

Autonomic Nervous System Drugs

Abrams chap 16 – 20
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Objectives

- Describe the major divisions of the nervous system.
- Compare and contrast the actions of the sympathetic and parasympathetic nervous systems.
- Identify the neurotransmitters important to the autonomic nervous system.
- Compare and contrast the types of adrenergic and cholinergic receptors.
- Explain the mechanisms of action, therapeutic effects and major adverse effects of autonomic nervous system agents.
- Apply the nursing process relating to administration of autonomic nervous system agents.

Neurotransmitters

- Norepinephrine
 - Postganglionic fibers of SNS
- Acetylcholine
 - Preganglionic fibers of SNS and PNS
 - Postganglionic fibers of PNS
 - Motor neurons supplying skeletal muscle

Adrenergic and Cholinergic Receptors

- Adrenergic receptors
 - Alpha
 - Beta
 - Dopamine
- Cholinergic receptors
 - Muscarinic
 - Nicotinic

Sympathetic Nervous System Stimulation

- Sympathomimetic, adrenergic, or alpha- and beta-agonists
- Used for effects on heart, bronchi, and blood vessels
 - Vasoconstriction – raise blood pressure
 - Cardiac stimulation – increase heart rate and contractility
 - Bronchodilation

Epinephrine

- **Prototype: adrenergics**
- Increases BP, vasodilation and increased blood flow to skeletal muscles, heart and brain.
- Relaxation of bronchial smooth muscle.
- Mixed alpha and beta stimulation
- Indications:
 - Anaphylaxis
 - Cardiac arrest
- Adverse Effects
 - Hypertension, tachycardia, CNS stimulation, hyperglycemia

Sympathetic Nervous System Inhibition

- Sympatholytic, antiadrenergic, alpha- or beta-blocker
- Many used to treat hypertension, cardiovascular disorders
- Other indications: glaucoma, BPH
- Effects depend on receptor selectivity

Antiadrenergic Drugs

- Alpha 2 agonists - produce negative feedback to decrease release of norepinephrine
 - clonidine (Catapres)
 - Decrease blood pressure
- Alpha1 blockers - occupy receptor sites
 - tamsulosin HCL (Flomax)
 - Prevent smooth muscle contraction in prostate and bladder
- Beta blockers - occupy receptor sites
 - propranolol (Inderal)
 - Decrease cardiac output, heart rate, blood pressure

Parasympathetic Nervous System Stimulation

- Parasympathomimetic, cholinergic
- Direct acting
 - Stimulate cholinergic receptors
 - Uses: rx urinary retention, paralytic ileus
- Indirect
 - Slow metabolism of acetylcholine
 - Uses: myasthenia gravis, Alzheimer's disease, glaucoma

Prototype: Bethanechol (Urecholine)

- Direct acting muscarinic agonist
- Use: relieve urinary retention post op or post partum
- Adv effects: hypotension, bradycardia, increased salivation, diarrhea
- Given PO or SC

Myasthenia Gravis

- Skeletal muscle weakness
 - Defect in transmission of nerve impulses to voluntary muscles
 - Weakness of eye muscles, difficulty swallowing
- Mild to severe forms
- Rx: anticholinesterase agents
 - Neostigmine, pyridostigmine (Mestinon)
- Difficult to differentiate myasthenia gravis crisis from cholinergic crisis

Parasympathetic Nervous System Inhibition

- Parasympatholytic, anticholinergic, cholinergic blocker
- Block action of acetylcholine in PNS
- Most block muscarinic receptors
- Indications for Use
 - GI, GU, ophthalmic and respiratory disorders
 - Bradycardia
 - Parkinson's disease
 - Surgery and bronchoscopy

Atropine

- **Prototype: anticholinergics**
- Belladonna alkaloid
- Antidote for cholinergic overdose and poisoning
- Emergency treatment of bradyarrhythmias, asystole
 - Increases heart rate by blocking action of the vagus nerve
- Other uses: with morphine to relieve pain of renal and biliary colic, prior to surgery or bronchoscopy to decrease respiratory secretions
- Adverse effects: dry mouth, urinary retention, tachycardia, CNS stimulation
