Adrenergic, Adrenergic Blockers, Cholinergic and Cholinergic Blockers
Objective 1: Explain the difference between the sympathetic and parasympathetic nervous systems

**Autonomic Nervous System**

- **Sympathetic Nervous System:** regulates the expenditure of energy
- **Parasympathetic Nervous System:** conserves energy
Objective 2: Name the adrenergic neurohormones and the drugs that mimic their action
Neurohormones of the Sympathetic (adrenergic) Nervous System

- **Norepinephrine**
  - Secreted by the nerve endings of adrenergic nerve fibers

- **Epinephrine**
  - Secreted by the adrenal medulla
Adrenergic Drugs (Sympathomimetics)

- **Actions:**
  - On Central Nervous System: wakefulness, quick reaction time, quickened reflexes
  - On Peripheral Nervous System: relaxation of smooth muscle of bronchi, constriction of blood vessels, increase heart rate
Adrenergic Receptors

- Alpha and Beta receptors
- Drugs may be selective or non-selective
- Drug’s action depends on which receptors are stimulated
Adrenergic Drugs: Uses

- Shock
- Control of Hypotension
- Control of superficial bleeding
- Treatment of heart block
- Respiratory distress
- Nasal congestion and glaucoma
Adrenergic Drugs

- **Neosynephrine and Ephedrine** - Nasal decongestant
- **Dopamine** - Treats severe hypotensive episode
- **Epinephrine** - has vasopressor effect on body - Used in allergic reactions and cardiac arrest
- **Norepinephrine (Levophed)** - Acute hypotensive states
- **Isoproterenol** - acute hypotensive state
Adrenergic Drugs: Contraindications

- Hypersensitivity
- Isoproterenol: tachyarrhythmias, tachycardia, digoxin toxicity, angina
- Dopamine: pheochromocytoma, unmanaged arrhythmias, V-fib
- Epinephrine: narrow angle glaucoma, do not use in fingers and toes
- Norepinephrine: hypovolemic
Objective 3: List the types of adrenergic drugs and name an example of each
Anti-adrenergic (Adrenergic Blocking) Drugs

1. **alpha-adrenergic blockers**: the direct opposite of adrenergic drug, so, vasodilatation mostly of superficial vessels. (Regitine)

2. **Beta-adrenergic blockers**: used to decrease heart rate and cause vasodilation (Lopressor, Brevibloc, Inderal)
Adrenergic Blockers (continued)

3) **Antiadrenergic Drugs** - inhibit the release of norepinephrine. Some are peripherally acting drugs (Ismelin) and others affect CNS (clonidine) - both treat hypertension.

4) **alpha/beta adrenergic blockers** - by blocking both α and β receptors, they cause peripheral vasodilation (Normodyne)
Alpha Adrenergic Blockers

- Blocks stimulation of alpha adrenergic receptors
- Uses:
  - Treatment of pheochromocytoma, HTN during pre-op preparation, prevention or treatment of tissue damage caused by extravasation of dopamine
  - SE: weakness, HOTN, tachycardia, arrhythmias
Beta Adrenergic Blockers

- Beta receptors found mainly in the heart
- Uses: HTN, arrhythmia, migraine, angina, glaucoma, prevent reinfarction with recent MI
- Adverse reactions: HOTN, bradycardia, dizziness, hyperglycemia, N/V, bronchospasm
- Examples: esmolol, propranolol, atenolol, timolol
- Contraindications: sinus bradycardia, heart block, heart failure, asthma, emphysema, HOTN
Alpha/Beta Blocking Drugs

- Block stimulation of both Alpha and Beta receptors
- Carvedilol and labetalol
- Use: HTN
- SE: generally mild: fatigue, dizziness, HOTN
- Contraindications: bronchial asthma, decompensated heart failure, severe bradycardia
Antiadrenergic Drugs

- Inhibit the release of norepinephrine
- May be centrally or peripherally acting
- Uses: treatment of cardiac arrhythmias and HTN
- SE: dry mouth, drowsiness, sedation, HOTN, weakness
- Contraindications: liver disease, MAOI therapy,
Antiadrenergic Drugs

• **See table pg. 286-287**

• **Centrally acting:** clonidine, methyldopa

• **Peripherally acting:** alfuzosin, doxazosin, prazosin, reserpine, tamsulosin, terazosin
Objective 4: Describe the relationship between ACh and AChE

- The Parasympathetic Nervous system also has two neurohormones:
  - **Acetylcholine (ACh)** – release by the stimulation of a parasympathetic nerve fiber and is inactivated by
    - **Acetylcholinesterase (AChE)**
Cholinergic Drugs

- Action- Mimic the action of the parasympathetic nervous system, to conserve energy.
- These drugs have very limited, specific uses and have many side effects.
- Many are used to treat glaucoma by causing miosis (constriction of the iris) (Pilocar).
- Myasthenia Gravis- treated with Mytelase or Mestonin.
- Urinary retention (not caused by mechanical obstruction such as enlarged prostate) Urecholine is used to stimulate micturation.
- Prostigmin-can be used post-op to decrease abd. distention.
Cholinergic Drugs: Adverse Reactions

- Non-selective drugs so many adverse reactions:
  - N/V, muscle cramping, and cardiac arrhythmias, flushing of the skin
  - Topical application (eye gtts) have few adverse reactions other than temporary visual disturbance and possible HA
Cholinergic Crisis

- Cholinergic drug toxicity
- Severe abdominal cramping, diarrhea, excessive salivation, muscle weakness, rigidity and muscle spasm, jaw clenching
- Antidote: atropine
Objective 5: Identify two cholinergic blocking agents and their use
Cholinergic Blockers

• Action- inhibit the action of Ach therefore impulses are not transmitted to effector organ
• Increase the HR, decrease GI and GU motility, mydriasis
• Again, non-selective so many adverse reactions—Elderly DO NOT tolerate these drugs well.
Cholinergic Blocking Agents

- **Atropine** - used to treat bradycardia, 3rd degree heart block, and given pre-op to reduce respiratory secretions
- **Scopolamine** - for treatment of motion sickness, also used for pre-anesthetic sedation
- **Belladonna alkaloids** - adjunctive therapy for GI disorders, diverticulitis, diarrhea
Adverse Reactions: Cholinergic Blockers

- Dry mouth
- Photophobia
- Constipation
- Drowsiness
- Heat prostration-especially in hot weather
- N/V, heartburn
- Urinary retention
- Severe bradycardia or tachycardia