

Rationale/Need

- Vision is an integral part of the vast majority of the human population's daily life.
- When patients present with vision or ocular complaints, they can be anxious and in severe pain.
- It is important for the physician to be knowledgeable about basic ophthalmological pathology and treatment options to help allay patient fear, treat patient pain, and seek consultation as necessary, sometimes urgently, minimize preventable blindness.
- The East Carolina University Brody School of Medicine has undergone a significant reconfiguration of the medical student year 1 (M1) and 2 (M2) curriculum with an organ system-based alignment of content.
- As part of the curriculum redesign process, a gap in instruction regarding eye pathology was identified.
- This project sought to define the specific topics that should be taught as part of medical student preclinical instruction in eye pathology and incorporate them into the Brody M2 Pathology curriculum.

Methods / Description

- PubMed and Google searches were conducted using key words including ophthalmology education, medical education, and pathology education.
- Eye pathology topics from two standard textbooks were also compiled.
- In addition, the existing M1 and M2 curriculum content was searched for coverage of ophthalmologic topics.
- A survey composed using Google Docs forms was administered to Brody M2 students enrolled in the pathology course; students received a bonus point on their pathology National Board of Medical Examiners pathology subject evaluation score if they completed the survey:
 - Assess satisfaction with the presentation of the materials in the pathology course.
 - Assess for areas for improvement.
 - Assess cumulative presentation of ocular pathology management presented in the pathology, pharmacology, and medicine courses.
 - Determine the perceived success of the overlaps in ophthalmology coverage in pathology, pharmacology, and medicine.

Results

- No peer-reviewed articles were identified which specifically summarize or suggest what eye pathology topics should optimally be taught during medical school.
- Topics covered in two primary pathology textbooks were evaluated (References 1,2).
- A detailed summary of ophthalmic pathology topics is available as a Web reference (Reference 3).
- Topics covered in the curriculum at Duke University School of Medicine were reviewed (Reference 4).
- A list of key topics was compiled and used in the creation of two new pathology lectures.

Results

Figure 1. What Should we Teach: Summary of Key Topics Covered in Pathology Lectures: Divided by Site and Algorithmic Etiology

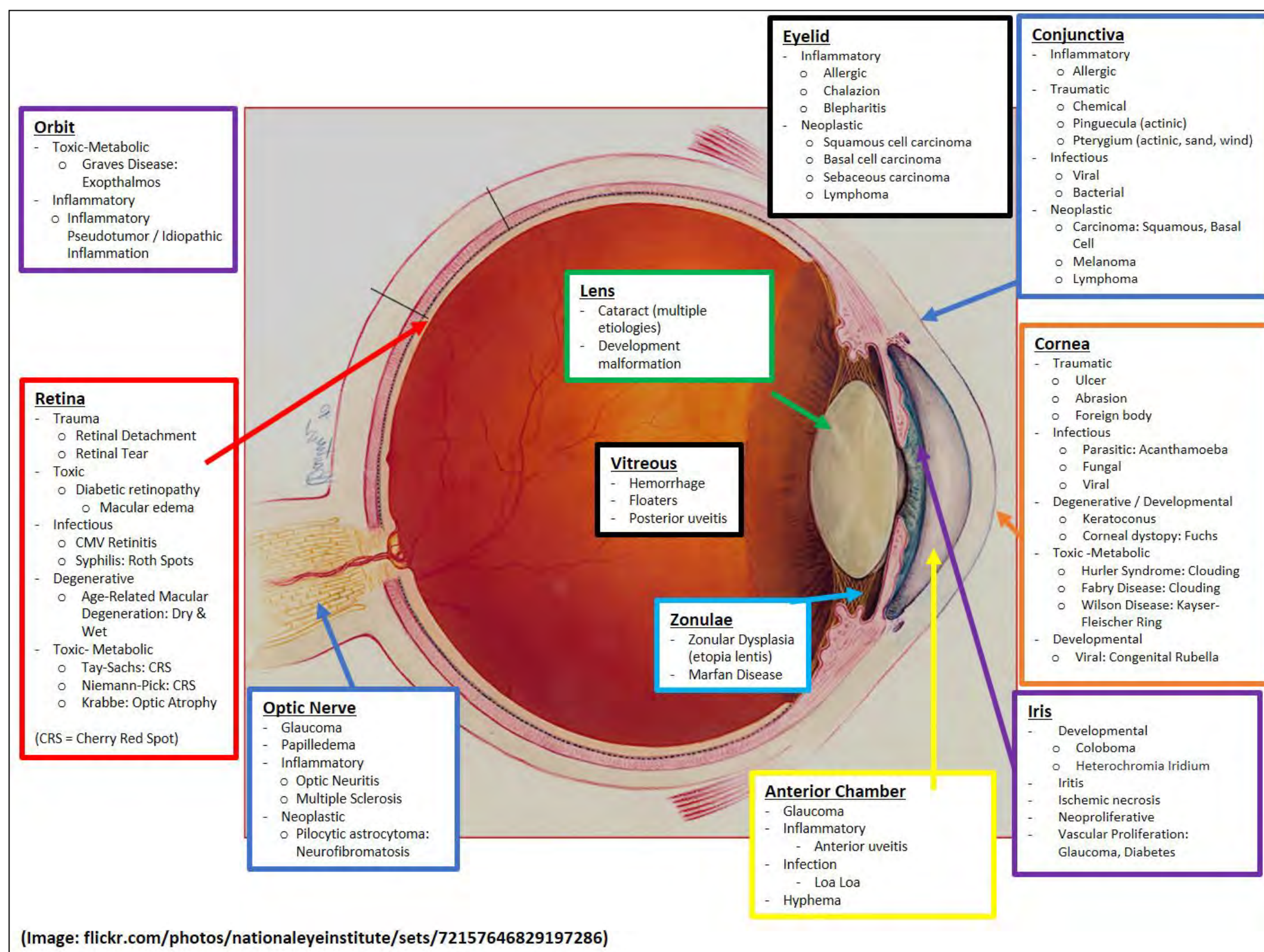


Figure 3. Examples of Topics Covered

Uveitis: Anterior Uveitis; Granulomatous Iritis; Anterior Uveitis; Hypopyon; Exudate Ant. Chamber; Anterior Uveitis; Ankylosing Spondylitis; "Acute"

Glaucoma: Anterior and Posterior Chambers; Major Outflow Pathway; Primary Angle-Closure Glaucoma; Neovascular Glaucoma; Iris Blocks Trabecular Area; Neovascular Blocks Trabecular Area; Diabetes

Melanoma: Ciliary Body; Uvea: Extraocular Extension

Choroid: Retinal Detachment

Tay - Sachs Disease: G_{M2} Gangliosidosis

Retinoblastoma: Clinical Finding: Leukocoria: White Pupil on Ophthalmologic Exam; Microscopic: Small Round Blue Cell Tumor; Necrosis; Fliener-Winterbinder Rosettes; Photoreceptor Differentiation; Rods!!!! Differentiation

| Diabetic Retinopathy | | | Age-Related Macular Degeneration | | |
|--|-------------------|---------------|--|------------------|--|
| Subtypes | | | Subtypes | | |
| | Non-Proliferative | Proliferative | Dry: Atrophic | Wet: Neovascular | |
| Microaneurysms | + | + | + | - | |
| Ischemia: Areas of Non-Perfusion | + | + | + | - | |
| Leakage of Fluid and Protein | + | + | + | - | |
| Exudates = "Edema" | + | + | + | - | |
| Hemorrhage | + | +++ | - | + | |
| New Blood Vessel Formation | - | + | - | + | |
| Scar | - | + | - | + | |
| Retinal Detachment Risk | - | + | - | + | |
| - Underlying Problem: Arteriosclerosis → Ischemia → VEGF → Vascular Proliferation | | | - Underlying Problem: Not Known | | |

Figure 2. Anatomic Segmentation of Topics: Starting with Anatomy

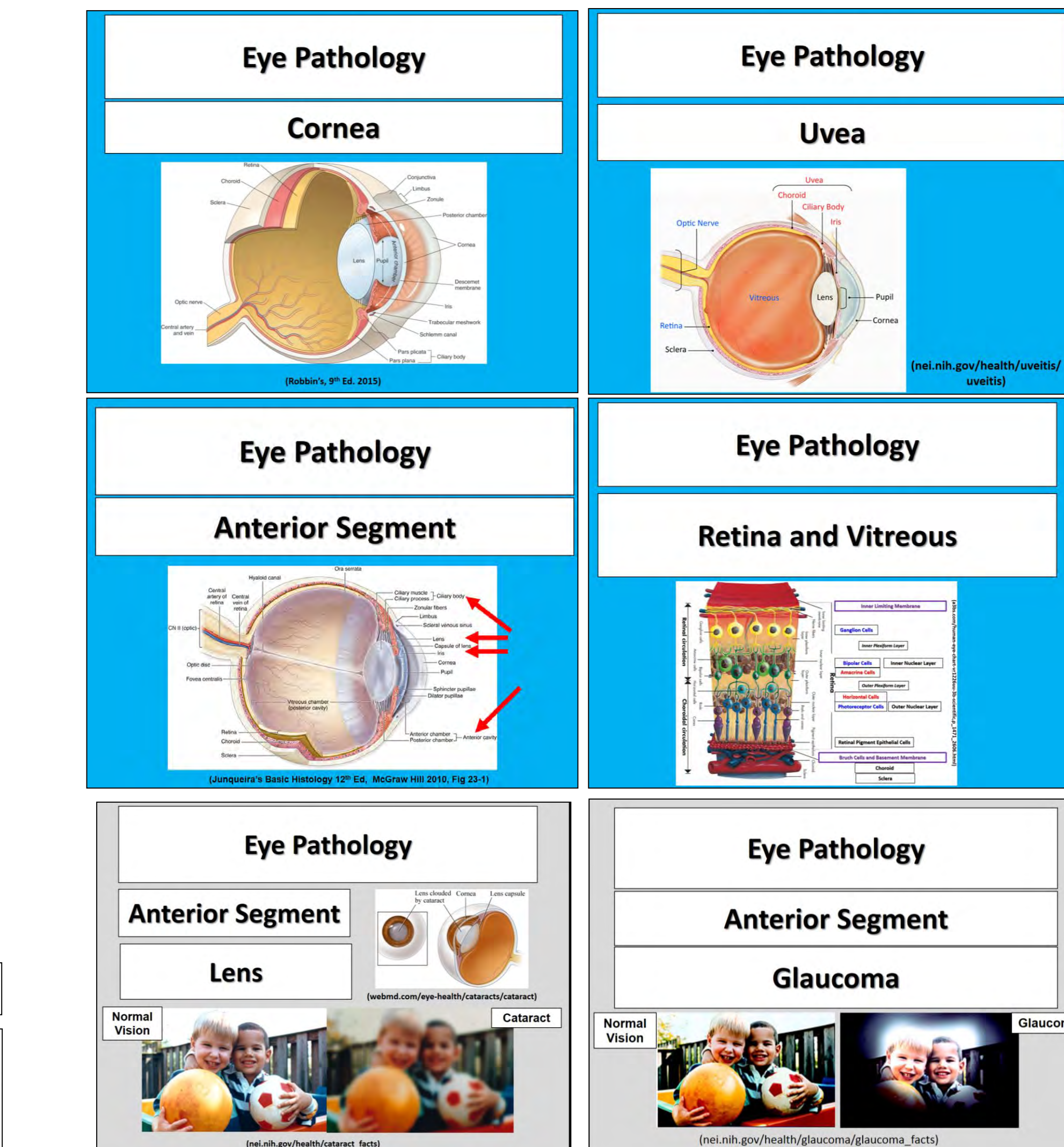


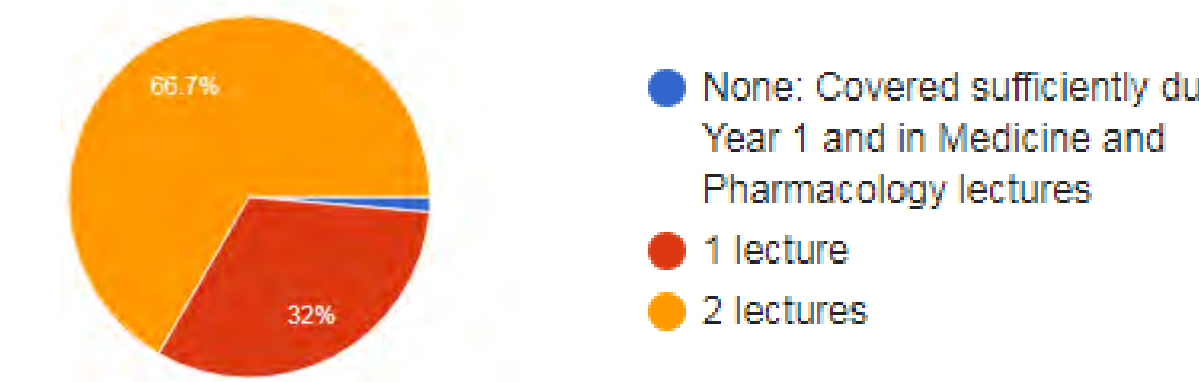
Figure 4. Survey Feedback

Participation: 75 of 78 M2 students (96.2%) completed the survey.

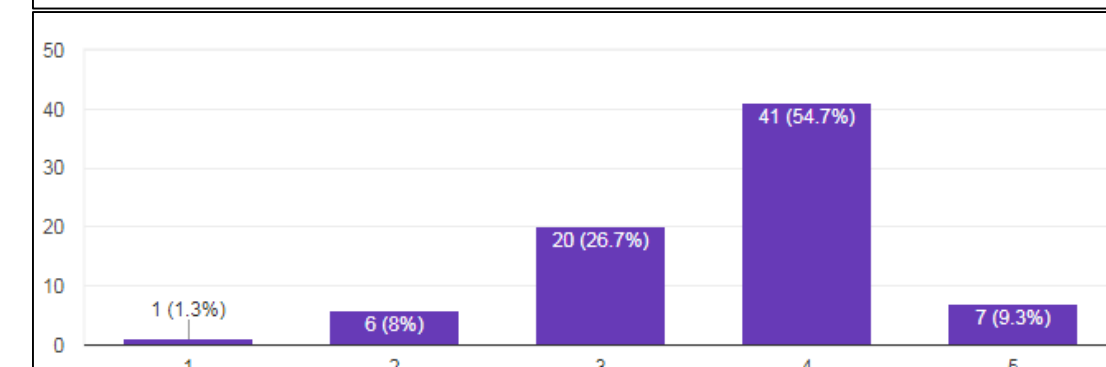
Most Common Comments / Feedback:

- Present pathology before pharmacology and medicine lectures.
- More detail and time in pathology lectures on highest-yield topics: diabetes, hypertension, glaucoma; reduce coverage of lower-yield topics to allow for time.
- Present both eye pathology lectures during same block (separated in 2017-2018).
- Eye coverage in year 1 is not extensive: review of gross and microscopic anatomy is essential and helpful.
- Pathology lectures necessary given complex set of diseases affecting different parts of the eye.

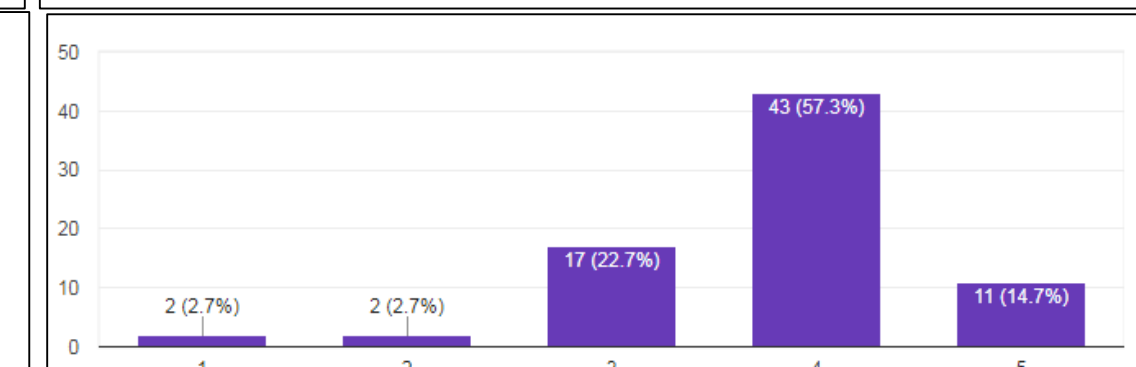
Number of Pathology Lectures: How many eye pathology lectures are justified given (1) the multiple locations in the eye in which pathology can occur and (2) the presence of both eye-specific as well as systemic pathologic processes affecting the eye?



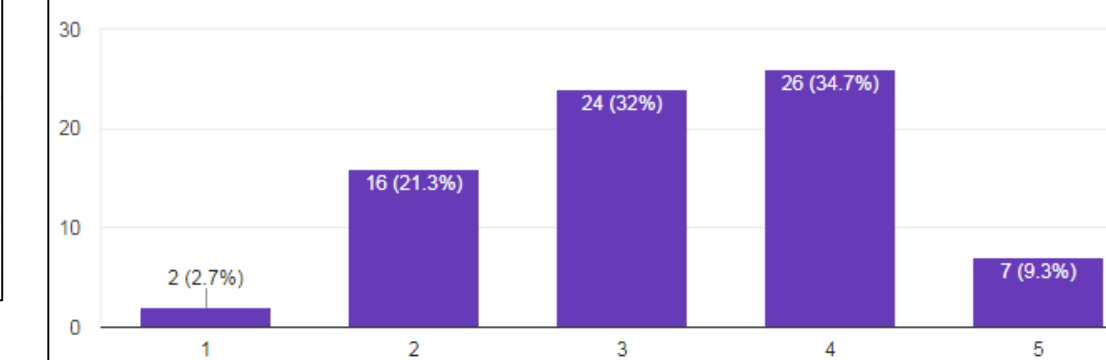
Pathology Lecture Construct and Delivery: The eye pathology lectures were reasonably well-constructed and delivered in their maiden voyage in the Block 4 curriculum.



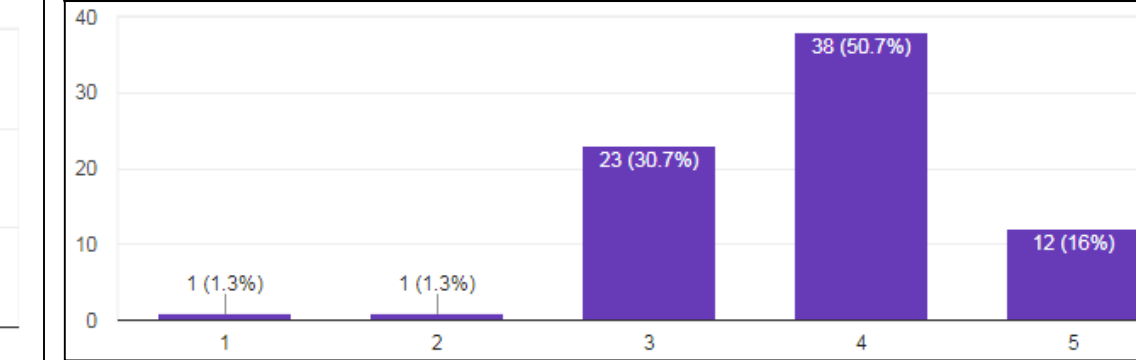
Pathology Lecture Content: The eye pathology lectures covered mostly important and challenging topics:



Pathology, Medicine, and Pharmacology Lectures Complementary: The eye disease coverage in the Pathology, Medicine (Dr. Tannenber, Chronic Complications of DM lecture), and Pharmacology (Dr. Taylor, Lecture 69, Drugs Used in Ophthalmology) Courses was complementary:



Pathology, Medicine, and Pharmacology Lectures Relatively Free of Points of Disagreement / Disparity: The coverage of topics in the Pathology, Medicine, and Pharmacology Courses was mostly consistent and without significant points of disagreement / disparity:



Conclusions After Year 1

- This project sought to address a gap in the basic science curriculum identified during the ongoing curriculum redesign process with the primary goal of improving ophthalmic education and pre-clinical ophthalmic knowledge.
- Discussion of eye pathology allows for further exploration of critical and common systemic diseases which wreak havoc on multiple organ systems:
 - Hypertension
 - Diabetes mellitus, type 1 and type 2
 - Temporal arteritis / giant cell arteritis
- Pathology lecture time allows for discussion of eye-specific disease, sometimes related to systemic disease, which are sight-threatening:
 - Viral and amebic keratitis
 - Glaucoma
 - Macular degeneration
 - Retinitis pigmentosa
- Allows for review of systemic diseases that, while rare, are discussed extensively in medical student curriculum:
 - Lysosomal Storage Disease: Tay-Sachs, Niemann-Pick
 - Retinoblastoma

To-Do List

- Incorporate feedback to improve the content of the pathology lectures.
- Meet with medicine and pharmacology colleagues to integrate and align presentations of eye disease in:
 - Pathology: All major topics
 - Pharmacology: Glaucoma, Macular degeneration
 - Medicine: Diabetic eye disease
- Pursue collaborative efforts with pathologists at Duke University and University of Illinois-Chicago to develop consensus about content to be presented.
- Pursue additional collaborative studies with Ophthalmologists to validate topic coverage.
- Administer survey after second year of lectures.

References

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2. Strayer DS, Rubin E, Eds. Rubin's Pathology: Clinicopathologic Foundations of Pathology, 7th Edition. Philadelphia, Wolters Kluwer, 2015.
3. Parrish RK, To M. Principles and guidelines of a curriculum for ophthalmic education of medical students. 200g. <http://www.icoph.org/resources/15/Principles-and-Guidelines-of-a-Curriculum-for-Ophthalmic-Education-of-Medical-Students.html>, accessed 03/20/2018.
4. Duke University Medical School Pathology and Virtual Microcopy Resources, <http://web.duke.edu/pathology/>, accessed 03/20/2018.
5. Shah M, Knoch D, Waxman E. The state of ophthalmology medical student education in the United States and Canada, 2012 through 2013. Ophthalmology. 2014 121(6):1160-3.
6. Spivey BE. Ophthalmology for medical students: content and comment. Arch Ophthalmol. 1970 Sep;84(3):368-75.