

# AudioDigest Memberships



## Dogma and Authority in Ophthalmology

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### Education Objectives

The goal of this program is to improve the recognition of the negative effects of dogma and authority on the progression of ophthalmology. After hearing and assimilating this program, the clinician will better be able to:

1. Recognize situations in which the influence of an authority may impede the progression of a scientific field.
2. Question the validity of accepted wisdom or dogma of long-standing medical practices.
3. Determine the limits of a new technology in a safe and scientifically rigorous manner.

### Summary

**Pioneers with limited capacity for change:** *Wurst* — luminary and early pioneer in field of intraocular lenses (IOLs); believed that procedures more advanced than large-incision extracapsular cataract extraction waste of time and that devices associated with cataract surgery not important; *summary* — smart and capable people often project own beliefs onto others and assume that new ideas or techniques, or those beyond what individual personally involved in, not important; individuals with high level of importance in particular field can slow progress

**Authority trumping science:** *Zimmerman and Witmer* — Zimmerman known for developing timolol; as young fellow at University of Florida, attended meeting in Europe where Witmer presented ideas about corneal endothelium; when Zimmerman relayed contradictory findings from Bourne's pioneering work with specular microscopy, Witmer cited own position as famous and senior European ophthalmologist as reason to ignore Zimmerman; authority trumping science or facts has been issue throughout history of medicine and science, and remains issue today; *Semmelweis* — physician worked in mid-1800s Vienna at birthing center for extremely poor women, where chance of dying after childbirth from puerperal fever (group A *Streptococcus* infection of vaginal tract) 1 in 3; Semmelweis challenged established belief that high rate of death was because women of ill repute punished by God; he suggested that wiping pus from hands onto aprons after examining dying women may transfer infection when delivering baby; idea new and highly controversial, so tested by washing hands between each patient and rinsing hands in carbolic acid after examination of any patient with puerperal fever; rate of maternal death from puerperal fever decreased from 33% to <1%; when results presented, reaction was fear at implication that doctors responsible for deaths; *Hageman and Kupfer* — 30 yr ago, macular degeneration (MD) considered age-related light-induced toxicity, and high-quality histopathology of drusen lacking (considered breakdown product associated with toxicity); when Hageman studied fresh tissue, he found drusen loaded with complement, suggesting involvement of immune system; after submitting grant application to National Eye Institute (NEI), he was informed by Kupfer, director of NEI, that reviewing grant for study of MD in association with immune system waste of time; Hageman obtained private money to pursue research until became obvious that MD more than light-induced toxicity; subsequently received call from Kupfer suggesting new grant would be considered by NEI; *summary* — while authority should never trump science, it commonly does; study showed that in any field of science with preeminent luminary, field does not advance substantially until luminary dies

**Danger of authorities making unilateral decisions:** *Kelman* — fought organized ophthalmology to bring phacoemulsification into common practice; evolved from iconoclast to authority in field of cataract surgery; when Kelman tip devised, data to demonstrate superiority for longitudinal phacoemulsification not provided; later study showed Kelman tip reduces efficiency by half and

doubles “chatter,” yet use accepted as wisdom for 30 yr because Kelman considered authority in field; on other hand, without Kelman tip, unknown whether development of torsional phacoemulsification would have occurred; *summary* — while authority can suppress progression in field, correct indication for new but not fully proven idea or device may take time to discover; authority alone should not make decisions, and appropriate testing always necessary

**Medicine based on dogma:** *athlete's heart (AH)* — in early 1900s, condition noted in which low pulse rate seen associated with athletic training; treated effectively by absolute elimination of activity (eg, drive wherever possible, do not take stairs); AH eventually eliminated as diagnosis during World War II, when elite group of paratroopers began aggressive training and many subsequently diagnosed with AH; after realizing that elite group not possible if AH negative condition, elite soldiers observed rather than treated, and army discovered that more pronounced AH associated with greater fitness; *questioning accepted wisdom* — speaker believes diagnoses similar to early concept of AH still exist; even with scientific method, many practices in medicine based on dogma rather than on studies; questioning accepted wisdom critical to advancing medicine; if unable to provide good reason for particular practice when questioned, then appropriate to evaluate whether using optimal methodology; dogma and authority work together to hinder progression of field

**Identifying cause of poor outcomes:** in mid-1970s, series of patients underwent cataract surgery with implantation of IOLs (at time, IOLs still controversial); initial postoperative visual outcomes positive, but over period of months inflammation developed; at first responded to steroids but eventually progressed to hypopyon and “puffballs” throughout vitreous; diagnosis severe fungal endophthalmitis (caused by *Paecilomyces lilacinus*), and outcomes poor; common factor use of Luminex IOLs; found that single batch of supposedly sterile bicarbonate of soda (used to rinse and neutralize lenses stored in concentrated sodium hydroxide before implantation) contaminated with fungus; such negative episodes gave support to many senior ophthalmologists' opposition to use of IOLs; however, problem not IOLs or concept of phacoemulsification, but rather poor technique (flawed method of sterilization, contamination of neutralizing solution); negative outcome may not mean concept flawed (important to identify true cause); physicians must be smart enough to differentiate whether problem with overall approach or something more peripheral

**Developing new technology:** *determining limits* — speaker involved with number of patients who underwent unsuccessful radial keratotomy surgeries in Phoenix by “now-infamous” ophthalmologist; time is required to develop safe parameters for new techniques, because limits of any new technology initially unknown; important to move cautiously from area with known parameters to identify new limits; *new technology* — competes with established technology, and likelihood of future improvements often not considered; time is required to determine how new technology will operate once fully developed; scientific rigor still critical, and period of time and transition necessary before complications with new technology resolved; proponents of new technology or techniques have duty to prove superiority, but too often rely on authority or individuals with conflicts of interest to demonstrate superiority; when comparative studies performed, final analyses often reveal some results simply hype or show that other results of significance overlooked

**General conclusions:** clinicians should encourage use of, and be open minded about, new technology; however, also must encourage questioning of accepted wisdom and requesting evidence of superiority of new approaches; insist that appropriate studies and evidence be present; maintain open-minded skepticism, in particular when marketing professionals or well-known authority attempting to push superiority

**Anderson DH et al:** The pivotal role of the complement system in aging and age-related macular degeneration: hypothesis revisited. *Prog Retin Eye Res* 2010 Mar;29(2):95-112; **Azoulay, P et al:** Does science advance one funeral at a time? *NBER Working Paper No. 21788* Issued December 2015, revised June 2018; **Csoka AB:** Innovation in medicine: Ignaz the reviled and Egas the regaled. *Med Health Care Philos* 2016 Jun;19(2):163-8; **Pettit TH et al:** Fungal endophthalmitis following intraocular lens implantation. A surgical epidemic. *Arch Ophthalmol* 1980 Jun;98(6):1025-39.

Penetrating Ocular Trauma

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**Penetrating periocular trauma:** mostly straightforward, but some cases more difficult and unexpected; with every eyelid laceration, must remain aware of possibility of injury to underlying globe and other critical eyelid structures, intraorbital penetration involving extractor muscles or sensory or motor nerves, and intracranial injury

**Complete eye examination:** *case 1* — patient assessed in emergency department (ED), not by ophthalmology; eyelid lacerations sutured closed and reevaluated after 1 wk; injury full thickness laceration through eyelid and conjunctiva, and most (but not all) way through sclera

**Mechanism of injury:** important to know as precisely as possible; *case 2* — during argument, spoon dug into patient's orbit, causing direct injury to optic nerve; Wilbrand knee defined as intranasal fibers that go into contralateral optic nerve (crossing over to opposite optic tract); injury from spoon avulsed optic nerve just enough to impair vision (“pie in sky” defect) in other eye; *case*

3 — patient treated in ED for what was considered superficial stab wound; 2 days later, referred to ophthalmology; on examination, left upper eyelid swollen shut, left hypotropia present, and no function in levator palpebrae superioris or superior rectus muscles; evaluation of motility shows hypotropia worse in lateral gaze than on opposite side (reflects absence of superior rectus function on left side); knife had perforated eyebrow laceration into orbit and cut superior division of third cranial nerve; when penetrating trauma present, always suspect worst

**Penetrating ocular injuries:** case 4 — patient running with small bottle brush in hand; tripped and fell, causing laceration; full examination, including sedated examination, in ED identified relative afferent pupillary defect (RAPD); on imaging, small track of air bubbles back to optic nerve visible; brush penetrated behind globe and hit optic nerve; case 5 — 3-yr-old sustained eyelid laceration after unwitnessed fall while walking with pencil in hand; subcutaneous fat present in cheeks, but not in eyelids; when fat visible in eyelid laceration, evidence that orbital septum perforated; any time penetrating object shaped like finger, presume greatest extent of penetration possible; on imaging, child had defect in orbital roof with penetration into intracranial space; because child walking and talking, deeper penetration likely to be missed without imaging

**Importance of imaging:** case 6 — patient involved in motor vehicle accident required intracranial evacuation of hematoma; ophthalmology involved after patient developed postoperative orbital cellulitis; imaging showed subperiosteal abscess; abscess drained and bacterial culture grew *Mycoplasma hominis* (usually genitourinary tract pathogen; infection likely resulted from bacteremia after Foley catheter used during surgery); patient cleared for discharge by neurosurgery 1 day before abscess identified, but speaker thought patient may have infraplasted globe; performed imaging that identified baseball-sized intracranial abscess in frontal lobe

**Penetrating ocular injuries (continued):** case 7 — young girl fell off bicycle, causing brake handle to penetrate lower eyelid; 5 days later, infection present with swelling, limited motility, vision reduced to light perception with RAPD, and tight orbit; imaging showed “guitar pick sign” (eyeball pushed forward but held back by optic nerve becomes deformed and less round); large orbital abscess in frontal lobe not surprising, but defect in orbital roof unexpected; girl had penetrating brain injury through lower eyelid and orbital roof, yet able to walk into ED

**Visible retained foreign bodies (RFBs):** case 8 — at King Khaled Eye Specialist Hospital in Riyadh, patient presented to ED after ceremonial Yemeni dagger plunged forcefully through orbit (result of argument); patient alert and appropriate, but speech impaired; curved dagger penetrated through eyelid and sinus into throat; dagger removed and eyelid laceration sutured closed; case 9 — occult penetrating injury; patient presented with eyelid laceration and mild difficulty swallowing after possible punch to eye; when eyelid lifted up, piece of metal visible; when patient opened mouth, point of knife penetrating hard pallet visible; fortunately, knife penetrated anterior to globe, causing no intraocular injury (motility and vision normal); case 10 — young child playing outside emerged from under tree grasping eye in pain; local ED observed mild ecchymosis but no penetrating injury, and could not obtain child’s cooperation for full examination; at speaker’s children’s hospital, full examination under anesthesia revealed marked RAPD on right side; on imaging, computed tomography showed some air density, and magnetic resonance imaging showed large stick penetrating through optic canal and indenting carotid artery posteriorly; angiography obtained (because ophthalmic artery also passes through optic canal), showing small constriction but good downstream flow; injury was self-sealing laceration with RFB (without assessment for RAPD, RFB would be missed); case 11 — patient with schizophrenia inserted pencils through medial canthus on both sides that penetrated into brain; when dealing with penetrating trauma, always suspect worst; case 12 — man working on deck while drinking alcohol dropped nail gun, causing discharge; continued to work, but next day felt mild discomfort in eye with limited motility and mild proptosis; nail had penetrated under lip through gum, floor of orbit, and orbit, avoiding eyeball and optic nerve, before entering frontal lobe; case 13 — man presented with persistent sensation of foreign body after glass thrown at face; when main piece of glass surgically extracted, number of other pieces discovered

**Occult RFBs:** question is always whether to perform exploratory surgery or simply observe; case 14 — on imaging, many small particles present in patient’s eye, with one piece of graphite between superior oblique and medial rectus; rule of thumb is to determine risk-benefit ratio of surgery to find RFB vs observation; in this case, clinician elected to leave object in place; must inform patient and/or family that risk for infection or fistula present; case 15 — patient struck by stick in eye area 24 hr earlier had early cellulitis and air density (indicates dry wood that requires removal); during surgery to remove piece of wood, additional pieces found in same area; in such cases, advise patient after surgery that as many pieces removed as possible, but problems may still occur; case 16 — 40-yr-old man presented with long-standing inert RFB; mass in inferior orbit starting to cause discomfort and palpable behind orbital rim, but examination otherwise normal; imaging showed presence of radio-dense RFB; patient denied history of trauma or lacerations; surgery performed, and piece of glass discovered; when patient returned 1 wk later, described incident when 2 yr of age in which glass screen door broke and caused small self-sealing laceration; shows that inert RFBs may not require immediate removal

#### Acknowledgements

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. The Audio Digest Foundation thanks the speakers and sponsors for their cooperation in the presentation of this program.

## Readings

**Boral SK et al:** New innovative approaches for difficult retained intraocular foreign bodies. *Ophthalmologica* 2018;240(3):179-80;  
**Kaushik S et al:** Occult intraocular foreign body: ultrasound biomicroscopy holds the key. *Int Ophthalmol* 2008 Feb;28(1):71-3;  
**Loporchio D et al:** Intraocular foreign bodies: A review. *Surv Ophthalmol* 2016 Sep-Oct;61(5):582-96; **Morgan AM, Kasahara N:** Comparative evaluation of the prognostic value between the Ocular Trauma Score and the Pediatric Penetrating Ocular Trauma Score. *J Craniofac Surg* 2018 Oct;29(7):1776-9.

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