

ANTICHOLENERGIC DRUGS

These are those drugs which block the cholinergic receptor.

By: ZAKIRULLAH YOUSUFZAI

These drugs are also called cholinergic antagonist or cholinergic blocker.

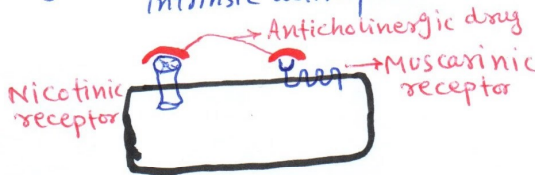
These drugs bind with receptor but unable to stimulate the ^{cholinergic} receptor.

cholinergic drugs = Affinity to bind + intrinsic activity

Anticholinergic = Affinity to bind + NO intrinsic activity

cholinergic receptor may be Nicotinic or Muscarinic

Prevent the action of Endogenous Acetyl-Choline on receptor



ANTICHOLENERGIC DRUGS

ANTI MUSCARINIC

Non selective Muscarinic Antagonist

e.g.: Atropine
Scopolamin

selective Muscarinic Antagonist

M₁ selective
e.g.: Pirenzapine

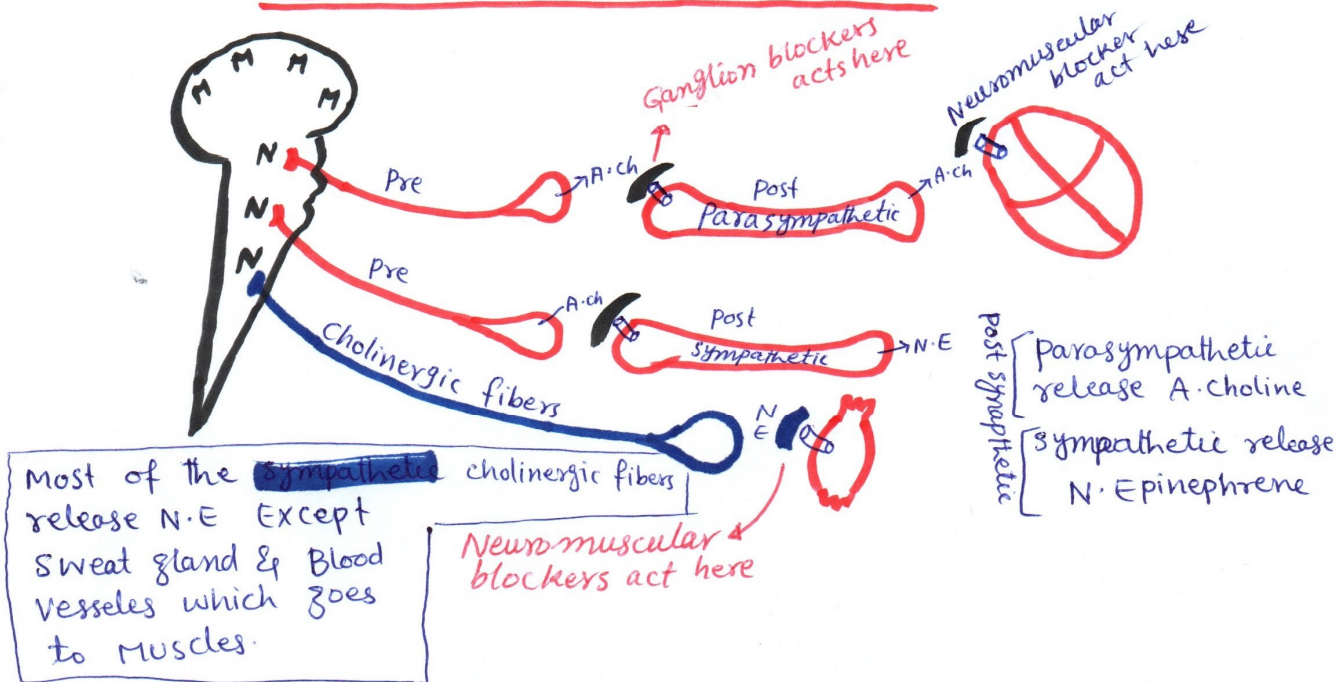
M₃ selective
eg: Darifenacine

ANTI NICOTINIC

N_n (Nicotinic receptor on neuronal ends)
Ganglion Blockers

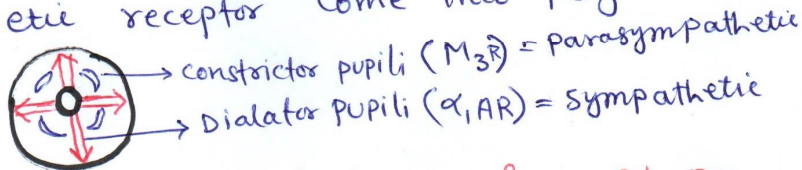
N_m (Nicotinic receptor on Neuro-muscular junction)
Neuro-muscular Blockers

ANTIMUSCARINIC DRUGS



Antimuscarinic drugs primarily acts on neuroeffector transmission at parasympathetic system so they are Parasympatholytic drug

Most of the body tissues have Both sympathetic & Parasympathetic receptors, when Parasympathetic receptor are inhibited the unopposed sympathetic receptor Come into play.
E.g: eye



ATROPIN: It is an alkaloid derived from Atropa-

Belladonna •
Beautiful lady

Fate
↓
(Greek God that cut thread of life)

in old days this plant is eaten by ladies to dilate the pupil
But due to its so side effects, now the drops are used in eyes.
* Duration of action of Atropin = 4 hour when taken systematically.
* Duration of action of Atropin = 4-5 day when drop put into eye.

Action of ATROPIN IN BODY

1) EYE Mydriasis:

- ① Atropin block M_3 receptor on sphincter pupili & Cause pupilodilatation \Rightarrow (Mydriosis)
- ② Cycloplegia: Cause paralysis of Ciliaris Muscle, so person can't focus for near objects & develop ~~cycloplegia~~. Blurred vision.
- ③ Photophobia: As pupil are dilated, too much light come to eye & cause photophobia.



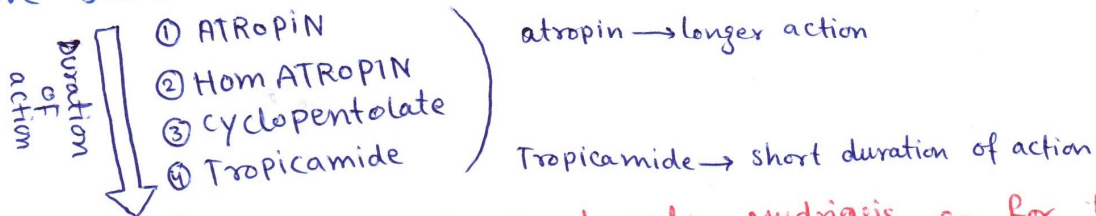
Never give Atropin to patient with history of narrow angle glaucoma, b/c as pupil dilate it further move peripherally & further close the angle.

Uses of Atropin in Ophthalmology:

- 1) to check Refractive errors.
- 2) Fundoscopy/Retinoscopy.
- 3) Keratitis \Rightarrow inflammation of cornea
Irido ~~keratitis~~ cyclitis \Rightarrow inflammation of Iris + ciliary body.

whatever in this inflammation Fibrinogen is produced & that cause Adhesion of either Iris & cornea or Iris with lens, to prevent such adhesion we need to dilate the pupil.

nowadays to check the refractive errors, we use drugs which have short duration of action:



* For Fundoscopy we need only Mydriasis, so for this purpose we use α_1 Adrenergic stimulant (Phenyl ephedrine)

But in people 40 or +, they have los. the capacity of accommodation of lens by ciliaris muscle, so while check for ref. errors they need only pupil dilatation & not cycloplegia.
Atropin toxicity cause such blurring of vision that perso become **Blind AS BAD.**

② SECRETION: Atropin ↓ all secretions

- ① ↓ lacrimation = Xerophthalmia
- ② Dry mouth = Xerostomia
- ③ ↓ Nasal & lower respiratory secretions.
- ④ ↓ sweating = Anhidrosis (skin become dry)

i.e = DRY as a BONE

But in Nasal Rhinitis many Antihistaminic drugs which also has Antimuscarinic action are used. i.e: Atropin

In old days when anesthetic were used they cause irritation of respiratory system & as a result the respiratory secretions become increased & mucociliary mechanism is disturbed; so to prevent such complication, patient is treated preoperatively with Atropin which ↓ such secretions.

BUT action of atropin on sweat gland is not good b/c sweat gland have M₃ receptors stimulated by sympathetic nervous system, so when sweating is blocked the body temperature goes up.

Atropin cause cutaneous vessel dilation, so neck & face become red called Atropin Flush.

i.e: Red as a Beat.

③ Respiratory system:

normally bronchial tree tone is maintained by parasympathetic Ns the bronchial tree is slightly constricted.

when such drug is given constriction will be lost & person develop bronchial dilation.

*in previous days Atropin were given for Asthma. But nowadays synthetic analog of Atropin (Ipratropium) is used.

Ipratropium is quaternary ammonium compound so it is less polar, so less cross BBB.

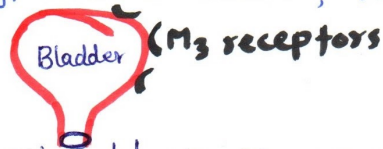
4) G.I.T: Atropin loss the cholinergic activity, as a result decrease motility. So of these drugs used as a:

- ① antispasmodic
- ② ↓ secretion of GIT Hcl.

For decreasing Hcl M_1 antagonist (PIRENZAPINE) are used. So it help in healing of peptic/Duodenal ulcers. Atropin is most effective as antispasmodic than ↓ Hcl.

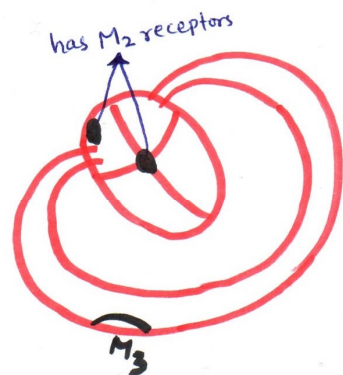
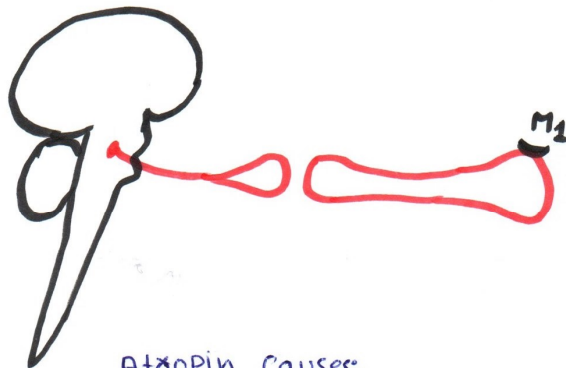
5) Urogenital symptoms:

Darfenicine block M_3 receptor, of bladder; so it is used in patient with hypermotile bladder, wet bed (children).



6) CVS:

- ① at low dose Atropin block M_1 receptor on postsynaptic ganglion & HR ↓ (bradycardia).
- ② At Moderate dose the Atropin block M_2 receptor of SA-node & AV_{node} & as a result SA-node \rightarrow ^{AV node} not inhibited & lead to ↑ HR (Tachycardia)
- ③ At high dose Atropin block M_3 receptor on Endothelium, so Cholinergic dependant blood vessele dialation does not occur.



Atropin Causes:

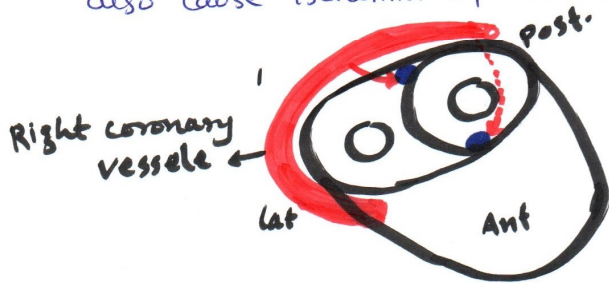
- ① initially \Rightarrow ↓ HR
- ② Moderate \Rightarrow ↑ HR
- ③ High dose \Rightarrow loss of vessele dialation.

USES OF ATROPIN in CVS

① symptomatic sinus Bradycardia: in this condition SA-node work less, so Atropin increase the activity of SA-node & as a result ↑HR

② partial heart block or Posto-inferior MI:

The right coronary artery supply posterior, inferior wall of heart as well SA- & AV-nodes, occlusion to this vessel also cause ischemia of nodes as a result ↓HR.



Antimuscarinic

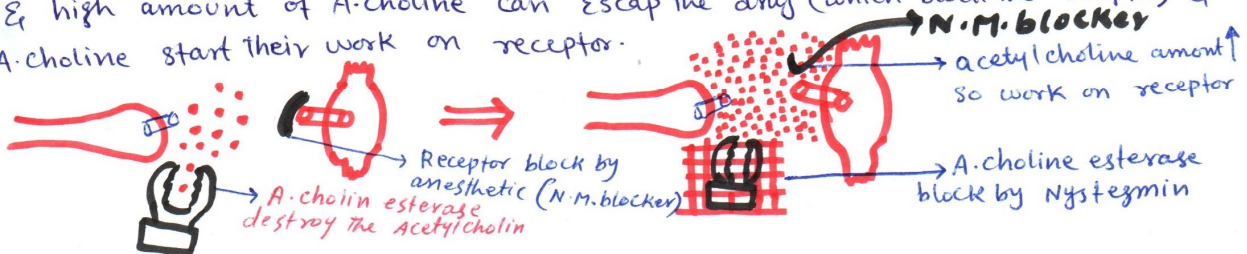
- used preoperatively to ↓ bronchial mucous.
- ↓ vagal reflexes
- Removal of neuromuscular blockers.

during operation when we touch the abdominal viscera, it activate vagal reflexes, given atropin preoperatively/peroperatively decrease vagal reflexes.

80% of vagal fibers are sensory.

* in general anesthesia we give muscle relaxant, & after operation we need movement of muscles.

* during operation a lot of acetylcholine released, (while receptor for acetylcholine are blocked by anesthetic drugs), so acetylcholine esterase are activated & destroy the Acetylcholine, for that we give **Nystegmin** to destroy the enzyme (A-choline esterase) so the Acetylcholine accumulate & high amount of A-choline can escape the drug (which block the receptor) & A-choline start their work on receptor.



But Neostigmin also block Acetylcholine esterase at other neuroeffector sites (like Heart), so to prevent this action we give Atropin peroperatively.

Atropin also used in:

Cholinergic crisis due to:

- (1) Mushyrom poisoning
- (2) overdose of physiostigmin
- (3) organophosphate substances.

In cholinergic crisis **DUMBBLESS** produce

- Diarrhea
- Urination
- Miosis
- Bronchial spasm
- Lacrimation
- Excitation of skeletal muscles
- Sweating
- Salivation

So Atropin are Anti DUMBBLESS.

Atropin First Cause +ve & than excitation of CNS.

Initially it caus in CNS:

Made as a Hat by Atropin

In old times Hates put glue (toxic substances) on head, that toxic substances enter to CNS & cause psychosis & death.

- ① Delirium → acute confusion state in hyperactivity.
- ② Hallucination → (Perception without external stimulus.
- ③ Convulsion
- ④ Coma &
- ⑤ death

SCOPOLAMIN USES

Can cross BBB, b/c It is high polar

- ① Antimotion sickness (used before motion start)
- ② Scopolamin + Morphine ⇒ used for Anesthesia (specially obstructive anesthesia)
- ③ Scopolamin transdermal patch ⇒ applied on the back of ear for mastoid, b/c absorbed well.
- ④ Cause Amnesia (forget the things)
- ⑤ Cause sedation in CNS.

Ipratropium: used in COPD.

↳ It is a new agent of Tiotropium.

Tiotropium: It has long duration of action & used for Bronchodilation.

BenzTropin:

Used in Parkinson's disease.

~~Ph~~ mnemonic: Park my Benz.

[in Parkinson's disease the cholinergic activity are ↑, as compare to dopaminergic activity so, anticholinergic drug are used]

Trihexyphenidyl:) also used in Parkinson's disease.

Biperiden :

anticholinergic
Used in
GIT

Pirenzapine → ↓ HCl + ↓ GI motility

Glycopyrrolate
Dicyclomine
Methscopolamin

antispasmodic

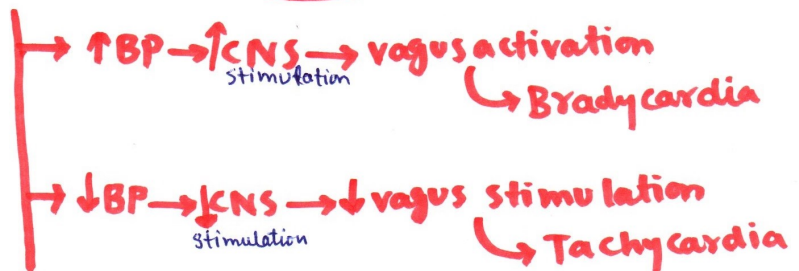
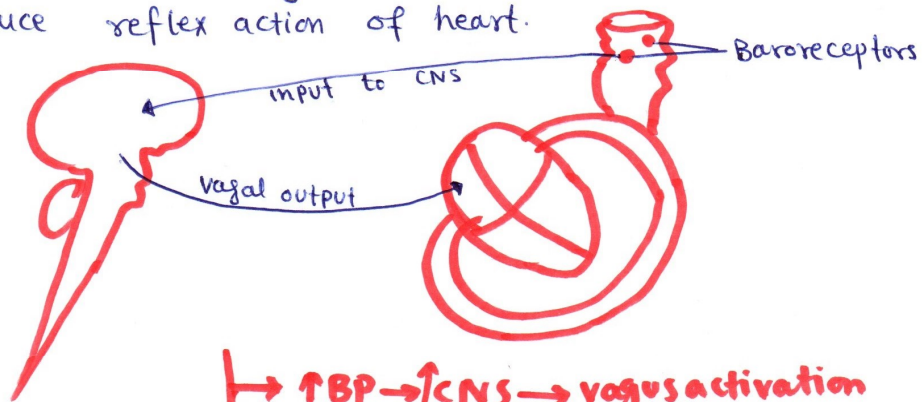
Anti cholinergic
Used in
Urinary
system

Darifenacine
Tolterodine
oxybutynine

used in stress incontinence
OR
hyperactive bladder.

* ganglion blockers are rarely used

Drugs which are strong arteriolo/venous constrictor or dilator produce reflex action of heart.



Ganglion Blockers

ganglion blocker block both sympathetic & parasympathetic outflow, so for that reason less used.

① Nicotine (no therapeutic uses)

↳ Depolarizing blocking agent

1st it cause stimulation at low concentration & than inhibition of Nn (nicotinic receptor on neuronal ganglion)

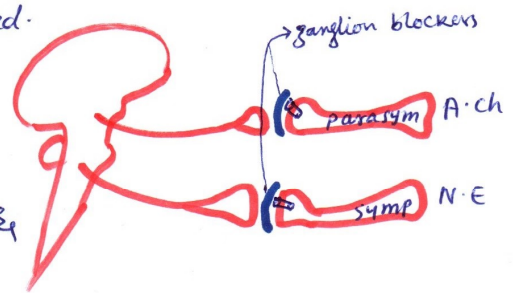
* At low dose ↑HR, ↑GI secretions, Mydriasis

At high dose ↓HR (cvs collapse), ↓GIT secretions (constipation)

② Trimethaphan (only IV)

③ Mecamylamine (oral)

} non depolarizing
Directly block the channel



ganglion blockers are used to prevent aortic dissection.

Dissection of aorta, when some blood penetrate into media & pseudo lumen formed. in such cases we give ganglion blockers to reduce BP.

End of Anticholinergic drugs: BY: zakirullah yousufzai

