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Ocular Pharmacology



Vet Eye Pros

Dr. Andrew Rogen, DVM, DACVO

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Spring Conference



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Pharmacology after lunch? WHY???





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Why we're talking about eye meds

- Why we're talking about eye meds
 - Better treatment outcomes
 - Avoid complications
 - Streamline inventory & reduce overhead



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Outline

- When to prescribe drug
- Why to prescribe
- What drugs should be prioritized



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Ocular Drug Limitations

- Drug washout and dilution
- Significant anatomic barriers
 - Tear Film
 - Cornea
 - Conjunctiva
 - Sclera
 - Blood-Eye Barrier
- Species specific variables



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Topical Antibiotics

- Indications
 - All corneal ulcers
 - Bacterial conjunctivitis
 - Post-op patients
- Antibiotic formulations
 - Drops
 - Ointments
- Treatment frequency considerations



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Topical Antibiotics

- Antibiotic susceptibility
 - Culture results
 - Spectrum
- Antibiotic selection
- Special considerations



Drugs on a Shelf: Antibiotics

Drug Class	Ocular Drugs	Gram Spectrum	Mechanism	Special Notes
Aminoglycoside	Gentamicin Tobramycin Neomycin	-	Inhibit 16S ribosome subunit	Gentamicin best for Moraxella bovis
Macrolide	Erythromycin	+	Inhibit 50S ribosome subunit	Resistance to macrolides correlates with resistance to methicillin
Tetracycline	Oxytetracycline	-	Inhibit 30S ribosome subunit	Terramycin includes polymyxin B
Fluoroquinolones	Ofloxacin Ciprofloxacin Moxifloxacin	-/+	DNA Gyrase Inhibitor (topoisomerase II +/- IV)	Ciprofloxacin: crystal precipitate Later generations = increased Gram + activity
Polypeptide	Bacitracin	+	Permeates cell membrane	No transcorneal penetration NeoPolyBac is only ointment
Polymyxin	Polymyxin B Gramicidin	- +	Disrupts cell membrane and neutralizes LPS	Polymyxin B Feline anaphylaxis NeoPolyGram is drop
Cephalosporins	Cefazolin	+	Interfere with cell wall enzymes	Compounded from injectable in artificial tears
Amphenicol	Chloramphenicol	+	Binds 50S ribosome subunit	Aplastic anemia (1:1,000,000)



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Topical Antibiotics

- What drugs to keep on hand
 - Ofloxacin
 - Tobramycin
 - Erythromycin
 - Cefazolin injectable (1 gram) + Artificial Tears

- +/- NeoPolyBacitracin



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Topical Anti-inflammatories

- What drug classes are available?
 - Steroids
 - NSAIDs
 - Calcineurin inhibitors (more on these later)

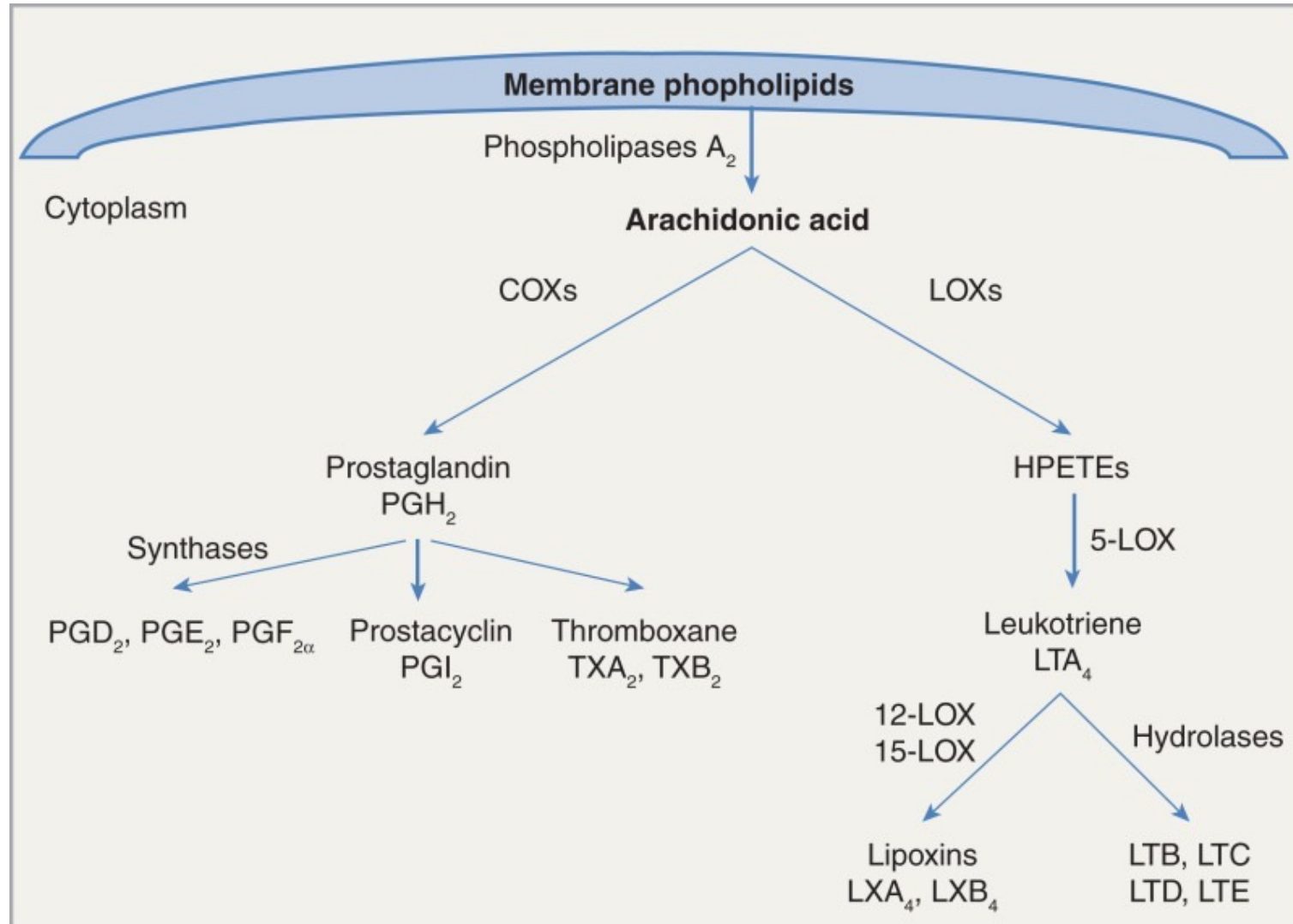


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Anti-inflammatory Mechanisms



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Topical Anti-inflammatories

- What drugs are available?
 - Steroids
 - Hydrocortisone
 - Dexamethasone
 - Prednisolone Acetate
 - NSAIDs
 - Diclofenac
 - Ketorolac
 - Flurbiprofen
 - Bromfenac*



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Topical Anti-inflammatories

- Complications
 - Steroids
 - Crystalline corneal degeneration
 - Ocular hypertension?
 - Polyuria/polydipsia/polyphagia
 - Hyperglycemia
 - NSAIDs
 - Ocular hypertension?
 - GI ulcers, vomiting, diarrhea?
 - Inhibits platelet function



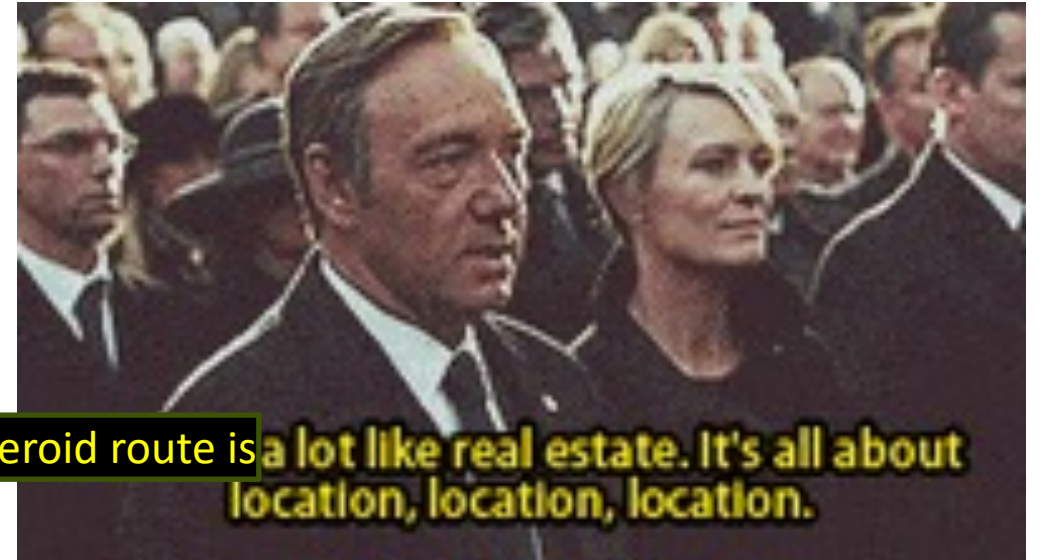
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Topical Anti-inflammatories

- When to choose one drug over another
 - Surface
 - Anterior Segment
 - Posterior Segment



Steroid route is a lot like real estate. It's all about location, location, location.



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Topical Anti-inflammatories

- What drugs should you stock?
 - Steroids
 - NeoPolyDexamethasone
 - Prednisolone Acetate 1%
 - NSAIDs
 - Diclofenac



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Topical Glaucoma Medications

- Carbonic Anhydrase Inhibitors
- Beta-Blockers
- Prostaglandin Analogues
- Osmotic Agents



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Topical Glaucoma Medications

- Carbonic Anhydrase Inhibitors
- Available drugs
 - Dorzolamide
 - Brinzolamide
- Frequency
 - BID-TID
- Complications
 - Stinging on application
 - Keratitis



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Topical Glaucoma Medications

- Beta-Blockers
- Available drugs
 - Timolol
 - Betaxalol
- Frequency
 - BID-TID
- Complications
 - Bradycardia
 - Asthma (feline)



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Topical Glaucoma Medications

- Prostaglandin Analogues
- Available drugs
 - Latanoprost
 - Travaprost
- Frequency
 - BID-TID
- Complications
 - Pupil constriction
 - Induce uveitis



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Topical Glaucoma Medications

- Osmotic Agents
- Available drugs
 - Mannitol
 - Glycerin
- Complications



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Topical Glaucoma Medications

- Primary Glaucoma
 - Dorzolamide +/- Timolol
 - Latanoprost
- Safest bet
 - Dorzolamide



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Tear Film

- Tear Supplements
 - Artificial Tears
 - Drops
 - Gels
 - Ointments
- Tear Stimulants
 - Calcineurin-inhibitor
 - Cyclosporine
 - Tacrolimus
 - mTOR inhibitor (Rapamycin)
 - Sirolimus

Product	Company	Volume	Form	Ingredients	Preservatives	Frequency
Systane Original	Alcon	15 mL	Suspension	Polyethylene glycol 400 0.4% Propylene Glycol 0.3%	Boric acid, calcium chloride, hydroxypropyl guar, magnesium chloride, POLYQUAD (polyquaternium-1) 0.001% preservative, potassium chloride, purified water, sodium chloride.	1-2 drops as needed
Refresh Tears	Allergan	15 mL	Solution	Carboxymethylcellulose sodium 0.5%	Boric acid, calcium chloride, potassium chloride, purified water, PURITE (stabilized oxychloro complex), sodium borate, sodium chloride	1-2 drops as needed
Gentle Tears Day + Night	Alcon	8 mL	Gel Drops	Polyethylene glycol 400 0.4% Propylene Glycol 0.3%	Boric acid, calcium chloride, hydroxypropyl guar, magnesium chloride, POLYQUAD (polyquaternium-1) 0.001% preservative, potassium chloride, purified water, sodium chloride.	1-2 drops as needed. Shake well.
OptixCare Purple	Aventix	20 gram (0.7 oz)	Gel	Hyaluron	Sodium Hydroxide, EDTA, Cetrimide, Deionized water, Sorbitol, Carbomer	1-2 drops as needed
OptixCare Green	Aventix	20 gram (0.7 oz)	Gel	Hyaluron	Sodium Hydroxide, EDTA, Cetrimide, Deionized water, Sorbitol, Carbomer,	1-2 drops as needed
Optix Care EMS Yellow	Aventix	Three 1 mL alloquats	Solution	0.01% RGTA (Carboxymethylglucose sulfate polymers)	1 mL of excipients (solution unlisted)	Apply once every two days on affected eye.
Eye Lube Pro	Sentrx Animal care	20 gram (0.7 oz)	Gel	Hyaluron	Sodium Hydroxide, EDTA, Cetrimide, Deionized water, Sorbitol, Carbomer,	1-2 drops 2-4 times daily or as recommended.
Oculenis BioHance Ocular Repair Gel	Sentrx Animal Care	3 mL	Gel Drop	Cross-linked hyaluronic acid 0.75%	Water, Sodium chloride, EDTA, potassium chloride, potassium phosphates	1-2 drops twice daily minimum
Ocunovis Procure BiHance Gel Eye Drops with Amino Acids	Sentrx Animal Care	5 mL	Gel Drop	Cross-linked hyaluronic acid 0.4%,	Water, Sodium chloride, EDTA, potassium chloride, potassium phosphates 0.1% glycine, 0.075% proline, 0.01% Leucine, 0.01% lysine	1 drop twice daily



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Topical Tear Stimulants

- Drugs
 - Cyclosporine
 - Tacrolimus
 - Sirolimus
- Indications
- Frequency



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Topical Tear Stimulants

- What to keep in stock?
 - Depends
 - Artificial tear
 - Probably worth scripting out



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Questions?

Oakdale

1163 Helmo Ave. N.
Oakdale, MN 55128

(651) 501-3766



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St. Paul

1542 W. 7th St.
St. Paul, MN 55102

(651) 293-1800

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