Chapter 13

Drugs Affecting the Autonomic Nervous System

Basic Functions of the Nervous System

- Recognizing changes in
  - Internal environment
  - External environment
- Processing and integrating changes
- Reacting to changes

Divisions of the Peripheral Nervous System

- Somatic nervous system
  - Voluntary control over skeletal muscles
- Autonomic nervous system
  - Involuntary control over smooth and cardiac muscle and glands

Sympathetic and Parasympathetic Divisions

- Opposite actions to maintain body homeostasis

Sympathetic Nervous System

- Activated under stress
- Fight-or-flight response
Parasympathetic Nervous System

- Activated under nonstressful conditions
- Rest-and-digest response

Synaptic Transmission

- Connection of two neurons outside CNS
  – Preganglionic neuron
  – Postganglionic neuron

Primary Neurotransmitters

- Norepinephrine (NE)
- Acetylcholine (Ach)

Norepinephrine

- Released by most postganglionic nerves
- Binds with adrenergic receptors
  - Alpha-receptors
    – Beta-receptors
**Acetylcholine**

-Released by presynaptic nerves in parasympathetic nervous system
- Binds with cholinergic receptors
- Muscarinic receptors
  - Nicotinic receptors

**Alpha1-adrenergic Receptors**

- In all sympathetic target organs except heart
- Response
  - Constriction of blood vessels
  - Dilation of pupils

**Alpha2-adrenergic Receptors**

- At presynaptic adrenergic neuron terminals
- Activation inhibits release of norepinephrine

**Beta1-adrenergic Receptors**

- In heart and kidneys
- Response
  - Activation increases heart rate and force of contraction of heart.
  - Increases release of renin

**Beta2-adrenergic Receptors**

- In all sympathetic target organs except the heart
- Inhibit smooth muscle

**Nicotinic Receptors**

- In sympathetic and parasympathetic postganglionic neuron cell bodies
- Response
  - Stimulate smooth muscle
  - Stimulate gland secretion
Muscarinic Receptors

- In parasympathetic target organs except the heart
- Response
  - Stimulate smooth muscle
  - Stimulate gland secretion

Classification and Naming of Autonomic Drugs

- Based on actions of sympathetic and parasympathetic nervous systems
- Stimulate sympathetic nervous system
  - Adrenergic agents or sympathomimetics
- Inhibit sympathetic nervous system
  - Adrenergic-blocking agents, adrenergic antagonists, or sympatholytics

Classification and Naming of Autonomic Drugs (continued)

- Stimulate parasympathetic nervous system
  - Cholinergic agents or parasympathomimetics
- Inhibit parasympathetic nervous system
  - Cholinergic-blocking agents, anticholinergics, parasympatholytics, or muscarinic blockers

Role of Nurse

- Monitor client’s condition
- Provide education on drug therapy
- Note adverse effects of drug therapy
- Identify possible interactions
- Identify contraindications of drug therapy

Parasympathomimetics

- Monitor for adverse effects
- Monitor liver enzymes
- Assess and monitor for appropriate self-care administration

Direct Acting

- Monitor intake and output ratio
- Monitor for blurred vision
- Monitor for orthostatic hypotension
Indirect Acting

- Monitor muscle strength and neuromuscular status
- Monitor ptosis, diplopia, and chewing
- Schedule medication around mealtimes
- Schedule activities to avoid fatigue
- Monitor for muscle weakness

Anticholinergic

- Monitor for signs of anticholinergic crisis
- Report changes in heart rate, blood pressure, or development of dysrhythmias
- Provide comfort measures for dryness of mucous membranes
- Minimize exposure to heat or cold or strenuous exercise
- Monitor I&O
- Monitor patient for abdominal distension, and auscultate for bowel sounds

Adrenergic Antagonist

- Monitor urinary hesitancy, incomplete bladder emptying, interrupted urinary stream
- Monitor for syncope
- Monitor vital signs, level of consciousness, and mood
- Monitor for dizziness, drowsiness, or light-headedness
- Observe for side effects
- Monitor liver function

Sympathomimetic

- Closely monitor IV insertion
- Monitor breathing patterns, shortness of breath, and/or audible wheezing
- Observe patient’s responsiveness to light
- Monitor for rhinorrhea and epistaxis

Adrenergic Agents (Sympathomimetics)

- **Prototype drug:** phenylephrine (Neo-Synephrine)
  - Mechanism of action: to stimulate the sympathetic nervous system directly/indirectly

Adrenergic Agents (Sympathomimetics) (continued)

- **Primary use:** depends on receptors activated
  - Alpha1-receptors: nasal congestion, hypotension, dilation of pupils for eye examination
  - Alpha2-receptors: hypertension
  - Beta1-receptors: cardiac arrest, heart failure, shock
  - Beta2-receptors: asthma and premature-labor contractions
Adrenergic Agents (Sympathomimetics) (continued)

- **Adverse effects:** tachycardia, hypertension, dysrhythmias, CNS excitation and seizures, dry mouth, nausea and vomiting, anorexia

Adrenergic-Blocking Agents

- **Prototype drug:** prazosin (Minipress)
- **Mechanism of action:** to inhibit the sympathetic nervous system
- **Primary use:** hypertension, dysrhythmias, angina, heart failure, benign prostatic hypertrophy, narrow-angle glaucoma
- **Adverse effects:** dizziness, drowsiness, headache, loss of energy and strength, palpitations, dry mouth

Cholinergic Agents (Parasympathomimetic)

- **Prototype drug:** bethanechol (Urecholine)
- **Mechanism of action:** to activate the parasympathetic nervous system directly/indirectly
- **Primary use:** glaucoma, urinary retention, myasthenia gravis, Alzheimer’s disease
- **Adverse effects:** profuse salivation, increased muscle tone, urinary frequency, bronchoconstriction, bradycardia

Cholinergic-Blocking Agents

- **Prototype drug:** atropine (Atropair, Atropisol)
- **Mechanism of action:** to inhibit the parasympathetic nervous system
- **Primary use:** peptic ulcers, irritable bowel syndrome, mydriasis and cycloplegia during eye examination, bradycardia, preanesthetic, asthma
- **Adverse effects:** tachycardia, CNS stimulation, urinary retention, dry mouth, dry eyes, decreased sweating, photophobia

Drugs Affecting the Autonomic Nervous System

- **Assessment**
  - Potential nursing diagnoses
  - Reason for drug
  - Monitoring vital signs
  - Doing complete health history

Drugs Affecting the Autonomic Nervous System (continued)

- Cautions and contraindications for drug
- Allergies
- Drug history
- Possible drug interactions
- Evaluating lab findings
Drugs Affecting the Autonomic Nervous System (continued)

• Nursing Diagnosis
  – Knowledge deficient, related to drug therapy
  – Risk for injury, related to side effect of drug therapy
  – Disturbed sleep pattern

• Planning
  – Client will exhibit decrease in symptoms for84x649 which drug is being given
  – Client will demonstrate an understanding of drug's activity
  – Client will accurately describe drug side effects and precautions
  – Client will demonstrate proper administration technique

• Implementation
  – Administration of drug
  – Observing for adverse effects
  – Client education/discharge planning
  – Providing additional information as needed to encourage compliance
  – Doing home-health visits

• Evaluation
  – Evaluating effectiveness of drug therapy.
  – Confirming that client goals and expected outcomes have been met

Adrenergic Agents

Table 13.1 Types of Autonomic Receptors

Table 13.2 Adrenergic Agents
## Table 13.3 Adrenergic Antagonists

<table>
<thead>
<tr>
<th>Name</th>
<th>Trade Name</th>
<th>Mechanism</th>
<th>Indications</th>
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<tbody>
<tr>
<td>Propranolol</td>
<td>Inderal</td>
<td>Beta-adrenergic blocking</td>
<td>Hypertension, angina, tachyarrhythmias</td>
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<tr>
<td>Metoprolol</td>
<td>Lopressor</td>
<td>Beta-adrenergic blocking</td>
<td>Hypertension, angina, tachyarrhythmias</td>
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<tr>
<td>Atenolol</td>
<td>Tenormin</td>
<td>Beta-adrenergic blocking</td>
<td>Hypertension, angina, tachyarrhythmias</td>
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<tr>
<td>Timolol</td>
<td>Brevibloc</td>
<td>Beta-adrenergic blocking</td>
<td>Glaucoma, tachyarrhythmias</td>
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## Table 13.4 Cholinergic Agents

<table>
<thead>
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<th>Name</th>
<th>Trade Name</th>
<th>Mechanism</th>
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<tbody>
<tr>
<td>Atropine</td>
<td></td>
<td>Anticholinergic</td>
<td>Anticholinergic agents for anti-muscarinic effects</td>
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<tr>
<td>Pirenzepine</td>
<td></td>
<td>Anticholinergic</td>
<td>Anti-diarrheal, antispasmodic</td>
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<tr>
<td>Hyoscine</td>
<td></td>
<td>Anticholinergic</td>
<td>Anti-diarrheal, antispasmodic</td>
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## Table 13.5 Anticholinergic Agents

<table>
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<tr>
<th>Name</th>
<th>Trade Name</th>
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<th>Indications</th>
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</thead>
<tbody>
<tr>
<td>Scopolamine</td>
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<td>Anticholinergic</td>
<td>Anti-emetic, anti-diarrheal</td>
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<tr>
<td>Hyoscine</td>
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<td>Anticholinergic</td>
<td>Anti-emetic, anti-diarrheal</td>
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<tr>
<td>Dicyclomine</td>
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<td>Anticholinergic</td>
<td>Anti-diarrheal, anti-spasmodic</td>
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</tbody>
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**Note:** The table contents are based on the provided images and may not reflect the exact text from the original document.