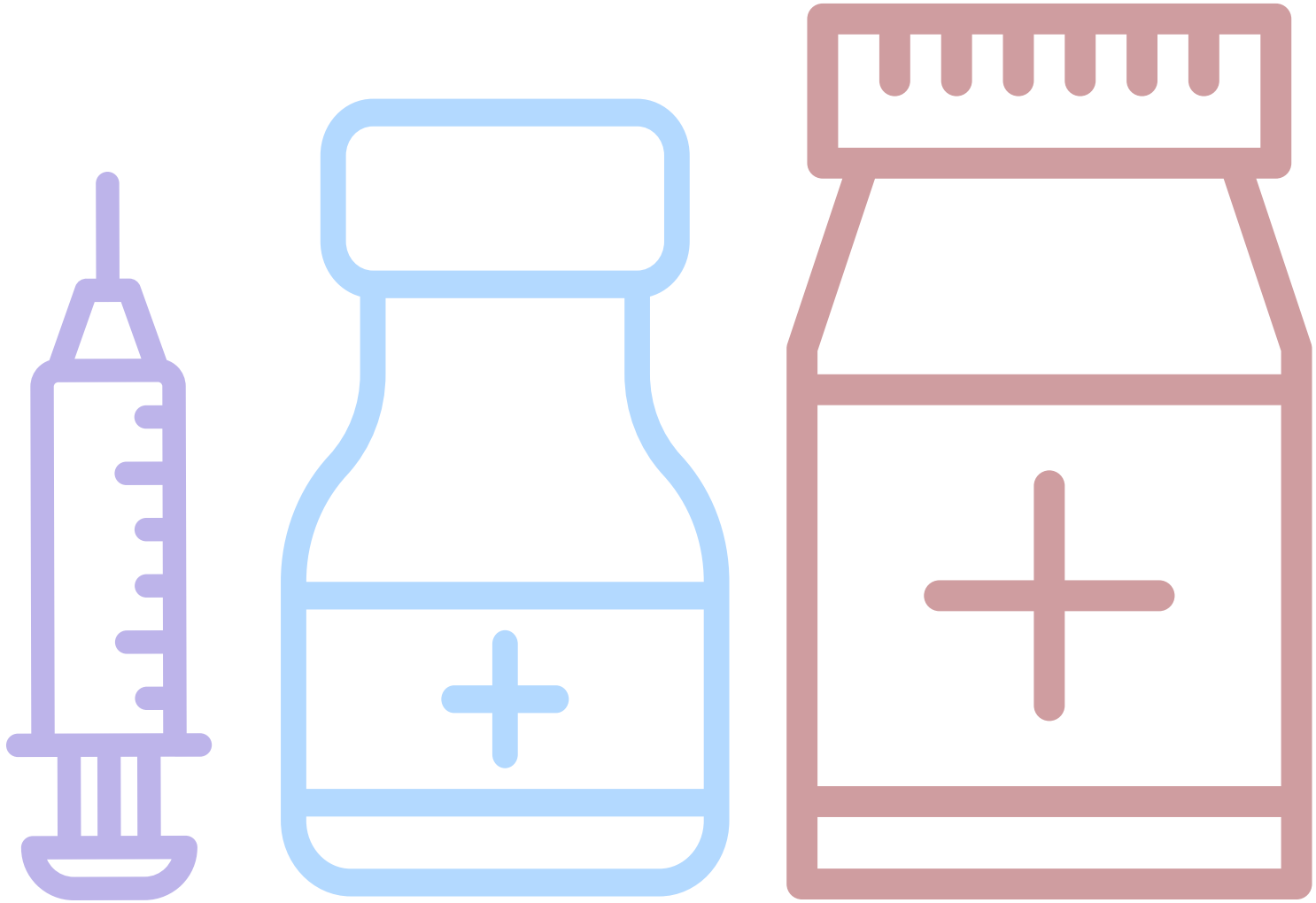
Ophthalmic Therapeutics Formulary



College of Veterinary Medicine

Quick Guide: Navigation & Icons

- Use the Index slide to quickly locate drug classes and specific medications.
- Each drug is organized in a consistent format for easy comparison.
- Refer to "How to Choose an Ophthalmic Drug" slides for step-by-step clinical decision-making.
- Tables and summary slides highlight first-line therapies and key comparisons.
- Focus on clinical pearls and cautions to avoid common mistakes (e.g., avoiding steroids with corneal ulcers).

Icon key:



Caution



Compound



Costly

Index

Antibiotics

1. Neo-Poly-Bac/Neo-Poly-Gram
2. Cefazolin
3. Ofloxacin
4. Tobramycin
5. Chloramphenicol
6. Terramycin®
7. Erythromycin

Antifungals

1. Natamycin
2. Amphotericin B
3. Voriconazole

Antivirals

1. Cidofovir
2. Ganciclovir
3. Famciclovir
4. GS-441524

Corticosteroids

1. Prednisolone Acetate
2. Neo-Poly-Dex

Non-Steroidal Anti-Inflammatories

1. Diclofenac
2. Flurbiprofen

Lacrimostimulants and Lacrimomimetics

1. Cyclosporine
2. Tacrolimus

Antiglaucoma Drugs

1. Dorzolamide
2. Brinzolamide
3. Latanoprost
4. Timolol
5. Dorzolamide + Timolol

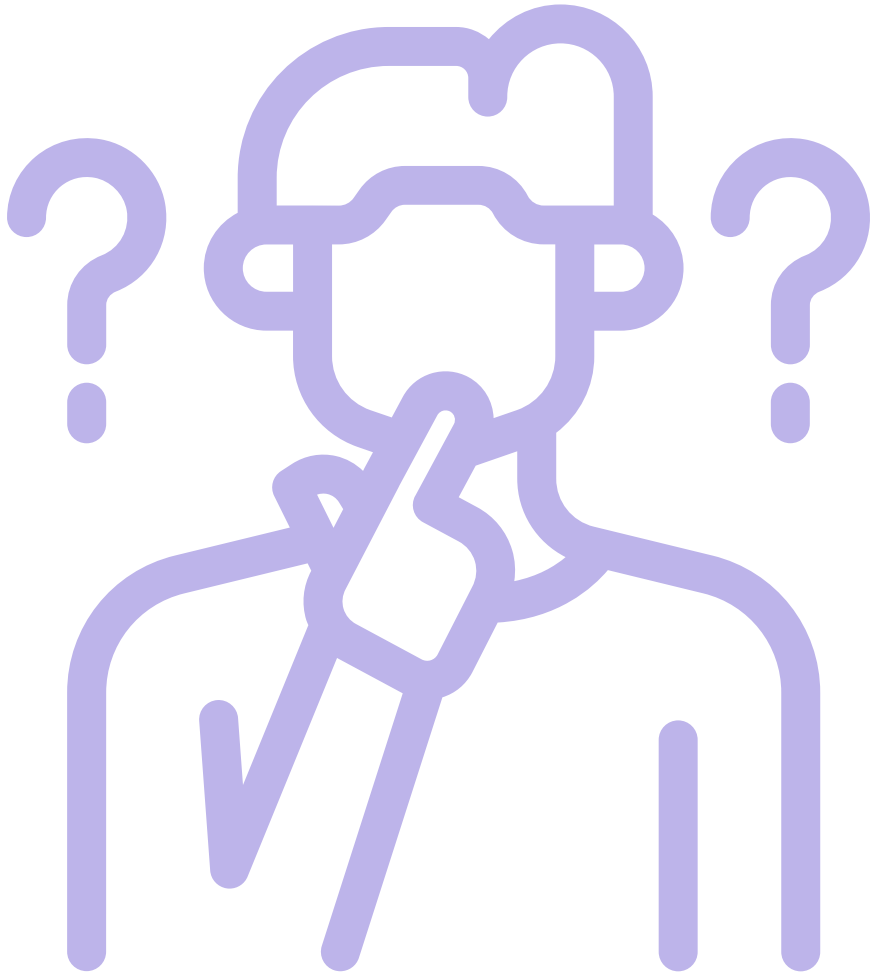
Mydriatics and Cycloplegics

1. Atropine Sulfate

How to Choose an Ophthalmic Drug

Ask yourself these 6 questions:

1. Is there a corneal ulcer?
2. Does the drug need to penetrate the cornea?
3. If infectious, what organism is most likely?
4. Is inflammation present?
5. Is tear production normal?
6. Is intraocular pressure increased?



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How to Choose an Ophthalmic Drug

1. **Is there a corneal ulcer?**

Perform a fluorescein stain

1. If YES: avoid corticosteroids and NSAIDs
2. Focus on antibiotics, antifungals (especially horses), pain control (atropine)

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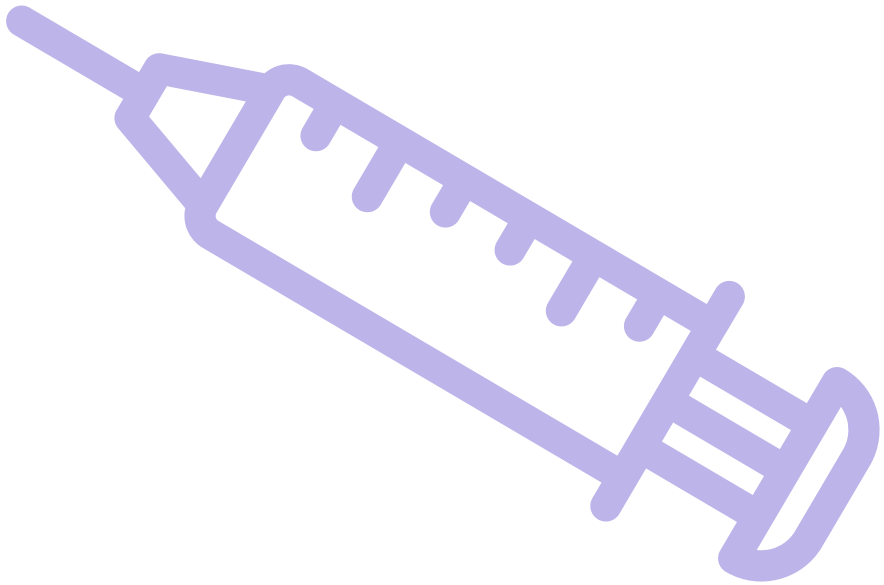
How to Choose an Ophthalmic Drug

2. Does the drug need to penetrate the cornea?

If infection is within the cornea (stromal disease), choose drugs that penetrate intact corneal epithelium

Examples:

1. Fluoroquinolones
2. Chloramphenicol
3. Voriconazole



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How to Choose an Ophthalmic Drug

3. What organism is most likely?

Use signalment and species clues

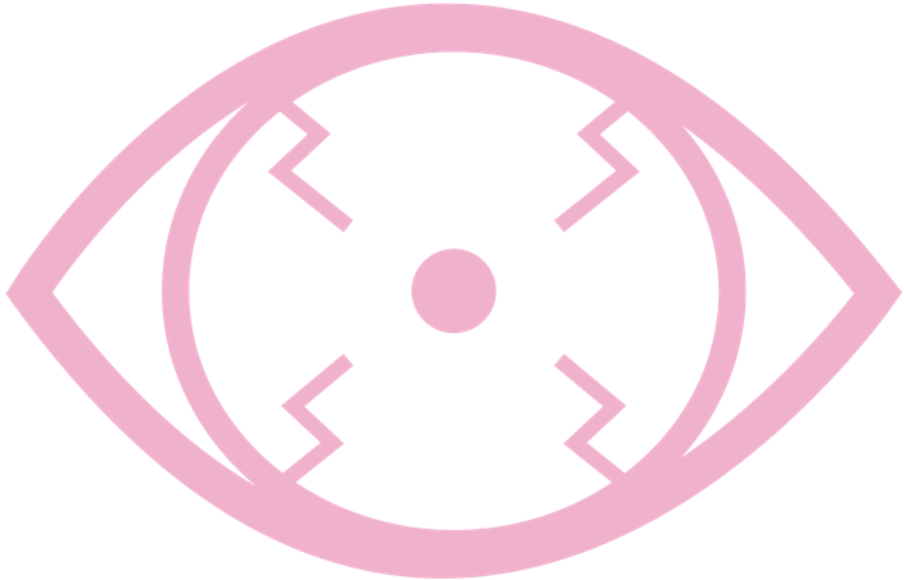
Species	Common Pathogens
Dogs: Infected Corneal Ulcer	*Staphylococcus, Streptococcus*
Cats: Conjunctivitis	*Chlamydia, Mycoplasma*, FHV-1
Horses: Corneal Infections	*Staphylococcus, Streptococcus*, fungal organisms

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How to Choose an Ophthalmic Drug

4. Is inflammation present?

Anti-inflammatory therapy may be appropriate (corticosteroids vs. NSAIDs)



Examples:

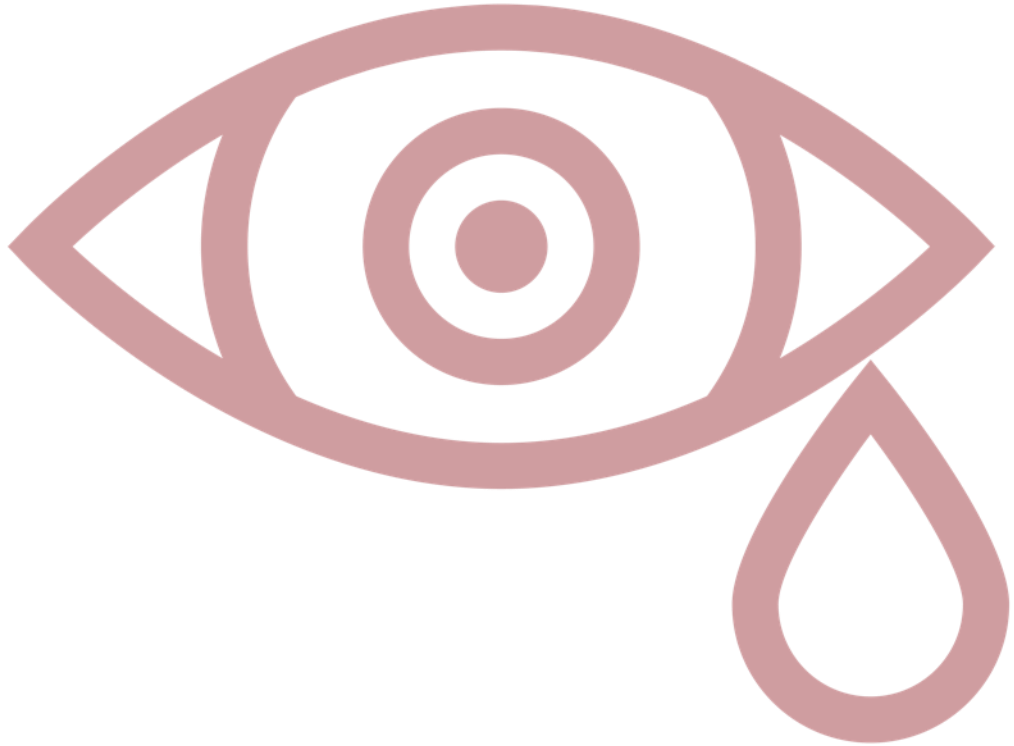
1. Uveitis
2. Allergic conjunctivitis
3. Immune-mediated keratitis

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How to Choose an Ophthalmic Drug

5. Is tear production normal?

Consider lacrimostimulants for keratoconjunctivitis sicca



Options:

1. Cyclosporine
2. Tacrolimus
3. Combine with lacrimomimetics

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How to Choose an Ophthalmic Drug

6. Is intraocular pressure elevated?

If glaucoma is suspected, initiate treatment with drugs that reduce aqueous humor production

Examples:

1. Dorzolamide/Timolol
2. Latanoprost (primary glaucoma in dogs, contraindicated if anterior lens luxation is present)

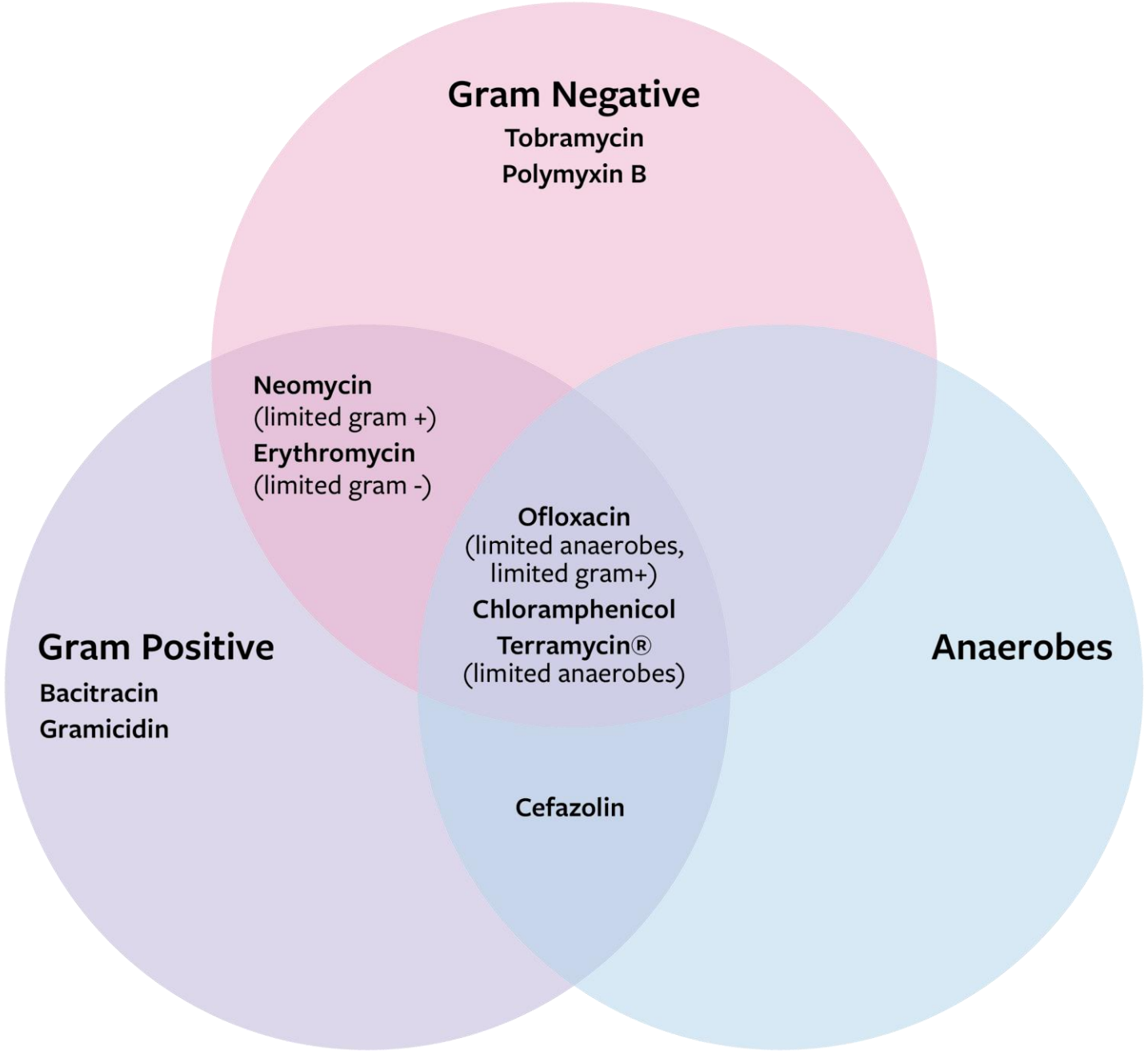
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First-Line Therapies

Disease	First-line Therapy
Simple corneal ulcer	Neo-Poly-Bac (dog, horse), erythromycin (cat)
Infected corneal ulcer	Fluoroquinolone (ofloxacin) + cefazolin. Ideally perform culture & sensitivity. Antifungal (voriconazole) in horses.
Stromal abscess	Fluoroquinolone (ofloxacin) for small animals + voriconazole for horses
Feline conjunctivitis (suspect bacterial)	Erythromycin
FHV-1 keratoconjunctivitis	Cidofovir
Keratoconjunctivitis Sicca	Cyclosporine
Glaucoma	Dorzolamide + Timolol (Cosopt®)
Equine Fungal Keratitis	Voriconazole

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Spectrum of Commonly Used Ophthalmic Antibiotics



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Penetration of Ophthalmic Antibiotics

Antibiotic Class	Do Not Penetrate	Penetrate
Cephalopsorins • Cefazolin	✓	
Aminoglycosides • Neomycin • Tobramycin	✓	
Cyclic Polypeptides • Bacitracin • Polymixin B	✓	
Macrolides • Erythromycin	✓	
Tetracyclines • Terramycin ® (oxytetracyclie + polymyxin B)	✓	
Fluoroquinolones • Ofloxacin		✓
Chloramphenicol		✓

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Choosing Ophthalmic Antibiotics

Clinical Problem	Key Therapeutic Principle	Example Drugs
Simple corneal ulcer	• Prevent infection	Neo-Poly-Bac, Erythromycin
Corneal ulcer with infiltrate and/or stromal loss (indicating infection)	• Treat infection + corneal penetration • Ideally guided by culture and susceptibility	Fluoroquinolone (ofloxacin) + cefazolin (gram+), or chloramphenicol. If a horse, + antifungal (voriconazole)
Stromal abscess	• Corneal penetration + broad spectrum • Epithelium intact → culture often not possible	Fluoroquinolone (ofloxacin). If a horse, + anti-fungal (voriconazole)
Suspected Pseudomonas infection	• Strong gram-negative coverage	Tobramycin, Polymyxin B (in combination)
Feline bacterial conjunctivitis	• Target *Chlamydia felis and Mycoplasma spp.*	Erythromycin

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Neo-Poly-Bac or Neo-Poly-Gram

Class	**Aminoglycoside (Neomycin), Cyclic Polypeptides (Polymyxin B, Bacitracin, Gramicidin)**
Mechanism	Neomycin: Inhibits 30s bacterial ribosomes Polymyxin B/Gramicidin: Disrupts bacterial cell membranes Bacitracin: Inhibits cell wall synthesis
Primary Indications	1. Prevention of infection of simple corneal ulcers
Spectrum	Neomycin: Gram-negative aerobes, limited gram-positive Polymyxin B: Gram-negative aerobes Bacitracin/Gramicidin: Gram-positive aerobes
Penetration	**Does not penetrate intact corneal epithelium**
Adverse Effects	1. Ocular irritation 2. !!! **Potential hypersensitivity reactions and/or anaphylaxis in cats due to Polymyxin B component**
Practical Considerations	1. Combination of antibiotics broadens spectrum 2. !!! **Make sure your tx does not contain a steroid if treating a corneal ulcer!**
Dose(s)	Neo-Poly-Bac Ointment: ¼" strip in affected eye(s) 3-4x daily Neo-Poly-Gram Solution: 1 drop in affected eye(s) 3-4x daily





Clinical Pearl: Polymyxin may cause anaphylaxis in cats!

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Cefazolin



Class	**1st Generation Cephalosporin**
Mechanism	Inhibits bacterial cell wall synthesis
Primary Indications	1. Infected corneal ulcer
Spectrum	• Gram-positive aerobes • Anaerobes
Penetration	**Does not penetrate intact corneal epithelium**
Adverse Effects	1. Ocular irritation
Practical Considerations	1. Not commercially available but easily made from injectable form or compounding pharmacy 2. Extra-label use of cefazolin is prohibited in major food animal species
Dose	• 1 drop to the affected eye(s) every 2-8 hours

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Ofloxacin 0.3% Soln

Class	**2nd Generation Fluoroquinolone**
Mechanism	Inhibits bacterial DNA-gyrase, preventing bacterial DNA replication
Primary Indications	1. Infected corneal ulcer 2. Bacterial stromal abscess
Spectrum	• Gram-negative aerobes • Some gram-positive aerobes • Limited anaerobes
Penetration	**Penetrates intact corneal epithelium**
Adverse Effects	1. Ocular irritation
Practical Considerations	1. Not associated with retinal toxicity (cats) or arthropathy (dogs) like systemic fluoroquinolones
Dose	1 drop in the affected eye(s) every 2 to 8 hours



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Tobramycin 0.3% Soln or Ointment

Class	**Aminoglycoside**
Mechanism	Binds 30s bacterial ribosomal subunit to inhibit bacterial protein synthesis
Primary Indications	1. Superficial ocular infections 2. Corneal ulcers with stromal loss in combination with an antibiotic that penetrates corneal epithelium
Spectrum	Gram-negative aerobes, good activity against P. aeruginosa
Penetration	**Does not penetrate intact corneal epithelium**
Adverse Effects	1. Ocular irritation
Practical Considerations	1. Good choice when *Pseudomonas* infection is suspected
Dose	1 drop in the affected eye(s) 3-4 x daily



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Chloramphenicol 0.5% Soln

Class	**Amphenicol**
Mechanism	Binds 50s ribosomal subunit to inhibit bacterial protein synthesis
Primary Indications	1. Infected corneal ulcers
Spectrum	• Gram-negative aerobes, ineffective against *P. aeruginosa* • Gram-positive aerobes • Anaerobes
Penetration	**Penetrates intact corneal epithelium**
Adverse Effects	1. Ocular irritation 2. Rare bone marrow toxicity in humans – wear gloves!
Practical Considerations	1. Avoid in food animals
Dose	1 drop in the affected eye(s) every 2 to 8 hours



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Terramycin® (Oxytetracycline + Polymyxin B)

Class	**Tetracycline and Cyclic Polypeptide**
Mechanism	Oxytetracycline: Binds 30s bacterial ribosomal subunit to inhibit bacterial protein synthesis Polymyxin B: Disrupts bacterial cell membranes
Primary Indications	1. Prevention of infection of simple corneal ulcers 2. Infectious keratoconjunctivitis (Bovine, Sm. Ruminants)
Spectrum	• Gram-negative aerobes • Gram-positive aerobes • Limited anaerobes
Penetration	**Does not penetrate intact corneal epithelium**
Adverse Effects	1. Ocular irritation 2. !!! **Caution in cats (risk of anaphylaxis due to Polymyxin B)**
Practical Considerations	1. Veterinary-labeled product
Dose	¼" strip in the affected eye(s) 3-4x daily



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Erythromycin 0.5% Ointment

Class	**Macrolide**
Mechanism	Binds 50s bacterial ribosomal subunit to inhibit bacterial protein synthesis
Primary Indications	1. Prevention of infection of simple corneal ulcers 2. Infectious conjunctivitis in cats
Spectrum	• Gram-positive • Gram-negative • Intracellular: *Chlamydia spp.* and *Mycoplasma spp.*
Penetration	**Does not penetrate intact corneal epithelium**
Adverse Effects	1. Ocular irritation 2. !!! **Caution in pocket pets** due to risk of potentially fatal GI adverse effects if ingested through grooming
Practical Considerations	1. Only available in an ointment formulation
Dose	¼" strip in the affected eye(s) 3-4x daily



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Choosing an Ophthalmic Antifungal

Medication	Natamycin 5%	Amphotericin B	Voriconazole 1%
Class	Polyene Antifungal	Polyene Antifungal	Azole Antifungal
Penetration	Does not penetrate corneal epithelium	Does not penetrate corneal epithelium	Penetrates corneal epithelium
Spectrum	*Candida, Aspergillus, Cephalosporium, Fusarium, Penicillium* (better for filamentous organisms)	*Aspergillus, Blastomyces, Candida, Coccidioides, Cryptococcus* (better for yeast organisms)	Most fungi susceptible, particularly *Aspergillus*
Indication	Ulcerative fungal keratitis	Ulcerative fungal keratitis. Can be used as an injection (subconjunctival, intrastromal) for stromal abscesses. Can be irritating.	Part of 1st line treatment for infected corneal ulcers in horses and camelids due to their propensity for fungal keratitis

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Polyene Antifungals

Examples	**Natamycin 5% Suspension, Amphotericin B**
Mechanism	Bind ergosterol in fungal cell membranes, creating pores and cell death
Primary Indications	1. Equine fungal keratitis
Spectrum	1. Natamycin 5%: Effective against *Candida, Aspergillus, Cephalosporium, Fusarium, Penicillium* 2. Amphotericin B: Wide spectrum, yeast > filamentous
Penetration	**Do not penetrate intact corneal epithelium**
Adverse Effects	1. Corneal irritation
Practical Considerations	1. Amphotericin B not commercially available but easily made from injectable form or compounding pharmacy 2. $$$ Natamycin may be cost prohibitive
Dose(s)	Natamycin 5% Susp: Instill 1-2 drops (or 0.1mL) into the affected eye every 4-6 hours, suspensions (as opposed to solutions) can precipitate and occlude the SPL Amphotericin B: Instill 1-2 drops (or 0.1mL) into the affected eye every 4-6 hours



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Azole Antifungals



Examples	**Voriconazole 1%**
Mechanism	Inhibits ergosterol synthesis
Primary Indications	1. Ulcerative and nonulcerative keratomycosis 2. Stromal abscesses
Spectrum	Most fungi susceptible, particularly *Aspergillus*
Penetration	**Penetrates intact corneal epithelium**
Adverse Effects	1. Ocular irritation
Practical Considerations	1. First-line medication for infected corneal ulcers in horses (not dogs and cats) 2. Not commercially available but easily made from injectable form or compounding pharmacy 3. More effective against filamentous fungal organisms than polyene or other azole antifungal agents
Dose(s)	• 1 drop to the affected eye(s) every 4-6 hours • 0.1mL in the SPL catheter, every 4-6 hours

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Choosing An Antiviral

	Cidofovir 0.5% soln	Ganciclovir 0.15% gel	Famciclovir	GS-441524
Mechanism of Action	Selective inhibition of viral **DNA** synthesis	Selective inhibition of viral **DNA** synthesis	Inhibits herpesvirus **DNA** polymerase, terminating viral replication	Nucleoside analogue, inhibits **RNA** viral synthesis
Route of Administration	Topical	Topical	Oral	Oral
Frequency of Administration	2x daily	3-5x daily	2x daily	2x daily
Indication	Herpes-virus induced ocular surface disease	Herpes-virus induced ocular surface disease	Feline Herpesvirus-1	Feline Infectious Peritonitis

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Topical Antivirals

Examples	**Cidofovir 0.5% soln, Ganciclovir 0.15% gel, Idoxuridine 0.1% soln/ointment**
Mechanism	Inhibit viral DNA synthesis or replication
Primary Indications	1. Herpes-virus induced ocular surface disease
Spectrum	DNA virus (Herpes viruses)
Adverse Effects	1. Cidofovir: ocular irritation
Practical Considerations	1. Cidofovir not commercially available but easily obtainable from compounding pharmacies 2. Idoxuridine rarely used as frequency of administration limits compliance
Dose(s)	**Cidofovir:** 1 drop to the affected eye(s) 2x daily **Ganciclovir:** 1. Cats: 1 drop to the affected eye(s) 3-5x daily 2. Dogs: 1 drop to the affected eye(s) 3-5x daily **Idoxuridine:** 1. All species: 1 drop or ¼" strip to the affected eye(s) 6-8 x daily

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Oral Antivirals for Herpes Viruses

Examples	Famciclovir
Mechanism	Inhibits herpesvirus DNA polymerase and viral replication
Primary Indications	1. Feline Herpesvirus-1: improves ocular and respiratory signs
Adverse Effects	1. Uncommonly may cause vomiting, diarrhea, polydipsia, and hypersalivation
Practical Considerations	1. Human-labeled products are preferred over compounded formulations due to concerns of inconsistent formulation 2. Useful with concurrent upper respiratory signs or if the cat is not amenable to topical treatment 3. May be beneficial in severe or recurrent cases
Dose	90 mg/kg PO BID



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Oral Antivirals for Feline Infectious Peritonitis

Examples	**GS-441524**
Mechanism	Adenine analogue, inhibits RNA viral synthesis
Primary Indications	1. Uveitis associated with Feline Infectious Peritonitis
Adverse Effects	1. Minimal, but increased liver enzymes, eosinophilia, and lymphocytosis have been observed
Practical Considerations	1. Must be obtained from a compounding pharmacy 2. $$$ May be cost prohibitive
Dose	15-20 mg/kg q24 hrs or split q12 hrs NOTE: higher dosages needed with ocular involvement



Tablet size compared to a U.S. dime

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Choosing an Ophthalmic Corticosteroid

	Prednisolone Acetate 1% Suspension	Neo-Poly-Dex Suspension or Ointment	Neo-Poly-Bac-Hydrocortisone
Penetration	Good intraocular penetration	Decent intraocular penetration	**Does not penetrate** corneal epithelium
Clinical Indication(s)	1. Anterior Uveitis 2. Allergic Conjunctivitis 3. Immune-Mediated Keratitis	1. Equine anterior uveitis 2. Non-infectious conjunctivitis 3. Post-surgical inflammation with infection risk	Limited due to lack of penetration and weak anti-inflammatory effects
Contraindication(s)	1. Corneal ulcer 2. Caution in patients with uncontrolled KCS 3. May cause recrudescence of FHV-1 clinical disease	1. Corneal ulcer 2. Caution in patients with uncontrolled KCS 3. May cause recrudescence of FHV-1 clinical disease	1. Corneal ulcer 2. Caution in patients with uncontrolled KCS 3. May cause recrudescence of FHV-1 clinical disease

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Prednisolone Acetate 1%

Mechanism	Inhibit phospholipase A_2 and subsequently cyclooxygenase and lipoxygenase pathways
Primary Indications	1. Anterior Uveitis 2. Allergic Conjunctivitis
Penetration	**Does penetrate corneal epithelium → preferred for uveitis**
Adverse Effects	1. Avoid with bacterial, viral, or fungal ocular infections 2. May delay corneal wound healing
Practical Considerations	1. !!! **Never use with a corneal ulcer or stromal abscess!** 2. No proven effect on diabetic regulation in dogs
Dose	1. 1 drop in the affected eye(s) every 6-24 hours



Clinical Pearl: Never use with a corneal ulcer or stromal abscess!

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Neo-Poly-Dex Suspension or Ointment

Class	**Antibiotic-Steroid Combination**
Components	Neomycin: Aminoglycoside antibiotic Polymyxin B: Cyclic polypeptide antibiotic Dexamethasone: Corticosteroid
Primary Indications	1. Non-infectious conjunctivitis 2. Anterior uveitis 3. Post-surgical inflammation with infection risk
Penetration	**Somewhat limited intraocular penetration**
Adverse Effects	1. Secondary corneal infections 2. May delay corneal wound healing 3. !!! **Anaphylaxis risk in cats (polymyxin B)**
Practical Considerations	1. !!! **Never use with a corneal ulcer or stromal abscess!** 2. Preferred in horses with anterior uveitis due to availability as an ointment 3. No proven effect on diabetic regulation in dogs
Dose	1 drop or 1/4” strip in the affected eye(s) every 6-24 hours



Clinical Pearl: Ointment is easier to administer than drops in horses with anterior uveitis

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Choosing an Ophthalmic NSAID

	Diclofenac 0.1% soln	Flurbiprofen 0.03% soln
Indication(s)	1. Corneal inflammation 2. Anterior segment inflammation	1. Corneal inflammation 2. Anterior segment inflammation
Comparison to Corticosteroids	1. Less potent 2. Safer for long-term use	1. Less potent 2. Safer for long-term use
Potency	Higher concentration → greater potency	Less potent than Diclofenac
Toxicity	Highly toxic to birds, do not use in avian species	Safe to use in birds
Contraindications	Avoid with corneal ulcers	Avoid with corneal ulcers

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Diclofenac 0.1% Solution

Mechanism	Inhibition of cyclooxygenase enzymes which inhibits prostaglandin production
Primary Indications	1. Corneal inflammation 2. Anterior segment inflammation
Adverse Effects	1. Transient ocular irritation 2. Delayed corneal wound healing 3. Rare systemic adverse effects including GI bleeding or ulceration 4. Highly toxic to birds
Practical Considerations	1. Avoid with corneal ulcers 2. Do not use in avian species
Dose	1 drop to the affected eye(s) every 6-12 hours



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Flurbiprofen 0.03% Soln

Mechanism	Inhibition of cyclooxygenase enzymes which inhibits prostaglandin production
Primary Indications	1. Corneal inflammation 2. Anterior segment inflammation
Adverse Effects	1. Transient ocular irritation 2. Delayed corneal wound healing 3. Rare systemic adverse effects including GI bleeding or ulceration
Practical Considerations	1. Avoid with corneal ulcers 2. NSAID of choice in birds
Dose	1 drop to the affected eye(s) every 6-12 hours



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Immunomodulatory/Lacrimostimulant Drugs

	Cyclosporine	Tacrolimus
Clinical Uses	1. First-line treatment for keratoconjunctivitis sicca 2. Chronic superficial keratitis (pannus) 3. Pigmentary keratitis	1. Preferred for pigmentary keratitis 2. Cyclosporine-refractory keratoconjunctivitis sicca
Practical Considerations	1. Does not penetrate corneal epithelium, not a treatment option for anterior uveitis 2. Pricier than other ophthalmic medications, but generally not cost prohibitive	1. Greater potency than cyclosporine 2. Greater effect than cyclosporine on reducing corneal pigment 3. Does not penetrate corneal epithelium, not a treatment option for anterior uveitis 4. Pricier than other ophthalmic medications, but generally not cost prohibitive
Contraindications	1. Infected corneal ulcer 2. Ruptured globe	1. Infected corneal ulcer 2. Ruptured globe

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Cyclosporine



Mechanism	Inhibits IL-2 to prevent T-cell activation
Primary Indications	1. Keratoconjunctivitis Sicca (Dry eye) 2. Pigmentary Keratitis 3. Chronic Superficial Keratitis (Pannus)
Adverse Effects	1. Mild, local irritation 2. Avoid with active bacterial/viral infections
Practical Considerations	1. Commercially available as a 0.2% ophthalmic ointment 2. Pricier than other ophthalmic medications, but generally not cost prohibitive 3. May be compounded into a 1 or 2% solution, suspension, or ointment 4. May take 4-6 weeks of treatment for clinical improvement 5. Animals that do not respond to the 0.2% ointment may benefit from higher concentrations 6. Sustained-release implants have been developed for equine recurrent uveitis and immune-mediated keratitis in horses, and have been utilized for KCS in dogs
Dose(s)	1/4” strip to the affected eye(s) every 12 hours

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Tacrolimus



Mechanism	Inhibits IL-2 to prevent T-cell activation
Primary Indications	1. Cyclosporine-refractory keratoconjunctivitis sicca 2. Pigmentary keratitis 3. Chronic superficial keratitis (pannus)
Adverse Effects	1. Mild, local irritation
Practical Considerations	1. Compounded as 0.02, 0.03, 0.3, 0.5, and 1% solution, suspension, and ointment 2. May be beneficial in patients that do not respond adequately to topical cyclosporine 3. Pricier than other ophthalmic medications, but generally not cost prohibitive
Dose	1 drop to the affected eye(s) every 12 hours

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Lacrimomimetics/Lubricants

Mechanism: Mimic tear film



Indications:

1. Quantitative or qualitative keratoconjunctivitis sicca
2. Patients undergoing sedation or general anesthesia

Considerations:

1. Many products available
   a) Ointments: Artificial Tears, Puralube, etc.
   b) Gels: Optixcare, Genteal, etc.
   c) Solutions not useful
2. Not a treatment for KCS, but supports ocular surface health while waiting for cyclosporine to take effect



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Antiglaucoma Drugs

	Dorzolamide 2%	Brinzolamide 1%	Latanoprost 0.005%	Timolol 0.5%	Cosopt® (Dorzolamide 2% + Timolol 0.5%)
Mechanism of Action	Carbonic Anhydrase Inhibitor	Carbonic Anhydrase Inhibitor	Prostaglandin Analogue	Beta Blocker	Carbonic Anhydrase Inhibitor + Beta Blocker
Adverse Effects	1. Can cause marked conjunctivitis, keratitis, and/or periocular dermatitis 2. May cause metabolic acidosis and hypokalemia in cats	1. Better tolerated due to less acidic pH 2. May cause metabolic acidosis and hypokalemia in cats	1. Corneal irritation 2. Conjunctival hyperemia, epiphora, and blepharospasm in horses	1. Caution in patients with heart disease, asthma, or chronic bronchitis	1. Mild ocular irritation 2. Caution in small dogs, cats, and smaller species due to beta-blocker effects
Practical Considerations	1. May sting when administered	1. May be cost prohibitive	1. Limited efficacy in cats and horses 2. Avoid in patients with anterior uveitis or anterior lens luxation 3. Potent miotic	1. Limited efficacy as monotherapy 2. May cause miosis in cats	1. Mainstay of glaucoma therapy across species

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Carbonic Anhydrase Inhibitors

Examples	**Dorzolamide 2% soln, Brinzolamide 1% susp**
Mechanism	Inhibit carbonic anhydrase isoenzyme II, decrease aqueous production reduce IOP
Primary Indications	1. Primary or secondary glaucoma
Adverse Effects	1. Dorzolamide can cause a marked conjunctivitis, keratitis, and/or periocular dermatitis, may sting when administered 2. Brinzolamide may be better tolerated because of less acidic pH 3. May cause metabolic acidosis and hypokalemia in cats
Practical Considerations	1. $$$ Brinzolamide may be cost prohibitive 2. 25-30% IOP reduction in normal cats, dogs, and horses
Dose(s)	Dorzolamide: 1 drop to the affected eye(s) 3 times daily Brinzolamide: 1 drop to the affected eye(s) 2-3 times daily





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Prostaglandin Analogues

Examples	**Latanoprost 0.005% Soln**
Mechanism	Prostaglandin $F_{2\alpha}$ analog, increases uveoscleral outflow via remodeling of ECM of ciliary body, reducing IOP
Primary Indications	1. Primary or secondary glaucoma
Adverse Effects	1. Corneal irritation 2. Conjunctival hyperemia, epiphora, and blepharospasm in horses
Practical Considerations	1. !!! **Avoid using in patients with anterior uveitis or anterior lens luxation** 2. Potent miotic 3. 25-60% IOP reduction in dogs 4. Limited efficacy in cats and horses
Dose	1 drop to the affected eye(s) twice daily



Clinical Pearl: Avoid using in patients with anterior uveitis or anterior lens luxation

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Beta Blockers

Examples	**Timolol 0.5% soln**
Mechanism	Unknown, thought to limit blood flow to ciliary body, limiting aqueous humor production and reducing IOP
Primary Indications	1. Primary or secondary glaucoma
Adverse Effects	1. May cause miosis in cats 2. Caution in patients with heart disease, asthma, or chronic bronchitis
Practical Considerations	1. Limited efficacy as a sole agent
Dose	1 drop to the affected eye(s) twice daily



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Combination Antiglaucoma Medications

Examples	**Dorzolamide 2%/Timolol 0.5% Soln (Cosopt®)**
Mechanism	Combination of carbonic anhydrase inhibitor and beta blocker
Primary Indications	1. Primary or secondary glaucoma
Adverse Effects	1. Mild ocular irritation 2. Caution in small dogs, cats, and smaller species due to beta-blocker effects
Practical Considerations	1. Mainstay of medical therapy for glaucoma across species
Dose	1 drop to affected eye(s) 2-3 times daily



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Mydriatics and Cycloplegics

Mydriatic: induces dilation of the pupil

- Indications: examination of the posterior segment, surgery of the lens or posterior segment, prevention of posterior synechiae with uveitis

Cycloplegic: induces paralysis of the ciliary muscle

- Indications: analgesia for uveitis (spasm of ciliary muscle)

NOTE: All cycloplegics are mydriatics, not all mydriatics are cycloplegics

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Mydriatics

Medication	Atropine Sulfate 1%	Tropicamide 1%	Phenylephrine Hydrochloride 2.5%
Class	Parasympatholytic	Parasympatholytic	Direct-acting sympathomimetic
Mechanism	Paralyzes iris and ciliary body smooth muscles	Paralyzes iris and ciliary body smooth muscles	Stimulates iris dilator muscle
Cycloplegic?	Yes	Yes	No
Onset	~ 1 hour	~15 minutes	~ 20 minutes
Duration	Days to weeks	2-12 hours	~5 hours
Clinical Uses	1. Analgesia for uveitis 2. Prevention of posterior synechia 3. Dilation for cataract surgery	1. Lens and fundic examination	1. Dilation for cataract sx 2. Vasoconstriction limits hemorrhage during ocular surgeries
Contraindications	1. Elevated IOP 2. Lens instability 3. Caution in patients with KCS	1. Elevated IOP 2. Lens instability	1. Use caution in patients with hypertension 2. Monitor for adverse cardiovascular effects

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Atropine Sulfate 1%

Class	Mydriatic/Cycloplegic
Mechanism	Nonselective muscarinic receptor antagonist (Parasympatholytic)
Primary Indications	1. Anterior uveitis (pain relief, prevent synechiae) 2. Corneal ulcers (pain management for reflex uveitis) 3. Not used for diagnostic pupil dilation due to long duration of effect
Adverse Effects	1. !!! **Contraindicated in patients with primary glaucoma** 2. Use minimum frequency necessary in horses due to small risk of colic 3. Ocular irritation
Practical Considerations	1. May cause excessive drooling in cats 2. Warn owners of photophobia, sensitivity to bright lights
Dose	1. 1 drop in the affected eye(s) once, or 1-2x daily



Clinical Pearl: Never use in patients with glaucoma. Red cap = caution!

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