

Autonomic Nervous system (A.N.S)

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- It is divided into sympathetic and parasympathetic nervous system.

- **Sympathetic outflow** comes from all thoracic and upper three lumbar segments of the spinal cord.

- **Parasympathetic outflow** comes from: a. Cranial division: III, VI and X cranial nerves.

- b. Sacral division: 2nd-3rd sacral segments of the spinal cord.

Drugs Acting on the Sympathetic N.S.

Adrenaline

Adrenaline is a potent stimulant of both α and β receptors.

Therapeutic uses:

- A) Local:**
1. To stop local bleeding as in cases of epistaxis (nasal bleeding).
 2. Added to local anesthetics to prolong their effect
 3. Nasal decongestant in common cold.
 4. On eye to treat glaucoma.

B) Systemic

1. Dilates tracheobronchial tree in cases of bronchial asthma due to stimulation of B2 receptors.
2. Cardiotonic (can be given intracardiac in cases of heart arrest).
3. Allergy and anaphylactic shock because it is the physiologic antidote of histamine.
4. Hypotensive shock.

Side effects of adrenaline

Tachycardia, palpitation, anxiety, headache and tremors.

Toxicity of adrenaline

- 1- Cardiac arrhythmias and irregularities treated by B-blockers.
- 2- Pulmonary edema and pulmonary hypertension.
- 2- Cerebral hemorrhage due to sudden rise of blood pressure.
- 4- Gangrene of the fingers if given in high concentration with local anesthesia.

Contraindications of adrenaline:

1- Hypertension.

2- Hyperthyroidism because it causes cardiac arrhythmias.

3- Angina pectoris because it increases cardiac work and worsen angina (acute myocardial infarction may occur).

Ephedrine

Its effects as adrenaline, but with longer duration and it can be given orally. It also stimulates the central nervous system.

Clinical uses:

- 1- Hypotension as in case of spinal shock and in obstetrics.
- 2- Bronchial asthma (chronic cases).
- 2- Common cold (nasal decongestant).

Phenylephrine

Its effects as adrenaline: it stimulates alpha receptors

-It is an effective mydriatic agent, used for examination of the retina.

-Used as nasal decongestant

Sulbutamol

It stimulates beta receptors in smooth muscles in bronchial wall.

The most important uses of it is in the therapy of bronchial asthma.

Sympathetic depressants (sympatholytics)

1. Drugs which compete with adrenaline on the receptors e.g.:

α blockers (Ergot alkaloids)

Uses:

ergotamine used in treatment of migraine.

Hydergine used in treatment of hypertension.

ergotamine used in treatment of postpartum hemorrhage.

Prazosin

It is effective in the treatment of hypertension due to blockade of α 1 receptors.

β - blockers

used in hypertension and cardiac arrhythmias as **propranolol**.

2. Drugs that prevent the release of noradrenaline from the sympathetic nerves .e.g.

Reserpine (serpasil) and **α - methyldopa** (aldomet) used in treatment of hypertension.

Drugs acting on the parasympathetic N.S.

Acetyl choline (A.ch)

It is not used therapeutically because it has short duration of action and non-specific effects, so other substitutes replace it.

Methacholine

Uses:

Tachycardia (paroxysmal supraventricular tachycardia)

Urine retention.

Glaucoma.

Contraindications.

Bronchial asthma.

Peptic ulcer.

Hyperthyroidism.

Choline-esterase enzyme inhibitors (CEIs)

(Eserine and prostigmine)

They reversibly inhibit the enzyme responsible for destruction of A.ch (choline-esterase enzyme).

Uses of CEIs

Eserine

- 1- Glaucoma (to lower the elevated intraocular pressure).
- 2- Antidote to atropine.
- 3- In alternate with mydriatics (in case of iritis to cut adhesions between iris and lens).
- 4- To counteract the mydriatic effect of parasympatholytics.

Prostigmine (neostigmine)

- 1- Myasthenia gravis.
- 2- Urinary retention after surgical operations.
- 3- Glaucoma to increase the flow of aqueous humor.
- 4- Antidote of curare.
- 5- Postoperative dilatation of stomach in absence of mechanical obstruction.

Parasympatholytics

Atropine

Effects:

- 1- Increase heart rate (it produces initial bradycardia followed by tachycardia).
- 2- Retention of urine.
- 3- Stimulates C.N.S then inhibits it.
- 4- Relaxation and reduction of secretion of the respiratory passage.
- 5- Dilatation of the pupil.

Routes of administration:

Atropine eye drops.

Atropine ampoules (injection).

Oral preparations.

Inhalation preparation (Ipratropium used in B.A)

Uses:

preanaesthetic medication to decrease the respiratory secretion and dilates bronchi.

Examination of the funds of the eye.

Peptic ulcer (pirenzepine).

Parkinsonism (Benzotropine).

Bronchial asthma (Ipratropium).

Incontinence of urine (cetiprine).

Antidote for organophosphorus poisoning.

Side effects:

Constipation due to relaxation of the smooth muscles of the G.I.T.

Urine retention in old patients with prostatic enlargement.

Tachycardia.

Blurring of vision.

Palpitation, hallucination and dry skin (flushing).

Treatment of Atropine toxicity:

Stomach lavage (using K – permanganate).

Antidote: prostagmine or eserine.

Artificial respiration.

Catheterization for urinary retention.

Autacoids

Histamine

Actions:

- Contraction of smooth muscle fibers (intestine and bronchi).
- Dilation of coetaneous blood vessel with edema formation.
- Decrease arterial blood pressure.
- Stimulation of gastric secretion.

Antihistaminics

1. Physiological antagonism

Adrenaline because it causes vasoconstriction and bronchodilatation (used in shock and bronchial asthma).

2. Competitive antagonists (antihistaminics)

They compete with histamine on the histamine receptors.

3. Prevention of histamine release: e.g. corticosteroids.

4. Desensitization By gradually increasing doses of histamine.

Uses of antihistaminics:

- Allergic conditions as urticaria.
- Motion sickness.
- Nausea and vomiting of pregnancy.

Side effects of antihistaminics:

Sedation and drowsiness.

Dry mouth.

Uses of H₂ receptor antagonists

Treatments of peptic ulcer