

	Options	Clinical Uses	Special Properties	Ocular Side Effects	Systemic Side Effects	Contra-indications	Drug Interactions
<b>Anti- muscarinics</b> (mydriasis)	<p>1. <b>tropicamide</b> (.25-1%) -quick acting, short action (6 hrs) -weak cycloplegia -safest -cycloplegia inadequate in young children</p> <p>2. <b>cyclopentolate</b> (0.5-2%) -quick, longer -best cycloplegia! (esp for children)</p> <p>3. <b>homatropine</b> (2-5%) -slower onset, longer (1-3 days) -low potency cycloplegia -optical/therapeutic</p> <p>4. <b>scopolamine</b> (0.25%) (hyoscine, anti-emetic) -slow onset, much longer -very potent -therapeutic uses</p> <p>5. <b>atropine</b> (0.5-2%) -slower onset, longer (6-12 days) -very potent (most potent myd./cyc.)</p> <p>6. <b>pirenzepine</b></p>	<p><b>A. Diagnostic</b> -mydriasis &gt;&gt; -cycloplegia</p> <p><b>B. Therapeutic</b> -optical aid (CAT) -uveitis -amblyopia Tx -myopic control (atropine/pirenzepine)</p> <p>-reduced efficacy with repeated use -use more potent cycloplegics for young kids and accomm. ET -higher dose for cycloplegia, dark irides, young kids -antimuscarinic + sympathomimetic for incr. mydriasis in resistant diabetic =longer acting drugs for uveitis/optical effect</p>	<p>-reversibility</p> <p>-specificity &amp; selectivity of either muscarinic subtype or muscarinic itself</p> <p>-good lipid solubility</p>	<p>-allergies (toxic keratitis, contact dermatitis esp with ung)</p> <p>-peripheral ocular stinging</p> <p>-increased IOP (at risk: incr. IOP, narrow angles, POAG)</p>	<p>-tachycardia -urinary retention -hypotension -respiratory depression -grand mal seizures -coma -death -flushing -fever/thirst</p> <p><u>CNS:</u> -headache -psychose/behav. Disturbance -esp. with infants, young kids, light pigmentation, down's syndrome, brain damaged, spastic paralysis) -w/ cyclopentolate, atropine, scopolamine</p>		<p>-Parkinson's disease (anti-M)</p> <p>-asthma (anti-M)</p> <p>-Alzheimer's disease (anticholinesterases)</p> <p>-Myasthenia gravis (anticholinesterases)</p>

**Muscarinic Agonists**  
(miotics)

Options	Clinical Uses	Special Properties	Ocular Side Effects	Systemic Side Effects	Contra-indications	Drug Interactions
<p><b>ALL...</b></p>	<p><u>ALL:</u> -miosis (reverse mydriasis) -diagnose Aide's &amp; fixed dilated pupil -glaucoma therapy</p>	<p><u>ALL:</u> -pupil miosis -accommodative spasm -increased aqueous outflow -increased tear production</p>	<p>-blurry vision -retinal detach. -conj. hyperemia, burning -follicular (blepharo)conjunctivitis (allergy) -band keratopathy (pilocarpine) -increased progression CATs b/c Ach receptors on lens -pupillary block GLC -lid muscle twitching</p>	<p>-PS effects (bradycardia etc) -brow ache, HA -nausea, vomit -muscle weakness</p> <p><u>Tx:</u> -parenteral atropine (direct agonists) -pralidoxime (anticholinesterases)</p>	<p>?</p> <p>-asthma -cardiac failure -peptic ulcers -urinary retention -Parkinson's disease -hyperthyroidism -uveitic GLC</p>	
<p><u>DIRECTLY ACTING:</u> <b>1. acetylcholine</b> (full) -not active topically -very short acting -low toxicity <b>2. pilocarpine</b> (partial) -short acting (2-4 hr) partial agonist -pigment binding -paradoxical cycloplegia (POAG) <b>3. methacholine</b> (full) <b>4. carbachol</b> (full) <b>5. aceclidine</b> (full) -minimal ciliary muscle spasm</p>						
<p><u>INDIRECTLY ACTING:</u> (anticholinesterases) <b>1. physostigmine</b> -eserine -pediculosis -antidote <b>2. echothiophate</b> -irreversible -antidote -low lipid solubility (poor corneal abs., slow onset, low CNS penetration) <b>3. dyflos (DFP)</b> -irreversible -lipid soluble (good corneal abs., rapid onset, higher CNS penetration) <b>4. edrophonium</b> -Tensilon test <b>5. neostigmine</b> -myasthenia gravis <b>6. pyridostigmine</b> -myasthenia gravis</p>	<p><u>INDIRECTLY ACTING:</u> -Dx/Tx accomm. ET (increase accomm. gain to decrease convergence) -break synechia -myasthenia gravis -antidote for anticholinergic drugs -pediculosis (physostigmine ung)</p>	<p>-generally longer acting than direct  -vasodilation (increase permeability of BA/BB barriers)  -unstable in soln.</p>	<p>-pupillary margin iris cysts -anterior subcapsular cataract -activation latent uveitis -posterior synechia -punctal stenosis</p>			<p>-succinylcholine (respiratory paralysis) -Myasthenia gravis (anticholinesterase) -Alzheimer's disease (e.g. revastigmine) -organophosphate insecticides/pesticides</p>

	Options	Mydriatic choices	Special Properties	Ocular Side Effects	Systemic Side Effects	Contra indications	Drug Interactions	
<b>Adrenergic Agonists</b> (mydriatics)	<u>Mydriatic/cycloplegic combos:</u>  1. 0.25% tropicamide + 1% hydroxyamphetamine  2. 0.2% cyclopentolate + 1% phenylephrine  3. 0.3% scopolamine + 10% phenylephrine  → reduced side effects	<b>In general...</b>  w/ IDA's mydriasis easier to reverse, denervation loss in sensitivity, tachyphylaxis to hypertension SE	-40-90 minute for max response -duration 5+ hours -pupil active -sector dilation possible -blue eyes more sensitive -older patients less responsive -denervation supersensitivity (DA)	-conjunctival blanching  -pupillary block GLC (narrow angles)	-skin blanching -altered cardiac rhythms -hypertensive crisis / subarachnoid hemorrhage / death: (idiopathic orthostatic hypotension, hypertension, cardiac disease, diabetics (insul. Dep), hyperthyroidism, advanced arteriosclerosis) -occipital headaches -CNS stimulation		For sympathomimetic mydriatics... -atropine (ocular) -sympathectomizing drugs (e.g reserpine, neuronal blockers) -MAO inhibitors -TCAs -methyphenidate (ADS)	
	<u>DIRECTLY ACTING:</u>  $\alpha_1$ selective: <b>1. phenylephrine</b> <b>2. naphazoline</b> <b>3. oxymetazoline</b> <b>4. tetrahydrozoline</b>  $\alpha_2$ selective <b>1. apraclonidine</b> <b>2. brimonidine</b>  nonselective $\alpha/\beta$ <b>1. epinephrine</b>	<b>1. phenylephrine</b> (0.12-10%, DA)		-oxidation problem -transient pain, lacrimation -keratitis? -corneal clouding (NB already damaged epi) -allergic dermatconjunctivitis -rebound conj. cong. w/ repeated use -pigment release from iris (esp. elderly, dark irides) -rebound pupil constriction in older people				
	<u>INDIRECTLY ACTING:</u>  <b>1. hydroxyamphetamine</b> -inhibits uptake 1, MAO, incr. NE release, $\alpha/\beta$ agonist?  <b>2. cocaine</b> -inhibits uptake 1  <b>3. ephedrine</b> -increases NE release, $\beta$ agonist	<b>2. hydroxyamphetamine</b> (1%, IDA)	<b>3. cocaine</b> (1-4%, IDA) -mydriatic use in Ddx of Horner's	-readily absorbed via mucosa into systemic circulation	-compared to phenylephrine, fewer at risk groups!  -corneal epi damage / erosions -corneal anesthesia	<u>CNS:</u> -incr. body temp -excitement, restlessness -rapid pulse, HA -GI upset -delirium, convulsions -respiratory depression -death		

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<b>Adrenergic Antagonists</b> <small>(miotic)</small>	<p><b>1. thymoxamine (0.5%)</b></p> <p><b>2. dapriprazole (0.5%)</b>            -variable action against anti muscarinics (pilocarpine better?)            -good actions against phenylephrine            -minimal risk of pupillary block (compare to pilocarpine)            -NO accommodative effect (pilocarpine has potential)</p>	<p>α selective</p> <p>-reversal of mydriasis (&amp; accomm.)            [phenylephrine, hydroxyamphetamine, tropicamide]</p> <p>-post CAT surgery miosis</p> <p>-DDx of GLC</p> <p>-Tx hyperthyroid lid retraction</p>		<p>-transient stinging, burning            -corneal edema            punctuate keratitis            -itchy dry eyes            -lid erythema &amp; edema            -conjunctival injection, edema            -ptosis (iatrogenic Horner's)            -decreases IOP</p> <p>→ don't reverse mydriasis unless absolutely necessary</p>	<p>-facial flushing            -vertigo            -GI upset            -headaches</p>		