

Anticholinergic drugs

What students should know:

Student should be able to describe:

- Kinetics of muscarinic antagonists
- The effects of atropine on the major organ systems.
- To list the clinical uses of muscarinic antagonists.
- To know adverse effects & contraindications.
- To identify one antimuscarinic agent for each of the following special uses: mydriasis, cycloplegia, peptic ulcer & parkinsonism.

Anticholinergic Drugs (Cholinoreceptor blockers)

Nicotinic blockers.

Ganglionic blockers.

Neuromuscular blockers.

Muscarinic blockers (Parasympatholytics)

Classification of Antimuscarinics

1. Naturally occurring alkaloids.

Atropine – Hyoscine

2. Synthetic atropine substitutes.

Naturally occurring alkaloids

Atropine

Pharmacokinetics

- Tertiary amine ?
- Orally absorbed - Cross BBB
- Metabolized in the liver, excreted in urine.
- Has short duration of action on most organs except eye.

Mechanism of action

- **Reversible competitive blockade of all muscarinic receptors (NOT SELECTIVE).**
- **Block muscarinic actions of Ach and other parasympathomimetics.**
- **Can atropine reverse the action of Ach on skeletal muscles?**

Pharmacological Effects

CNS

- **CNS sedative action**
- **Vagal nucleus (CIC):**
Initial bradycardia & Tachycardia.
- **Antiemetic effect (block vomiting center).**
- **antiparkinsonian effect (block basal ganglia).**
- **Toxic dose:**
Hyperthermia - excitement-hallucination.

CVS

1. Heart

- Initial bradycardia (**central**) followed by tachycardia (**peripheral**).
- ↑ AV conduction (+ ve dromotropic effect).

2. Blood vessels

- **Therapeutic dose:** ↓ Vasodilatation induced by cholinomimetics.
- **Toxic dose:** Cutaneous vasodilatation → (atropine flush).

Eye

- **Passive mydriasis**
due to paralysis of circular muscle.
- **Cycloplegia (loss of accommodation)**
due to paralysis of ciliary muscle.
- **Loss of light reflex.**
- **↑ I.O.P # glaucoma.**
- **↓ Lacrimal secretion → sandy eye.**

Secretions

- ↓ **Salivary secretion** → (**Dry mouth**).
- ↓ **Sweating** → **Dry skin** → **Fever in infants and children.**
- ↓ **Bronchial secretion** → ↑ **Viscosity.**
- ↓ **Lacrimal secretion** → **Sandy eye.**
- ↓ **Gastric secretion** → ↓ **Gastric motility**

GIT

- Relaxation of smooth muscles (**constipation**).
- ↓ GIT motility → Antispasmodic effect.
- ↑ Sphincter contractions.

Urinary Tract

- Relaxation of the ureter smooth muscles.
- Sphincter contraction.
- Urinary retention.

Bronchial Muscles

- Bronchial Relaxation
- ↓ Bronchial secretion → ↑ viscosity

Uses

1. **preanesthetic** medication to :
 - ↓ Salivary & bronchial secretion.
 - Protect the heart from excessive vagal tone.
2. **Antispasmodic** in renal & intestinal colics.
3. Cholinomimetic or organophosphorous poisoning.
4. Myocardial infarction(to prevent vagal discharge).

Adverse effects & Toxicity

- Blurred vision – Mydriasis
- Tachycardia - Atropine flush
- Urinary retention - Constipation.
- Dryness of mouth , Sandy eye
- Malignant hyperthermia.
- Hallucination, Excitaciona (Toxic dose).

Treatment

- Gastric lavage.
- Anticonvulsant.
- Cooling blanket.
- **Antidote:** Physostigmine (IV slowly).

Hyoscine (SCOPOLAMINE)

What is difference between atropine and hyoscine?

Hyoscine

- More rapid onset of action
- Shorter duration of action
- Less mydriatic action (2-4 days).
- More CNS depressant action
Sedation – Inhibition of vomiting center.
- Has amnesic action.
- Less CVS effect

Uses

- Preanesthetic medication
- Antiemetic action (Motion sickness).

Contraindications

- Glaucoma.
- Tachycardia.
- Prostate hypertrophy in old patients.
- Constipation & paralytic ileus.
- Children

Synthetic Atropine Substitutes

Eye For Fundusoscopic Examination of the eye.

Atropine 7 days.

Homatropine 24 hours.

Cyclopentolate 12 hours.

Tropicamide 6 hours.

GIT

Peptic ulcer

Pirenzepine (Selective M1 blocker)

Antispasmodic

Hyoscine butyl bromide

Oxyphenonium.

Dicyclomine

Propantheline.

Glycopyrrolate.

Parkinsonism

- Benztropine.
- Trihexphenidyl.

Bronchial Asthma

Ipratropium bromide

- Quaternary compound.
- Taken by inhalation as aerosol (bronchodilator).
- Little effect on viscosity.
- Useful in COPD patients.

USES of antimuscarinics

- AS mydriatics.
- Bronchial asthma.
- Antispasmodic for intestinal and renal colics
- Traveller 's diarrhea
- Peptic ulcer
- Antiparkinsonian.
- Antiemetic, motion sickness (Hyoscine).
- Pre-anesthetic medication.
- Cholinomimetics intoxication
- Urinary incontinence in adults

Direct cholinomimetic drugs

ACh	—
Methacholine	—
Carbachol	Paralytic ileus Urinary retention Glaucoma
Bethanechol	Paralytic ileus Urinary retention
Pilocarpine	Glaucoma
Cevimeline	Sjogren's syndrome.

Indirect cholinomimetic drugs (Anticholinesterases)

Edrophonium.-	Diagnosis of Myasthenia gravis. Supraventricular tachycardia
Neostigmine	Myasthenia gravis treatment , Paralytic ileus Urinary retention
Physostigmine	Glaucoma atropine toxicity
Ambenonium Pyridostigmine	Myasthenia gravis treatment
Ecothiophate Isofluorophate	Glaucoma.
Donepezil Tacrine	Alzheimer disease

Antimuscarinic drugs

Atropine	Preanesthetic medication - Antispasmodic
Hyoscine	Motion sickness - Preanesthetic medication Antispasmodic
Pirenzepine	Peptic ulcer
Ipratropium	Asthma
Benztropine	Parkinsonism
Dicyclomine Oxyphenonium	Antispasmodics
Tropicamide Cyclopentolate Homatropine	Fundus examination



Thank you