosed with ZLD in the COPLOW database. Notable non-terrier pure breeds included Australian cattle dogs (n=66, 16.26%), beagles (n=35, 8.62%), shar-peis (n=28, 6.9%), Chihuahuas (n=9, 2.22%), and Australian shepherds (n=3, 0.74%). These breeds were also over-represented among mixed breed dogs with ZLD. When compared with the total number of individuals from these breeds in the database, Australian cattle dogs with ZLD=18.28%, beagles=3.83%, shar-peis=14.97%, Chihuahuas=0.85%, and Australian shepherds 0.51%. The most common breed that had bilateral enucleation and a subsequent ZLD diagnosis was the shar-pei (n=12 [42.9%] of affected shar-peis). Conclusions. PLL is present in many dog breeds, some of which (Chihuahua, beagle, and Australian shepherd) are not reported in the literature or recognized by the ACVO as predisposed. Testing PLL-positive animals of these breeds for the point mutation in ADAMTS17 characterized in terriers is ongoing and would be a valuable addition to the current understanding of ZLD. None.
REFRACTIVE ERROR OF THREE INTRAOCULAR LENSES FOLLOWING CATARACT SURGERY IN DOGS
(M Kaminsky1, A Hoffman1, R Ofri2, KA Konrade1, L Gantz3) Eye Care for Animals, Pasadena, CA1; Koret School of Veterinary Medicine, Hebrew University of Jerusalem, Israel2; Department of Optometry and Vision Science, Hadassah Academic College Jerusalem, Israel3

**Purpose.** To evaluate refractive state outcomes following phacoemulsification and implantation of three different intraocular lenses (IOLs) using streak retinoscopy. **Methods.** A prospective, randomized, controlled study was conducted on 43 client-owned dogs undergoing phacoemulsification with IOL implantation. Eyes were randomized to receive either An-vision Fo-X (N=26), An-vision MD8 (N=18), or I-MED I-LENS (N=24) IOL. Refraction was measured at 1-week, 1-month, and 3-months post-operatively using streak retinoscopy by two examiners who were masked to each other’s results. Interobserver variability was compared using correlation analysis and paired t-tests. Refractive error outcomes for each IOL type were compared using one-way ANOVA for independent measures. **Results.** Post-operative refractive outcomes were highly correlated and not significantly different between two examiners for all timepoints (Pearson’s r= 0.97, 0.98, 1.00; p=0.76, 0.94, 0.98, respectively). One-week post-operatively, the refractive errors (mean±SD) for Fo-X, MD8, and I-LENS were -0.14±2.02D, 0.97±2.01 D, and 0.15±2.55D, respectively. One-month post-operatively, the refractive errors were 0.35±2.04 D, 0.06±2.41D, and -0.82±2.20D, respectively. Three-months post-operatively, the refractive errors were -0.16±2.67D, 1.60±2.99D, and 0.59±1.51D, respectively. There were no significant differences in refractive error outcomes between Fo-X, MD8, and I-LENS at 1-week, 1-month, and 3-months post-operatively (p=0.16; F(df=2,66)- =1.89). However, the Fo-X was the only IOL to yield nearly emmetropic outcomes (±0.50D) at all three time points. **Conclusions.** The post-operative refractive states of dogs were not statistically different when comparing three types of IOLs at three post-operative time points, though the Fo-X was the only IOL to yield nearly emmetropic outcomes at all three time points. **None.**
Purpose. To determine the effect of cumulative dissipated energy (CDE) on complications and visual outcome following cataract surgery in dogs. Methods. Retrospective medical record review was conducted on dogs that underwent unilateral or bilateral elective cataract surgery by a single surgeon. A total of 182 canine eyes were included. Preoperative variables such as age, cataract duration, and preexisting conditions were recorded. Intraoperative variables such as intraocular lens (IOL) status, phacoemulsification time, average power, irrigation fluid volume, and CDE were recorded. Postoperative complications and visual status at last follow-up were compared with these variables. Results. Eighty-six percent of dogs had vision in one or both eyes at last follow-up (LFU) examination. Median follow-up time was 186 days postoperatively. Eyes that developed glaucoma had a significantly greater mean CDE (77.73 +/- 80.11) than eyes that did not develop glaucoma (49.21 +/- 38.93). Eyes that remained sighted at the LFU examination had a significantly lower mean CDE (48.31 +/- 37.14) than eyes that were blind at LFU (82.05 +/- 82.73). Significantly lower mean CDEs were found in eyes of diabetic dogs, younger dogs, early-operated eyes (< 1 month duration), and eyes with preoperative lens-induced uveitis. Conclusions. Higher CDE may be associated with an increased risk of postoperative glaucoma and loss of vision in dogs. Cumulative dissipated energy may be a useful prognostic indicator for success of canine cataract surgery. None.
THE EFFECTS OF INTRACAMERAL LIDOCAINE-EPINEPHRINE (SHUGARCAINE) ON BLOOD PRESSURE AND HEART RATE DURING PHACOEMULSIFICATION: 96 EYES (2014-2022) (LK Gibson, 1 SA Pumphrey, 1 F Maggio, 2 LA Wetmore, 1) Department of Clinical Sciences, Tufts University Cummings School of Veterinary Medicine; 1 Tufts Veterinary Emergency Treatment and Specialties; 2.

**Purpose.** To investigate the effects of an intracameral lidocaine-epinephrine fixed combination on the blood pressure and heart rate of dogs undergoing phacoemulsification. **Methods.** A medical records search was performed to identify dogs that had undergone phacoemulsification with or without administration of intracameral lidocaine-epinephrine to achieve mydriasis. Dogs were excluded if they had pacemakers or were receiving systemic medications that could affect blood pressure or heart rate. Dogs that received an anticholinergic during surgery were censored at the time of administration. Data collected included body weight, anesthetic protocol, mydriatic effect, and blood pressure and heart rate, starting at or immediately before lidocaine-epinephrine administration then every 5 minutes for the following 30 minutes. **Results.** 56 eyes from 34 dogs that received intracameral lidocaine-epinephrine and 40 control eyes from 21 dogs that did not receive intracameral lidocaine-epinephrine were identified for inclusion. Changes in heart rate in treated dogs were not significantly different from those seen in control dogs at each 5-minute interval for the first 30 minutes following administration of lidocaine-epinephrine. Similarly, changes in blood pressure from the time of lidocaine-epinephrine administration were not significantly different than those seen in control dogs at each 5-minute interval for the first 30 minutes of surgery. Full mydriasis was achieved in 55 of 56 eyes treated with intracameral lidocaine-epinephrine. **Conclusions.** Intracameral lidocaine-epinephrine is an effective mydriatic and does not appear to affect intraoperative blood pressure or heart rate. More research is needed to characterize the systemic effects of intracameraly-administered drugs. **None.**
GENERAL SCIENTIFIC SESSION FRIDAY

CANINE ENDOTHELIITIS: CLINICAL CHARACTERISTICS, ADVANCED IMAGING FEATURES, AND TREATMENT (MA Mayes1, MI Casanova2, S Park2, K Steele3, L Linton4, S Kim2, KL Good2, BA Moore5, GM Newbold6, BC Leonard2, JY Li7, SM Thomasy2,7). 1William R. Pritchard Veterinary Medical Teaching Hospital, School of Veterinary Medicine, University of California-Davis; 2Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California-Davis; 3Eye Care for Animals, Reno, Nevada; 4Animal Eye Center, Inc, Rocklin, California; 5Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Florida; 6Department of Veterinary Clinical Sciences, The Ohio State University; 7Department of Ophthalmology & Vision Science, School of Medicine, University of California-Davis.

Purpose. To describe the clinical findings, multimodal corneal imaging features and treatment in dogs diagnosed with endothelitis. Methods. Four dogs met inclusion criteria for bilateral corneal disease with endothelial inflammation and secondary corneal edema that responded to topical anti-inflammatory treatment. The dogs selected underwent a complete ophthalmic examination with emphasis on the cornea including Fourier-domain optical coherence tomography (FD-OCT), ultrasound pachymetry (USP), digital slit lamp photography, and in vivo confocal microscopy (IVCM). Results. All dogs in this study had thickened corneas due to edema with FD-OCT and USP, particularly inferiorly. Mild to severe polymegathism and pleomorphism of corneal endothelial cells, reduced endothelial cell density, hyperreflective keratic precipitates (KPs), and extracellular debris as well as hyporeflective pseudoguttata were observed with IVCM. Hyperreflective KPs were commonly observed on the inferior cornea using FD-OCT. Clinical examination and advanced imaging results were consistent with a diagnosis of endothelitis. All dogs initially responded to topical anti-inflammatory treatment and required continued therapy; two dogs also received topical netarsudil (Rhopressa®, Aerie Pharmaceuticals), a rho-associated coiled-coil kinase inhibitor. Conclusion. Endothelitis should be considered for dogs with bilateral corneal edema that is most severe at its inferior aspect. Descemet’s membrane-endothelial complex should be thoroughly inspected for KPs or inflammatory debris. Chronic administration of topical anti-inflammatories may be necessary to prevent recurrent bouts of endothelitis. Supported by NIH grants K08EY028199, P30EY12576, R01EY01634 and the Jane-Lin Fong Ophthalmic Clinical Trial Support Fund. None.
ALTERATIONS OF THE BACTERIAL OCULAR SURFACE MICROBIOME ARE FOUND IN BOTH EYES OF HORSES WITH UNILATERAL INFECTIOUS ULCERATIVE KERATITIS (ME Julien,1 JB Shih,1 LV Vallone,1 JS Suchodolski,1 R Pilla,1 and EM Scott,1) Department of Small Animal Clinical Sciences, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University, College Station, Texas, USA;1

Purpose. To compare the bacterial ocular surface microbiota in both eyes of horses with unilateral infectious ulcerative keratitis (IUK) with controls free of ocular disease. Methods. Conjunctival swabs were obtained from both infected eyes and unaffected eyes of 15 client-owned horses with unilateral IUK following informed consent, as well as from one eye of 15 healthy horses. Genomic DNA was extracted from the swabs and sequenced on an Illumina platform using primers that target the V4 region of bacterial 16S rRNA. Data were analyzed using Quantitative Insights Into Molecular Ecology (QIIME2). Results. The ocular surface of infected eyes had significantly decreased species richness compared with unaffected fellow eyes (Chao1 p=0.005, Observed ASVs p=0.012) with no differences in evenness of species (Shannon p=0.107). Bacterial community structure was significantly different between either eye of horses with IUK and controls (unweighted UniFrac: control vs. unaffected, p=0.03; control vs. infected, p=0.003; unaffected vs. infected, p=0.016). Relative abundance of the gram-positive taxonomic class, Bacilli, was significantly decreased in infected eyes compared with controls (p=0.001) and unaffected eyes (p=0.04). Conclusions. The results suggest the occurrence of dysbiosis in infected eyes and reveal alterations in beta diversity of unaffected fellow eyes. Further investigations are necessary to better understand the role of the microbiome in the pathophysiology of ocular surface disease. Supported by Texas A&M University startup funds to EMS. None.
EX VIVO CONFOCAL MICROSCOPY OF CORNEAL TISSUES ASSOCIATED WITH EQUINE ULCERATIVE KERATITIS (MC Jimmerson 1, DJ Wiener 2, MC Johnson 2, EM Scott 1, SP Collins 1, and LV Vallone 1)
Department of Small Animal Clinical Sciences, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University. 1, Department of Veterinary Pathobiology, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University. 2

**Purpose.** To differentiate bacterial keratitis (BK) from fungal keratitis (FK) using ex vivo confocal microscopy (EVCM) as a point-of-care screening tool for fungal hyphae in horses with ulcerative keratitis. **Methods.** Corneal tissues were obtained from horses presenting with ulcerative keratitis via conventional corneal cytology-glass slide preparations and/or keratectomy. Ex vivo confocal microscopy was performed using a modified Heidelberg Retina Tomograph III and Rostock Cornea Module (63x objective and 400um field lens). Fresh, saline-immersed, and formalin-fixed corneal tissues, with or without associated transport substrates (glass slide or suture pack material), were brought directly to the microscope and imaged in 2 planes, normograde and retrograde. Some samples were imaged serially, before and after formalin fixation. Retained EVCM images were screened for fungal hyphae in conjunction with cytology, histopathology, and aerobic and fungal cultures results when available. **Results.** Corneal tissues from 12 eyes of 12 horses underwent EVCM. Fungal keratitis in 5/12 eyes was corroborated via EVCM where cytology/histopathology/fungal culture also revealed fungi. Samples were negative for fungi in 4/12 eyes via EVCM where cytology and/or aerobic culture were positive for bacteria only, supporting a diagnosis of BK. Three of 12 eyes were equivocal for FK via EVCM but showed mixed bacterial and fungal populations through culture. Fungal hyphae are readily identified in formalin fixed tissues demonstrating similar imaging features to fresh or saline-immersed tissues. **Conclusions.** Where in vivo confocal microscopy is either not available or contraindicated (i.e. fragile cornea conditions), EVCM serves as an effective screening tool for fungi. **None.**
DECREASED CORNEAL SUBBASAL NERVE FIBER LENGTH AND DENSITY IN DIABETIC DOGS WITH CATARACTS USING IN VIVO CONFOCAL MICROSCOPY (KH Chan, Z Badanes, and EC Ledbetter, Department of Clinical Sciences, College of Veterinary Medicine, Cornell University, Ithaca NY.)

Purpose. To determine whether there is a significant difference in the fiber length or density of the corneal subbasal nerve plexus (CSNP) in cataractous dogs with versus without diabetes mellitus (DM). 26 domestic dogs of various breeds with cataracts presented for phacoemulsification, 13 with DM and 13 without DM. Methods. The inclusion criteria for the study were dogs with bilateral cataracts and no clinical evidence of corneal disease. Diabetic dogs had documented hyperglycemia and were being treated with insulin. Non-diabetic dogs had no evidence of DM on examination and bloodwork. Complete ophthalmic examination, corneal esthesiometry, and in vivo confocal microscopy of the CSNP was performed. The CSNP was analyzed using a semi-automated program. Statistical analysis was performed using linear mixed models. A p-value ≤ 0.05 was considered significant. Results. The mean (± SD) CSNP fiber length was significantly decreased in diabetic (3.8 ± 3.0 mm/mm²) versus non-diabetic (6.7 ± 1.9 mm/mm²) dogs. Likewise, the mean (± SD) fiber density was significantly decreased in diabetic (8.3 ± 3.1 fibers/mm²) versus non-diabetic (15.5 ± 4.9 fibers/mm²) dogs. The corneal touch threshold was significantly decreased in diabetic (2.1 ± 0.8 cm) versus non-diabetic (2.8 ± 0.4 cm) dogs. Conclusions. Morphological and functional abnormalities of the CSNP were present in dogs with DM, including decreased fiber length, fiber density, and corneal sensitivity. These findings are consistent with diabetic neuropathy and could contribute to clinically significant corneal complications after cataract surgery. None.
EXTRACELLULAR MATRIX-BASED BIOADHESIVES WITH SCAR-FREE CORNEAL TISSUE RECONSTRUCTION: IN VIVO RABBIT EXPERIMENTS (JH Jang 1, H Kim 2, W Han 3, JY KIM 1,4, J Jang 2,5, DW Cho 2) Department of Veterinary Ophthalmology, College of Veterinary Medicine, Konkuk University, Seoul, Korea. 1 Department of Mechanical Engineering, Pohang University of Science and Technology, Pohang, Kyungbuk, Korea. 2 Division of Integrative Bioscience and Biotechnology, Pohang University of Science and Technology, Pohang, Kyungbuk, Korea. 3 KU Center for Animal Blood Medical Science, Konkuk University, Seoul, Korea. 4 Department of Convergence IT Engineering, Pohang University of Science and Technology, Pohang, Kyungbuk, Korea. 5

**Purpose.** To introduce gelatinized cornea-derived extracellular matrix (GelCodE) based new bioadhesive, mixed with photocrosslinker, activated by visible light system. **Methods.** GelCodE is a gelatinized hydrogel made up of porcine cornea-derived decellularized extracellular matrix. Eighteen New Zealand White rabbits (female, 12 weeks, 2.5-3kg) were used. Each rabbit received a manual lamellar keratectomy in one randomly selected eye to create a circular partial trephination of approximately 50% depth in the central cornea. Rabbits were divided into 4 groups: normal, wound-only, Tisseel (Baxter, USA), and GelcodE. GelCodE was applied into the wound bed and the gel was irradiated with visible blue light for 3 minutes to photocrosslink the material in situ. Slit lamp biomicroscopy and anterior segment optical coherence tomography (AS-OCT) were used to evaluate eyes on days 0, 3, 7, 14, 28. At week 2 and 4, 9 rabbits each (total 18) were euthanized. The eyes were enucleated for histopathological analysis and immunofluorescence analysis. **Results.** GelCodE groups showed significantly low value of size and severity of corneal opacity compared to wound-only and Tisseel groups (P<0.001). Histopathological analysis showed that GelCodE groups have intact and continuous epithelial basement membrane and well-organized formation of anterior stroma collagen fibrils compared to control and Tisseel groups. Immunofluorescence analysis showed Tisseel and wound-only groups possess prominent α-SMA positive cells in anterior stroma layer, but not in the GelCodE groups. **Conclusions.** Overall, GelCodE is a new bioadhesive that shows biocompatibility and biointegration with cornea, ultimately leading to scar-free corneal wound healing, and also could be applied in a simple method without the need for sutures.
OPHTHALMIC ABNORMALITIES ASSOCIATED WITH AUSTRALIAN TICK PARALYSIS (HOLOCYCOTOXICITY) IN HOSPITALISED DOMESTIC DOGS AND CATS. (BD Reynolds, 1 JS Smith, 1 KA Caruso, 1 CJ Whittaker, 1 MJ Annear, 1 N Hamzianpour, 1 WM Irving, 1 PM McCarthy, 1, Nagel HG, 2, E Perry, 3, A Dion, 3, Li J, 3 and Hall E 4.) Eye Clinic for Animals, Sydney, Australia;1 Terry Hills Animal Hospital, Sydney, Australia;2 Northside Emergency Veterinary Service, Sydney, Australia;3 University of Sydney, Sydney, Australia.4

**Purpose.** To investigate ophthalmic pathology in dogs and cats hospitalised with holocyclotoxicity from the Australian paralysis tick (Ixodes holocyclus). **Methods.** Dogs and cats hospitalized with holocyclotoxicity were prospectively recruited and examined by an ABVO resident (BDR). The ophthalmic findings were correlated with the degrees of paralysis, and various other factors using linear modelling and logistic regression models. **Results.** 47 dogs (94 eyes) and 28 cats (56 eyes) were recruited. 17/47 (36.2%) dogs and 21/94 (22.3%) dog eyes had corneal ulcers that were typically superficial and in a horizontal orientation. In dogs, increased gait paralysis correlated with decreased STT-1 values (p = 0.017) and increased likelihood of corneal ulceration (p = 0.017). In dogs, increased body weight correlated with increased STT-1 values (p<0.001) and decreased prevalence of corneal ulceration (p = 0.044). 12/28 (42.9%) cats and 18/56 (32.1%) cat eyes had corneal ulcers that were typically superficial and punctate. In cats, greater body weight correlated with decreased prevalence of corneal ulcers (p = 0.017) and increased respiratory paralysis correlated with absence of a complete blink response (p = 0.041). Advanced age is associated with the absence of corneal ulceration (p=0.017). **Conclusions.** Dogs and cats hospitalized from holocyclotoxicity have a high prevalence of superficial corneal ulceration and the degree of paralysis is associated with increased prevalence of ophthalmic pathology. In dogs and cats, lower body weight correlated with increased prevalence of corneal pathology. **None.**
EVALUATION OF THERAPEUTIC EFFECTS OF AUTOLOGOUS PLATELET CONCENTRATES ON THE DEEP CORNEAL ULCER (NY Kang,1 SY Choi,1 YS Goh,1 HM Kim,1 KM Park,1) Laboratory of Veterinary Ophthalmology, School of Veterinary Medicine, Chungbuk National University Cheong-ju, Korea.1

Purpose. To evaluate the initial healing effects of autologous platelet concentrates such as platelet-rich plasma gel (PRP) and platelet-rich fibrin (PRF) compared with conventional porcine small intestinal submucosal membrane (SIS) graft on deep corneal ulcers. Methods. Thirty-three eyes from male New Zealand white rabbits underwent lamellar keratectomy (LK) to induce deep corneal ulcers. Rabbits were divided randomly into four groups. Group 1 (n=8): LK, Group 2 (n=8): LK+SIS graft, Group 3 (n=9): LK+SIS graft+PRP gel, Group 4 (n=8): LK+SIS graft+PRF. All eyes were evaluated for vascularization, corneal thickness, and presence of myofibroblasts using slit lamp-biomicroscopy, ocular coherence tomography, and α-smooth muscle actin (SMA) staining, respectively. Results. Vascularization scores were highest in groups 2,3, and 4. In addition, corneal vessel retraction started 3 weeks after LK in groups 3 and 4. Groups 1 and 2 had no vessel retraction. Histopathological results showed that α-SMA was diffusely distributed in group 2 and in particular group 3. However, in group 4, α-SMA was nearly not observed and high numbers of inflammatory cells were present. Group 3 showed the fastest clinical recovery in terms of corneal clarity at 4 weeks after surgery. In contrast, severe complications such as perforation and inflammation occurred in group 4 after surgery. Conclusion. PRP gel has beneficial effects on initial healing of deep corneal ulcers, especially in promoting myofibroblast differentiation. Use of PRF results in adverse effects. SIS graft with PRP is recommended for faster healing of deep corneal ulcers. Supported by the RIS through the NRF of Korea. None.
KEYNOTE PRESENTATION

Saturday, October 29, 2022
11:00 am

Gustavo Aguirre
VMD, PhD, PhD(hc), DACVO

“From Dogs to DNA; from the Cage to the Bedside”
GENERAL SCIENTIFIC SESSION SATURDAY

GENERAL SCIENTIFIC SESSION
RISK FACTORS FOR EQUINE RECURRENT UVEITIS IN THE KNABSTRUPPER BREED. (LS Sandmeyer, 1 NB Kingsley, 2,3 S Parker, 4 A Dwyer, 5, Heden S, 6 C Reilly, 7 A Edmans 8, S Archer, 9 RR Bellone, 2,3. Department of Small Animal Clinical Sciences, University of Saskatchewan; 1 Veterinary Genetics Laboratory, University of California-Davis; 2 Department of Population Health and Reproduction, University of California-Davis; 3 Department of Large Animal Clinical Sciences, University of Saskatchewan; 4 Genesee Valley Equine Clinic, LLC, Scottsville, New York; 5 Distriktsveterinärerna, Falköping, Sweden; 6 Heste-Dyrlægen, Taastrup, Denmark; 7 Department of Clinical Sciences, Uppsala, Sweden; 8 Independent researcher, Sayward, British Columbia; 9.

**Purpose.** To evaluate clinical manifestations, frequency, and potential risk factors for ERU in Knabstrupper horses. **Methods.** Ocular examinations were performed on 116 horses. Ocular anomalies were recorded; horses were classified as suspect, ERU affected, or unaffected. DNA was extracted (blood or hair follicle samples). Microagglutination testing (MAT) of serum assessed exposure to Leptospira spp. Clinical signs, age, sex, base colour, coat pattern, LP and PATN1 genotypes, percent white at birth, progressive roaning, and exposure to Leptospira were assessed as risk factors using multivariable exact logistic regression. A pedigree analysis was performed (n = 20 cases and 21 controls), and coefficients of coancestry (CC) and inbreeding were calculated. **Results.** ERU in the Knabstrupper is insidious in nature. Prevalence in this population was 20.7%. Like findings for Appaloosas, LP homozygotes had higher odds of uveitis compared with true solid (N/N) horses (LP/LP OR = 7.64, 95% CI 0.8 - +INF, P = 0.04). Age was also a significant predictor of odds of ERU. After accounting for LP, the 16–20-year age group had higher odds of ERU compared with the youngest group (OR = 13.36, 95% CI 1.4 – 213.4, P = 0.009). The distributions of average CC were significantly different between affected and controls (P = 0.01). **Conclusions.** ERU manifests in the Knabstrupper like the Appaloosa with age and LP homozygosity being confirmed risk factors. Our data support genotyping for LP to assess risk of ERU in Knabstruppers. Additional studies are necessary to develop more robust risk models across LP breeds for earlier detection and improved clinical management. Funding: research supported by funding from the Knabstrupperforeningen for Danmark, the UC Davis Center for Equine Health (18-17), and the Morris Animal Foundation (D16EQ-028). COI: NB Kingsley and RR Bellone are affiliated with the UC Davis Veterinary Genetics Laboratory, a service laboratory offering diagnostic genetic tests for horses and other animal species.
GENERAL SCIENTIFIC SESSION SATURDAY

ACCURACY OF DATA IN ABSTRACTS OF VETERINARY OPHTHALMOLOGY RESEARCH ARTICLES PUBLISHED IN PEER-REVIEWED JOURNALS (K. Handel, R. Ofri, L. Sebbag) Koret School of Veterinary Medicine, The Hebrew University of Jerusalem

**Purpose.** To assess the accuracy of abstracts in published ophthalmology original articles in 7 veterinary journals.  

**Methods.** Abstracts and contents of 204 original research articles in veterinary ophthalmology published in seven peer-reviewed journals between 2016-2020 were reviewed. Abstracts were considered deficient if they contained data that were either missing from or inconsistent with corresponding data in the article’s body, a deficiency independently verified by all three investigators. Each abstract was graded between 0 (inaccurate) to 3 (accurate). Statistical tests assessed the potential impact of the following outcomes on abstract scores: journal, 1- and 5-year impact factor, year of publication, number of words in abstract, study type (prospective/retrospective), as well as corresponding author’s institution (academia/private practice), English level (native/non-native) and number of publications.  

**Results.** Most abstracts were accurate, with a total of 1%, 4%, 9% and 86% receiving a score of 0, 1, 2 and 3, respectively. The proportion of articles with a perfect score (=3) was greater in native (89%) vs. non-native English speakers (83%), prospective (88%) vs. retrospective (81%) studies, and academia (88%) vs. private practice (78%), although differences were not statistically significant (P≥0.130). A significant but very weak (r = -0.14 to -0.19; P≤0.034) negative correlation was found between abstract score and number of words, as well as 1-year and 5-year impact factors. No significant correlation (P=0.899) was found between abstract score and corresponding author’s number of publications.  

**Conclusions.** Data in abstracts that are inconsistent or missing from the article’s body is not common in veterinary ophthalmology publications. None.
CANINE BEHAVIORAL VISION TESTING IN THE ULTRAVIOLET SPECTRUM (NE Himebaugh,1 AM Antezana,1 BC Gilger,1 B Ekesten,2 and A Oh,1) College of Veterinary Medicine, North Carolina State University, Raleigh, NC, United States; 1 Swedish University of Agricultural Sciences, Uppsala, Uppsala, Sweden. 2

**Purpose.** To assess ultraviolet (UV) vision in dogs using a four-choice tunnel vision testing device. **Methods.** Thirteen normal laboratory dogs were enrolled in the study. Dogs were dark adapted prior to testing. Wavelengths tested were 455 nm (positive control), 365 nm, collimated 365 nm, 340 nm, and 275 nm. Complete darkness served as the negative control. Dogs underwent 8 trial runs per wavelength and the negative control. The order of the wavelength trials and open tunnels were randomized. Time to exit (seconds) and correct-first choice (percentage correct of 8 trial runs) were recorded. Data were analyzed using one- and two-way repeated measures ANOVAs with significance set at p<0.05. **Results.** Compared with the negative control and 275 nm, dogs exited the vision testing device (time to exit) significantly faster at 340 nm, 365 nm, collimated 365 nm, and 455 nm wavelengths. Compared with 275 nm, dogs were significantly more likely to choose the open tunnel first (correct-first choice) at 365 nm, collimated 365 nm, and 455 nm. There was no significant difference in time to exit or correct-first choice when comparing the negative control to 275 nm, and when comparing the wavelengths 340 nm, 365 nm, collimated 365 nm, and 455 nm. There was no significant difference in time to exit or correct-first choice when assessing age and presence of nuclear sclerosis. **Conclusions.** Dogs have visual capabilities in the UV spectrum. Supported by grant ARO 2021-2420. **None.**
FEAR-FREE OPHTHALMIC EXAMINATION PROTOCOL FOR THE VETERINARY OPHTHALMOLOGIST (AFeldman,1 MDArmour,2 MK Ropski,3 AL Labelle, 4) Friendship Hospital for Animals;1 Armour Veterinary Ophthalmology;2 Animal Behavior Wellness Center;3 Bright Light Veterinary Eye Care.4

Purpose. To describe a fear-free approach to the ophthalmic examination of the dog and cat to improve patient comfort and facilitate a complete examination. Methods. The examination environment, cooperative care techniques, and owner involvement are discussed with guidance from a behavior specialist. Fear-free protocols and strategies are adapted to the peculiarities of the ophthalmic examination. The reported effects of sedating and anxiolytic medications on ocular parameters are reviewed in conjunction with recommended protocols. Results. Exam rooms should have dimmer switches to facilitate gradation to lower lighting and furniture arrangement to minimize hiding or seclusion. The ophthalmic examination should be performed with minimal restraint when possible, and optimize patient to owner eye contact when considered positive feedback. Minimal movement of cats into and out of carriers is recommended. Fear-free head restraint, resting of chin, and target training in position are preferable for facilitation of examination, along with “look” cues. Use considerate approach techniques to encourage pets to approach vet and equipment initially. Proper timing of treats or toys before, during, or after the ophthalmic examination can facilitate examination. Muzzle use and towel wrapping during the ophthalmic examination and pre-visit gabapentin and trazodone protocols can affect speed and completion of the ophthalmic examination. Conclusions. Many aspects of the ophthalmic examination can be adapted to decrease patient fear, anxiety, and stress, facilitate efficient and thorough examination of anxious or fearful patients, and improve patient and client compliance and retention. None.
Purpose. To describe a smartphone-based teleophthalmology model of training veterinary students, associated student feedback, and qualitative imaging trends over a 1-year period. Methods. Universal smartphone macro lens (EasyMacro®) adapters were distributed to veterinary students undertaking the clinical ophthalmology rotation within a veterinary teaching hospital from May 2021-2022. Following a 50-minute video tutorial, students were instructed to obtain “representative” ocular images of assigned clinical patients using personal smartphone devices. Student examination and imaging confidence were assessed via a post-rotation Likert scale survey where 1 = strongly disagree, 5 = strongly agree. Students’ smartphone-specific technique adjustments were investigated with a targeted post-rotation interview. Images were then reviewed to determine qualitative trends in imaging outcomes relative to device-specific techniques. Results. Post-rotation median ophthalmic examination and smartphone imaging confidence scores were higher than pre-rotation values (4/5-post vs. 2/5-pre for both scores) for the 77/134 (57%) survey respondents. Targeted interviews of 134 students guided technique modifications for 35 distinct smartphone models, informing interpretation of 3,558 student-derived images. Subjectively, poor quality images were not restricted to specific smartphone models and were most often associated with inadequate illumination of the subject, certain protective phone cases, and/or environmental light contamination. Subjectively, high quality images were obtained with all 35 smartphone models assessed, particularly where students adhered to video tutorial technique recommendations. Conclusions. The described training model was associated with increased post-rotation ophthalmic examination and imaging confidence among students. Described imaging techniques are subjectively associated with high quality ocular images and are universal to all smartphones assessed. None.
DEVELOPMENT OF COMPUTERIZED ANALYTICAL ROUTINES FOR GUIDING MEDICAL TREATMENT OF OPHTHALMIC DISEASES IN DOGS WITH PANCREATITIS (S.D. Grozdanic1,2, I. Lakic2, S. Luzetskii2, S. Djukic2, M. Stojanovic2, B. Neteresbskii2, V. Kazan2, T. Lacic1,2, M.D. Grozdanic3, K.Lenac4, M. Ivasic-Kos5) 1Animal Eye Consultants of Iowa, North Liberty, IA; 2Oculus Veterinary Hospital, Belgrade, Serbia; 3Vision Biomedical Solutions, Apatin, Serbia; University of Rijeka – 4Faculty of Engineering and 5Faculty of Informatics and Digital Technologies, Rijeka, Croatia.

**Purpose.** To describe development of prognostic diagnostic tools for ophthalmic diseases by utilizing the Pro4Eyes software platform. **Methods.** Medical records of dogs with pancreatitis (between August 2015 and January 2022) were reviewed and used for modeling analysis of risk factors for possible ophthalmic diseases. Pro4Eyes software platform was utilized for the final data modeling to identify ocular diseases with the highest risk factors in dogs with pancreatitis. Total data from 504 dogs with ophthalmic diseases and concurrent pancreatitis were analyzed. **Results.** Computational modeling of data from dogs with pancreatitis revealed the highest risk for the concurrent presence of xeromycteria (50%) > corneal stromal abscess (33.3%) > SARDS (28.9%) > corneal lipid deposits (28.6%) > absolute KCS (28%) > KCS (27%) > uveitis (26%) > glaucoma (19.8%). Modelling revealed the highest risk for the concurrent presence of kidney diseases (47.9%) > diabetes mellitus (45%) > hypothyroidism (34.6%) > systemic hypertension (32.6%) > suspected mitral valve disease (25.6%). **Conclusions.** Data mining with development of computational analytical routines may provide an essential tool for better understanding of complex disease interactions and more precise guidance of medical care. Grants: **None.** Commercial Interest: S.D. Grozdanic, M.D. Grozdanic - Vision Biomedical Solutions, Apatin, Serbia
EFFECTS OF TOPICAL DEXMEDETOMIDINE ON INTRAOCULAR PRESSURE AND CARDIOVASCULAR PARAMETERS IN DOGS ANESTHETIZED WITH ISOFLUORANE (FLC Brito, 1 MG Sousa, 2 R Carareto, 2 AB De Nardi, 3 N Nunes, 3 and JL Laus, 3 F Montiani-Ferreira, 2) Fabio Brito Oftalmologia Veterinária and Faculdade Qualittas; 1 Universidade Federal do Parana; 2 Universidade Estadual Paulista – UNESP Jaboticabal. 3

**Purpose.** To determine the intraocular pressure (IOP) and cardiac changes in dogs anesthetized with isoflurane and treated by topical dexmedetomidine. **Methods.** sixteen healthy dogs of various breeds and ages, genders as and with mean body weight of 11 kg were used. Dogs were anesthetized with isoflurane (1.0 MAC) and maintained under anesthesia for 30 minutes to serve as a control (G1). After this period, one drop of dexmedetomidine (0.025mg) was administered topically into both eyes (G2). In both groups the IOP was measured by using applanation tonometry. Mean arterial pressure (MAP) and heart rate (HR) were recorded before general anesthesia was induced (MO), after a stable plane of anesthesia was achieved (M1), and every 10 minutes (M1, M2, M3, M4) for G1. Dexmedetomidine was then instilled and dogs were monitored in the same parameters and periods (G2). Data were analyzed using ANOVA, Fisher’s Test and Pearson correlation. **Results.** Signs of ocular irritation were not evident after instilling dexmedetomidine. A significant decrease in mean IOP mean was observed in group 2 dogs at all measurement times (p<0.05). A significant decrease in mean intraocular pressure was observed in group 2 dogs at all measurement times. A significant correlation was observed between heart rate and IOP (r=0.25229, p=0.004), but there was no correlation with mean systemic arterial pressure (r=0.11092, p=0.212261). **Conclusions.** Dexmedetomidine showed evidence of the potential to lower intraocular pressure and be used in the management of ocular hypertension. However, heart rate should be monitored. **None.**
Purpose. Assess the impact of serum/plasma on antimicrobial susceptibility to topical antibiotics. Methods. Serum and plasma were harvested from 10 healthy dogs and 10 healthy horses, obtaining fresh and frozen (1 month at -20°C) aliquots for the experiment. Albumin levels were quantified using species-specific ELISA kits. Thirty bacteria isolated from dogs with infectious keratitis were used. For each isolate, commercial plates were used to assess the minimal inhibitory concentration (MIC) of 17 different antibiotics in the absence (control) or presence of 8 test groups: canine and equine serum or plasma (fresh and frozen). Results. Mean albumin levels in canine and equine samples varied from 13.8-14.6 mg/ml and 25.9-26.5 mg/ml, respectively. No bacteriological differences were noted between fresh and frozen samples in either species. Serum/plasma of horses (much lesser extent dogs) had direct antimicrobial effect in selected bacterial isolates (up to 97.5% with frozen serum for Staphylococcus pseudintermedius). When compared with control, canine serum/plasma increased MICs of selected antibiotics by 1.5-10.8 fold, while equine serum/plasma increased MICs (1.5-5.4 fold) or decreased MICs (0.25-0.67 fold) depending on the antibiotic and bacterial isolate. Average MIC changes were significantly lower in equine vs. canine serum or plasma (1.8 vs. 2.9-fold, P=0.001). Conclusions. Serum and plasma can reduce antibiotic efficacy (antibiotic-protein binding from high levels of albumin); therefore, care should be taken to apply serum/plasma last and space administration from topical antibiotics. Equine serum/plasma may be preferred to canine blood products given greater antimicrobial effects and lesser impact on antimicrobial susceptibility to topical antibiotics. None.
Purpose. To determine if topical serum use impacts clinical outcomes of infected corneal ulcers in dogs. Methods. Dogs undergoing medical and surgical therapy for infected corneal ulcers managed with and without topical serum were identified retrospectively in the same geographic region of the United States. Healing times, visual outcomes and enucleation were recorded for medically managed ulcers. Visual outcomes and enucleation were recorded for surgically managed ulcers. In dogs undergoing surgery, post-operative management was performed with or without serum. The number and frequency of topical medications were recorded for all groups. Statistical analysis using SAS 9.4 (Cary, NC) was performed for all comparisons, with a significance level of p=0.05. Results. 252 eyes (237 dogs) were included in the study. Of these, 203 eyes underwent medical therapy (150 without serum/53 with serum) and 49 eyes were treated surgically at presentation (35 without serum/14 with serum post-operatively). In the medical group, the use of serum had no impact on healing times (p=0.380), visual outcomes (p=0.751) or enucleation (p=0.433). In eyes treated medically, enucleation was necessary in 3% (5/150) in the non-serum group and 6% (3/53) in the serum group. In the surgery group, visual outcomes (p=0.488) and enucleation (no eyes enucleated in the surgery group) were not impacted by serum use. Healing times were not impacted by frequency of topical medications (p=0.092) or by number of topical medications (p=0.346). Conclusions. Topical serum does not impact healing times, visual outcomes or enucleation in infected corneal ulcers treated medically or surgically in dogs. None.
Precorneal Retention Time of Ocular Lubricants in Dogs (L Bedos, 1 RA Allbaugh, 1 MM Roy, 1 MA Kubai, 1 L Sebbag 1, 2) Iowa State University College of Veterinary Medicine 1; Koret School of Veterinary Medicine, The Hebrew University of Jerusalem 2.

Purpose: To determine the precorneal retention time of five different artificial tears commonly used in dogs. Methods: Six healthy Beagle dogs (n=12 eyes) were enrolled to study five artificial tears: Artificial Tears Solution®, I-Drop® Vet Plus, Optixcare® Eye Lube Plus, Systane® Ultra lubricant eye drops and Artificial Tears Ointment. Each lubricant was mixed with 10% sodium fluorescein to achieve 1% fluorescein formulations. Following topical administration (35 mg) in each eye, tear fluid was collected with capillary tubes at selected times (0, 1, 5, 10, 20, 30, 40, 50, 60, 90, 120, 180 min) and fluorescein concentrations were measured with a computerized scanning ocular fluorophotometer. Results: Tear fluorescence was significantly greater with Artificial Tears Ointment® compared with other lubricants from 1 to 20 min post-administration. Median (range) precorneal retention times were significantly different among the 5 lubricants, ranging from 40 minutes (20-90 min) for Artificial Tears Ointment®, 35 min (20-90 min) for Systane® Ultra, 30 min (10-60 min) for I-Drop® Vet Plus, 25 min (10-60 min) for Optixcare® Eye Lube Plus, and 10 min (10-20 min) for Artificial Tears Solution®. Precorneal retention time was significantly lower for Artificial Tears Solution® compared with the other 4 formulations. Conclusion: In dogs, ophthalmic ointment administration provided higher tear concentrations (first 20 min) and longer precorneal retention time compared with other topical lubricants. Precorneal retention time was also prolonged with formulations containing polyethylene glycol/propylene glycol (Systane® Ultra) and 0.25% hyaluronate (I-Drop® Vet Plus and Optixcare®) when compared with the regular artificial tears solution (1.4% polyvinyl alcohol). None.
FLUOROMETRIC EVALUATION OF CROSS-LINKED VS LINEAR HYALURONIC ACID EYE LUBRICANTS

(F Montiani-Ferreira, 2 SK Atzet, 1 AD Fankhauser, 1 EK Behan, 1 DJ Haeussler, 3) SentrX Animal Care; 1 Veterinary Medicine Department, Federal University of Paraná; 2 Animal Eye Institute; 3

**Purpose.** This study evaluated the residence time of linear versus cross-linked hyaluronic acid (XHA) on the canine ocular surface, using covalently labeled fluorescent compounds. This allows for evaluation of the actual presence of XHA, as opposed to the bulk medium (water). **Methods.** Linear HA and XHA were covalently modified using AlexaFluor-488 reactive moieties. Physical properties of the solutions were also evaluated for concentrations, viscosity and shear thinning profiles. Eye drops were applied to eyes of 18 dogs that were previously assessed and determined to have normal baseline ocular health (STT, slit lamp biomicroscopy, tonometry and fundoscopy). Using a blue light filter (450–490 nm), digital images were obtained, from instillation to 180 minutes. Images were analyzed assessing the percent of the total ocular area covered with green fluorescence at various time points. **Results.** All HA samples were successfully modified with approximately 5 mol% Alexa-Fluor. Viscosity varied from 0.4 to 32 Pa-s and all samples exhibited shear thinning. Linear HA quickly migrated to the tear meniscus and could be quantified up to 36 min. XHA exhibited a dual phase behavior: A wide surface coverage first, lasting up to 50 min, then accumulating in tear film meniscus and medial canthus in the second phase, remaining in contact with the ocular surface up to 180 min. **Conclusions.** XHA exhibited a broader ocular surface coverage and a significantly increased ocular surface contact time compared with linear HA. Not only could this indicate extended lubrication but, potentially, could be used as a topical sustained-release drug application method. Supported by SentrX Animal Care. E: SKA, ADF, EKB. C: FMF, DH

Saturday Presenting 3:45pm
LOCAL ANESTHETIC DELIVERY VIA AN INDWELLING RETROBULBAR CATHETER IN HORSES. 
(LM Moody, 1 BC Foote, 1 DVH Hendrix, 1 DA Ward) College of Veterinary Medicine, University of Tennessee 

**Purpose.** To evaluate the effects of local anesthetic delivery via an indwelling retrobulbar catheter on corneal sensitivity, pupillometry, and ocular motility in normal horses. **Methods.** One eye was randomly selected from seven healthy horses. A 20-gauge long-line catheter was placed in the retrobulbar space and injected with either 10mL of 0.5% bupivacaine HCl or 0.9% sodium chloride. Cochet-Bonnet esthesiometry (CBE), pupil photogrammetry, pupillary light reflexes (PLRs), and oculocephalic reflexes were evaluated prior to the injection (t=0) and at t=15min, 1, 3, 6, 9, and 12 hours after injection. Following a 7-13 day washout period, this procedure was repeated using the injection solution that was not used previously. Corneal touch thresholds (CTTs) derived from CBE and pupillary areas (PA; as measured from photographs) were compared across time for each group. PLRs and oculocephalic reflexes were compared between groups at each evaluation time point. **Results.** Injection of 0.9% sodium chloride did not significantly affect CBE, PA, PLRs, or oculocephalic reflex at any time point. Injection of 0.5% bupivacaine HCl significantly reduced CTT (P<0.001) for 6 hours and increased PA (P=0.037) for 3 hours. PLRs and oculocephalic reflexes were maintained following saline injection at all time points. Following bupivacaine injection, PLRs were either reduced or absent for 9 hours and oculocephalic reflexes were reduced for 3 hours. Mild adverse effects included chemosis, blepharoedema, and transiently reduced palpebral reflex. **Conclusions.** Injection of bupivacaine via an indwelling retrobulbar catheter in horses reduces corneal sensitivity and may be useful in treating horses with corneal disease. **None.**
DISTRIBUTION OF LIPOSOME-ENCAPSULATED SIROLIMUS IN OCULAR TISSUES AND PLASMA AFTER SUBCONJUNCTIVAL INJECTION IN RABBITS (A Botello-Bárcenas1, GA Garcia-Sánchez 1, D Brooks 2, R Garcia-Santisteban 1, MA Linares-Alba 3, G Gum 4) Hospital Veterinario Oftalvet, Mexico City, Mexico; 1 University of Florida, Gainsville FL USA; 2 Laboratorio Santgar, Mexico City, Mexico; 3 Absorption Systems California, San Diego CA USA; 4

**Purpose.** To determine the pharmacokinetics of a liposomal sirolimus formulation (LS) in ocular tissues (aqueous humor, vitreous humor, retina, combined retina/choroid/retinal pigment epithelium, sclera, and iris/ciliary body) and plasma following a single subconjunctival injection in Dutch Belted rabbits (DBR). **Methods.** Thirty male DBR were subconjunctivally injected in both eyes with 0.1 ml of LS of 1000 µg/ml. Ocular tissues and whole blood samples were obtained at selected times post-injection. Sirolimus concentrations were measured using liquid chromatography/tandem mass spectrometry. **Results.** All examined ocular tissues had quantifiable amounts of LS at all times. Vitreous peak of sirolimus levels occurred at 2 hours, and the sclera adjacent to the injection peaked at both 2 and 96 hours. LS levels in remaining ocular tissues peaked at 6 hours and decreased with time, persisting at presumed therapeutic levels at day 22. No LS detected in serum or aqueous humor at any time. **Conclusions.** Subconjunctival injection of LS can quickly diffuse into posterior ocular tissues, peak levels occurred at 6 hours and persisted in all posterior tissues after 22 days. Subconjunctival injection of LS resulted in no quantifiable amounts of sirolimus at any time point in plasma and aqueous humor. Supported by Laboratorio Santgar, Mexico City 03840. I.
COMPARISON OF THE EFFECT OF SEDATION AND GENERAL ANESTHESIA ON PATTERN AND FLASH VISUAL EVOKED POTENTIALS IN NORMAL DOGS (S Chang,1 D Zwueste,1 B Ambros,1 J Norton,2 and ML Leis,1) Department of Small Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan;1 Department of Surgery, College of Medicine, University of Saskatchewan;2

**Purpose.** Visual evoked potentials (VEPs) can provide objective functional assessment of the post-retinal visual pathway. The purpose of this study was to compare the effects of sedation and anesthesia on pattern VEP and flash VEP waveforms in clinically normal dogs. **Methods.** All dogs (n=13) included in the study had normal ophthalmic and neurologic examinations, including electroretinography and retinoscopy. In this randomized crossover study, dogs either underwent sedation (butorphanol and dexmedetomidine) or anesthesia (propofol and sevoflurane) and VEPs were obtained from 3 subcutaneous recording electrodes placed on the head (O1, Oz, O2). Following a 2-week washout period each dog received the opposite treatment. **Results.** Pattern VEPs could only reliably be recorded under sedation and a maximum of 3 peaks were identified (N75, P100, N135). Flash VEPs could be recorded under both sedation and anesthesia and a maximum of 5 peaks were identified (N1, P1, N2, P2, N3). The latency of the N1 peak (P=0.047) and the baseline-N1 amplitude (P=0.002) were significantly longer under general anesthesia. **Conclusions.** Flash VEPs could be recorded under commonly used clinical sedation (dexmedetomidine and butorphanol) and general anesthesia (propofol and sevoflurane) protocols in dogs, although peaks were more consistently identified under sedation and both amplitude and latency were increased by anesthesia. Pattern VEPs could only be consistently recorded under sedation. Visual evoked potentials should be preferentially recorded in dogs sedated with dexmedetomidine and butorphanol, regardless of the stimulus. Supported by the Western College of Veterinary Medicine Companion Animal Health Fund grant. **None.**
EFFECTS OF TOPICAL ROPIVACAINE HYDROCHLORIDE 0.5% AND LIDOCAINE HYDROCHLORIDE 2% APPLIED TO THE HEALTHY EQUINE CORNEA (MP Minaldi, LE Fidler, CM Betbeze, RL Fontenot, RW Wills, MR Telle) Department of Clinical Sciences, Mississippi State University; College of Veterinary Medicine, Mississippi State University; Department of Pathobiology and Population Medicine, Mississippi State University; Department of Comparative Biomedical Sciences, Mississippi State University.

**Purpose.** To evaluate corneal sensitivity and side effects following application of ropivacaine hydrochloride 0.5% (Somerset Therapeutics, LLC Hollywood, FL 33024) and lidocaine hydrochloride 2% (Hospira, Lake Forest, IL 60045) on the healthy equine cornea. **Methods.** A randomized, masked, crossover study was utilized. Baseline semiquantitative preclinical ocular toxicology (SPOT) scores and corneal touch thresholds (CTT) using a Cochet-Bonnet esthesiometer were recorded and measured, respectively, for eight healthy adult horses before medication application. Advanced Eye Relief™ (Bausch Health US, LLC Bridgewater, NJ 08807) was used as a negative control. 0.2mL of ropivacaine or lidocaine was splashed on a randomly selected cornea and the contralateral eye received eyewash. CTT was measured in both eyes at 1, 5, 15, 25, 35, 45, 55, 65, and 75 minutes post-application. Post-application SPOT scores were recorded. Results of linear mixed model statistical analyses are reported (mean +/- standard error). **Results.** Mean eyewash CTT (3.41 cm +/- 0.464) was significantly different between ropivacaine-treated (1.44cm +/- 0.562) (p=0.0078) and lidocaine-treated eyes (1.75 cm +/- 0.562) (p=0.0235); CTT was not significantly different between drug groups (p=0.8757). Time to maximum anesthesia was not significantly different between ropivacaine (13.25 min +/- 3.353) and lidocaine (16.25 min +/- 3.353) (p=0.4035). No significant side effects were appreciated as confirmed by SPOTS. **Conclusions.** Ropivacaine and lidocaine effectively lowered corneal sensitivity with no clinically significant side effects and appear safe for clinical use. Their effects on corneal sensitivity were not significantly different as measured in this study. Supported by VAF2022-3 and ORGS House Officer Fund. None.
EFFECT OF 0.024% LATANOPROSTENE BUNOD ON INTRAOCULAR PRESSURE AND PUPIL DIAMETER IN NORMAL CATS AND CATS WITH PRIMARY CONGENITAL GLAUCOMA (VY Yang,1 JS Eaton,1 JA Kiland,2 KE Koch,2 K Oikawa,1 GJ McLellan 1 2) Surgical Sciences, School of Veterinary Medicine, University of Wisconsin-Madison 1; Ophthalmology and Visual Sciences, School of Medicine and Public Health, University of Wisconsin-Madison 2

Purpose. To compare the effects of 0.024% latanoprostene bunod (LBN; Vyzulta®, Bausch+Lomb, Bridgewater, NJ) to 0.005% latanoprost (LAT; Sandoz, Princeton, NJ) in normal and glaucomatous cats. Methods. Five normal and 5 glaucomatous cats of both sexes were included in this prospective, masked, randomized, controlled, crossover study. All cats received LAT or LBN in one eye at 8AM and 8PM for 10d. Following an 11d washout, cats received the other drug in this eye for 10d. Contralateral eyes served as saline-treated controls. Intraocular pressure (IOP) and pupil diameter (PD) were measured at 8am (prior to treatment), 12pm and 4pm at baseline, and during treatment and recovery phases. Ophthalmic examinations were performed once during each study phase. Cumulative IOP was calculated for each eye over each treatment phase. For each group, IOP and PD data were compared between treated and control eyes and timepoints by repeated measures ANOVA with Tukey, Dunnet or Holm Sidak post-tests. P values <0.05 were considered significant. Results. IOP and cumulative IOP were not consistently or significantly lowered by either LAT or LBN treatment in normal or glaucomatous eyes. PD was significantly decreased at the 4h timepoint during the treatment phase with LAT and LBN in normal and glaucomatous cats. No adverse events were observed. Conclusions. Addition of a nitric oxide-donating moiety to latanoprost yielded no significant additive IOP-lowering effect in either normal or glaucomatous cats in this study. Supported by ACVO VAF Resident Grant (VAF2020-5), UW-Madison SVM CAF, NIH P30 EY016665 and Research to Prevent Blindness. None.
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