

ADRENERGIC AGONISTS

(Adrenergic drugs/ Sympathomimetic amines/ Sympathomimetic agents)

Adrenergic drugs cause **stimulation of the adrenergic receptors** in the sympathetic nervous system. They **mimic the actions of major neurotransmitters** of the sympathetic nervous system, i.e., **epinephrine and norepinephrine**.

Adrenergic drugs either directly or indirectly stimulate the adrenergic nerves. In direct stimulation, they mimic the actions of noradrenaline while indirect stimulation triggers the release of noradrenaline.

They mainly provide,

- **Pressor effect** (blood pressure raising effect), due to direct stimulation of the heart and constriction of the arterioles.
- **Bronchodilation**, due to relaxation of the bronchial smooth muscle.
- **Central stimulant actions**
- **Mydriasis**

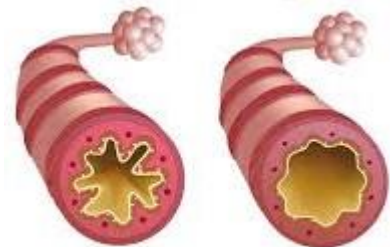
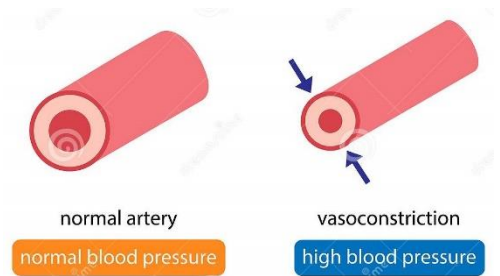
CLASSIFICATION:

Catecholamines:

- Epinephrine (Adrenaline)
- Norepinephrine (Noradrenaline)
- Dopamine
- Isoprenaline

Non-catecholamines:

- Phenylephrine
- Salbutamol (Albuterol)
- Terbutaline
- Ephedrine
- Pseudoephedrine
- Hydroxy Amphetamine
- Metaraminol
- Naphazoline



Asthmatic airway

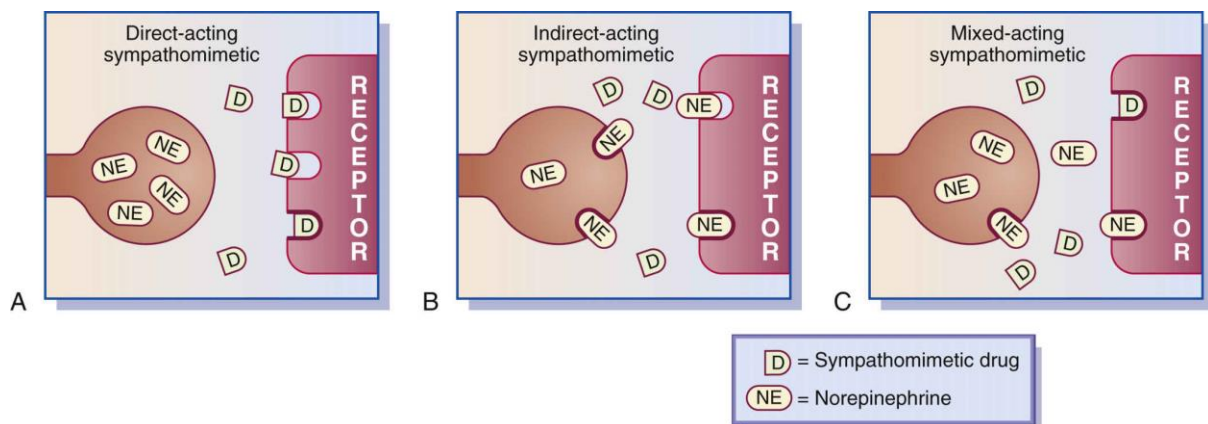
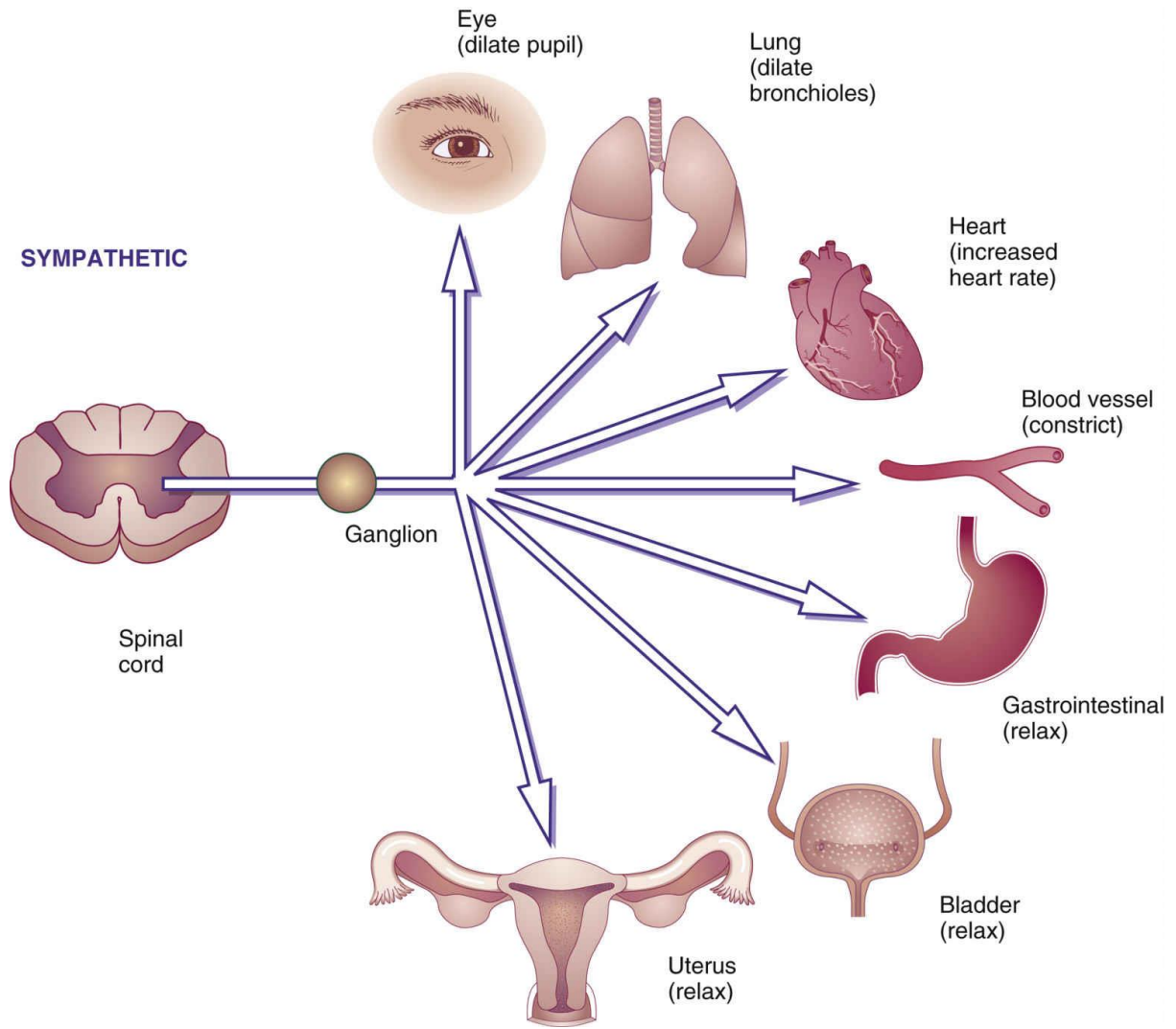
After bronchodilation



mydriasis



miosis



ADRENERGIC ANTAGONISTS

(Sympatholytic agents/ Adrenoceptor antagonists/ Adrenergic blocking agents/ Anti-adrenergic drugs)

Adrenergic antagonists are drugs which **antagonise the actions of adrenergic drugs**.

They block the responses mediated by adrenergic receptor (α or β receptors) activation.

They **inhibit the actions of sympathomimetic amines** (Adrenaline, Noradrenaline) by acting on α or β receptors or both of them.

They mainly provide,

- Vasodilation
- Broncho constriction
- Miosis

CLASSIFICATION:

α – Blockers:

Non-selective α_1 & α_2 Blocker:

Reversible:

- Tolazoline
- Phentolamine

Irreversible:

- Phenoxybenzamine

Selective α_1 & α_2 Blocker:

α_1 Blocker:

- Prazosin
- Terazosin

α_2 Blocker:

- Yohimbine.

β – Blockers:

Non-selective β_1 & β_2 Blocker:

- Propranolol

- Timolol.

Cardio selective β_1 Blocker:

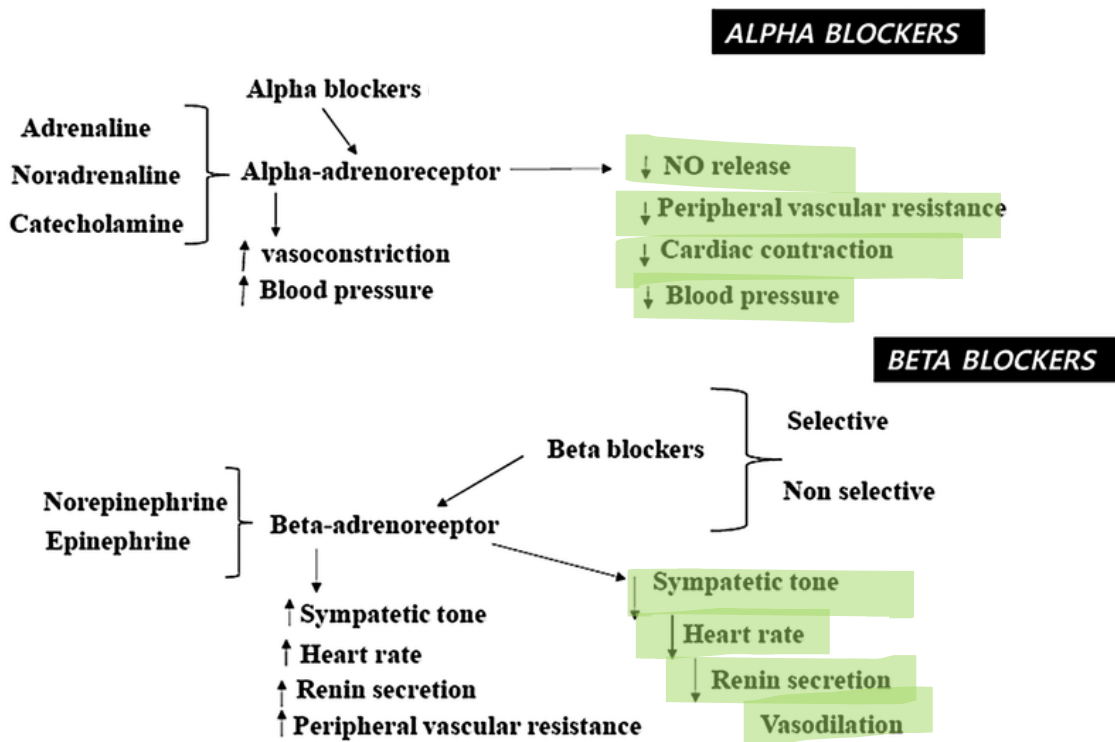
- Atenolol
- Metoprolol

$\alpha + \beta$ Blocker:

- Carvedilol
- Labetalol

Selective β_2 Blocker:

- Butoxamine



CHOLINERGIC DRUGS AND RELATED AGENTS

(Parasympathomimetic agents, Cholinergic agonists)

Cholinergic agonists are drugs that **mimics the action of the neurotransmitter acetylcholine**, the primary transmitter of nerve impulses within the parasympathetic 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.

Cholinergic agonists are of two types:

- **Direct-acting cholinergic agonists:** directly bind to cholinergic receptors.
- **Indirect-acting cholinergic agonists:** increase the availability of acetylcholine (ACh) at the cholinergic receptors by inhibiting the hydrolysis of ACh by Acetyl choline esterases (AChE).

They provide,

- **Miosis** (reduction in intraocular pressure)
- **Increases the secretion of exocrine glands** (gastric, salivary, ocular, sweat glands)
- **Vasodilation**
- **Smooth muscle contraction**

Classification:

Direct acting agents (Cholinergic agonists):

Choline esters:

- Acetylcholine
- Carbachol

Cholinergic alkaloids:

- Pilocarpine
- Muscarine

Indirect acting agents (Anticholinesterase):

Reversible:

Carbamates:

- Neostigmine
- Edrophonium
- Physostigmine

Acridine:

- Tacrine

Irreversible:

Organophosphorus compounds:

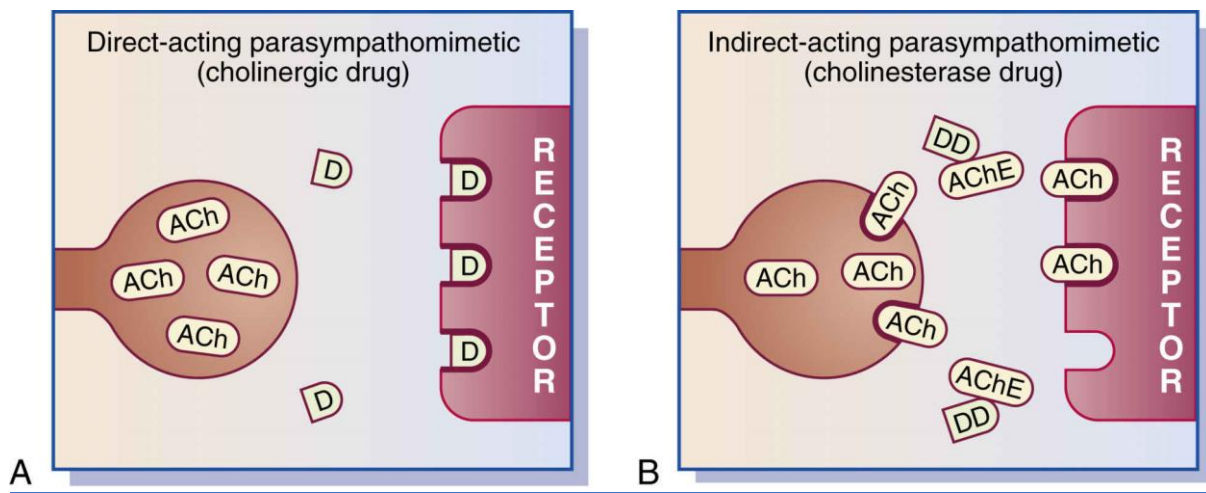
- Echothiophate
- Parathion
- Sarin
- Soman

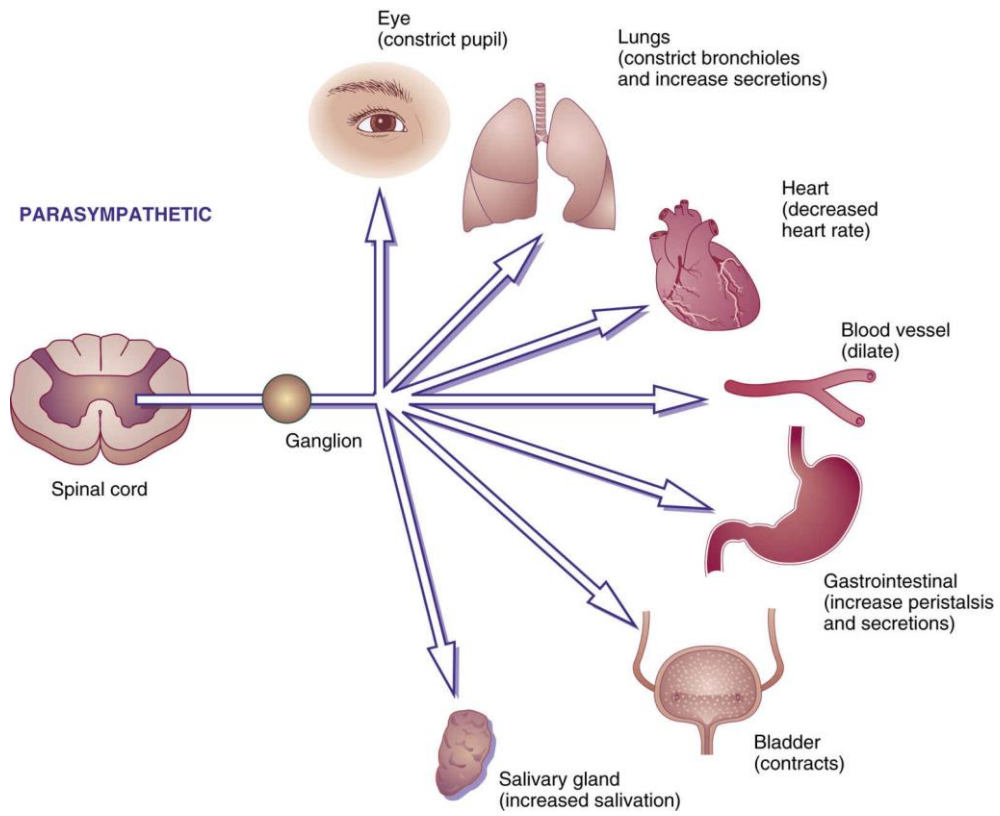
Carbamates:

- Carbaryl

Cholinesterase reactivator:

- Pralidoxime.





CHOLINERGIC BLOCKING AGENTS

(Anti cholinergic agents, Parasympatholytics, Muscarinic antagonists, Anti parasympathetic agents, Anti muscarinic agents & Antispasmodics.)

Cholinergic antagonist is a general term for agents that bind to cholinceptors (muscarinic or nicotinic) and prevent the effects of acetylcholine (ACh) and other cholinergic agonists.

They provide,

- Decreased GI motility and salivation
- Mydriasis (pupil dilation)
- Increase in pulse rate
- Decreased bladder contraction
- Decreased rigidity
- tremors

Classification:

Anti muscarinic agents:

- Atropine
- Tropicamide
- Homatropine
- Dicyclomine
- Cyclopentolate
- Clidinium
- Ipratropium bromide.

Anti nicotinic agents:

Ganglionic blockers:

- Hexamethonium
- Mecamylamine

Neuromuscular blockers/ Skeletal muscle relaxants:

- Tubocurarine
- Pancuronium.

Cholinergic actions	Anticholinergic actions
Eye Circular muscle of iris Contraction (miosis) Ciliary muscles Contraction accommodation for near vision	relaxation (mydriasis) relaxation (cycloplegia) loss of accommodation
Heart bradycardia (↓ H.R.)	Tachycardia (↑ H.R)
Urinary bladder Contraction of muscles Relaxation of sphincter Urination	Relaxation of muscles contraction of sphincter Urinary retention
Exocrine glands Increase of sweat, saliva, lacrimal, bronchial, intestinal secretions	Decrease all secretions
GIT ↑ peristalsis ↑ secretion relaxation of sphincter Diarrhea	↓ peristalsis ↓ secretion Contraction of sphincter constipation
Lung Bronchoconstriction ↑ bronchial secretion	Bronchodilatation ↓ Decrease secretion