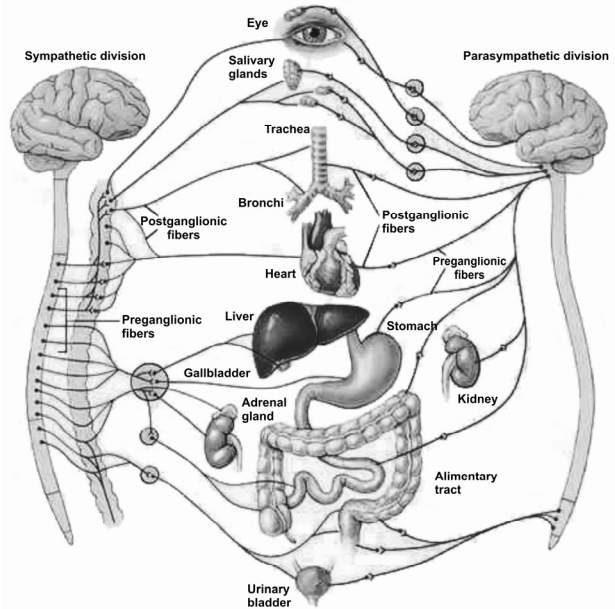
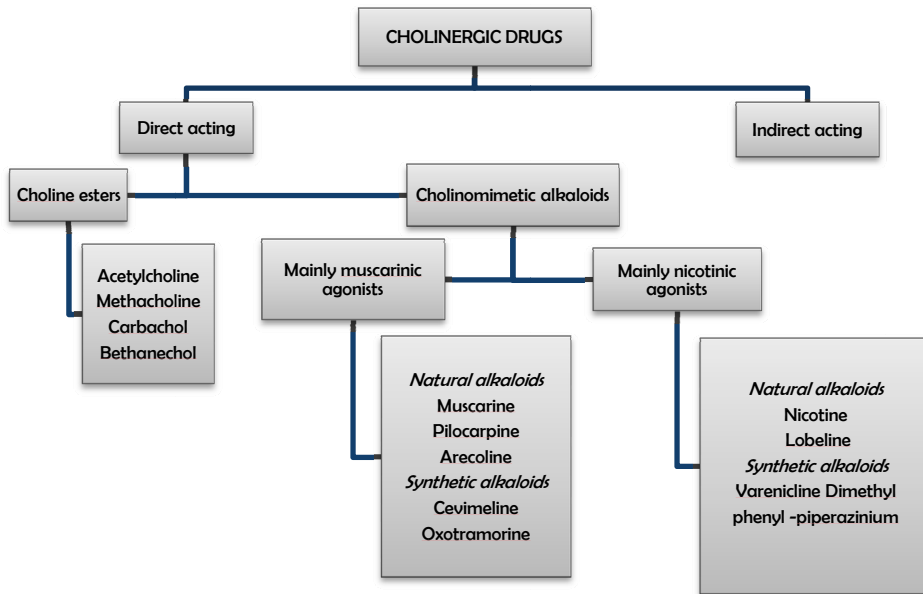


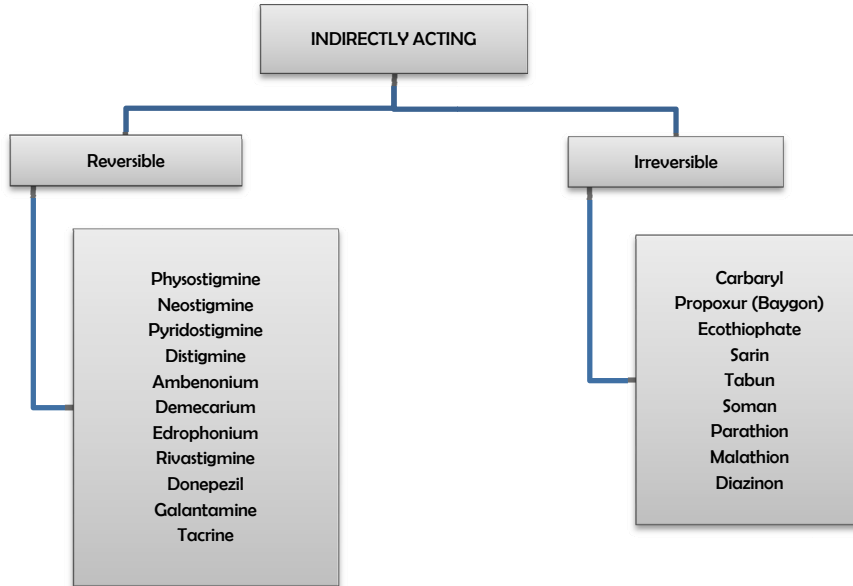
1. Drugs Affecting Autonomic Nervous System

Cholinergic Drugs (Cholinomimetic, Parasympathomimetic)

Cholinergic drug: Any of various drugs that inhibit, enhance, or mimic the action of the neurotransmitter acetylcholine, the primary transmitter of nerve impulses within the para-sympathetic nervous system i.e., that part of the autonomic nervous system that contracts smooth muscles, dilates blood vessels, increases bodily secretions and slows the heart rate.







Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Direct Acting					
(a) Choline esters					
Acetylcholine (MIOCHOL)	0.5-2 mL of 1% solution topically.	Acts on the muscarinic and nicotinic receptors.	Used to constrict the pupils of eye after eye surgeries	Hot flushes Sweating Dyspnea Bradycardia Hypotension	Acetylcholine× Diphenhydramine May reduce the effects of acetylcholine ophthalmic.
Metacholine (PROVO CHOLINE)	2.5 - 25 mg/mL solution inhaled 5 times a day.		Used during lung function tests to determine if a patient has asthma	Headache Itching Lighthea, dedness Throat irritation	Metacholine× Atenolol Cause symptoms of chest tightness, difficulty breathing, shortness of breath, or nausea.
Bethanechol (BETHACOL)	10-40 mg oral.		Used to treat urinary retention	Shortness of breath Tightness in chest	Bethanechol× Tramadol May increase the risk of seizures.
(b) Cholino mimetic alkaloids					
<i>Mainly muscarinic agonists</i>					
<i>Natural alkaloids</i> Pilocarpine (PILOCAR)	0.5-4% topically.	Produces muscarinic and nicotinic effects by directly interacting with the receptors.	Used topically in treatment of open angle and acute congestive glaucomas Used alternatively with mydriatics to break adhesion between the iris and the lens	Salivation Sweating Bradycardia Bronchospasm Pulmonary edema	Pilocarpine × Hyoscyamine Reduce the effectiveness of one or both medications.

Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
<i>Synthetic alkaloids</i> Cevimeline (EVOXAC)	30 mg orally three times a day.	It is a Muscarinic agonist activates the muscarinic M1 and M3 receptors. The M1 receptors are common in secretory glands results in an increase in secretion from the secretory glands. The M3 receptors are found on smooth muscles results in smooth muscle contraction.	Used to treat dry mouth in patients with Sjogren disease	Excessive sweating Runny or stuffy nose	Cevimeline × Promethazine May increase the blood levels of cevimeline, increase side effects such as nausea, vomiting, diarrhea, sweating, drooling, increased urination, blurred vision, confusion, tremor, palpitation and irregular heartbeat.
<i>Mainly nicotinic agonists</i>					
<i>Natural alkaloids</i> Nicotine (COMMIT)	14 – 20 mg/day.	It binds to nicotinic acetylcholine receptors on dopaminergic neurons in the cortico-limbic pathways, leads to depolarization which activate voltage-gated calcium channels.	Used to aid in smoking cessation	Mouth sores, blisters, or irritation Sore throat Heartburn	Nicotine × Ergotamine May increase the effects of narrowing the blood vessels and decrease blood flow. A severe decrease in blood flow to the brain and other parts of the body can lead to dangerous side effects.

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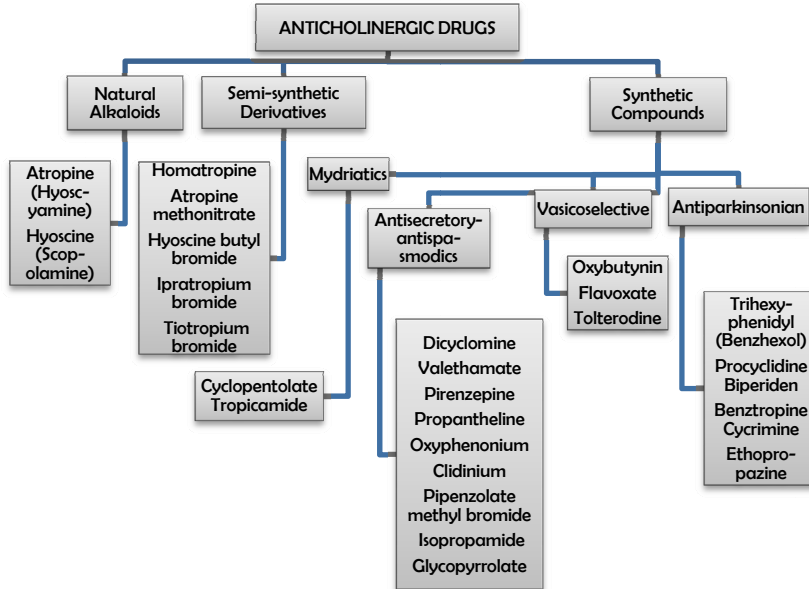
Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
<i>Synthetic alkaloids</i> Varenicline (CHANTIX)	0.5 mg orally once a day.	Works in the brain by blocking the pleasurable effects of smoking.	Helps to decrease desire to smoke	Abnormal dreams Lack or loss of strength Loss of taste Hyperventilation	Varenicline × Nicotine Can cause an increase in side effects, nausea, headache, vomiting, dizziness and fatigue.
Indirectly Acting					
(a) Reversible					
<i>Tertiary amines</i> Physostigmine	0.5 to 1.0 mg i.m or i.v.	Reversibly inhibits both true and pseudo Cholinesterase.	Used to treat Glaucoma, severe atropine and other antimuscarinic drug poisoning	Salivation Nausea and vomiting Bradycardia Convulsions	Physostigmine × Bupropion May increase the risk of seizures.
<i>Quaternary ammonium compounds</i> Neostigmine	15–30 mg oral, 0.5–2.5 mg s.c./i.m.		Used to improve muscle strength in patients with a certain muscle disease (myasthenia gravis)		Bupropion × Neostigmine May increase the risk of seizures.
Pyridostigmine (DISTINON)	60–180 mg oral		–		
<i>Alcohols</i> Edrophonium (ENLON)	2-10 mg/day		Edrophonium × Clozapine. Using these medications together can cause increasing muscle weakness.		
<i>Miscellaneous</i> Rivastigmine (EXELON)	1.5 - 6 mg/day		Used to treat mild to moderate dementia in patients with Alzheimer or Parkinson disease		Rivastigmine × Bupropion/ Tramadol May increase the risk of seizures.

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Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Donepezil (ARICEPT)	5-10 mg/day	Centrally active, reversible inhibitor of acetyl cholinesterase, which prevents the hydrolysis of acetylcholine.	Treating dementia in patients with moderate to severe Alzheimer disease May improve memory, awareness and the ability to function	Diarrhea Loss of appetite Muscle cramps Unusual tiredness or weakness	Donepezil × Bupropion Combining these medications may increase the risk of seizures.
(b) Irreversible					
<i>Organo phosphorous compounds</i> Echothiophate (PHOSPHOLIN E IODIDE)	0.03% twice daily	It is a long-acting cholinesterase inhibitor for topical use which enhances the effect of endogenously liberated acetylcholine.	Used to treat glaucoma, eye-focusing disorders, chronic open-angle glaucoma	Blurred vision Watery eyes, twitching eyelids Red or puffy eyelids	-

Cholinergic Blocking Drugs

Any agent that blocks the action of acetylcholine and substances similar to acetylcholine. Such agents, in effect, block the action of cholinergic nerves that transmit impulses by the release of acetylcholine at their synapses.



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Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Natural Alkaloids					
Atropine (ATROSULPH)	0.6-2.0 mg i.m./i.v.	It works by blocking the effects of acetylcholine in the nervous system, stomach, intestines, certain glands and other tissues.	Used to treat spasms in the stomach, intestine and other organs Used to decrease the production of saliva and secretions of the airway prior to surgery	Xerostomia (dry mouth) Dry skin Blurred vision Mydriasis Photophobia Urinary retention Tachycardia Xerophthalmia Constipation	Atropine × Potassium chloride may increase the irritant effects of potassium on the stomach and upper intestine. This can rarely result in ulcers, bleeding, and other gastrointestinal injury.
Hyoscine (BUS-COPAN)	20-40mg oral/i.m./ s.c./i.v.	Acts by interfering with the transmission of nerve impulses by acetylcholine in the parasympathetic nervous system (specifically vomiting center).	Used to dilate the pupil temporarily and paralyze certain parts of the eye for diagnostic procedures It may be used before or after surgery to treat certain types of eye inflammation	Blurred vision Drowsiness Dry mouth Inflammation.	-
Semi-synthetic Derivatives					
Homatropio (HOMIDE)	1-2% topically in eye	Anticholinergic and narcotic cough suppressant Works by drying up secretions and narcotic depresses the cough reflex in the brain.	Used as cough suppressant	Dizziness, vomiting Constipation Blurred vision Dry mouth Stomach upset	Homatropine × Indinavir/ diltiazem/ propoxyphene May increase side effects such as drowsiness, dizziness, light headedness, difficulty concentrating and impairment in thinking and judgment.

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Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Synthetic Compounds					
(a) Mydriatics					
Cyclopentolate (CYCLOMID EYE)	0.5–1.0% topically in eye.	Anticholinergic agent. It works by relaxing the muscle of the eye to cause the pupil to dilate or widen.	Dilating the eye before an exam or surgery and preventing the eye from focusing	Blurred vision Eye pain Severe burning or redness of eyes Drowsiness Constipation Dry mouth Fast heartbeats	–
(b) Antisecretory - antispasmodics					
Propantheline (PROBANTHINE)	15–30 mg oral.	Action is achieved via a dual mechanism: 1. A specific anticholinergic effect (antimuscarinic) at the acetylcholine-receptor sites and 2. A direct effect upon smooth muscle (musculotropic).	Used to treat stomach ulcers in combination with other medicines	Xerostomia Decreased sweating Adverse ophthalmic effects (e.g., blurred vision, mydriasis, cycloplegia, increased ocular tension)	Propantheline / Oxyphenonium × Potassium chloride Combining these medications may increase the irritant effects of potassium on the stomach and upper intestine. This can rarely result in ulcers, bleeding, and other gastrointestinal injury.
Oxyphenonium (ANTRENYL)	5–10 mg oral				
Clidinium (NORMAXIN)	2.5–5 mg oral.	Inhibits muscarinic actions of acetylcholine at postganglionic parasympathetic neuro effector sites primarily by inhibiting the M1 muscarinic receptors.	Used to treat stomach or bowel problems such as ulcers, irritability, or inflammation	Dizziness Drowsiness Blurred vision Dry eyes Dry mouth Constipation	Clozapine × Chlordiazepoxide increase in side effects such as extreme drowsiness, confusion, shallow breathing, low blood pressure, weak pulse and incoordination.

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Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Dicyclomine (CYCLO-MINOL)	20 mg oral/ day.	Anticholinergic. It works by blocking a chemical in the smooth muscle of the stomach and intestines causing them to relax, which reduces cramping.	Used to treat the symptoms of irritable bowel syndrome	Dry mouth Dizziness Blurred vision Weakness Nervousness	Dicyclomine × potassium chloride Combining these medications may increase the irritant effects of potassium on the stomach and upper intestine. This can rarely result in ulcers, bleeding, and other gastrointestinal injury.
Valethamate (VALAMATE)	8 mg i.m., 10 mg oral.	Inhibits the phosphodiesterase IV.	Used to treat spasmodic pains in abdominal region and smooth muscle pain	Blurred vision Impaired alertness Dryness of mouth Flushing Increased heart rate Nervousness	-
(c) Vasoselective					
Oxybutynin (OXYBUTIN)	5 mg BD/TDS oral.	Inhibits the muscarinic action of acetylcholine on smooth muscle. By inhibiting particularly the M1 and M2 receptors of the bladder, detrusor activity is markedly decreased.	Used to reduce muscle spasms of the bladder and urinary tract, frequent or urgent urination, incontinence (urine leakage), and increased night-time urination	Acid or sour stomach Diarrhea Drowsiness Dryness of the eyes, mouth, nose or throat Heartburn Indigestion	Oxybutynin × Potassium chloride May increase the irritant effects of potassium on stomach and upper intestine. This can rarely result in ulcers, bleeding and other gastrointestinal injury.

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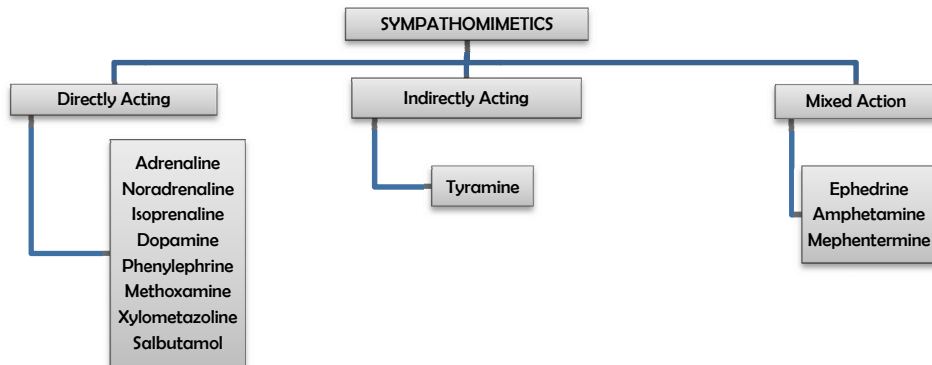
Drug	Dose	Mechanism of action	Uses	Adverse effects:	Drug interactions:
Flavoxate (FLAVATE)	200 mg TDS.	Direct antagonist at muscarinic acetylcholine receptors in cholinergically innervated organs.	Used to reduce muscle spasms of the bladder and urinary tract, frequent or urgent urination, incontinence (urine leakage) and increased night-time urination	Drowsiness Dryness of mouth and throat Difficult urination Increased sweating	Flavoxate × Propoxyphene Increase side effects such as dizziness, drowsiness, confusion, difficulty concentrating and other nervous system or mental effects.
(d) Antiparkinsonian					
Trihexyphenidyl (PACITANE)	2–10 mg /day.	Anticholinergic agent. It works by relaxing smooth muscle, which stops muscle spasms.	Used to treat Parkinson disease and other Parkinson-like disorders when used in combination with other medicines Treat Parkinson disease	Dizziness Mild nausea Nervousness	Trihexyphenidyl × Potassium chloride May increase the irritant effects of potassium on the stomach and upper intestine. This can rarely result in ulcers, bleeding, and other gastrointestinal injury.
Procyclidine (KEMADRIN)	5–20 mg/ day.			Dry mouth Blurred vision Epigastric distress Constipation Muscular weakness.	Procyclidine × Topiramate Increased body temperature and decreased sweating is observed.

Adrenergic Drugs

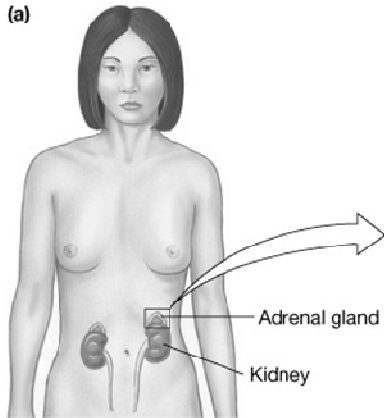
An adrenergic agent is a drug, or substance, which has effects similar to, or the same as, epinephrine (adrenaline). Thus, it is a kind of sympathomimetic agent.

(Sympathomimetics)

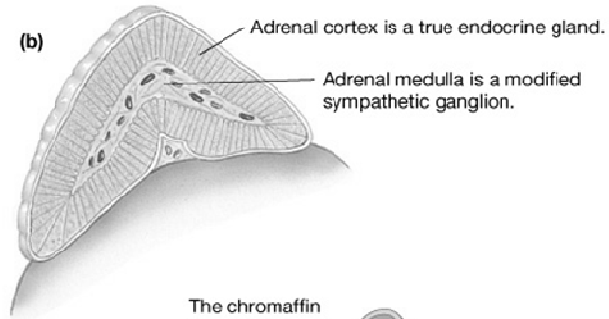
Based on Mechanism of Action



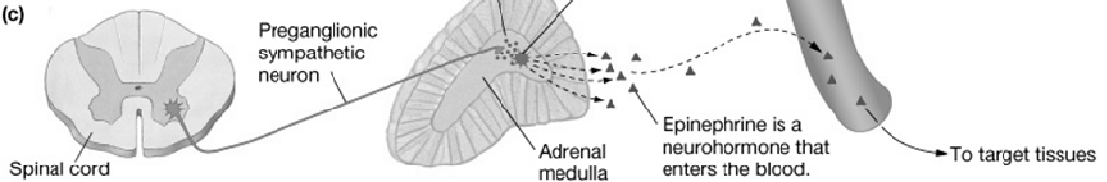
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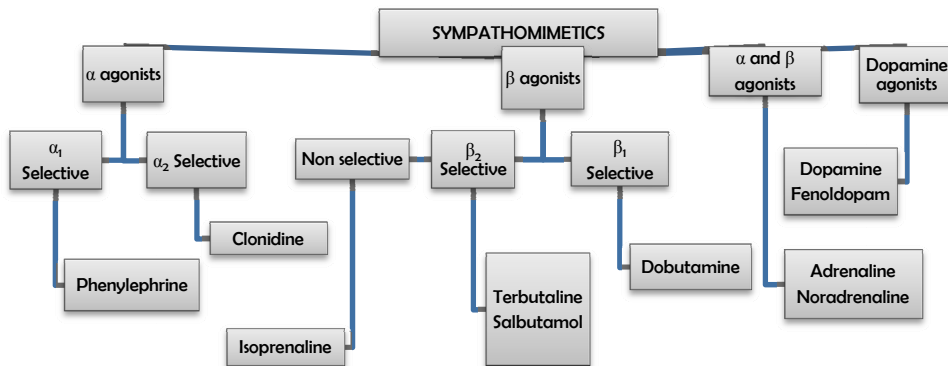
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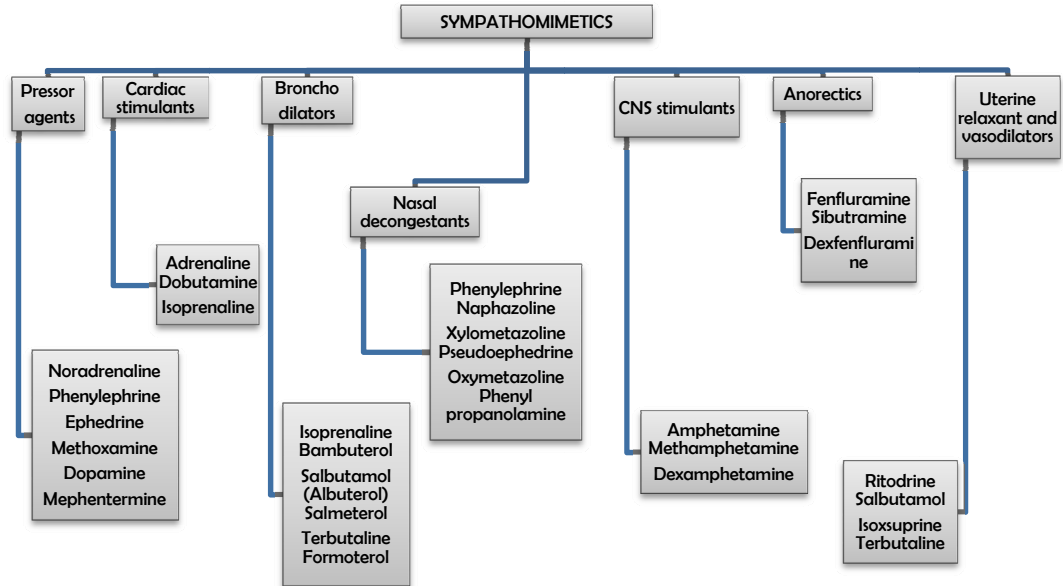
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Based on Spectrum of Activity



Therapeutic Classification



Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Pressor Agents					
Phenylephrine (DECOLD PLUS)	5–10 mg oral, 2–5 mg i.m.	Phenylephrine acts on α_1 -adrenergic receptors results in contraction of arteriolar smooth muscle in the periphery.	Used to treat nasal and sinus congestion, congestion of the tubes that drain fluid from the inner ears	Fast, pounding or uneven heartbeat. Difficulty breathing. Severe dizziness or anxiety.	Phenylephrine × Furazolidone Can cause dangerously high blood pressure and even death.
Noradrenaline (ADRENOR)	2–4 $\mu\text{g}/\text{min}$ i.v. infusion	Norepinephrine is a peripheral vasoconstrictor and an inotropic stimulator. It works by making the blood vessels narrower, which increases blood pressure. It also helps the heart work better.	Used to treat low blood pressure	Dizziness Tremor Respiratory difficulty or apnea	Noradrenaline × Halothane Can cause irregular heartbeat, chest tightness, blurred vision, nausea and seizures.
Methoxamine (VASOXINE)	10–20 mg i.m., 3–5 mg slow i.v. inj	Methoxamine acts through peripheral vasoconstriction by acting as a pure alpha-1 adrenergic receptor agonist, consequently increasing systemic blood pressure	Used in adjunctive treatment of hypotension due to haemorrhage, surgical complications and shock associated with brain damage due to trauma or tumor	Fast Heart beat High Blood Pressure Trouble Breathing	Methoxamine × Linezolid Can increase the blood pressure.

Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Cardiac Stimulants					
Adrenaline (ADRE- NALINE)	0.2–0.5 mg s.c./i.m.	Epinephrine works via the stimulation of alpha and beta-1 adrenergic receptors and a moderate activity at beta-2 adrenergic receptors.	Used to treat shortness of breath, chest tightness, and wheezing associated with asthma, emphysema and other breathing problems	Nausea and vomiting Feeling short of breath Dizziness	Adrenaline × Droperidol Can lower the blood pressure and slow the heart rate. This can cause a slow heartbeat, headaches, dizziness, or feeling like you might pass out.
Dobutamine (DOBUTREX)	2.5–10 µg/kg/ min i.v. infusion	Dobutamine directly stimulates beta-1 receptors of the heart to increase myocardial contractility and stroke volume, resulting in increased cardiac output.	Used to treat heart failure caused by surgery or heart disease	Ectopic heartbeats Increased heart rate Hypotension Local inflammatory changes	Dobutamine × Amitriptyline cause change in BP.
Bronchodilators					
Isoprenaline (ISUPREL)	The 1:200 solution administered in a dose of 5 to 15 deep inhalations	Stimulates beta-adrenergic receptors of intracellular adenylyl cyclase that catalyzes the conversion of adenosine triphosphate (ATP) to cyclic AMP. Increased cyclic AMP levels are associated with relaxation of bronchial smooth muscle.	Used to treat certain heart problems, blood vessel problems and certain types of irregular heartbeat It is also used during anesthesia to treat airway constriction	Nervousness Dizziness Blurring of vision Tachycardia Adam-Stokes syndrome Pulmonary edema Hypertension Ventricular arrhythmias	Isoproterenol × Bepridil Can increase the risk of an irregular heart rhythm that may be serious and potentially life-threatening.

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Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Bambuterol (BETADAV)	10-20 mg once daily at bedtime.		Used in the long-term management of persistent asthma	Fine tremor of skeletal muscle (e.g., hands) Palpitations Muscle cramps Tachycardia Peripheral vasodilation.	Bambuterol × Corticosteroids increase the risk of hypokalaemia.
Nasal Decongestants					
Phenylephrine (NEOSYNEPHRINE)	2 to 5 mg / day im	Acts on α_1 -adrenergic receptors peripheral vascular smooth muscle. Stimulation of the α_1 -adrenergic receptors results in contraction arteriolar smooth muscle in the periphery.	Used to relieve congestion due to colds, flu, hay fever and other allergies	Fast, pounding, or uneven heartbeat Swelling of the face, lips, tongue or throat Difficulty breathing Severe dizziness or anxiety	Phenylephrine × Furazolidone May cause dangerously high blood pressure and even death.
Naphazoline (NAPHAICON)	0.1% solution	Naphazoline is a direct acting sympathomimetic drug, which acts on alpha-adrenergic receptors in the arterioles of the nasal mucosa.	Used to relieve redness, burning, and irritation caused by dry eyes	Eye pain, changes in vision Chest pain, fast or uneven heart rate Severe headache Buzzing in ears	-
CNS Stimulants					
Amphetamine (ADDERALL)	10-20 mg/day.	Act as a direct agonist on central 5-HT receptors and may inhibit monoamine oxidase (MAO). In the periphery, amphetamines are believed to cause the release of noradrenaline by acting on the adrenergic nerve terminals and alpha- and beta-receptors.	Used to treat narcolepsy and attention deficit disorder with hyperactivity (ADHD)	Constipation Dry mouth Feeling nervous or excited Loss of appetite	Amphetamine × Selegiline can cause dangerously high blood pressure and even death.

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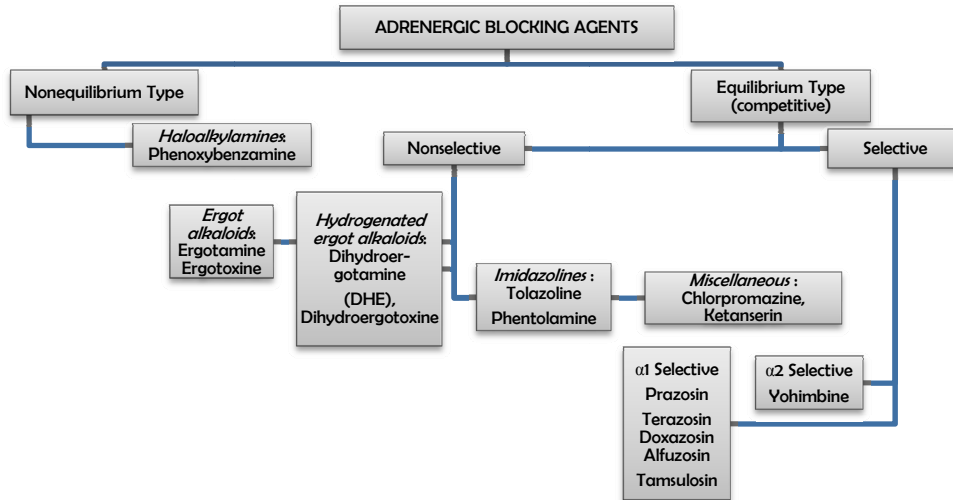
Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Anorectics					
Fenfluramine (PONDIMIN)	80-400 mg/day.	Fenfluramine binds to the serotonin reuptake pump leads to greater serotonin receptor activation which in turn lead to enhancement of serotonergic transmission in the centres of feeding behavior located in the hypothalamus. This suppresses the appetite for carbohydrates	Used in the treatment of: Autistic Disorder, Bulimia, Obesity	Dizziness Confusion Anxiety Nervousness Increased or decreased libido. Hypertension	Fenfluramine × Phentermine. may increase the risk of serious heart problems.
Sibutramine (MERIDIA)	10 mg orally once a day.	Inhibits norepinephrine (NE), serotonin (5-hydroxytryptamine, 5-HT). By inhibiting the reuptake of these neurotransmitters, sibutramine promotes a sense of satiety and decrease in appetite, thereby reducing food intake.	Treating obesity. It should be used with a reduced calorie diet	Anxiety Constipation Dryness of the mouth Irritability or unusual impatience Nervousness	Sibutramine × Dolasetron/ dextro- methorphan Can increase the risk of side effects such as confusion, hallucination, seizures, extreme changes in blood pressure, increased heart rate.
Uterine Relaxant and Vasodilators					
Ritodrine (YUTOPAR)	10-20 mg every/day.	Ritodrine is Beta-2 adrenergic agonist. It binds to beta-2 adrenergic receptors on outer membrane of myometrial cell, activates adenylyl cyclase to increase the level of cAMP which decreases intracellular calcium and leads to a decrease of uterine contractions.	Used to stop premature labour	Blurred vision Chest pain or tightness Drowsiness Dry mouth Fast or irregular heartbeat	Ritodrine × Dolasetron Can increase the risk of an irregular heart rhythm.

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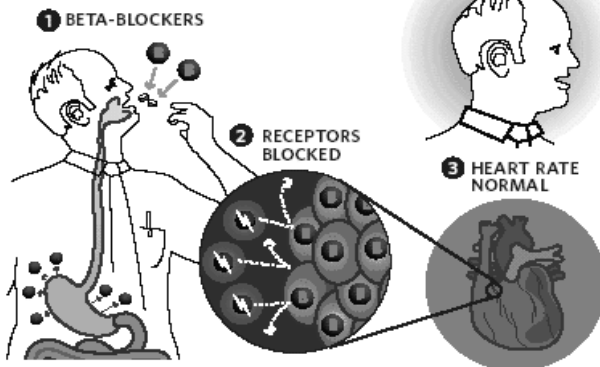
Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Terbutaline (BRETHINE)	5 mg orally 3 times a day.	Ritodrine is Beta-2 adrenergic agonist. It binds to beta-2 adrenergic receptors on outer membrane of myometrial cell, activates adenylyl cyclase to increase the level of cAMP which decreases intracellular calcium and leads to a decrease of uterine contractions.	Used as a "reliever" inhaler in the management of asthma symptoms and as a tocolytic	Shakiness in the legs, arms, hands or feet Trembling or shaking of the hands or feet	Terbutaline × Quinidine Can increase the risk of an irregular heart rhythm that may be serious and potentially life-threatening.

Adrenergic Blocking Drugs

An Adrenergic antagonist is a pharmaceutical substance that acts to inhibit the action of catecholamines at the adrenergic receptors. It is thus a type of sympatholytic.



How beta-blockers short-circuit stress



1 Beta-blockers enter the bloodstream through gastrointestinal tract.

2 Beta-blockers prevent adrenaline from attaching to the receptors on the heart's cells.

3 Heart rate stays normal; fight-or-flight reactions do not occur.

Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Nonequilibrium Type					
B-Haloalkylamines					
Phenoxybenzamine (DIBENZYLIN)	20 to 40 mg orally 2 to 3 times daily.	Phenoxybenzamine blocks alpha receptors, leading to a muscle relaxation thus widening of the blood vessels results in lowering of blood pressure.	Used to treat high blood pressure and sweating caused by a certain kind of tumors	Dizziness or lightheadedness Fast heartbeat Pinpoint pupils Stuffy nose	Phenoxybenzamine × Tizanidine may have additive effects in lowering the blood pressure. You may experience headache, dizziness, light headedness, fainting and/or changes in pulse or heart rate.
Equilibrium Type (competitive)					
Nonselective					
1. Ergot alkaloids:					
Ergotamine (ERGOMAR)	2-10 mg/day.	Acts by two mechanisms: 1. Activation of 5-HT Receptors located on intracranial blood vessels and 2. activation of 5-HT receptors on sensory nerve endings of the trigeminal system results in the inhibition of pro-inflammatory neuropeptide release.	Used to treat acute migraine headache with or without aura (flashing lights, wavy lines, dark spots)	Abdominal pain Numbness and tingling of the fingers and toes Muscle pain in the extremities	Ergotamine × Indinavir Combining these medications may significantly increase the blood levels and effects of ergotamine, which in some cases can lead to excessive narrowing of blood vessels in the body.

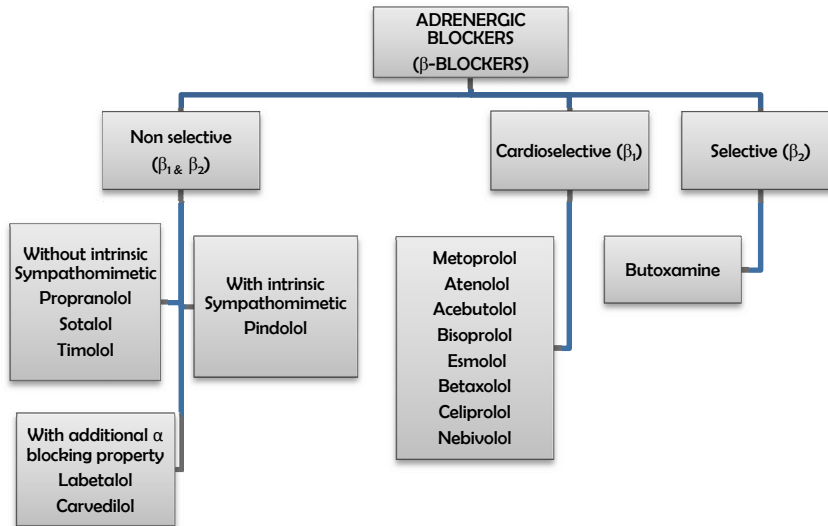
Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
2. Hydrogenated ergot alkaloids					
Dihydroergotamine (D.H.E. 45)	1-6 mg/day.	Activation of 5-HT _{1D} receptors located on intracranial blood vessels, leads to vasoconstriction and 2) activation of 5-HT _{1D} receptors on sensory nerve endings of the trigeminal system results in the inhibition of pro-inflammatory neuropeptide release.	Used to treat a migraine or cluster headache attack	Burning or tingling sensation, dryness, soreness, or pain in the nose Sudden sweating and feelings of warmth Dizziness Dry mouth	Dihydroergotamine × Bromocriptine combining these medications may have additive effects and cause excessive narrowing of blood vessels in the body.
Imidazolines					
Tolazoline (PRISCOLINE HYDROCHLORIDE)	25 mg/mL i.v.	Vasodilation by means of a direct effect on peripheral vascular smooth muscle	Used in the treatment of Arteriosclerosis Obliterans, Peripheral Vascular	Low blood pressure Bleeding of the stomach or intestines	Tolazoline/ Phentolamine × Tizanidine May has additive
		Tolazoline has moderate alpha-adrenergic blocking activity and has histamine agonist activity.	Diseases, Persistent Fetal Circulation Syndrome, Raynaud Disease, Spasm	Decreased blood platelets Kidney failure	Effects in lowering the blood pressure. You may experience headache, dizziness, light headedness, fainting and/or changes in pulse or heart rate.
Phentolamine (PHENTOSOL)	5 to 10 mg/day.	Competitively blocks alpha-adrenergic receptors leading to a muscle relaxation and a widening of the blood vessels, results in a lowering of blood pressure. Phentolamine also stimulates β-adrenergic receptors and produces a positive inotropic and chronotropic effect on the heart and increases cardiac output.	Used to prevent or control hypertension To treat dermal necrosis	Bruising or bleeding at place of injection Difficulty in ejaculating	

Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Miscellaneous					
Chlorpromazine (THORAZINE)	10 mg orally 3 to 4 times a day.	Antagonist on different postsynaptic receptors - on dopaminergic-receptors, serotonergic-receptors	Used to treat mental or mood disorders (e.g., schizophrenia), anxiety and restlessness before surgery, severe behavioral and conduct disorders in children	Extrapyramidal reactions (e.g., Parkinson-like symptoms, dystonia, akathisia, tardive dyskinesia) Dry mouth Orthostatic hypotension Amenorrhea	Chlorpromazine × Amiodarone Can increase the risk of an irregular heart rhythm that may be serious and potentially life-threatening.
Selective					
α_1-Selective					
Prazosin (MINIPRESS)	6-15 mg/day.	Prazosin acts by inhibiting the postsynaptic α_1 adrenoceptors on vascular smooth muscle. This inhibits the vasoconstrictor effect of circulating and locally released catecholamines (epinephrine and norepinephrine), resulting in peripheral vasodilation.	Used to treat high blood pressure or benign prostatic hyperplasia (BPH)	Dizziness or light headedness. Loss of bladder control.	Prazosin × Sodium oxybate Can affect the central nervous system may increase side effects like drowsiness, dizziness, lightheadedness, confusion, depression, low blood pressure.
Terazosin (HYTRIN)	2-10 mg/day.	Alpha-adrenergic blockers, relaxes veins and arteries so that blood can more easily pass through them. It also relaxes the muscles in the prostate and bladder neck, making it easier to urinate.	Used to treat hypertension (high blood pressure), or to improve urination in men with benign prostatic hyperplasia (enlarged prostate)	Dizziness Fast or irregular heartbeat Pounding heartbeat Shortness of breath	Terazosin × Tizanidine May have additive effects in lowering the blood pressure, headache, dizziness, lightheadedness, changes in pulse or heart rate.

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Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Doxazosin (CARDURA)	4-8 mg/day.	Alpha-adrenergic blockers, relaxes veins and arteries so that blood can more easily pass through them. It also relaxes the muscles in the prostate and bladder neck, making it easier to urinate.	Used to treat hypertension (high blood pressure), or to improve urination in men with benign prostatic hyperplasia (enlarged prostate)	Dizziness or light headedness Fast and pounding heartbeat	Doxazosin × Boceprevir may significantly increase the blood levels and effects of doxazosin. This may cause blood pressure to fall excessively and heart rate.
α_2-selective					
Yohimbine (EREX)	2.7 mg orally 3 times a day	Presynaptic alpha 2-adrenergic blocking agent, producing an increase in sympathetic drive.	Used to treat and diagnose some types of impotence	Irregular or fast heartbeat; or Confusion or unusual behavior	-

Adrenergic Blockers (β -Blockers)



Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Non selective (β_1 & β_2)					
Without intrinsic sympathomimetic					
Propranolol (HEMANGEOL)	40 mg orally 2 times a day.	Competes with sympathomimetic neurotransmitters such as catecholamines for binding at β_1 adrenergic receptors in the heart, inhibiting sympathetic stimulation.	Used to treat tremors, angina, hypertension, heart rhythm disorders, and other heart or circulatory conditions	Cough producing mucus Difficulty with breathing Tightness in the chest	Propranolol × Verapamil May lead to increased side effects Fatigue, headache, fainting, swelling of the extremities, weight gain, shortness of breath, chest pain, increased or decreased heartbeat, or irregular heartbeat.
Sotalol (BETAPACE AF)	80 mg orally twice a day.	Competitively blocking β_1 -adrenergic receptors within the myocardium and β_2 -adrenergic receptors within bronchial and vascular smooth muscle.	Used to maintain normal heartbeat in patients who have atrial fibrillation or atrial flutter (certain types of abnormal heartbeat)	Blurred vision Chest pain or discomfort Confusion Fast, slow, irregular, pounding, or racing heartbeat or pulse Light headedness, dizziness Tightness in the chest	Sotalol × Chloroquine Can increase the risk of an irregular heart rhythm

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Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
With intrinsic sympathomimetic					
Pindolol (VISKEN)	10 to 60 mg/day	Pindolol non-selectively blocks β -1 adrenergic receptors mainly in the heart, inhibiting the effects of epinephrine and norepinephrine resulting in a decrease in heart rate and blood pressure. By binding β -2 receptors in the juxtaglomerular apparatus, inhibits the production of rennin.	Used to treat high blood pressure	Burning, crawling, itching, numbness, prickling, "pins and needles", or tingling feelings Chest pain Shortness of breath Wheezing	Pindolol \times Albuterol May reduce the benefits of both medications, since they have opposing effects in the body. Cause narrowing of the airways, which may worsen the breathing problems or trigger severe asthmatic attacks.
With additional α blocking property					
Labetalol (TRANDATE)	200 to 400 mg orally twice a day.	Labetalol combines both alpha-1-adrenergic blocking and beta-adrenergic blocking activity.	Used to treat high blood pressure. It may be used alone or in combination with other medicines, such as diuretics	Blurred vision or other changes in vision Cold sweats Confusion Shortness of breath Swelling of face, fingers, feet, or lower legs Tightness in chest	Labetalol \times Methyldopa Leads to a serious increase in the blood pressure

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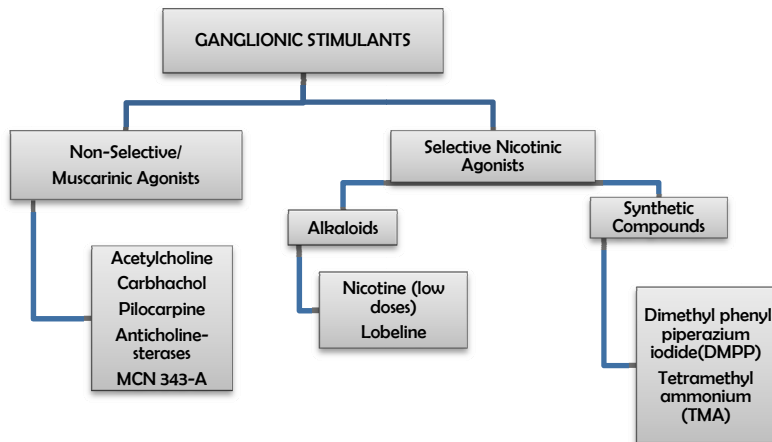
Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Carvedilol (COREG)	6.25 mg to 25 mg orally twice a day.	Blocks Beta-adrenergic receptor, also decreases systemic vascular resistance via its alpha adrenergic receptor blocking properties.	Used to treat heart failure and hypertension (high blood pressure)	Allergy Chest pain Dizziness, lightheadedness Shortness of breath Bradycardia	Carvedilol × Theophylline. can make carvedilol less effective and increase the effects of theophylline, Causes insomnia, tremors, restlessness, uneven heartbeats.
Cardioselective (β_1)					
Metoprolol (LOPRE-SSOR)	100 to 450 mg/day.	Competes with adrenergic neurotransmitters such as catecholamines for binding at β_1 adrenergic receptors in the heart.	Used to treat angina (chest pain) and hypertension (high blood pressure). It is also used to treat or prevent heart attack	Blurred vision Chest pain or discomfort Confusion Dizziness, faintness, or light headedness Shortness of breath Slow or irregular heartbeat	Metoprolol × Diltiazem May lead to increased side effects fatigue, headache, fainting, swelling of the extremities, weight gain, shortness of breath, chest pain, increased or decreased heartbeat, or irregular heartbeat.
Atenolol (TENORMIN)	50-100 mg orally once a day.		Used to treat angina (chest pain) and hypertension (high blood pressure). It is also used to treat or prevent heart attack	Blurred vision Confusion Shortness of breath Tightness in chest	Atenolol × Diltiazem may lead to increased side effects. fatigue, headache, fainting, swelling of the extremities, weight gain, shortness of breath, chest pain, increased or decreased heartbeat, or irregular heartbeat.

Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Bisoprolol (ZEBETA)	2.5-20 mg once daily.	Selectively blocks catecholamine stimulation of β_1 -adrenergic receptors in the heart At higher doses it may competitively block β_2 -adrenergic receptors in bronchial and vascular smooth muscle.	Used alone or in combination with other medications to treat high blood pressure	Anxiety Blurred vision Coma Confusion Chest discomfort Slow or irregular heartbeat	Bisoprolol \times Theophylline. Can make bisoprolol less effective and increase the effects of theophylline.
Esmolol (BREV-IBLOC)	10 mg/mL.	Blocks Beta-1 receptors in cardiac tissue.	Used to control of heart rate and blood pressure	Blurred vision Confusion Dizziness, faintness, or light headedness Unusual tiredness or weakness	Esmolol \times Atazanavir Can increase the risk of an irregular heart rhythm.
Betaxolol (KERLONE)	10 - 20 mg orally once a day.	Selectively blocks catecholamine stimulation of β_1 adrenergic receptors in the heart and vascular smooth muscle. Betaxolol can also competitively block β_2 -adrenergic responses in the bronchial and vascular smooth muscles.	Used to treat high blood pressure	Chest pain or discomfort Light headedness, dizziness, or fainting Shortness of breath Slow or irregular heartbeat	Betaxolol \times Diltiazem May lead to increased side effects fatigue, headache, fainting, swelling of the extremities, weight gain, shortness of breath, chest pain, irregular heartbeat.

Ganglionic Stimulants and Blocking Agents

Ganglionic Stimulants

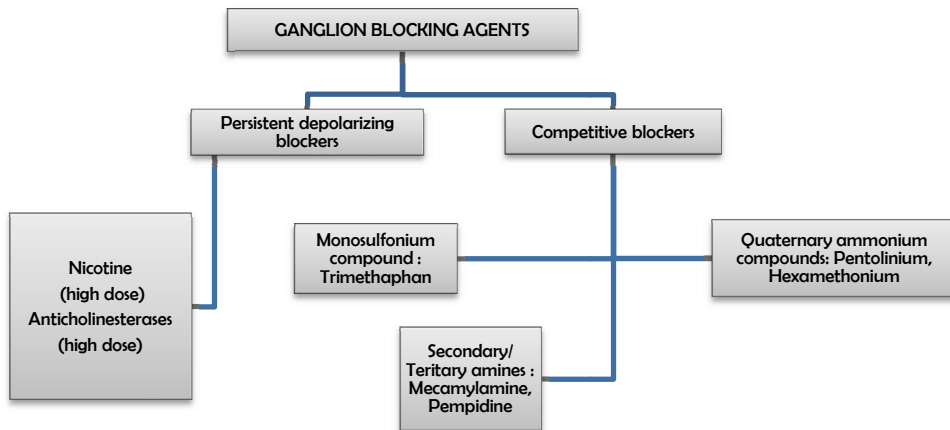
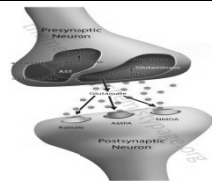
These are the agents that mimic neural transmission by stimulation of the nicotinic receptors on postganglionic autonomic neurons.



Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Non-Selective/Muscarinic Agonists					
Acetylcholine (MIOCHOL)	0.5-2 ml of 1% solution topically.	Agonist action on the muscarinic and nicotinic receptors.	Only neurotransmitter used in the motor division of the somatic nervous system.	Hot flushes Sweating Dyspnea Bradycardia Hypotension	Acetylcholine × Diphenhydramine may reduce the effects of acetylcholine ophthalmic
Carbachol (ISOPTO CARB-ACHOL)	1 or 2 drops topically in the affected eye(s) up to 3 times daily.	Carbachol is a parasympathomimetic that stimulates both muscarinic and nicotinic receptors. In topical ocular and intraocular administration	Used to treat glaucoma	Increased tear production Blurred vision Tightness in the chest Eye irritation Irregular heartbeat Stomach cramps.	-
Pilocarpine (PILOCAR)	0.5-4% topically.	its principal effects are miosis and increased aqueous humour outflow.		Salivation Sweating Bradycardia Bronchospasm Pulmonary edema	Pilocarpine × Hyoscyamine Reduce the effectiveness of one or both medications.
Selective nicotinic agonists					
Alkaloids					
Nicotine (low doses) (COMMIT)	14 – 20 mg/day.	It binds to nicotinic acetylcholine receptors on dopaminergic neurons in the cortico-limbic pathways, leads to depolarization which activate voltage-gated calcium channels.	Used to aid in smoking cessation	Mouth sores, blisters, or irritation Sore throat Heartburn	Nicotine × Ergotamine May increase the effects of narrowing the blood vessels and decrease blood flow. A severe decrease in blood flow to the brain and other parts of the body can lead to dangerous side effects.

Ganglion Blocking Agents

A ganglionic blocker (or ganglioplegic) is a type of medication that inhibits post ganglionic transmission, primarily by acting as a nicotinic antagonist.



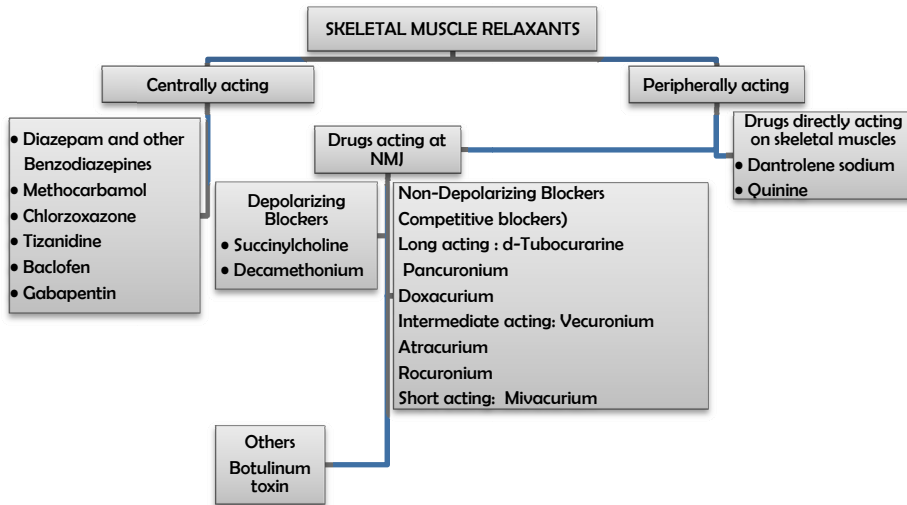
Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Persistent depolarizing blockers					
Nicotine (COMMIT)	14 – 20 mg/day.	It binds to nicotinic acetylcholine receptors on dopaminergic neurons in the cortico-limbic pathways, leads to depolarization which activate voltage-gated calcium channels.	Used to aid in smoking cessation	Mouth sores, blisters, or irritation Sore throat Heartburn	Nicotine × Ergotamine May increase the effects of narrowing the blood vessels and decrease blood flow. A severe decrease in blood flow to the brain and other parts of the body can lead to dangerous side effects.
Competitive blockers					
Monosulfonium compound					
Trimethaphan (ARFONAD)	0.5 to 1 mg / minute.	Trimethaphan is a ganglionic blocking agent prevents stimulation of postsynaptic receptors by competing with acetylcholine for these receptor sites.	Used to control hypotension during surgery to reduce bleeding into the surgical field, in the emergency treatment of pulmonary edema in patients with pulmonary hypertension	Constipation Dryness of mouth Impotence Itching, urticaria Tachycardia Urinary retention	Trimethaphan × Tizanidine May have additive effects in lowering blood pressure, headache, dizziness, lightheadedness, fainting, and/or changes in pulse or heart rate.
Amines (Secondary/Tertiary amines)					
Mecamylamine (INVERSINE)	25 mg orally/day.	It works by relaxing and dilating (widening) blood vessels.	Treating severe high blood pressure	Severe Blood Pressure Drop Upon Standing Severe Drowsiness Incomplete or Infrequent Bowel Movements	Mecamylamine × Tizanidine May have additive effects in lowering blood pressure, headache, dizziness, lightheadedness, fainting, and/or changes in pulse or heart rate.

Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Quaternary ammonium compounds					
Pentolinium (PENTOLONUM)	840 mg/day.	Binds to the nicotinic (ganglion) acetylcholine receptor. This receptor/channel is permeable to a range of divalent cations including calcium, the influx of which may activate a potassium current which hyperpolarizes the cell membrane. Blockage of the receptor leads to smooth muscle relaxation and vasodilation.	Used to produce controlled hypotension during surgical procedures and in hypertensive crises	Constipation Dryness of mouth Impotence Itching, urticaria Tachycardia Urinary retention	-



Skeletal Muscle Relaxants

Skeletal muscle relaxants are a heterogeneous group of medications commonly used to treat two different types of underlying conditions: spasticity from upper motor neuron syndromes and muscular pain or spasms from peripheral musculoskeletal conditions



Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Centrally Acting					
Diazepam (VALIUM)	10 mg 3 to 4 times/ day.	Binds to gamma-aminobutyric acid-A (GABA _A) receptors, this increases GABA affinity for the GABA receptor. Binding of GABA to the site opens the chloride channel, resulting in a hyperpolarized cell membrane that prevents further excitation of the cell.	Used to treat anxiety disorders, alcohol withdrawal symptoms, or muscle spasms. Diazepam is sometimes used with other medications to treat seizures	Shakiness and unsteady walk Problems with muscle control or coordination Agitation Decrease in frequency of urination Hyper excitability Yellow eyes or skin	Diazepam × Fluvoxamine Can cause drowsiness, confusion, muscle weakness, fainting, or coma.
Methocarbamol (ROBAXIN)	400 to 800 mg/day.	Muscle relaxant. It works by blocking nerve impulses (or pain sensations) that are sent to the brain.	Used together with rest and physical therapy to treat skeletal muscle conditions such as pain or injury	Confusion, memory problems, Loss of balance or coordination; Double vision, eye redness Insomnia Stuffy nose	Methocarbamol × Buprenorphine lead to serious side effects such as respiratory distress, coma, or even death.
Chlorzoxa Zone (PARA FONFORTE DSC)	250 to 750 mg orally 3 to 4 times a day.	Chlorzoxazone inhibits degranulation of mast cells, subsequently preventing the release of histamine and slow-reacting substance of anaphylaxis, mediators of type I allergic reactions.	Treating discomfort caused by muscle spasms. It is used in combination with rest, physical therapy, and other measures	Drowsiness Restlessness; Slightly discolored urine	Chlorzoxazone × Propoxyphene May increase side effects such as dizziness, drowsiness, confusion, difficulty concentrating, and other nervous system or mental effects.

Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Tizanidine (ZANAFLEX)	4 - 8 mg/ day orally.	Tizanidine reduces spasticity by increasing presynaptic inhibition of motor neurons through agonist action at α_2 -adrenergic receptor sites.	Used to treat spasticity by temporarily relaxing muscle tone	Chest pain or discomfort Nervousness Pain or burning while urinating Unusual tiredness	Tizanidine \times Caffeine/ Acetaminophen/ Phenylephrine Combining these medications may significantly increase the blood levels and effects of tizanidine. This may cause blood pressure to fall excessively.
Baclofen (LIORESAL)	40-80 mg/ day	Baclofen is a direct agonist at GABA B receptors. It is capable of inhibiting both monosynaptic and polysynaptic reflexes at the spinal level.	Used to treat muscle symptoms caused by multiple sclerosis, including spasm, pain and stiffness	Confusion Dizziness or light headedness Drowsiness Unusual weakness, especially muscle weakness	Baclofen \times Propoxyphene May increase side effects such as dizziness, drowsiness, confusion, difficulty concentrating and other nervous system or mental effects.
Gabapentin (GRALISE)	900 to 1800 mg orally in 3 divided doses.	Gabapentin increases the synaptic concentration of GABA, enhances GABA responses at non-synaptic sites in neuronal tissues, and reduces the release of mono-amine neurotransmitters.	Used in adults to treat nerve pain caused by herpes virus or shingles (herpes zoster). used to treat restless legs syndrome (RLS)	Clumsiness or unsteadiness Continuous, uncontrolled, back-and-forth, or rolling eye movements	Gabapentin \times Sodium oxybate /propoxyphene/ Can affect the central nervous system such as increases side effects like drowsiness, dizziness, lightheadedness, confusion, depression.

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Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Peripherally Acting					
1. Drugs acting at NMJ					
(a) Depolarizing Blockers:					
Succinylcholine (ANECTINE)	0.6 mg/kg.	It is a depolarizing muscle relaxant. It works by keeping muscles from contracting, which causes paralysis of the muscles in the face.	Used to induce anesthesia	Postoperative pain Jaw rigidity Excessive salivation Hypotension	Succinylcholine × Amikacin Can increase the blood levels or the adverse effects of succinylcholine.
Non-Depolarizing Blockers; Competitive blockers)					
Tubocurarine (TUBOCURARINE CHLORIDE)	0.6 mg/kg.	Binds to nicotinic-cholinergic receptors at the autonomic ganglia, in the adrenal medulla, neuromuscular junctions and in the brain.	Used to induce anesthesia	Allergic reactions Bronchospasm Hypotension	Tubocurarine × Paromomycin/ gentamicin/ neomycin Can increase the blood levels or adverse effects of tubocurarine.
Pancuronium (PAVULON)	0.1 mg/kg/ hr IV.	Inhibit neuromuscular transmission by competing with acetylcholine for the cholinergic receptors of the motor end plate, thereby reducing the response of the end plate to acetylcholine.	Used to produce skeletal muscle relaxation during surgery after general anesthesia, Treatment to increase pulmonary compliance during assisted or controlled respiration	Skeletal muscle weakness Elevation in pulse rate Excessive salivation.	Pancuronium × Tobramycin Can increase the blood levels or adverse effects of pancuronium.

Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Vecuronium (NORCURON)	0.08 to 0.1 mg/kg	Acts by competitively binding to nicotinic cholinergic receptors. Thus decreases the acetylcholine to bind to the nicotinic receptor at the postjunctional membrane of the myoneural junction. As a result, depolarization is prevented, calcium ions are not released and muscle contraction does not occur.	Used to relax muscles during surgery and mechanical breathing	Skeletal muscle weakness Anaphylactic reaction Tachycardia Hypotension	Vecuronium × Tobramycin/ Gentamicin Can increase the blood levels or adverse effects of vecuronium.
Atracurium (TRACRIUM)	0.4 to 0.5 mg/kg	Antagonizes the neurotransmitter action of acetylcholine by binding competitively with cholinergic receptor sites on the motor end-plate.	Used in addition to general anesthesia, to facilitate endotracheal intubation and to provide skeletal muscle relaxation during surgery or mechanical ventilation	Skin flush Erythema Itching	Atracurium × Gentamicin Can increase the blood levels or add to the adverse effects of atracurium.
Others : Botulinum toxin (MYOBLOC)	0.5 to 1.0 mL	Neurotoxin. It works by blocking nerve impulses to the muscles, temporarily paralyzing the muscle.	Used to reduce the severity of abnormal head position and neck pain associated with a certain neck problem (cervical dystonia)	Difficulty with swallowing Neck pain Uncontrolled twisting movements of the neck.	Botulinum toxin × Kanamycin May increase the risk of certain side effects such as excessive muscle weakness, paralysis, and difficulty breathing, swallowing or speaking.

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Drug	Dose	Mechanism of action	Uses	Adverse effects	Drug interactions
Drugs directly acting on skeletal muscles					
Dantrolene sodium	4 to 8 mg/kg/day.	Dantrolene depresses excitation-contraction coupling in skeletal muscle by binding to the ryanodine receptor 1 and decreasing intracellular calcium concentration.	Used to treat episodes of severe high body temperature (malignant hyperthermia) It is also used to prevent or reduce the risk of malignant hyperthermia	Diarrhea Dizziness General feeling of discomfort or illness Muscle weakness	Dantrolene × Estradiol Can cause serious side effects that may affect the liver.