Pharmacology of the ANS Ganglia

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Autonomic Nervous System

Structure and Physiology of the Autonomic Ganglion

- Ganglionic nicotinic (sympathetic & parasympathetic)
  - pentamer: 2 distinct subunits (α, β) - α2β3 or α3β2
  - α chains contain the Ach binding sites
  - binding of Ach → opening of ion channel (Na+ in, K+ out)
Structure of the Ganglia

1. N1 fast EPSP
2. M2 slow IPSP
3. M1 slow EPSP
4. Late, slow EPSP
Autocoids, peptides

Ganglionic stimulants

- Nicotine
  - tobacco (0.3-20mg, fatal dose, 40mg)
  - metabolized & excreted rapidly
  - ↑ HR, ↑ BP, ↑ respiratory rate
- Ach, DMPP (experimental)
- Lobeline (tobacco)
- Insecticides & rodenticide
  - nicotine is often the effective agent
- Toxicity
  - CNS stimulation: convulsions, headache
  - NMJ paralysis: depolarizing blockade
  - hypertension, hypotension, cardiac arrhythmias
  - vomiting, diarrhea, salivation

Treatment of poisoning from ganglionic stimulants

- Treatment:
  - vomiting induced for oral ingestion such as insecticides
- Treatment symptom-directed
  - muscarinic excess: anticholinergic (atropine)
  - NMJ blockade: mechanical respiration
  - CNS stimulation: anticonvulsant (diazepam)

Ganglionic Blocking Agents

- Mecamylamine
  - effective orally, CNS effects
- Trimethapram
  - inactive orally
  - used in hypertensive emergency (cns origin)
  - controlled hypertension during surgery
  - short duration of action, 5-10 min, no cns action
- Toxicity: hypotension, postural hypotension
- Treatment: pressor agent to counter hypotension

Predominant autonomic nervous system on effector sites

<table>
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<tr>
<th>Site</th>
<th>Predominant ANS</th>
<th>Effect of Ganglionic Blockade</th>
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Note: Ganglia block also high dose nicotine or high dose AchE inhibitors