

Geriatric Fast Fact #029

Systemic Effects of Ocular Medications I. Glaucoma and Pupillary Dilation

Ophthalmologic Condition: Glaucoma			
Drug Class/Mode of administration	Examples of common drugs	Systemic Effect	Contraindications
<p>α-2 adrenergic agonists Administration-Topical</p>	<ul style="list-style-type: none"> • Apraclonidine (more α1 activity) • Brimonidine (lipophilic, higher CNS penetration) 	<p>Cardiovascular: Bradycardia, hypotension, vasovagal symptoms GI: Dry mouth and nose (common), abnormal taste CNS (lipophilic agent only) CNS depression, somnolence, HA, fatigue^{2,3,4,5,6,8,9}</p>	<p>Do not use in patients taking a MAO inhibitor or with drugs that block re-uptake of epinephrine/norepinephrine^{2,4,5}</p>
<p>β- Adrenergic Antagonists (beta-blockers) Administration -Topical</p>	<ul style="list-style-type: none"> • Non-selective(β1/2): Levobunolol, Metipranolol, • Timolol • Non-selective with intrinsic sympathomim-etic activity: Carteolol • Selective β-1: Betaxolol 	<p>Side effects rare but more common in elderly or fragile patients -CNS : anxiety, confusion, fatigue, hallucinations, dysarthria -Cardiovascular : Bradycardia, heart block, arrhythmia, syncope, hypotension, dizziness, reduced exercise capacity -Respiratory : Bronchospasm, dyspnea, pulmonary failure -GI : Diarrhea, nausea, cramping -Endocrine : Reduces HDL, raise triglycerides, sexual dysfunction^{2,3,4,5,6}</p>	<p>Decompensated Heart failure Heart Block (any type) • safe with functioning pacemaker History of unexplained syncope, dizziness or pre-syncope Symptomatic bradycardia Asthma β1-selective agent can be used with well controlled mild-moderate disease COPD β1-selective likely safe based on systemic use of β1-selective oral agents in COPD patients^{3,7,8}</p>
<p>Carbonic Anhydrase Inhibitors • Oral & Topical</p>	<p>Oral: Acetazolamide Topical: Brinzolamide, Dorzolamide</p>	<p><u>Oral Administration:</u></p> <ul style="list-style-type: none"> • Renal: Metabolic acidosis, sodium and potassium wasting (all transient), urolithiasis, renal failure • GI: Metallic taste (common), nausea, vomiting, diarrhea, constipation, anorexia, GI bleed <p>-Nervous system: Parasthesias of fingers/toes (very common), confusion, lethargy, somnolence, fatigue -Hematologic: Aplastic</p>	<p><u>Oral Administration:</u> <u>Sulfonamide allergy</u> <u>Reduced kidney function (Dosage needs to be adjusted as acetazolamide plasma concentrations highly dependent on renal excretion)</u></p> <ul style="list-style-type: none"> • Concomitant use of loop or thiazide diuretics increases electrolyte

		<p>anemia(not dose or time dependent)</p> <p><u>Topical Administration:</u> Rarely serious</p> <p>-More common: Bitter taste, dry mouth</p> <p>-Rare: headache, nausea, fatigue, skin rash, urolithiasis^{2,3,5,9}</p>	<p>imbalance and risk of nephrolithiasis</p> <ul style="list-style-type: none"> • COPD/CO2 retainer (high risk for severe acidosis with metabolic acidosis combined with pre-existing respiratory acidosis) <p><u>Topical Administration:</u></p> <p>Sulfonamide allergy^{3,4,5,9}</p>
<p>Miotics (now rarely used for chronic glaucoma treatment)</p> <p>Administration: Topical</p>	<p><u>Direct cholinergic agonist:</u></p> <ul style="list-style-type: none"> • Acetylcholine, Pilocarpine, • <u>Indirect cholinergic agonist:</u> Carbachol • <u>Cholinesterase Inhibitor:</u> Echothiophate iodide 	<p>Common: periorbital pain/HA(Pilocarpine)</p> <p>Other systemic effects rare at recommended doses: diaphoresis, nausea, hypersalivation, bradycardia, hypotension, seizures, Hallucinations, coma^{2,3,5,6}</p>	<p>Avoid depolarizing agents like succinylcholine with use of cholinesterase inhibitors³</p>
<p>Prostaglandin Analogues (Prostaglandin F2α Receptor Agonist)</p> <p>Administration-Topical</p>	<p>Bimatoprost, Latanoprost, Tafluprost, Travoprost, Unoprostone isopropyl</p>	<p>Minimal to no specific Side Effects</p> <p>Most often reported but non-specific: flu-like/upper respiratory symptoms</p> <p>Theoretical stimulation of smooth muscle constriction (tracheobronchial, vascular, uterine)^{2,3}</p>	<p>Pregnancy Active ocular inflammation³</p>
<p>Ophthalmologic Condition: Pupillary Dilation</p> <p>(Secondary to Mydriatic and Cycloplegic Agents; Used for dilation during routine eye exam as well as for ocular inflammatory conditions)</p>			
<p>α-agonist</p> <p>-Topical</p>	<p>Phenylephrine</p>	<p>Hypertension, cardiac arrhythmias, angina, secondary CHF, pulmonary edema, subarachnoid hemorrhage</p> <p>Rare but serious, occur more frequently in patients with underlying poorly controlled cardiovascular disease³</p>	<p>10% formulation should never be used in patients with ischemic heart disease or hypertension</p> <p>2.5% formulation generally safe in all but neonates³</p>
<p>Cycloplegics (anti-muscarinic agents)</p> <p>-Topical</p>	<p>Atropine, Cyclopentolate, Scopolamine, Tropicamide</p>	<p>Acute urinary retention in elderly males with prostate enlargement (rare)</p>	<p>Well tolerated in all but very young³</p>

		Anti-cholinergic effects (dryness of mouth and skin, flushing, fever, irritability, tachycardia, confusion) Rare, occurs with over-dosing ^{3,5}	
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