Introduction to Clinical Pharmacology

Chapter 27

Antiparkinson Drugs

DEFINITIONS

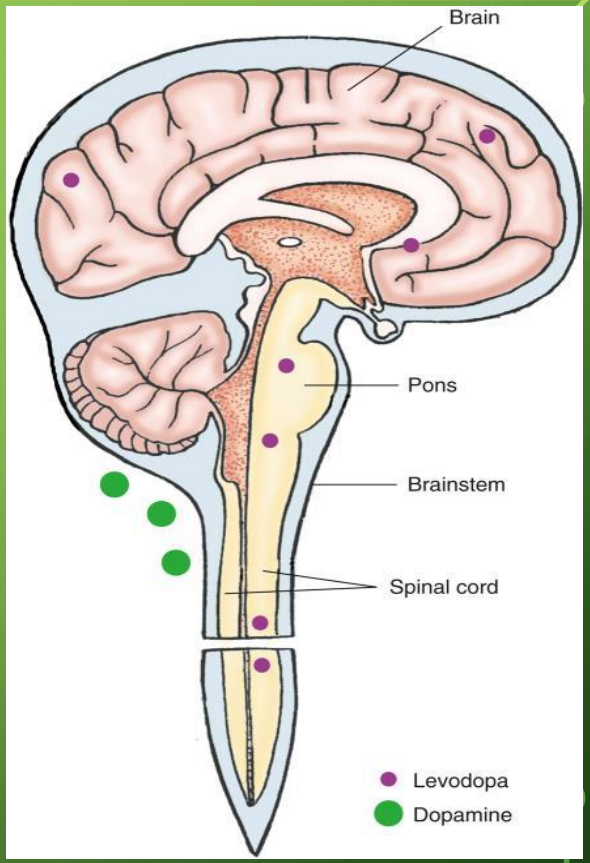
- Parkinsonism: referring to a cluster of symptoms associated with Parkinson's disease (i.e., fine tremors, slowing of voluntary movements, muscular weakness)
- Parkinson's disease: degenerative disorder caused by an imbalance of dopamine and acetylcholine in the CNS
- Symptoms of caused by depletion of dopamine in CNS

FOUR TYPES OF ANTIPARKINSON DRUGS

- Dopaminergic
- Dopamine Receptor Agonists
- Catechol-O-methyltransferase (COMT) inhibitors
- Cholinergic blocking drugs (anticholinergics)

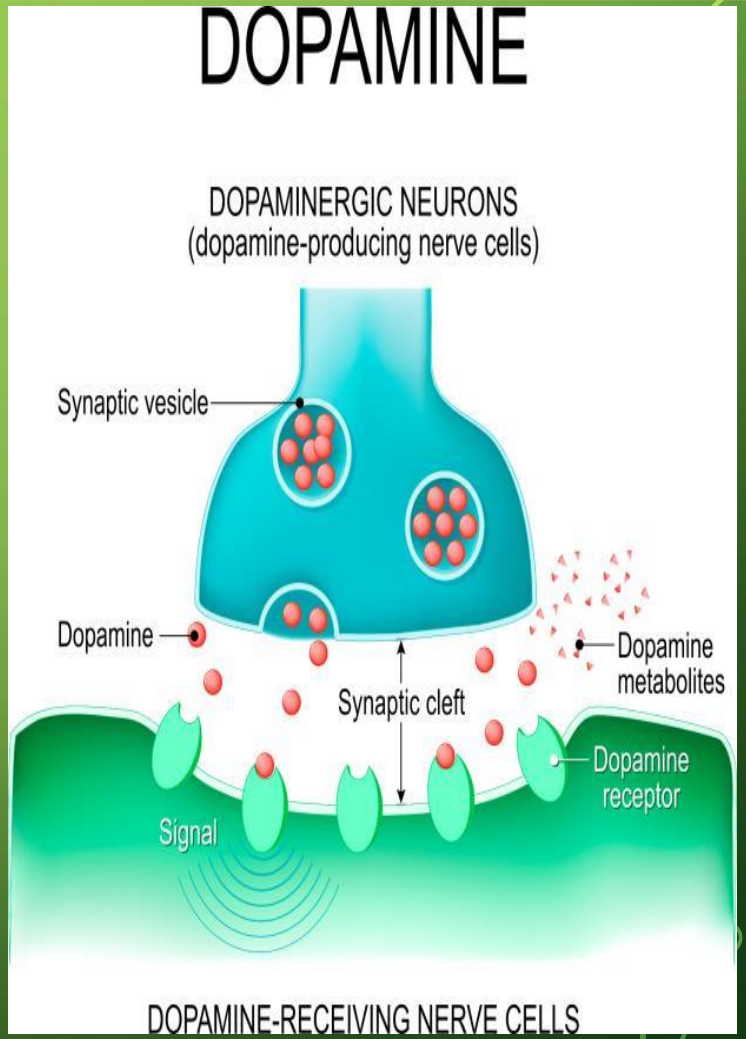
DOPAMINERGIC DRUGS—ACTIONS #1

- The blood-brain barrier selectively inhibits certain substances from entering the brain and spinal cord.
- Cells in the brain form tight junctions that prevent/slow the passage of certain substances
- Levodopa can pass the blood-brain barrier and dopamine cannot



DOPAMINERGIC DRUGS—ACTIONS #2

- Symptoms of caused by depletion of dopamine in CNS
- Agonists work to stimulate dopamine receptors (e.g., bromocriptine)
- Other drugs work to increase the availability of dopamine (e.g., Rasagiline, Selegiline)



DOPAMINERGIC DRUGS - USES

- Parkinson disease
- Parkinson-like (extrapyramidal) symptoms as a result of injury, drug therapy, or encephalitis
- Restless leg syndrome

DOPAMINERGIC DRUGS-ADVERSE REACTIONS #1

- Common Adverse Reactions:
  - Dry mouth, difficulty in swallowing
  - Anorexia, nausea, vomiting
  - Abdominal pain, constipation
  - Increased hand tremor
  - Headache, dizziness
  - Choreiform movements and dystonic movements (Levodopa)

DOPAMINERGIC DRUGS-ADVERSE REACTIONS #2

- Serious Adverse Reactions:
  - Dementia
  - Depression
  - Psychotic episodes
  - Paranoia
  - Suicidal tendencies

DOPAMINERGIC DRUGS—CONTRAINDICATIONS

- Contraindicated in clients with:
  - known hypersensitivity to the drugs
  - narrow angle glaucoma (levodopa)
  - MAOIs antidepressants (levodopa)

DOPAMINERGIC DRUGS—PRECAUTIONS

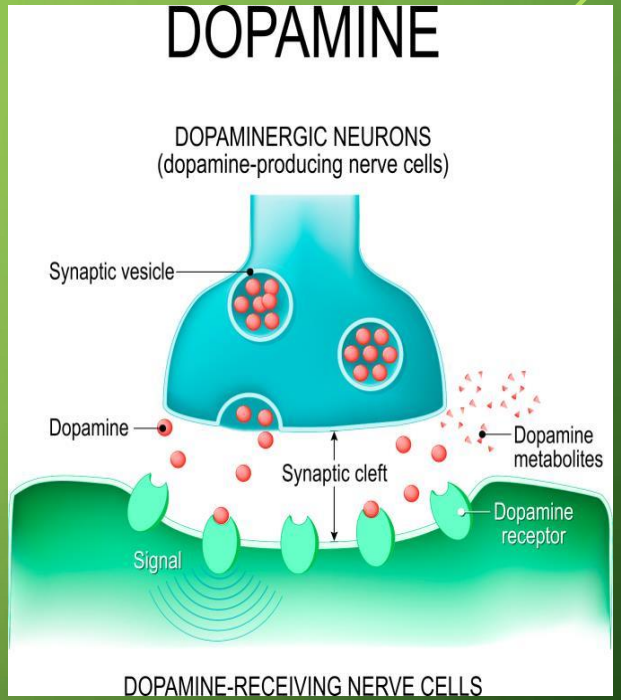
- Use cautiously in clients with:
  - Cardiovascular or pulmonary diseases
  - Peptic ulcer disease
  - Renal or hepatic disease
  - psychosis
  - pregnancy or lactation

DOPAMINERGIC DRUGS—INTERACTIONS

Interacting Drug	Common Use	Effect of Interaction
Tricyclic antidepressants	Management of depression	Increased risk of hypertension and dyskinesia
Antacids	Relief of GI upset and heartburn	Increased effect of levodopa
Antiepileptic	Seizure control	Decreased effect of levodopa

DOPAMINE RECEPTOR AGONISTS—ACTIONS

- Act directly on postsynaptic dopamine receptors of nerve cells in brain, mimicking effects of dopamine in brain
- Example: Pramipexole



DOPAMINE RECEPTOR AGONISTS—USES

- Treatment of signs and symptoms of Parkinson disease
- Rapid on-off phenomena of Parkinson disease (apomorphine injection with antiemetic therapy)
- Restless leg syndrome

DOPAMINE RECEPTOR AGONISTS—ADVERSE REACTIONS

- Common Adverse Reactions:
  - Nausea, dizziness, vomiting
  - Somnolence, hallucinations, confusion, visual hallucinations
  - Postural hypotension, abnormal involuntary movements
  - Headache

DOPAMINE RECEPTOR AGONISTS—CONTRAINDICATIONS AND PRECAUTIONS

- Contraindicated in clients with:
  - known hypersensitivity to the drugs
- Use cautiously in clients with:
  - dyskinesia
  - orthostatic hypotension
  - hepatic or renal impairment
  - cardiovascular disease
  - history of hallucinations or psychosis
  - thyrotoxicosis
  - peptic ulcer
  - pregnancy

(Ropinirole, Pramipexole)

DOPAMINE RECEPTOR AGONIST—INTERACTIONS

Interacting Drug	Common Use	Effect of Interaction
Cimetidine, ranitidine	Management of GI problems	Increased dopamine agonist effectiveness
Verapamil, quinidine	Management of cardiac problems	Increased dopamine agonist effectiveness
Estrogen	Female hormone supplement	Increased dopamine agonist effectiveness
Phenothiazines	Antipsychotic agent	Decreased dopamine agonist effectiveness

COMT INHIBITORS—ACTIONS

- Prolong the effect of Levodopa by blocking an enzyme, catechol-O-methyltransferase, which eliminates dopamine
- When given with Levodopa: increased plasma concentration and duration of action of Levodopa
- Examples: Entacapone

COMT INHIBITORS—USES

- Adjuncts to Levodopa/Carbidopa in treating Parkinson disease
- Manage fluctuations in response to Levodopa in clients with Parkinson disease (Entacapone)
- Clients with Parkinson disease that are not responsive to other therapies (Tolcapone)

COMT INHIBITORS—ADVERSE REACTIONS

- Generalized Adverse Reactions:
  - Dizziness
  - Dyskinesias, hyperkinesias, akathisia
  - Orthostatic hypotension
  - Sleep disorders, excessive dreaming
  - Somnolence
  - Muscle cramps

COMT INHIBITORS—CONTRAINDICATIONS AND PRECAUTIONS

- Contraindicated in clients with:
  - known hypersensitivity to the drugs
  - pregnancy and lactation
  - liver dysfunction (Tolcapone)

- Use cautiously in clients with:
  - Hypertension
  - Hypotension
  - decreased hepatic or renal function

COMT INHIBITORS—INTERACTIONS

Interacting Drug	Common Use	Effect of Interaction
MAOI depressants	Management of depression	Increased risk of toxicity of both drugs
Adrenergic drugs	Treatment of cardiac problems	Increased risk of cardiac symptoms

CHOLINERGIC BLOCKING DRUGS—ACTIONS

- Drugs with cholinergic blocking activity block acetylcholine in CNS, enhancing dopamine transmission
- Example: Benztropine mesylate
- Antihistamines, such as Diphenhydramine, are used in elderly clients as they produce fewer adverse effects

CHOLINERGIC BLOCKING DRUGS—USES

- Adjunctive therapy in all forms of parkinsonism
- Control of drug-induced extrapyramidal disorders

CHOLINERGIC BLOCKING DRUGS—ADVERSE REACTIONS #1

- Common Adverse Reactions that often lessen as therapy progresses:
  - Dry mouth
  - Blurred vision
  - Dizziness, nervousness
  - Mild nausea

CHOLINERGIC BLOCKING DRUGS—ADVERSE REACTIONS #2

- Other Adverse Reactions:
  - Skin rash, urticaria
  - Urinary retention, dysuria
  - Tachycardia
  - Muscle weakness
  - Disorientation, confusion

CHOLINERGIC BLOCKING DRUGS—CONTRAINDICATIONS

- Contraindicated in clients with:
  - known hypersensitivity to the drugs
  - glaucoma (angle-closure glaucoma)
  - pyloric or duodenal obstruction
  - peptic ulcers
  - prostatic hypertrophy
  - achalasia
  - myasthenia gravis
  - megacolon

CHOLINERGIC BLOCKING DRUGS—PRECAUTIONS

- Use cautiously in clients with:
  - tachycardia
  - hypotension or hypertension
  - urinary retention
  - decreased liver or kidney function
  - obstructive disease of the urinary system or GI tract
  - advanced age (older adult)

CHOLINERGIC BLOCKING DRUGS—INTERACTIONS

Interacting Drug	Common Use	Effect of Interaction
Amantadine	Treatment of parkinsonism	Increased anticholinergic effects
Digoxin	Management of cardiac disease	Increased digoxin serum levels
Haloperidol	Antipsychotic agent	Increased psychotic behavior
Phenothiazines	Antipsychotic agent	Increased anticholinergic effects

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #1

- Preadministration Assessment
- Objective Data
  - Description of signs of Parkinson disease and effects on change in activities of daily living
  - Neuromuscular assessment
  - Mental condition
  - Vital signs
  - Neurological studies and scans
  - Liver function labs if COMT inhibitors are being prescribed

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #2

- Pre-administration Assessment
- Subjective Data
  - Current history of symptoms, type and duration (may need to interview family or friends)
  - Drug history, particularly drugs with extrapyramidal reactions

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #3

- **Ongoing Assessment**
  - **Evaluate client's response to drug therapy by** observing for/asking about various neuromuscular signs **and compare these** observations **with data obtained during initial physical assessment;** a nurse can check for the effectiveness of the drug by observing for improvement of bradykinesia
  - Regular liver function tests (Tolcapone)
  - Test serum aminotransferase levels every 2 weeks for first year and every 8 weeks thereafter
  - Observe for other indicators of liver dysfunction: persistent nausea, fatigue, lethargy, anorexia, jaundice, dark urine, pruritis, and right upper quadrant tenderness

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #4

- Nursing Diagnoses
  - Malnutrition related to nausea and dry mouth
  - Constipation related to neurologic changes in the bowel
  - Injury Risk related to dizziness, lightheadedness, orthostatic hypotension, loss of balance
  - Impaired Physical Mobility related to alterations in balance, unsteady gait, and dizziness
  - Impaired Sleep related to involuntary movement at rest

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #5

- **Planning**
  - Expected client outcomes depend on the reason for administration of the drug but may include:
    - Optimal response to therapy
    - Management of adverse drug reactions
    - Absence of injury
    - Confidence in an understanding of the prescribed medication regimen

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #6

- Implementation
  - Promoting Optimal Response to Therapy
    - Carefully monitor drug therapy; provide psychological support; emphasize client and family teaching
    - Optimal therapy requires titration of doses based on client activities
    - Withhold next dose of drug and immediately notify primary health care provider if sudden behavioral changes are noted

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #7

- Implementation
  - Promoting Optimal Response to Therapy
    - Medications may be given via enteral tube for clients that cannot take medications orally
    - Medications can be administered via transdermal patch; change at same time every day to maintain blood level of drug; rotate sites
    - Teach clients and family about titration of the drug if applicable

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #8

- Implementation
  - Monitoring and Managing Client Needs
    - Malnutrition
      - Help client relieve dry mouth by offering frequent sips of water, ice chips, or sucking on sugar free candies
      - Create calm environment; serve small, frequent meals; serve foods client prefers to help improve nutrition
      - Monitor client's weight daily

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #9

- Implementation
  - Monitoring and Managing Client Needs
    - Constipation
      - Observe client with parkinsonism for outward changes that may indicate one or more adverse reactions or need to eliminate
      - Stress need for diet high in fiber and increasing fluids in diet
      - Administer stool softener if ordered

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #10

- Implementation
  - Monitoring and Managing Client Needs
    - Injury Risk
      - Carefully evaluate any sudden changes in client's behavior or activity and report them to primary health care provider
      - Assist client in getting out of bed or a chair, walking, and other self-care activities due to visual impairment or lack of balance
      - Encourage client to participate in activities that improve balance (e.g., Tai Chi)
      - Refer clients to occupational therapy or activity directors

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #11

- Implementation
  - Monitoring and Managing Client Needs
    - Injury Risk
      - Encourage client to use assistive devices when ambulating to promote balance and decrease falls
      - Clients should wear rubber-soled shoes to minimize slipping
      - Provide a safe environment; well lit, no tripping hazards

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #12

- Implementation
  - Monitoring and Managing Client Needs
    - Impaired Physical Mobility
      - On-off phenomenon: client may suddenly alternate between improved status and loss of therapeutic effect
      - If the symptoms occur, primary health care provider may order a drug holiday that includes complete withdrawal of Levodopa for 5 to 14 days, followed by gradually restarting drug therapy at lower dose

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #13

- Implementation
  - Monitoring and Managing Client Needs
    - Impaired Sleep
      - Client with restless-leg syndrome has difficult sleeping due to leg movements
      - To engage in activities that promote rest before sleep: bedtime ritual, hot bath, crossword, reading, leg massage
      - May prescribe antidepressants

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #14

- Implementation—Educating the Client and Family
  - Understand therapeutic drug regimen; ability to perform self-care at home; comply with prescribed drug therapy
  - A home environment that is least likely to result in accidents or falls
  - Take medication with meals if any GI disturbances

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG #15

- Implementation—Educating the Client and Family
  - Teach client and family:
    - Avoid tasks that require alertness if dizziness, drowsiness or blurred vision occurs
    - Avoid alcohol unless approved by primary health care provider
    - Methods to relieve dry mouth (sugar-free candies); consult a dentist if necessary related to difficulty with dentures or other dental problems
    - Keep all appointments with primary health care provider
    - Consult provider before buying vitamin supplements (Vitamin B_6 interferes with action of Levodopa)

NURSING PROCESS—CLIENT RECEIVING AN ANTIPARKINSON DRUG

- Evaluation
  - Was the therapeutic effect achieved? Was the client's Parkinson-like symptoms controlled?
  - Were adverse reactions: identified, reported, and managed?
    - Client maintains adequate nutrition status
    - Client has adequate bowel movements
    - No evidence of injury
    - Client maintains adequate mobility
    - Client reports restful sleep
  - Did client and family express confidence and demonstrate understanding of drug regimen?