Antimuscarinic drug

Drug	Effect	Receptor	Treatment for
Atropine[levo hyoscyamine & dextro]	**CNS:** drowsiness(نوم)and amnesia(فقدان الذاكرة),excitement, agitation(هلوسات خفيفة), hallucinations(هلوسات تؤدي للجنون),coma. **Eye:** mydriasis,,cycloplegia[M_3,ciliary muscle],glucoma,high intraocular pressure [IOP], reduce lacrimal secretion[sandy eyes]. **Cardiovascular:**M_2 vagal bloking cause tachycardia, M_1 initial blocking cause initial bradycardia, local toxic intraventricular conduction[here doesn't block any receptor], blush area[at toxic dose-normal dose doesn't make this- ,cutaneous vasodilation usually at check], prevent the depress[that caused by vagal discharge] sinoatrial or atrioventricular node function sufficiently that impair cardiac output. **Respiratory:**passive bronchodilation[M_3], reduce bronchial secretion, reduce accumulation of secretions in the trachea, inhalational anesthetics. **GIT:** decrease salivary secretions[cause dry mouth], low reduction of volume & amount of Gastric secretions[acid, pepsin,mucin]. **Genitourinary:** slow voiding[relaxes smooth muscle of the ureters and bladde], person who has urinary retention(احتباس بول) don't given atropine. **Sweet glands:** suppresses sweating which cause atropine fever.	**M_1,M_2,M_3,M_4,M_5.**	1. **Parkinson's disease.** 2. **Non-selective atropine derivative [inhalation] for bronchial asthma.** 3. **Diarrhea.** 4. **Spasm induced by mild inflammation, surgery, and certain neurologic conditions.** 5. **Don't given to prostatic hyperplasia patients.** 6. **laryngospasm(تشنج الحنجرة)..** 7. **vasovagal attack** 8. **hyperactive carotid sinus reflexes.** 9. **syncope that caused by vagal discharge.** 10. **traveler's diarrhea.** 11.
Hyoscine	**CNS:** drowsiness(نوم)and amnesia(فقدان الذاكرة),excitement, agitation(هلوسات خفيفة), hallucinations(هلوسات تؤدي للجنون),coma, sedation(خمول). **GIT:** dry mouth.	**M_1,M_2,M_3,M_4,M_5.**	1. **Vestibular disturbances(الاضطرابات الدهليزية).** 2. **Motion Sickness(دوار البحر).**
Pirenzepine and telenzepine	**GIT:** reduce gastric acid secretion, diminished GIT motility[from stomach into colon], inhibit spinster dilation[M_3], intestinal transit time is lengthened	**M_1&M_3.**	1. **Diarrhea.** 2. **Parkinson's disease.**
Benzetropine & Trihexyphenidyl			**adjunctive therapy for Parkinson's disease.**
Ipratropium and Tiotropium	**Respiratory:** local bronchodilation & reduce accumulation of secretions in the trachea.	**M_3&M_1.**	1. **Asthma.** 2. **chronic obstructive pulmonary disease [COPD]**
Lomotil[diphenoxylate+ atropne]		**M_2,M_3.**	**Any type of diarrhea.**
Oxybutynin	**Genitourinary:** relieve bladder spasm [genarlly] after urologic surgery [specially], reduce involuntary voiding in patients with a neurologic disease.	**M_3.**	bladder spasm [genarlly] after urologic surgery [specially].
Darifenacin		**M_3.**	**urinary incontinence(سلس البول).**
botulinum toxin A[bacterial product so it's toxic]	**Genitourinary:** urinary incontinence when they try drugs and they aren't effective, we the intrabladder injection of botulinum toxin A.		**urinary incontinence(سلس البول).**
Physostigmine	reversible acetylcholine inhibitor, we use low dose because it's toxic.		**Only used at Toxic dose of atropine[antidote].**
diazepam	**seizure control**		**Seizure.**
neostigmine	**Treatment of the antimuscarinic effects can be carried out with a quaternary cholinesterase inhibitor**		**Toxic of Quaternary alkaloids atropine-like derivatives.**

Sympathomimetic drug

Drug	Effect	Receptor	Treatment for
phenylephrine [non-catecholamines]	**Eye**: mydriasis without cycloplegia. **Cardiovascular:** causes vasoconstriction and prevent orthostatic hypotension, increase peripheral arterial resistance, decrease venous capacitance, there for increase BP. **Respiratory:** nasal decongestant[regarding local vasoconstriction].	α_1.	1. Useful for funduscopic examination (فحص قاع العين). 2. Hypotension. 3. Note: if atropine given we can't use this.
methoxamine [non-catecholamines]	**Cardiovascular:** causes vasoconstriction & prolonged increase in BP, baroreflex increase vagal rate so mediate bradycardia.	α_1.	rarely and limited used to treat hypotension
Hemoatropine	**Eye**: mydriasis without cycloplegia.	α_1.	Useful for prolonged eye examination.
Midodrine [prodrug]	**Note: enzymatically hydrolyzed to a selective α_1-receptor agonist**.	α_1.	orthostatic hypotension [diminishing the fall of blood pressure when the patient is standing].
clonidine	**Cardiovascular:** at rapid IV injection or in very high oral dose, it can cause vasoconstriction. **Low dose** can decrease BP [by inhibition of sympathetic tone(α_2 in brain)]. increased vagal nerve signal ratio[parasympathetic]which decreases the heart rate (bradycardia). **CNS:** generally inhibition of sympathetic tone [α_2, presynaptic sites inhibit release of NE], can cause sedation [throw locus ceruleus of the brain stem], has analgesic [throw spinal cord] & antishivering actions. **Renal:** has diuretic action.	α_2.	1. Hypertension [Abrupt withdrawal causes rebound hypertension] 2. ADHD (attention-deficit/hyperactivity disorder). 3. opioid withdrawal. 4. migraine prophylaxis [low dose]. 5. menopausal flushing [low dose]. 6. chorea (abnormal involuntary movement disorder) [low dose]
methylnorepinephrine	**Cardiovascular:** at rapid IV injection or in very high oral dose, it can cause vasoconstriction. Low dose can decrease BP [by inhibition of sympathetic tone]. **CNS:** generally inhibition of sympathetic tone [presynaptic sites inhibit release of NE]	α_2.	Hypertension
Guanfacine		α_2-selective agonist.	1. hypertension. 2. ADHD (attention-deficit/hyperactivity disorder). 3. Prader-Willi syndrome (PWS) [this person has aggression & self-injurious behavior cause by genetic change on chromosome number 15].
Dexmedetomidine		α_2-selective agonist.	1. initially intubated and mechanically ventilated patients [stronger α_2 agonist than other drug]. 2. opioid withdrawal.
Methyldopa	**Cardiovascular:** Metabolized to α-methyl norepinephrine which then lowers arterial pressure [presynaptic α_2 receptors in the brainstem], decrease BP [ACE inhibitor & angiotensin II receptor blockers], reduce plasma renin activity.	α_2.	1. Hypertension [especially during pregnancy].
Oxymetazoline	**Respiratory:** topical decongestant [constriction of the nasal mucosa], **large doses** can cause hypotension [because of central clonidine - like effect (α_2 effect)]	α_1, α_2[significant affinity].	
Epinephrine(adrenaline) [catecholamines]	**Cardiovascular:** A. **β_3:** stimulate lipolysis [increase FFA]. B. **β_2:** vasodilation of skeletal muscles blood vessels & coronary blood vessels, activate glycogenolysis in liver, C. **β_1:** Positive inotropic & positive chronotropic D. **α_1:** vasoconstriction of skin, splanchnic and renal vessels, increase arterial BP to treat CPR. E. **α_2:** vasoconstriction of skin, splanchnic and renal vessels. **Note: catecholamines increases coronary blood flow**. **CNS:** prolongs the duration of local anesthesia(L.A) & reduce toxicity of L.A. **Respiratory:** relax constricted bronchioles.	$\alpha_1, \alpha_2, \beta_1, \beta_2$,.	1. cardiopulmonary resuscitation (CPR) given intracardial. 2. Anaphylaxis[Glucocorticoids and antihistamine can be used with epinephrine]. 3. Hypotension that caused from Allergic reaction. 4.

Drug	Effect	Receptor	Treatment for
Norepinephrine [catecholamines]	**Cardiovascular:** vasoconstriction in all blood vessels include skeletal muscles blood vessels, so increases peripheral resistance, increase diastolic & systolic BP[after short period baroreflex cause bradycardia]. **Note: catecholamines increases coronary blood flow**.	$\alpha_1,\alpha_2,\beta_1,\beta_2$[little effect].	1. hypotensive emergency to preserve cerebral and coronary blood flow[note it's effect is for short time so we need IV fluid administered (saline)]. 2.
dobutamine	**Cardiovascular:** increases cardiac output by stimulating contractility increasing the heart rate, Has relatively greater inotropic than chronotropic effect compared with isoproterenol.	**Negative isomer:** β_1&α_1-antagonist. **Positive isomer:**α_1.	heart failure symptoms [Used to provide a short-term relief]
isoproterenol (isoprenaline) [catecholamines]	**Cardiovascular:** slightly increase systolic pressure and to lower diastolic pressure, decrease BP, positive chronotropic & inotropic actions [β_1], vasodilator [β_2], increase in cardiac output. . **Note: catecholamines increases coronary blood flow**.	β_1&β_2.	temporary emergency management of complete heart block.
albuterol (Salbutamol)	**Respiratory:** bronchodilation	β_2.	bronchial asthma
terbutaline	**Respiratory:** bronchodilation	β_2.	bronchial asthma
ritodrine	**Respiratory:** bronchodilation **Urogenital system:** uterine relaxation in premature labor	β_2.	bronchial asthma
Salbutamol	**Respiratory:** bronchodilation	β_2	bronchial asthma
Ephedrine [non-catecholamines]	**Mixed-Acting Sympathomimetics [direct & inderct effect].** **Respiratory:** Bronchodilator, decongestant. **CNS:** pressor agent during spinal anesthesia	**Direct effect:** β_2. **Indirect effect:** activates the release of NE through calcium independent mechanisms so activates adrenergic receptors.	extract From Ephedra sinica (plant) & old used herbal drug. 1. asthma. 2. hay fever 3. common cold. 4. increase blood pressure when we inject local anesthetic into the subarachnoid space in the spinal cord [because anesthetic block both sympathetic, parasympathetic & autonomic conduction so decrease sympathetic tone of blood vessels cause dilation therefore decrease BP]. 5. stress incontinence
Pseudoephedrine	**Respiratory:** decongestant.		
Amphitamine [non-catecholamines]	**CNS:** A. **Low dose:** improve attention to boring task. B. **High dose:** full-blown psychotic behavior.		
trimethaphan	**Cardiovascular:** decrease baroreflex function [ganglionic blocker], increase pressor(increase in blood pressure by stimulating constriction of the blood vessels) effect of phenylphrine	**Nicotine**	Baroreflex bradycardia that associated with phenylephrine using
Dopamine	**Cardiovascular:** A. **Low IV infusion:** vasodilation of renal[improve perfusion to the kidney in situations of joliguria], splanchnic, coronary and cerebral vessels [D_1], so peripheral resistance may decrease.. B. **Moderate IV infusion:** increasing contractility & the HR increases slightely[β_1 in heart]. C. **High IV infusion:** vasoconstriction, including in the renal vascular bed [α], dopamine may mimic the actions of epinephrine. **Renal:** induce natriuresis [increased Na^+ excretion in urine].	**D receptors, β_1, α receptors.**	1. Low IV infusion rate: oliguria (abnormally low urinary output). 2. Moderate IV infusion rate: congestive heart failure(CHF). 3. hypopsychosis. 4. short term relief of heart failure symptoms in patients with advanced ventricular dysfunction. 5.
levodopa		**dopaminergic drugs**	Parkinson's disease
Fenoldopam	**Cardiovascular:** leads to peripheral vasodilation in some vascular beds.	**D_1.**	IV treatment of severe hypertension

All_of_above_is_direct-Acting_Sympathomimetics

Sympathomimetic drug.

Drug	Effect	Receptor	Treatment for
Methamphetamine			**ADHD**
Modafinil	**CNS:** Inhibits both NE & DA transporters, increases interstitial concentrations of NE, DA , serotonin and glutamate. **Cardiovascular:** mild increases in BP & HR.		**1. narcolepsy.** **2. ADHD.**
Tyramine	**Note:** A. High concentration in fermented foods E.x:cheese. B. inactive orally then activated by MAO in GIT & liver. C. indirect sympathomimetic action caused by the release of stored catecholamines. **Cardiovascular:** if patient given MAO inhibitor Tyramine may increase BP.		**Can't use with MAO inhibitor so it can cause cheese reaction.**
Atomoxetine	Inhibit NE reuptake.		**ADHD**
Cocaine	local anesthetic with a sympathomimetic action that results from inhibition of NE reuptake. **CNS:** enters CNS causing an amphetamine-like psychological effect, major action in the CNS is to inhibit dopamine reuptake into neurons in the pleasure centers. **Cardiovascular:** used for nasopharyngeal surgery [cause vasoconstriction]		**used for nasopharyngeal surgery**

All_of_above_is_indirect-Acting_Sympathomimetics

Alpha Blockers.

Drug	Effect	Receptor	Treatment for
Phenoxybenzamine	**Note:** Non-competitive alpha blocker. Inhibit reuptake of NE & block histamine (H1), ACh, and serotonin receptors. **Cardiovascular:** little fall in BP in normal supine individuals, it reduces BP when sympathetic tone is high as a result of upright posture [Orthostatic hypotension], cause tachycardia. **Respiratory:** nasal stuffiness. **Urogenital system:** inhibition of ejaculation.	**α_1,α_2[none selective α blocker].**	**1. pheochromocytoma [small vascular tumor of the adrenal medulla, causing irregular secretion of epinephrine and NE].** **2. Peripheral vascular diseases.** **E.X: Raynaud's phenomenon [excessive reversible vasospasm in the peripheral circulation so Constriction of vessels decreases blood supply to fingers, causing them to tum pale].**
Phentolamine	**Note:** competitive alpha blocker. **Cardiovascular:** Reduces peripheral resistance [α_1], causes cardiac stimulation [α_2 receptors blockade enhances release of NE], cause severe tachycardia, arrhythmias & myocardial ischemia. **??:** Minor inhibitory effects at serotonin receptors [5HT= 5- hydroxy tyrptamine]. **Glands:** minor agonist effects at muscarinic (salivary, sweat, lacrimal) and H1 and H2 receptors (Increase acid secretion).	**α_1,α_2[none selective α blocker].**	**1. Diagnostic of pheochromocytoma.** **2. control of hypertension due to clonidine withdrawal.** **3. counteract vasoconstriction due to alpha agonists [treatment of overdose alpha agonist].**
Prazosin	**Note:** Little bioavailability [half-life is 3 h]. **Cardiovascular:** Relaxes both arterial and venous vascular smooth muscle [cause postural hypotension], maybe & maybe not cause tachycardia, **Metabolic:** increase HDL/LDL ratio. **Urogenital system:** Relaxes smooth muscle in the prostate, Improves urine flow with decrease urination tone.	**α_1[selective α blocker].**	**1. Hypertension.** **2. Benign prostatic hyperplasia (BPH).**
Terazosin	**Note:** High bioavailability.	**α_1[selective α blocker].**	**prostate hyperplasia**
Doxazosin	**Note:** longer half-life of about 22 hours.	**α_1[selective α blocker].**	**prostate hyperplasia**
Tamsulosin	Note: No effect on BP and heart rate, High bioavailability [half-life of 9–15 hours]. **CNS:** Dizziness. **Urogenital system:** retrograde ejaculation.	**Uroselective α_{1A} blocker.**	**1. preferred in patients who have orthostatic hypotension.** **2. prostate hyperplasia**

Drug	Effect	Receptor	Treatment for
Yohimbine	**Note:** it's an indole alkaloid. **Urogenital system:** Enhances sexual activity [aphrodisiac], improve male erectile dysfunction [yohimbine superseded by phosphodiesterase-5 inhibitors which prevents Nitric oxide from breaking down like sildenafil (viagra)]. **CNS**: Increases ADH release. **Renal system:**	**α_2[selective α blocker], can block 5HT [serotonin receptors] & DA receptor.**	**prostate hyperplasia**

β- Adrenoceptor blocker

Drug	Effect	Receptor	Treatment for
β- Adrenoceptor blocker	**Cardiovascular:** A. **heart[β_1]:** decrease HR, decrease SV (stroke volume), decrease cardiac work (contractility) & O2 consumption. B. **Blood vessels:** decrease in BP both diastolic and systolic [after continuous treatment], Don't cause hypotension in healthy individuals with normal BP. **Renal system:** Inhibit renin-angiotensin **Respiratory[β_2]:** Increase in airway resistance, particularly in patients with asthma [cause bronchoconstriction]. **CNS:** decrease release of epinephrine & NE. **Eye:** Reduce intraocular pressure in glaucoma by decreasing aqueous humor production. **Metabolic:** increases LDL, triglycerides, decrease HDL by inhibiting lipolysis, Glycogenolysis in the liver is inhibited after β_2-receptor blockade, β-blockers delay recovery from hypoglycemia due to insulin and oral anti diabetics and mask early symptoms of hypoglycemia (tremors, sweating & tachycardia) and palpations (sympathetic effects).		1. **Very valuable in hypertension, angina and chronic heart failure and following Myocardial infarction (MI).** 2. **these drugs should generally be avoided in patients with asthma [we can give them selective β_1 blocker].** 3. **glaucoma.** 4. **caution in insulin-dependent diabetic patients.** 5. **if hypoglycemia (tremors, sweating & tachycardia) and palpations was present in a patient, they shouldn't be given beta blockers.**
Cardioselective β Blockers (β1-selective antagonists)	**Respiratory:** less effects on bronchioles. **Metabolic:** less effects on carbohydrate metabolism, lipids. **Cardiovascular:** Lower incidences of Cold hands and feet. **Skeletal muscles:** Less liable to impaired exercise tolerance	**β_1.**	1. **If we used it for asthma person, we should use it with great caution.** 2. **myocardial infarction.** 3. **angina pectoris.**
β Blockers with partial β-agonist activity.	**Respiratory:** less likely to cause bronchoconstriction. **Cardiovascular:** less likely to cause bradycardia. **Metabolic:** less likely to cause abnormalities in plasma lipids.		1. **hypertension.** 2. **angina.**
propranolol	**Note:** Lipophilic β blockers, readily absorbed from GI, metabolized in liver, has large volume of distribution & penetrate BBB well, Has low and dose-dependent bioavailability (first- pass metabolism). **Liver:** hepatic failure prolongs their $t_{1/2}$. **Cardiovascular:** A. **heart[β_1]:** decrease HR, decrease SV (stroke volume), decrease cardiac work (contractility) & O2 consumption, decrease BP. **Respiratory[β_2]:** bronchoconstriction. **CNS:** decrease release of epinephrine & NE. **Metabolic:** inhibition of peripheral conversion of thyroxine to triiodothyronine	**β_1&β_2.** **No effect on α and M receptors butmay block some serotonin receptors in the brain.**	1. **thyroid storm (severe hyperthyroidism) [to control supraventricular tachycardias that often precipitate heart failure].** 2. **tremors.** 3. **musicians with performance anxiety ("stage fright") [at low dose of propranolol taken prophylactically].** 4. **alcohol withdrawal [symptomatic treatment].** 5. **migraine headache [reduces the frequency and intensity].**
metoprolol	**Note:** Lipophilic β blockers [High lipid solubility], readily absorbed from GI, metabolized in liver, has large volume of distribution & penetrate BBB well. **Liver:** hepatic failure prolongs their $t_{1/2}$. **Respiratory:** Less likely to worsen asthma.	**β_1[Cardioselective β Blockers].**	1. **angina.** 2. **hypertension.** 3. **Treat or prevent Myocardial Infarction (AMI) without bradycardia.**
oxprenolol	**Note:** Lipophilic β blockers, readily absorbed from GI, metabolized in liver, has large volume of distribution & penetrate BBB well. **Liver:** hepatic failure prolongs their $t_{1/2}$.		
carevdilol	**Note:** Lipophilic β blockers, readily absorbed from GI, metabolized in liver, has large volume of distribution & penetrate BBB well. **Liver:** hepatic failure prolongs their $t_{1/2}$.		
acebutolol	**Note:** Hydrophilic β blockers, less readily absorbed, not extensively metabolized, they are long plasma half-lives which are prolonged in renal failure.		

Drug	Effect	Receptor	Treatment for
Esmolol	**Note:** Ultra-short–acting β 1-selective blocker, Contains an ester linkage; esterases in red blood cells rapidly metabolize it, it Has a short half-life (about 10 minutes), Therefore Given by continuous IV infusions.	**β_1[Cardioselective β Blockers].**	**1. given only in ICUs and certain emergencies [who require a β -adrenoceptor antagonist]. 2. supraventricular arrhythmias & arrhythmias associated with thyrotoxicosis 3. myocardial ischemia & angina in acutely ill patients.**
Nebivolol	Note: The most highly selective β 1 blocker. **Cardiovascular:** vasodilation effect[throw increase endothelial NO release].so it has high hypotensive effect, Antioxidant [Antioxidant, can protect the vascular wall from free radicals that damage blood vessels and thereby contribute to the progression of cardiovascular disease].	**β_1[Cardioselective β Blockers].**	**Hypertension**
atenolol	**Note:** Hydrophilic β blockers[low lipid solubility] , less readily absorbed, not extensively metabolized, they are long plasma half-lives which are prolonged in renal failure. **CNS:** Side effects related to CNS are less prominent	**β_1[Cardioselective β Blockers].**	**1. Hypertension. 2. angina.**
bisoprolol	**Note:** Hydrophilic β blockers, less readily absorbed, not extensively metabolized, they are long plasma half-lives which are prolonged in renal failure.	**β_1[Cardioselective β Blockers].**	**1. hypertension [One dose/day]. 2. coronary heart disease, arrhythmias [One dose/day].**
nadolol	**Note:** Hydrophilic β blockers, less readily absorbed, not extensively metabolized, they are long plasma half-lives which are prolonged in renal failure.	**β_1&β_2.**	
sotalol	**Note:** Hydrophilic β blockers, less readily absorbed, not extensively metabolized, they are long plasma half-lives which are prolonged in renal failure. **Cardiovascular:** marked class III antiarrhythmic effects due to potassium channel blockade.	**β_1&β_2.**	**ventricular & supraventricular arrhythmias**
Timolol	**Note:** no local anesthetic activity, can cause serious adverse effects on the heart and airways in susceptible individuals.	**β_1&β_2.**	**glaucoma[topically]**
Pindolol	**CNS:** accelerates the antidepressant effect of selective serotonin reuptake inhibitors.	**β_1&β_2 [non-selective beta-adrenoceptor/5-HT1A antagonist]**	
Celiprolol	**Respiratory:** may have less adverse bronchoconstrictor effect in asthma and may even promote bronchodilation.	**β_1-selective antagonist with a partial β_2 -agonist activity**	**Some type of asthma.**
Acebutolol		**β_1-selective antagonist with a partial β_2 -agonist activity**	

Note: Glaucoma is treated by:

1. reduction of aqueous humor secretion E.x: beta antagonists.
2. enhancement of aqueous out-flow.

Drugs useful in reducing intraocular pressure: Cholinomimetics, α agonists, β blockers prostaglandin F2 analogs & diuretics.

Note: Beta1-selective antagonists are preferred in patients with diabetes or peripheral vascular disease since β 2 receptors are important in liver glycogenolysis(recovery from hypoglycemia) and blood vessels (vasodilation).

Note: Clinical trials have demonstrated that at least three β antagonists, metoprolol, bisoprolol, and carvedilol are effective in reducing mortality in selected patients with chronic heart failure.

Note: Clinical Toxicity of the Beta-Receptor Antagonist Drugs:

Cardiovascular: bradycardia, Coolness of hands and feet in winter, Caution is required in patients with severe peripheral vascular disease and in patients with compensated heart failure even though long-term use may prolong life, A very small dose of a β antagonist may provoke severe cardiac failure in a susceptible individual.

Beta blockers may interact with the calcium antagonist verapamil causing bradycardia, heart failure, and cardiac conduction abnormalities. These adverse effects may even arise in susceptible patients taking a topical β blocker and oral verapamil.

Patients with ischemic heart disease or hypertension maybe at increased risk if β blockade is suddenly interrupted.

CNS: mild sedation, vivid dreams (nightmares), and rarely depression.

Respiratory: Nonselective agents commonly causes worsening of preexisting asthma.

Metabolic: It is inadvisable to use β antagonists in insulin- dependent diabetic patients who are subject to frequent hypoglycemic Reactions [Beta1- selective antagonists are safer in these patients].

Both α&β- Adrenoceptor blocker

Drug	Effect	Receptor	Treatment for
Labetalol	**Cardiovascular:** Causes Hypotension with less tachycardia than occurs with α-blockers & quick decrease BP. [β_2 -agonist activity cause vasodilation].	**α-antagonist, β_1-selective antagonist with a partial β_2 -agonist activity**	
Carvedilol	**Note:** More potent at β than at α1 receptors, has Antioxidant property.	**nonselective β blocker & α_1 blocker, calcium channel blocker.**	**1. Hypertension.** **2. Angina.** **3. congestive heart failure.**

Ganglion-Blocking Drugs

Drug	Some note	Effect	Treatment for
Ganglion-Blocking Drugs	The toxicity of the ganglion-blocking drugs is limited to the autonomic effects.& these effects are intolerable except for acute use.	**CNS:** enters the CNS causing Choreiform movement Sedation, tremor, choreiform movements, and mental abnormalities. **Eye:** Cycloplegia [paralysis of ciliary muscles] with loss of accommodation & moderate dilation of the pupil because parasympathetic tone usually dominates this tissue. **Cardiovascular:** Marked decrease in arteriolar and venomotor tone, BP may fall [because both peripheral vascular resistance and venous return are decreased], Orthostatic or postural hypotension, diminished contractility and a moderate tachycardia. **GIT:** Secretion & Motility are profoundly inhibited & constipation can be marked. **Urogenital system:** may precipitate urinary retention in men with prostatic hyperplasia, Sexual function is impaired in that both erection and ejaculation. **Glands:** Sweating is reduced.	
Tetraethylammonium (TEA)	very short duration of action.		
Hexamethonium ("C6")	The first drug effective for hypertension.		
Decamethonium	"C10" analog of hexamethonium, is a depolarizing neuromuscular blocker.		
Mecamylamine	A secondary amine, developed to improve absorption from the GIT because the quaternary amine were poorly absorbed after oral administration.	**CNS:** enters the CNS causing Choreiform movement Sedation, tremor, choreiform movements, and mental abnormalities.	
Trimethaphan	A short-acting ganglion blocker, is inactive orally & is given by intravenous infusion.	**CNS:** producing hypotension in neurosurgery to reduce bleeding in the operative field.	**Occasionally used in the treatment of hypertensive emergencies**

Note: Ganglion-Blocking Drugs Mechanism of Action

1. **Ganglionic nicotinic receptors are subject to both depolarizing and nondepolarizing blockade**
2. **Nicotine & acetylcholine (if amplified with a cholinesterase inhibitor) can produce depolarizing ganglion block.**
3. **Drugs now used as ganglion blockers are classified as nondepolarizing competitive antagonists.**
4. **Blockade can be reversed by increasing the concentration of an agonist, e.g., acetylcholine.**

"أدام الله عليكم الصحة و العقل في هذه كلية، و وفقكم إلى ما يحب و يرضى"
"لا تنسونا من دعائكم"