

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</p> <p>GI: Dry mouth and nose (common), abnormal taste</p> <p>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 sympathomimetic activity: Carteolol • Selective β-1: Betaxolol 	<p>Side effects rare but more common in elderly or fragile patients</p> <p>-CNS : anxiety, confusion, fatigue, hallucinations, dysarthria</p> <p>-Cardiovascular : Bradycardia, heart block, arrhythmia, syncope, hypotension, dizziness, reduced exercise capacity</p> <p>-Respiratory : Bronchospasm, dyspnea, pulmonary failure</p> <p>-GI: Diarrhea, nausea, cramping</p> <p>-Endocrine: Reduces HDL, raise triglycerides, sexual dysfunction^{2,3,4,5,6}</p>	<p>Decompensated Heart failure Heart Block (any type)</p> <ul style="list-style-type: none"> • safe with functioning pacemaker <p>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</p> <ul style="list-style-type: none"> • Oral & Topical 	<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: Paresthesias of fingers/toes (very common), confusion, lethargy, somnolence, fatigue</p> <p>-Hematologic: Aplastic 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><u>Oral Administration:</u></p> <p><u>Sulfonamide allergy</u></p> <p><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 imbalance and risk of nephrolithiasis • 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>

Miotics (now rarely used for chronic glaucoma treatment) Administration: Topical	<u>Direct cholinergic agonist:</u> <ul style="list-style-type: none"> Acetylcholine, Pilocarpine, <u>Indirect cholinergic agonist:</u> Carbachol <u>Cholinesterase Inhibitor:</u> Echothiophate iodide 	Common: periorbital pain/HA(Pilocarpine) Other systemic effects rare at recommended doses: diaphoresis, nausea, hypersalivation, bradycardia, hypotension, seizures, Hallucinations, coma ^{2,3,5,6}	Avoid depolarizing agents like succinylcholine with use of cholinesterase inhibitors ³
Prostaglandin Analogues (Prostaglandin F2α Receptor Agonist) Administration-Topical	Bimatoprost, Latanoprost, Tafluprost, Travoprost, Unoprostone isopropyl	Minimal to no specific Side Effects Most often reported but non-specific: flu-like/upper respiratory symptoms Theoretical stimulation of smooth muscle constriction (tracheobronchial, vascular, uterine) ^{2,3}	Pregnancy Active ocular inflammation ³

Ophthalmologic Condition: Pupillary Dilation

(Secondary to Mydriatic and Cycloplegic Agents; Used for dilation during routine eye exam as well as for ocular inflammatory conditions)

α-agonist -Topical	Phenylephrine	Hypertension, cardiac arrhythmias, angina, secondary CHF, pulmonary edema, subarachnoid hemorrhage Rare but serious, occur more frequently in patients with underlying poorly controlled cardiovascular disease ³	10% formulation should never be used in patients with ischemic heart disease or hypertension 2.5% formulation generally safe in all but neonates ³
Cycloplegics (anti-muscarinic agents) -Topical	Atropine, Cyclopentolate, Scopolamine, Tropicamide	Acute urinary retention in elderly males with prostate enlargement (rare) Anti-cholinergic effects (dryness of mouth and skin, flushing, fever, irritability, tachycardia, confusion) Rare, occurs with over-dosing ^{3,5}	Well tolerated in all but very young ³