

Drugs of the Future 1 hour

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Course description

Is Optometry entering into the golden age of new therapeutics? Not just new drugs, but new drug classes for those frustrating chronic conditions. Two of these new classes are refractive: presbyopia and myopia. Although the classes are new, the drugs are old, but not tired. Ocular surface chronic conditions are the next two classes, one old one new: dry eye and demodex blepharitis. Help is on its' way for increasing myopia, demodex infestation, dry eye and presbyopia.

Learning objective:

1. Learn about parasitic blepharitis
 2. Learn about meibomian gland dysfunction (MGD) and causes
 3. Know the pitfalls of refractive drugs
 4. Understand the optics behind refractive drugs
 5. Learn about past treatment strategies for chronic ocular surface disease
 6. Learn about the options for management of demodex
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- I. Myopia- new drug class
 - a. The Need
 - i. Myopia is not a condition, it is an "epidemic"
 - ii. Historically, there has never been a time when myopia has been so prevalent
 - iii. Record-breaking numbers of myopia
 - b. Current treatments
 - i. Treatments
 1. Spectacle multifocals
 2. CL multifocals
 3. MiSight soft lenses
 4. Ortho-K
 5. Other
 - c. Current tools
 - i. Myopia management calculator
 - ii. Review of myopia management
 - iii. Papers
 - d. The drugs
 - i. Atropine and atropine derivatives
 1. Mechanism of Action (MOA)
 - ii. Past clinical studies

1. GALVIS, Virgilio, et al. "Topical atropine in the control of myopia." *Medical Hypothesis, Discovery and Innovation in Ophthalmology* 5.3 (2016): 78
 2. Yam, Jason C., et al. "Low-concentration atropine for myopia progression (LAMP) study: a randomized, double-blinded, placebo-controlled trial of 0.05%, 0.025%, and 0.01% atropine eye drops in myopia control." *Ophthalmology* 126.1 (2019): 113-124.
 3. Chua, Wei-Han, et al. "Atropine for the treatment of childhood myopia." *Ophthalmology* 113.12 (2006): 2285-2291
- iii. Current clinical studies
 - iv. Challenges
 1. Stability of atropine
 2. Adverse events
 3. Which dose?
 4. How long?
 - a. 4-5 year studies
 5. Pregnancy tests for children
 6. Three cycloplegic evaluations
 7. Where are the Phase 2 studies?
- II. Demodex- new drug class
- a. The Need
 - i. Demodex is the most common ectoparasite in humans
 - ii. 100% prevalence 70 years old +
 - b. Current treatments
 - i. Tea Tree oil
 1. "100% tea tree oil was found to have the most rapid kill time when compared to all other treatments, including 100% caraway oil, 100% alcohol, 10% povidone-iodine and 4% pilocarpine."
 - a. Gao, Y. Y., et al. "In vitro and in vivo killing of ocular Demodex by tea tree oil." *British journal of ophthalmology* 89.11 (2005): 1468-1473
 - b. Keyur Savla, Jimmy T Le, Andrew D Pucker. (2019) Tea tree oil for Demodex blepharitis. *Cochrane Database of Systematic Reviews* 26.
 2. MOA
 3. It burns
 4. It stings
 5. It hurts
 6. Corneal damage risk
 - a. Scott Schachter, OD
 - i. [http://optometrytimes.modernmedicine.com/search/solr_search/demodex?f\[0\]=im_taxonomy_vid_10%3A140&f\[1\]=im_taxonomy_vid_107%3A5030](http://optometrytimes.modernmedicine.com/search/solr_search/demodex?f[0]=im_taxonomy_vid_10%3A140&f[1]=im_taxonomy_vid_107%3A5030)

- ii. Avenova
 1. Tested: Besifloxacin, chlorhexadine, 0.01% hypochlorous acid, and povidone-iodine
 2. Bacteria (Blepharitis): *S. pneumoniae*, *S. aureus* and *H. influenza*
 3. ““0.01% hypochlorous acid demonstrated growth of all the bacteria at all the serial dilutions”
 - a. Grob, S. R., et al. "Bactericidal effect of hypochlorous acid in blepharitis." *Am Acad Ophthalmol* 2017 (2017).
 4. ““Avenova was no more effective against Demodex mites in-vitro than 100% mineral oil, which is known to be innocuous.”-Al Kabat
 - a. Kabat, Alan G. "In-Vitro Demodicidal Activity of Commercial Lid Hygiene Products." *Investigative Ophthalmology & Visual Science* 59.9 (2018): 905-905
 - b. Kabat AG. In vitro demodicidal activity of commercial lid hygiene products. *Clin Ophthalmol*. 2019;13:1493–1497. Published 2019 Aug 6. doi:10.2147/OPTH.S209067
- iii. IPL
 1. MOA
 2. Zhang, XiaoZhao, Nan Song, and Lan Gong. "Therapeutic Effect of Intense Pulsed Light on Ocular Demodicosis." *Current eye research* 44.3 (2019): 250-256
- iv. Ivermectin
 1. MOA
 2. Holzchuh, Flávio Gaieta, et al. "Clinical treatment of ocular Demodex folliculorum by systemic ivermectin." *American journal of ophthalmology* 151.6 (2011): 1030-1034
- c. The drug(s)
 - i. From Veterinary medicine
 1. Six, Robert H., et al. "Efficacy of sarolaner, a novel oral isoxazoline, against two common mite infestations in dogs: *Demodex* spp. and *Otodectes cynotis*." *Veterinary parasitology* 222 (2016): 62-66.
 2. Snyder, Daniel E., Scott Wiseman, and Julian E. Liebenberg. "Efficacy of lotilaner (Credelio™), a novel oral isoxazoline against naturally occurring mange mite infestations in dogs caused by *Demodex* spp." *Parasites & vectors* 10.1 (2017): 532
 3. Matricoti, I., and E. Maina. "The use of oral fluralaner for the treatment of feline generalised demodicosis: a case report." *Journal of Small Animal Practice* 58.8 (2017): 476-479
 - ii. Paralysis of the mite
 - iii. Video
- d. Challenges
 - i. Phase 2 Single site Mexico
 - ii. Epilation and microscope
 - iii. Symptomatic relief?

- iv. 2 week lifecycle of the mites
- III. Meibomian gland dysfunction (MGD)- new drug class?
- a. The Need
 - i. Most dry eye is MGD
 - b. Current treatments
 - i. Obstruction vs Anti-inflammatory
 - ii. Mechanical device treatments
 - c. The drugs
 - i. Novaliq
 - ii. Hovione
 - 1. Tetracycline class: minocycline
 - 2. MOA
 - 3. Aronowicz JD, Shine WE, Oral D, Vargas JM, McCulley JP. Short term oral minocycline treatment of meibomianitis. *Br J Ophthalmol.* 2006;90(7):856–860. doi:10.1136/bjo.2006.091579
 - 4. Wladis, Edward J., et al. "Oral antibiotics for meibomian gland-related ocular surface disease: a report by the American Academy of Ophthalmology." *Ophthalmology* 123.3 (2016): 492-496
 - 5. Doughty, Michael J. "On the prescribing of oral doxycycline or minocycline by UK optometrists as part of management of chronic Meibomian Gland Dysfunction (MGD)." *Contact Lens and Anterior Eye* 39.1 (2016): 2-8.
 - d. Challenges
 - i. Ointments
 - 1. Residence time vs blur
 - ii. Dosing
- IV. Presbyopia- new drug class
- a. The Need
 - i. Sooner or later, we all become presbyopes
 - b. Current treatments
 - 1. Multifocals
 - 2. CL Multifocals
 - 3. CL Monovision
 - 4. Surgery
 - c. The drugs
 - i. Pilocarpine and derivatives
 - 1. MOA
 - 2. Benozzi, Jorge, Giovanna Benozzi, and Betina Orman. "Presbyopia: a new potential pharmacological treatment." *Medical hypothesis, discovery and innovation in ophthalmology* 1.1 (2012): 3

3. Renna, Antonio, Jorge L. Alió, and Luis Felipe Vejarano. "Pharmacological treatments of presbyopia: a review of modern perspectives." *Eye and Vision* 4.1 (2017): 3.
4. Renna, Antonio, et al. "Pharmacological treatment of presbyopia by novel binocularly instilled eye drops: a pilot study." *Ophthalmology and therapy* 5.1 (2016): 63-73.
5. Wolffsohn, James S., and Leon N. Davies. "Presbyopia: effectiveness of correction strategies." *Progress in retinal and eye research* 68 (2019): 124-143.

d. Challenges

- i. Headache
- ii. Iris atrophy
- iii. Generics formulation
- iv. Duration of effect
- v. No insurance coverage-cosmetic?

V. Q&A / Discussion