

CHOLINERGIC TRANSMISSION

Drugs involved in interrupting processing of neurotransmitter at synapse:

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| Hemicholinium | Na/choline cotransporter | Inhibits choline uptake into presynaptic terminal |
| Vesamicol | ACh/H cotransporter | Inhibits ACh uptake into vesicles |
| β -bungarotoxin | | Inhibits release of ACh |
| Aminoglycoside Antibiotics, e.g streptomycin | Calcium channels on presynaptic membrane | Inhibits calcium dependent release of ACh vesicles |
| Tetanus toxin and Botulinum B,D,F,G | Synaptobrevin | Inhibits exocytosis of ACh vesicles |
| Botulinum toxin A,E | SNAP-25 | Inhibits exocytosis of ACh vesicles |
| Botulinum toxin C1 | Syntaxin and SNAP-25 | Inhibits exocytosis of ACh vesicles |

Drugs acting as muscarinic agonists

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| ACh | Muscarinic = nicotinic | Parasympathetic actions |
| Metacholine | Muscarinic > nicotinic | Parasympathetic actions |
| Carbachol | Muscarinic < nicotinic | Parasympathetic actions |
| Bethanechol | Muscarinic | Used for bladder and GI hypotonia (little effect on heart) |
| Pilocarpine | Muscarinic | Used for glaucoma (can cross conjunctival membrane) |

Drugs acting as muscarinic antagonists

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| Atropine | Non selective (cns stimulant) | Pre med (reduced secretions and bronchodilatation, tachycardia, GI hypermotility (but causes urinary retention, dry mouth, blurred vision) |
| Hyoscine | Non selective (cns depressant) | Same as for atropine, antiemetic |
| Ipratropium | Non selective | Doesn't inhibit mucociliary clearance – used by inhalation for asthma and bronchitis |
| Tropicamide/ Cyclopentolate (longer acting) | Non selective | Used as eye drops for ophthalmic use – mydriasis, cycloplegia (increases intraocular pressure so contra indicative with pt with glaucoma) |
| Pirenzepine | M1 | Inhibits gastric acid secretion – used for peptic ulcer in the past (selective means fewer side effects) |

Drugs acting on ganglionic nicotinic receptors

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| Nicotine | Ganglia (stimulation then block) | Both para and symp. Stimulated. Tachycardia, \uparrow ABP, \uparrow bronchial, salivary and sweat secretion ... |
| Hexamethonium (pore block antagonist) | Ganglia (transmission block) | Block all ANS ganglia – hypotension, loss of cardiac reflexes, inhibition of secretions, GI paralysis, impaired micturition |
| Trimetaphan (competitive antagonist) | Ganglia (transmission block) | As above, occasionally used for controlled hypotension during anaesthesia |

Drugs acting on NMJ transmission (ie muscle relaxants)

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| Tubocurarine (non depolarising nmj blocker) | nmj | Causes ganglion block and histamine release – hypotension and bronchoconstriction (reversible with anticholinesterase drugs) |
| Gallamine (non depolarising nmj blocker) | Nmj | Tachycardia due to being muscarinic antagonist |
| Suxamethonium (depolarising nmj blocker) | nmj (also muscarinic) | Bradycardia (due to being muscarinic agonist), cardiac dysrhythmias (increased [K]) raised intraocular pressure, post operative muscle pain. Also malignant hyperthermia in rare cases. (causes fasciculations) |
| α bungarotoxin | Nmj | Inhibits transmission (used to distinguish ganglionic and nmj nAChR) |

Drugs acting on cholinesterases – Anticholinesterases – enhancement of cholinergic transmission

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| Edrophonium | nmj – short action | Causes muscle fasciculation, increased twitch tension, depolarisation block. Used mainly in diagnosis of myasthenia gravis |
| Neostigmine | nmj – medium action | Used iv to reverse competitive nm block; used orally in treatment of myasthenia gravis |
| Physostigmine | Parasympathetic NS – medium term | . Used as eye drops in treatment of glaucoma. (crosses BBB causing initial excitation then depression due to excessive activation of brain muscarinic receptors) other effects include Bradycardia, hypotension, excessive secretions, bronchoconstriction, GI hypermobility, decrease in intraocular pressure |
| Pyridostigmine | nmj – medium | As neostigmine, but longer duration |

| | action | |
|-------------|-----------------------------------|--|
| Ecothiopate | Parasympathetic NS – long term | As physostigmine, but longer term (excluding CNS effects) |
| Dyflos | Parasympathetic NS – long term | Organophosphate as physostigmine, but longer term (including the CNS effects) |
| Pralidoxime | | Acts as strong nucleophile to reactivate AChR that have irreversible anticholinesterases bound |
| Parathion | N/A – long term | Used as insecticide, agricultural and for head lice |