		Cholinergic Drug	Mechanism	Therapeutic Use
		Edrophonium	competitive antagonist (short half life)	diagnose myasthenia gravis
	bitors	Donepezil	competitive antagonist (long half life)	Alzheimer's
		Physostigmine	carbamyolation	treat acute glaucoma by causing miosis which moves iris away from canal of
	l id			Schlemman
	] e			reverse anticholinergic poisoning
	ACh-Esterase Inhibitors	Neostigmine		treatment of myasthenia gravis
				restore GI motility and urinary flow following surgery
23		Pyridostigmine		treatment of myasthenia gravis
nist		Organophosphates	phosphorylation (irreversible)	toxic nerve gas in biochemical warfare
Agonists		(Sarin)		insecticide
1	Muscarinic	Bethanecol	agonist resistant to ACh-Esterase	restore GI motility and urinary flow following surgery
		Carbechol	muscarine agonist	Treat acute glaucoma by causing miosis which moves iris away from canal of
				Schlemman
		Pilocarpine	muscarine agonist	Treat acute glaucoma by causing miosis which moves iris away from canal of
				Schlemman
		A A	4340	stimulate salivation in pts with xerostomia
		A A		CF Chloride Sweat Test
		Nicotine	DIOC	smoking cessation therapy
	ACh- EsteraseReac tivators	Pralidoxime	displaces organophosphate from irreversible	reverse cholinergic poisoning due to organophosphates
			phosphorylated active site on Ach-Esterase	
		A A		
1				
	Muscarinic	Atropine	competitive inhibitor (long half-life)	reverse cholinergic poisoning
		Benzatropine	compensate numbers (rong num me)	reduce tremors in Parkinson's disease
Antagonists		Tropicamide	competitive inhibitor (short half-life)	mydriasis (but in doing so there is an increase in intraocular pressure which can
		opiiaac	competitive immortal (orient num ime)	precipitate narrow angle glaucoma)
				cycloplegia (lose accommodation)
		Scopolamine		motion sickness
		Ipratropium Bromide		bronchodilator and decreases bronchial secretions therefore effective for
		Convright	2015 - Alexander	asthma and bronchitis
		Trimethaphan	competitive antagonist with the end effect on an	Primary Sympathetic in Artery/Vein thus resulting in hypotension
	Ganglionic Nicotinic	Hexamethonium	organ depending on which system (Sym or Para)	Primary Parasympathetic in Heart/Iris/GI thus resulting in tachycardia,
		Decamethonium	is the more dominant	mydriasis, decreased GI motility
	glic etin			,
	Gang lioni Nicotinic			
	0 2			

	Succinylcholine	unusual mechanism b/c this drug is an agonist	adjuvant for anesthesia
	(depolarizer)	that actually antagonizes,	relax muscle for orthopedic procedures and intubation, and electroshock
		there is initial stimulation resulting in	therapy (order of paralysis: face/fingers/toes > limbs/neck > intercostals
a		fasciculations but after a while the effect stops	muscles > diaphragm)
l lng		the muscle is a constant depolarized state so	N.B. prolonged apnea
nu ic		additional ACh can't elicit an AP in addition	N.B. can cause malignant hyperthermia when there is exists the combination of
ro tin		nicotinic receptors become desensitized after	succinylcholine + halothane + ryanodine receptor mutation resulting in
Neur		awhile THUS THE END EFFECT IS ANTAGONISM	hyperthermia and muscle rigidity
2 2			N.B. potential hyperkalemia b/c of tissue damage
_	D-Tobucurarine	true competitive antagonist	adjuvant for anesthesia
	Vecuronium		relax muscle for orthopedic procedures and intubation, and electroshock
	(non-depolarizer)		therapy
			N.B. prolonged apnea
			N.B. drug interactions with inhalational anesthetics, antibiotics, CCB by
			increasing their effects

## βB (Beta-Blockers)

β1>2 Blockers "Cardioselective" (best for the pts that have relative contraindications to bb noted below)

Atenolol (Tenormin) used for HTN/ischemia but rarely used, +chlorthalidone (Tenoretic)

Esmolol (Brevibloc) b/c very short half life (10min) used only to treat acute SVTs

Metoprolol Tartrate (Lopressor) +HCTZ (Lopressor HCT) BID dosing, used for HTN/ischemia

Metoprolol Succinate (Toprol XL) QD dosing, used for HTN/ischemia and CHF

Betaxolol (Kerlone)

Bisoprolol (Zebeta) +HCTZ (Ziac) CHF

Acebutolol (Sectral)

## **β1=2 Blockers "Non-Cardioselective"**

Propranolol (Inderal) used to treat mainly migraine, systemic catecholamine effects (hyperthyroidism, anxiety, pheo), portal HTN, SVTs

Timolol (Blocadren) as an ointment used to treat chronic glaucoma + HCTZ (Timolide)

Nadolol (Corgard) + bendroflumethiazide (Corzide)

Pindolol (?)

Sotalol (Betapace)

Penbutolol (Levatol)

Propranolol (?)

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β1=2 Weak Blockers "Intrinsic Sympathomimetic Activity – ISA" (not good for CHF, partial beta agonist in that they stimulate the beta receptor to which they are bound yet they inhibit stimulation by more potent endogenous catecholamines there in effect they are weak blockers)

Penbutolol (Levatol), Pindol (Visken) used for HTN/ischemia but rarely used

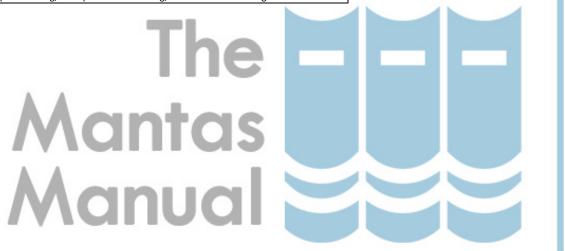
Acebutolol (Sectral) used to treat acute SVTs

Carteolol (Cartol) as an ointment used to treat chronic glaucoma

**β1=2,α1 Blockers "Beta/Alpha Blockers"** (best for pts who are in a hyper-catecholamine state 2/2 amphetamine/cocaine/MAOI use, clonidine withdrawal, pheochromocytoma, these patients are stimulating both alpha and beta and if you use any other BB there will be unopposed alpha resulting in severe vasoconstriction and thus MI, CVA, APVD, NB "-a/ilol" not "-olol", has minimal metabolic SEs therefore good in pts w/ DM) Carvedilol (Coreg) used for HTN/ischemia and CHF Labetalol (Trandate) used for HTN/ischemia and HTN emergency b/c can be given IV

Nevivolol (Bystolic) new BB that apparently is better than Coreg

- Coreg and Toprol XL are proven in CHF b/c they are long acting
- Labetalol can be titrated up to 2400mg, metoprolol is fast acting, esmolol is short acting



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#### Mechanism

- -β1
- -/+β2
- -α1
- decreased heart remodeling (CHF)
- decreased aqueous humor secretion (chronic glaucoma)
- decreased CNS vasodilation (migraines)
- decreased sympathetic effects (hyperthyroidism, anxiety, pheo)
- decreased RAS effects by decreasing renin secretion
- decreased HR/SV (SVTs, ischemia, and mild HTN despite the inhibition of beta 2)
- reset baroreceptors
- release of vasodilatory prostaglandins
- CNS antihypertensive effects

# Side Effects & Containdications

CNS (esp the more lipophilic the BB like propranolol)

- fatigue, malaise, sedation
- sleep alteration w/ nightmares
- even though ejaculation is alpha mediated pts on BB exhibit sexual dysfunction specifically decreased
- depression

 $\mathsf{CV}$ 

- bradycardia ± heart block especially worrisome in acutely decompensated CHF
- orthostatic hypotension
- claudication symptoms b/c the increase in BP from inhibiting beta2 is enough to cause an immediate local problem despite the decrease in BP from inhibiting beta1
- · decreased exercise capacity

Pulm

bronchospasm especially worrisome in acutely decompensated asthma

GΙ

D/N/V/GERD

GU

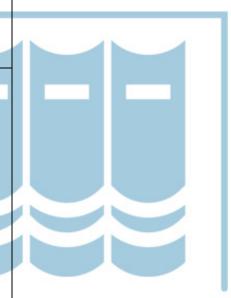
libido

#### Endo

- decreases hepatic gluconeogenesis resulting in hypoglycemia (use cautiously in diabetics b/c more prone
  to hypoglycemia and when it occurs symptoms of hypoglycemia ie sympathetic hyperactivity is not as
  pronounced so called "hypoglycemic unawareness")
- dyslipidemia (refer)

Skin

hair thinning



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+			<ul> <li>α2 is primarily found on cells that secrete NEpi acting as a negative feedback mechanism, clonidine specifically acts on the pre-synaptic NEpi neuron in the brain that acts on the adrenal medulla to secrete Epi (circulating catecholamine) thereby decreasing circulating catecholamines</li> </ul>
			<ul> <li>Uses: (1) acute hypertensive urgency/emergency (2) decrease the physical symptoms (not mental symptoms hence that is why you need methadone) of heroin withdrawal (3) decrease the symptoms of amphetamines, cocaine, et al (4) ADHD, insomnia, tic syndrome, et al (5) neuropathic pain (6) hot flashes</li> </ul>
		SEs: rebound hypertension/tachycardia/diaphoresis, bradycardia, constipation, dry mouth, dizzy, drowsy, sexual dysfxn, rash if tansdermal formed used, +Coomb's hemolytic anemia and +ANA and hepatitis in	
	-	-	(refer)
-		A	<ul> <li>Directly blocks alpha mediated vasoconstriction therefore profound effects on blood pressure unlike beta blockers but the problem is that there is a reflex tachycardia which is profound enough that the overall effect on BP is minimal</li> <li>Use: pheochromocytoma (phenoxy) and acute HTN crisis (phento)</li> <li>Phenoxy irreversibly blocks (therefore long lived) while phento reversibly blocks (therefore short lived)</li> <li>"first dose effect" greater decrease w/ the first dose than w/ subsequent doses</li> </ul>
			<ul> <li>Use: HTN in pts with BPH</li> <li>SEs: extensive orthostatic hypotension resulting in HA, dizziness, and even syncope (esp w/ first dose), dyslipidemia</li> <li>"first dose effect" as above</li> </ul>
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