

**PHB**



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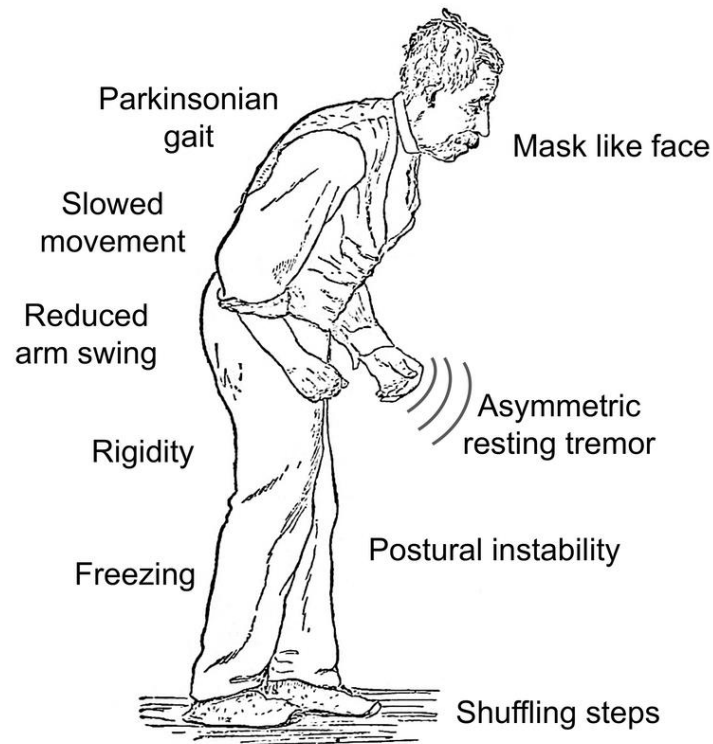
## Chapter– 5 Central Nervous System

### Topic: PARKINSON'S DISEASE

#### 5.1

#### Introduction

Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by the loss of dopamine-producing neurons in the brain.



#### 5.2

#### Etiopathogenesis

The exact cause of Parkinson's disease is not fully understood, but it is believed to result from a combination of genetic and environmental factors. The primary neuropathological hallmark of PD is the degeneration of dopaminergic neurons in the substantia nigra region of the brain, leading to a deficiency of dopamine, a neurotransmitter involved in movement control.

## 5.3

## Types

Parkinson's disease can be classified into several subtypes based on clinical presentation, age of onset and underlying pathology.

Common types include:

- 1. Idiopathic Parkinson's disease:** The most common form of PD, with no known cause or specific genetic mutation.
- 2. Young-onset Parkinson's disease:** PD diagnosed before the age of 40, often associated with a more aggressive disease course.
- 3. Parkinson-plus syndromes:** Atypical parkinsonian disorders with additional features such as progressive supranuclear palsy (PSP), multiple system atrophy (MSA), and corticobasal degeneration (CBD).
- 4. Drug-induced Parkinsonism:** Parkinsonian symptoms caused by certain medications, such as antipsychotics, antiemetics, and calcium channel blockers.

## 5.4

## Symptoms

Parkinson's disease is characterized by a wide range of motor and non-motor symptoms, which may include:

- ❖ Bradykinesia (slowness of movement)
- ❖ Rigidity (stiffness of muscles)
- ❖ Tremor in hands, arms, legs, jaw, or head.
- ❖ Muscle stiffness, where muscle remains contracted for a long time.
- ❖ Postural instability (impaired balance and coordination)
- ❖ Gait disturbances (shuffling gait, freezing of gait)
- ❖ Mask-like facial expression
- ❖ Non-motor symptoms: Such as depression, anxiety, cognitive impairment, sleep disturbances, autonomic dysfunction, and olfactory deficits.

## 5.5

## Diagnosis

Diagnosis of Parkinson's disease is primarily based on clinical evaluation, including a detailed medical history, physical examination, and assessment of motor and non-motor symptoms. Additional diagnostic tests may include:

- **DaTscan imaging**, Single-photon emission computed tomography (SPECT) imaging to assess dopamine transporter density in the brain.
- **MRI**, structural imaging of the brain to rule out other causes of parkinsonism and evaluate for structural abnormalities.
- **Laboratory tests**, such as blood tests to rule out other medical conditions or genetic testing for specific mutations associated with familial PD.

## 5.6

## Pharmacological managements

Pharmacological treatment of Parkinson's disease aims to alleviate symptoms, improve motor function, and enhance quality of life.

Commonly prescribed medications for PD include:

- 1. Dopamine agonists: e.g.** Pramipexole, ropinirole, and rotigotine; which mimic the action of dopamine in the brain.
- 2. Levodopa/carbidopa:**
  - **Mechanism:** The gold standard treatment for PD, levodopa is converted to dopamine in the brain, while carbidopa prevents its peripheral metabolism, reducing side effects.
- 3. Monoamine oxidase type B (MAO-B) inhibitors: e.g.** Selegiline and rasagiline; which inhibit the breakdown of dopamine in the brain.
- 4. Catechol-O-methyltransferase (COMT) inhibitors: e.g.** Entacapone and tolcapone; prolong the effect of levodopa by inhibiting its peripheral metabolism.

## 5.7

## Non - Pharmacological managements

Non-pharmacological interventions for Parkinson's disease may include:

- **Physical therapy:** Exercises to improve mobility, flexibility, balance, and strength.
- **Occupational therapy:** Strategies to enhance activities of daily living, such as dressing, grooming, and writing.
- **Speech therapy:** Techniques to address speech and swallowing difficulties common in PD.
- **Deep brain stimulation (DBS):** Surgical implantation of electrodes in the brain to modulate abnormal neural activity and alleviate motor symptoms in select patients.

## 5.8

## Complications

Complications of Parkinson's disease may include:

- Motor fluctuations in medication response leading to periods of under medication (off episodes) and dyskinesias (involuntary movements).
- Sudden inability to initiate or continue walking, leading to falls and injuries.
- Progressive decline in cognitive function, memory, and executive function, increasing the risk of dementia in advanced stages of PD.
- Depression, anxiety, apathy, hallucinations, and psychosis, which can significantly impact quality of life and functional independence.

## Practice Questions

### MULTIPLE CHOICE QUESTIONS

1. Parkinson's disease is a neurodegenerative disorder primarily affecting which part of the brain?
  - A) Cerebellum
  - B) Basal ganglia
  - C) Cortex
  - D) Brainstem
2. Which of the following is a hallmark symptom of Parkinson's disease?
  - A) Rapid eye movement (REM) sleep behavior disorder
  - B) Uncontrollable jerking or twitching of limbs
  - C) Bradykinesia (slowness of movement)
  - D) Muscle weakness and wasting
3. The primary neurotransmitter deficiency associated with Parkinson's disease is:
  - A) Acetylcholine
  - B) Serotonin
  - C) Dopamine
  - D) GABA (gamma-aminobutyric acid)
4. Which of the following is NOT a typical motor symptom of Parkinson's disease?
  - A) Tremor at rest
  - B) Rigidity of muscles
  - C) Dyskinesia (involuntary movements)
  - D) Postural instability
5. Levodopa is the most effective medication for managing the motor symptoms of Parkinson's disease because it:
  - A) Replenishes depleted levels of dopamine in the brain
  - B) Blocks the reuptake of dopamine in the synapse
  - C) Inhibits the breakdown of dopamine by monoamine oxidase
  - D) Stimulates dopamine receptors in the basal ganglia

6. Deep brain stimulation (DBS) surgery is a treatment option for Parkinson's disease that involves:
- A) Injection of dopamine agonists directly into the brain
  - B) Surgical removal of the substantia nigra
  - C) Implantation of electrodes in the brain to deliver electrical stimulation
  - D) Administration of anticholinergic drugs to reduce tremors
7. Which of the following is a non-motor symptom commonly associated with Parkinson's disease?
- A) Dysphagia (difficulty swallowing)
  - B) Hypertension
  - C) Osteoarthritis
  - D) Allergic rhinitis
8. Parkinson's disease is characterized by the presence of abnormal protein aggregates called:
- A) Neurofibrillary tangles
  - B) Lewy bodies
  - C) Beta-amyloid plaques
  - D) Tau proteins
9. Which of the following is a potential complication of long-term levodopa therapy in Parkinson's disease?
- A) Hallucinations and psychosis
  - B) Hypertension and stroke
  - C) Peripheral neuropathy
  - D) Glaucoma
10. Which of the following statements about Parkinson's disease is FALSE?
- A) It typically occurs in younger adults aged 20-40 years.
  - B) It is a progressive disorder, meaning symptoms worsen over time.
  - C) There is currently no cure for Parkinson's disease.
  - D) Parkinson's disease can be managed with a combination of medications, surgery, and lifestyle modifications.

**FILL IN THE BLANKS**

1. Parkinson's disease is a progressive.....disorder. (**Neurological**)
2. The main symptoms of Parkinson's disease include tremors.....and stiffness. (**slowness of movement**)



3. Parkinson's disease is caused by the loss of.....in the brain.  
**(Dopamine-producing neurons)**
4. The classic motor symptoms of Parkinson's are often accompanied by.....symptoms. **(Non-motor)**
5. Deep brain stimulation (DBS) is a surgical treatment option for advanced cases of Parkinson's to help control..... **(Tremors and motor symptoms)**

**SHORT ANSWER TYPE QUESTIONS**

1. What is Parkinson's disease?
2. What causes Parkinson's disease?
3. What are some common motor symptoms of Parkinson's disease?
4. How is Parkinson's disease diagnosed?
5. What are the main treatment options for Parkinson's disease?

**LONG ANSWER TYPE QUESTIONS**

1. Discuss the etiology and pathophysiology of Parkinson's disease.
2. Describe the typical clinical presentation and progression of Parkinson's disease.
3. Explain the diagnostic methods used for diagnosing Parkinson's disease.
4. Discuss the pharmacological and non-pharmacological treatment for managing Parkinson's disease.
5. What are the long-term implications of living with Parkinson's disease?

<b>MCQ Answer</b>									
<b>1.</b>	<b>B</b>	<b>3.</b>	<b>C</b>	<b>5.</b>	<b>A</b>	<b>7.</b>	<b>A</b>	<b>9.</b>	<b>A</b>
<b>2.</b>	<b>C</b>	<b>4.</b>	<b>C</b>	<b>6.</b>	<b>C</b>	<b>8.</b>	<b>B</b>	<b>10.</b>	<b>A</b>