Indirect Cholinomimetics

Indirect cholinomimetics, also known as anticholinesterases, work to decrease the action of the acetylcholinesterase enzyme (which works to break down acetylcholine). This leads to increased duration and action of the neurotransmitter acetylcholine. Drugs which don't cross the blood brain barrier include edrophonium, neostigmine and pyridostigmine. These drugs are used in patients with myasthenia gravis, while neostigmine is also used to treat ileus. Drugs that cross the blood brain barrier are centrally acting, and include physostigmine, which is used for atropine overdose and glaucoma, and donepezil, which is used in alzheimer's.



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Acetylcholinesterase Inhibitors
A-seagull-cola-nest with Inhibiting-chains
This class of drug inhibits the acetylcholinesterase enzyme, which normally acts to break down acetylcholine. This leads to increased levels and duration of action of the neurotransmitter acetylcholine.

Doesn't Cross BBB

Edrophonium
Edward-phone-thumb
Edrophonium is a reversible acetylcholinesterase inhibitor, which prevents the breakdown of acetylcholine. It works by competitively inhibiting the enzyme, acetylcholinesterase, at the neuromuscular junction. This drug is used to diagnose myasthenia gravis.

Myasthenia Gravis (Diagnosis)
Mice-thin-eye Graves
Also known as the "tensilon-test," myasthenia gravis can be diagnosed with edrophonium, as patients immediately show decreased muscle weakness.

Pyridostigmine and Neostigmine
Pyramid-stick-man and Neon-stick-man
These medications are cholinomimetics, or parasympathomimetics, which work to reversibly inhibit acetylcholinesterases and do not cross the blood brain barrier (BBB). These drugs work to treat mysasthenia gravis, while neostigmine is also used to reverse neuromuscular blocking agensts in anesthesia.

Myasthenia Gravis (Tx)
Mice-thin-eye Graves
These are used for long term treatment of myasthenia gravis because acetylcholinesterase inhibitors such as pyridostigmine and neostigmine can improve muscle function by slowing the natural enzyme cholinesterase that degrades acetylcholine in the motor end plate; the neurotransmitter is therefore around longer to stimulate its receptor.

Ileus
Eels
Neostigmine is indicated in the treatment of post-operative and neurogenic ileus as well as in treating urinary retention.

Crosses BBB

Physostigmine
Fly-stick-man
Physostigmine is more hydrophobic than other indirect cholinomimetics, and crosses the blood brain barrier. It is used to treat atropine and anticholinergic drug overdoses.

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Atropine Overdose

@-trooper with Overdose-pill-bottle

Physostigmine is used to counter the CNS effects of atropine overdose.

Glaucoma

Glock-eye

Physostigmine is helpful in inducing miosis, and leading to decreased intraocular pressure in glaucoma.

Donepezil

Donut-puzzle

Donepezil is an acetylcholinesterase inhibitor which is used for treating Alzheimer's disease.

Alzheimer's

Old-timer

In Alzheimer's disease, patients have relatively decreased acetylcholine levels. Thus, centrally acting acetylcholinesterase inhibitors help increase the available amount of relative acetylcholine.

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