CHAPTER 19

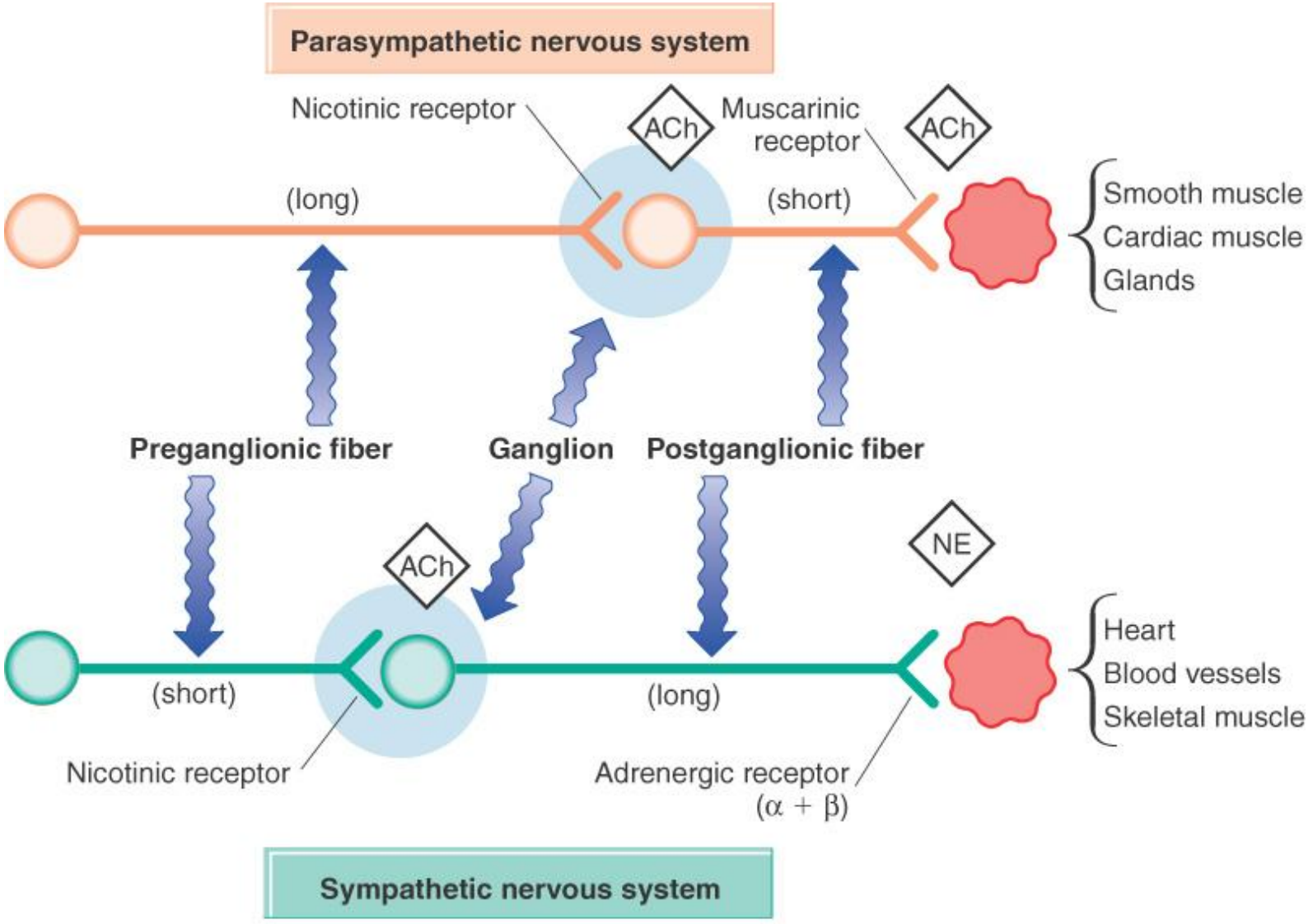
Cholinergic Agents

Cholinergic Agents: Definition

- Drugs that stimulate the parasympathetic nervous system (PSNS)
- The PSNS is the opposing system to the SNS

Cholinergic Agents: Definition (cont'd)

- Also known as cholinergic agonists or parasympathomimetics
- Mimic the effects of the PSNS neurotransmitter
  - Acetylcholine (ACh)



Cholinergic Receptors

- Two types
  - Nicotinic receptors
  - Muscarinic receptors

Cholinergic Agents
Mechanism of Action

- Direct-acting cholinergic agonists
  - Bind to cholinergic receptors
    - Direct activation of parasympathetic nerve fiber

Cholinergic Agents
Mechanism of Action (cont'd)

- Indirect-acting cholinergic agonists (Cholinesterase Inhibitors)
  - Inhibit the enzyme cholinesterase, which breaks down ACh
  - Result: more ACh is available at the receptors
  - Types
    - Reversible
      - Bind to cholinesterase for a period of minutes to hours
    - Irreversible
      - Bind to cholinesterase and form a permanent covalent bond
      - The body must make new cholinesterase

Cholinergic Agents
Drug Effects

- Effects seen when the PSNS is stimulated
- The PSNS is the "*rest and digest*" system

Cholinergic Agents
Drug Effects (cont'd)

"SLUDGE"

- *S*alivation
- *L*acrimation
- *U*rinary incontinence
- *D*iarrhea
- *G*astrointestinal cramps
- *E*mesis

Cholinergic Agents
Drug Effects (cont'd)

- Stimulate intestine and bladder
  - Increased gastric secretions
  - Increased gastrointestinal motility
  - Increased urinary frequency
- Stimulate pupil
  - Constriction (miosis)
  - Reduced intraocular pressure
- Increased salivation and sweating

Cholinergic Agents
Drug Effects (cont'd)

- Cardiovascular effects
  - Decreased heart rate
  - Vasodilation
- Respiratory effects
  - Bronchial constriction, narrowed airways

Cholinergic Agents
Indications

Direct-acting agents

- Reduce intraocular pressure
- Useful for glaucoma and intraocular surgery
  - Examples: acetylcholine, carbachol, pilocarpine
- Topical application due to poor oral absorption

Cholinergic Agents
Indications

- Direct-acting agents
  - Stimulates production of saliva
    - Sjogren's syndrome
      - Xerostomia
        - » Dry mouth
  - Example
    - Cevimeline (Evoxac)

Cholinergic Agents

Indications (cont'd)

Direct-acting agent

- Example
  - bethanechol (Urecholine)
- Increases tone and motility of bladder and GI tract
- Relaxes sphincters in bladder and GI tract
  - allowing them to empty
  - Helpful for postsurgical atony of the bladder and GI tract
- Oral dose or SC injection

Cholinergic Agents

Indications (cont'd)

Indirect-acting agents

- Examples:
  - physostigmine, pyridostigmine (Mestinon)
- Cause skeletal muscle contractions
- Used for diagnosis and treatment of myasthenia gravis
- Used to reverse neuromuscular blocking agents
- Used to reverse anticholinergic poisoning (antidote)

Cholinergic Agents
Indications (cont'd)

- Patient teaching myasthenia gravis pts receiving cholinergic agents
  - Take med 30 minutes ac
    - Allow onset & effect during meal
      - Aids in swallowing
  - Dosages should be evenly spaced
    - Optimize effects
  - Side effects to report to MD
    - Increased muscle weakness
    - Abdominal cramping, diarrhea

Cholinergic Agents

Indications (cont'd)

Indirect-acting agents

- Examples
  - donepezil (Aricept)
  - tacrine (Cognex)
  - rivastigmine (Exelon)
  - galantamine (Reminyl) – name changed to Razadyne
- Used in the treatment of mild to moderate Alzheimer's disease
  - DOES NOT CURE OR REVERSE DISEASE
- Helps to increase or maintain memory and learning capabilities
  - May take up to 6 weeks to see improvement

Cholinergic Agents

Side Effects

- Side effects are a result of overstimulation of the PSNS
  - Cardiovascular
    - Bradycardia, hypotension, conduction abnormalities (AV block and cardiac arrest)
  - CNS
    - Headache, dizziness, convulsions
  - Gastrointestinal
    - Abdominal cramps, increased secretions, nausea, vomiting

Cholinergic Agents
Side Effects (cont'd)

- Respiratory
  - Increased bronchial secretions, bronchospasms
- Other
  - Lacrimation, sweating, salivation, loss of binocular accommodation, miosis

Cholinergic Agents

Interactions

- Anticholinergics, antihistamines, sympathomimetics
  - Antagonize cholinergic agents
    - Resulting in decreased responses
- Other cholinergic agents
  - Additive effects

Cholinergic Agents

Nursing Implications

- Keep in mind that these agents will stimulate the PSNS and mimic the action of ACh
- Assess for allergies, presence of GI or GU obstructions, asthma, peptic ulcer disease, or coronary artery disease
- Perform baseline assessment of VS and systems overview

Cholinergic Agents
Nursing Implications (cont'd)

- Medications should be taken as ordered and not abruptly stopped
- The doses should be spread evenly apart to optimize the effects of the medication
- Overdosing can cause life-threatening problems. Patients should not adjust the dosages unless directed by the physician

Cholinergic Agents
Nursing Implications (cont'd)

- Encourage patients with myasthenia gravis to take medication 30 minutes before eating to help improve chewing and swallowing
- When donepezil is prescribed for Alzheimer's disease, be honest with caregivers and patients that the drug is for management of symptoms, not a cure
- Therapeutic effects of donepezil may not occur for up to 6 weeks

Cholinergic Agents

Nursing Implications (cont'd)

- Atropine is the antidote for cholinergics. It should be available in the patient's room for immediate use if needed
- Patients should notify their physician if they experience muscle weakness, abdominal cramps, diarrhea, or difficulty breathing

Cholinergic Agents

Nursing Implications (cont'd)

Cholinergic Agents
Nursing Implications (cont'd)

- Monitor for Therapeutic Effects
  - Alleviated signs and symptoms of myasthenia gravis
  - In postoperative patients with decreased GI peristalsis, look for:
    - Increased bowel sounds
    - Passage of flatus
    - Occurrence of bowel movements

Cholinergic Agents
Nursing Implications (cont'd)

- Monitor for Therapeutic Effects (cont'd)
  - In patients with urinary retention/ hypotonic bladder, urination should occur within 60 minutes of bethanechol administration