Parkinsonism

By Dr. Swathi Swaroopa. B

- Parkinson’s disease (PD) has highly characteristic neuropathologic findings and a clinical presentation, including motor deficits and, in some cases, mental deterioration.

Parkinson Disease

- First described in 1817 by an English physician, James Parkinson, in “An Essay on the Shaking Palsy.”
- The famous French neurologist, Charcot, further described the syndrome in the late 1800s

What causes PD

May be combination of factors involving

genetics, environmental agents,& abnormalities

in cellular process.

Risk Factors

- ***Age*** **- the most important risk factor**

  Develops around age 50

  *** incidence rises with age**

  *** affects 1-2% of population > age 65**

- **Positive family history**
- **Male gender**

  Higher incidence in men (62%) compared to women (38%)

- **Environmental exposure: Herbicide and pesticide exposure, metals (manganese, iron), well water, farming, rural residence, wood pulp mills; and steel alloy industries**
- **Life experiences (trauma, emotional stress, personality traits such as shyness and depressiveness)**

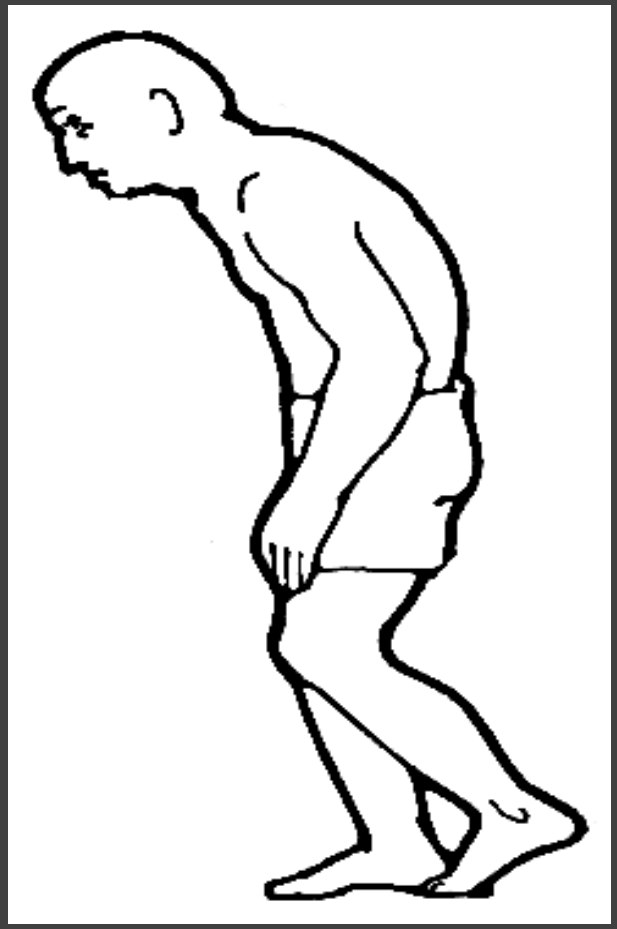
Three cardinal symptoms:

→ *resting tremor*

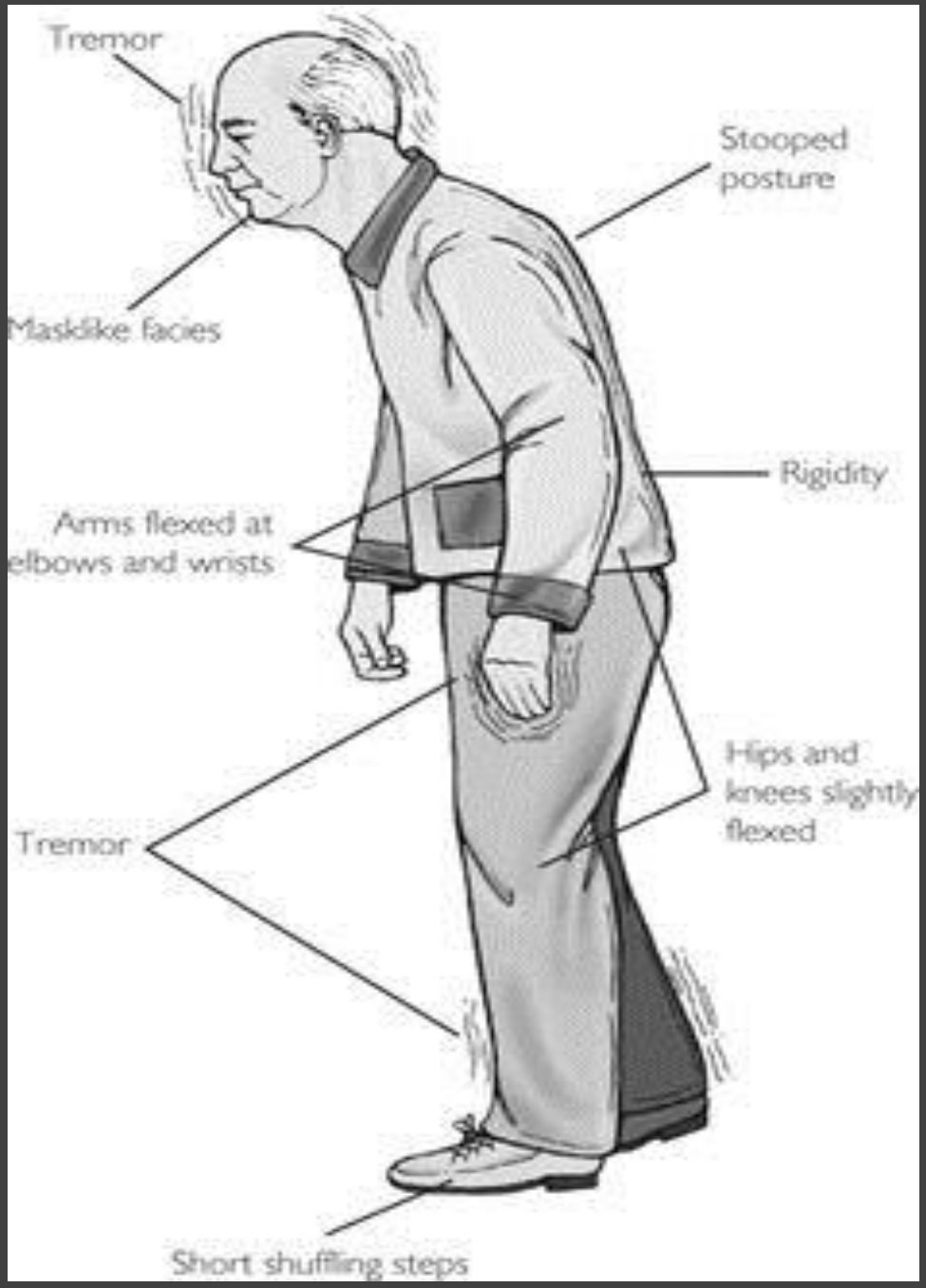
→ *bradykinesia (generalized slowness of movements)*

→*muscle rigidity*

→*Postural instability*



Symptoms worsen as disease progresses


Tremor
Stooped posture
Masklike facies
Rigidity
Arms flexed at elbows and wrists
Hips and knees slightly flexed
Tremor
Short shuffling steps

- **Resting tremor:** **Most common first symptom, Tremor is present most commonly in the hands, often begins unilaterally, and sometimes has a characteristic “pill-rolling” quality..**

- Bradykinesia: slowness of motion. The individual's movements become increasingly slow and over time muscles may randomly "freeze“
- Difficulty with daily activities such as writing, shaving, using a knife and fork, and opening buttons; decreased blinking, masked facies, slowed chewing and swallowing.

- **Muscular Rigidity**: Muscle tone increased in both flexor and extensor muscles providing a constant resistance to passive movements of the joints; stooped posture, anteroflexed head, and flexed knees and elbows.

Postural manifestations –

- postural instability

- rigidity

- stooped

Other symptoms

- Decreased dexterity,
- Difficulty arising from a chair,
- Decreased eye blinking
- Festinating gait,
- Dysarthria,
- Difficulty swallowing,
- Reduced facial expression,
- Freezing at initiation of movement,
- Hypophonia,
- Micrographia,
- Bladder disturbances,
- Constipation,
- Blood pressure changes,
- Dementia, anxiety, depression,
- Sleepiness, insomnia, obstructive sleep apnea.

Additional Symptoms

- **Depression:** **Mild to moderate depression in 50 % of patients.**

- **Cognitive impairment:** **Mild cognitive decline including impaired visual-spatial perception and attention, slowness in execution of motor tasks, and impaired concentration in most patients; at least 1/3 become demented during the course of the disease.**

Parkinson's Disease – Stages of Symptoms

Stage	Symptoms
One	Unilateral
Two	Bilateral No balance impairment
Three	Balance impairment Mild to moderate disease Physically independent
Four	Severe disability Still able to walk & stand unassisted
Five	Wheelchair-bound or bedriddened unless assisted

Etiology

- Genetic and environmental factors
- Oxidation hypothesis suggests that free radical damage

- A recent hypothesis suggests that Parkinson disease is caused by abnormalities of the ubiquitin proteasome system

- Genetic: mutation of alpha synuclein (neurodegeneration)gene which is an autosomaldominant familial form results in PD

Etiology

Metabolic disturbances

Infectious

Drug Induced

- Antipsychotics
- Antiemetics
- Dopamine depletors

Pathophysiology

- Two hallmark features in the substantia nigra pars compacta are loss of neurons and presence of Lewy bodies.

- Reduced activation of dopamine1 and dopamine2 receptors results in greater inhibition of the thalamus and reduced activation of the motor cortex.

Pathophysiology

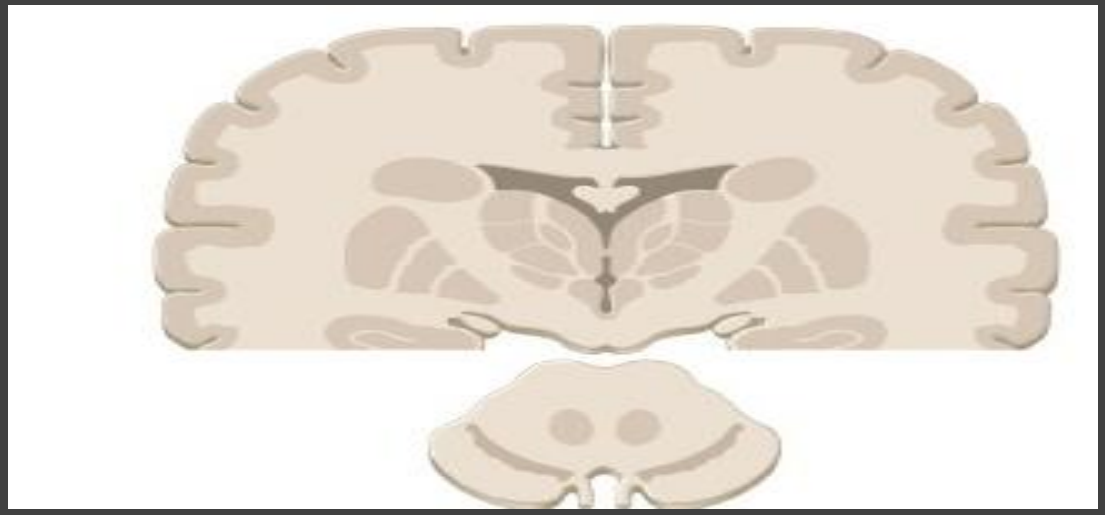
- In PD, nigral dopamine neurons and other cells die from a combination of factors
- Genetic vulnerability abnormal processing or folding of -synuclein
- Oxidative stress
- Proteasomal dysfunction
- Environmental factors

Parkinson's Disease - Pathophysiology

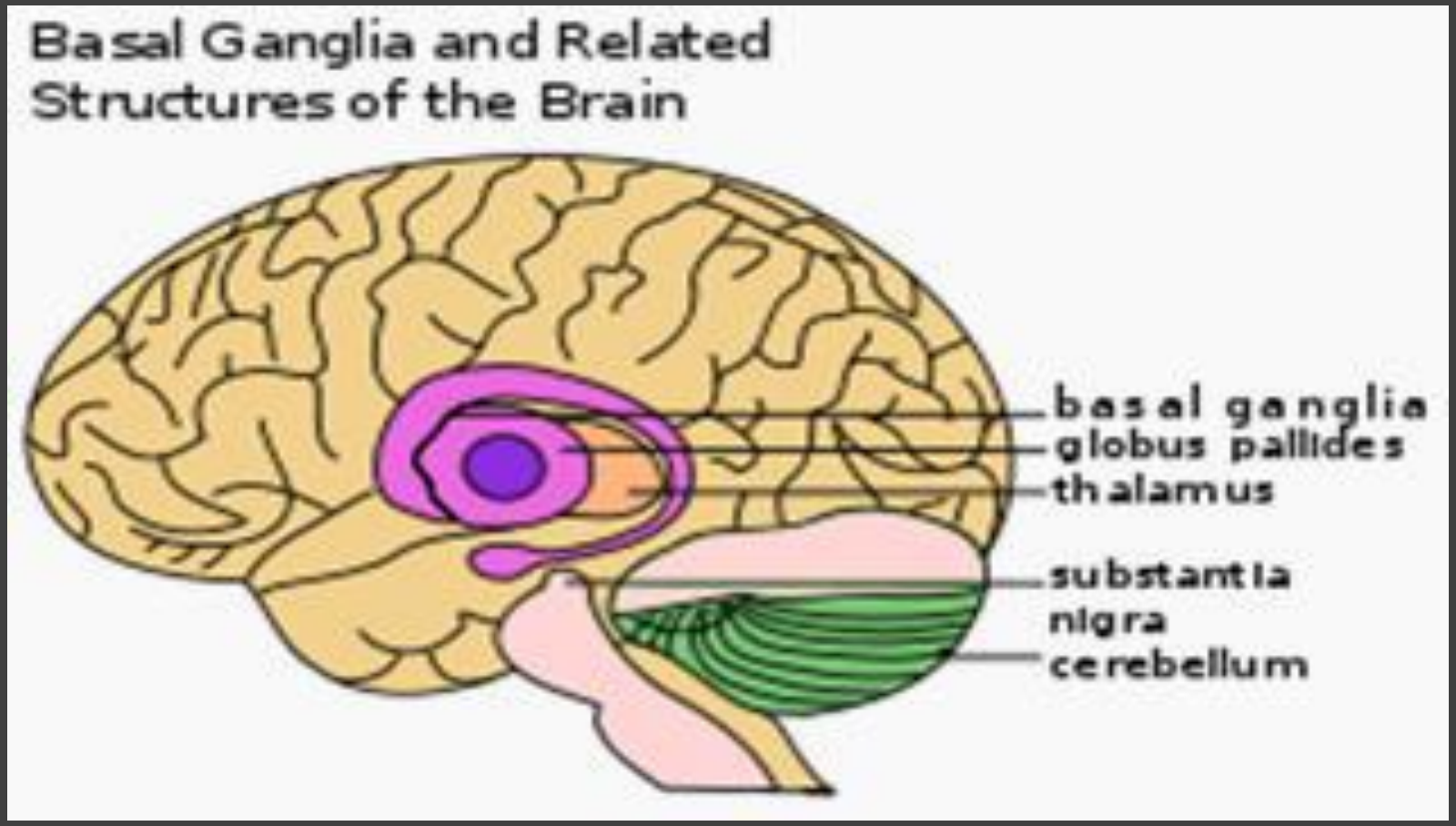
Question: What causes the movement problems of PD?

Answer: Deficiency of the brain chemical *dopamine* occurs in the basal ganglia.

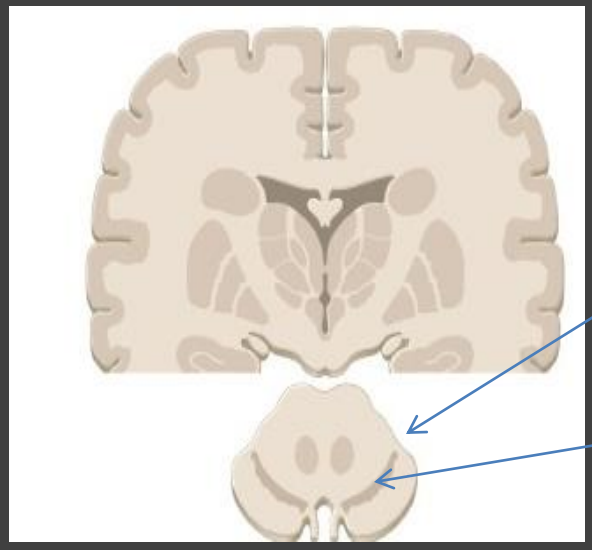
The Basal Ganglia is an area deep inside the cortex of the brain that coordinates normal muscle activity.



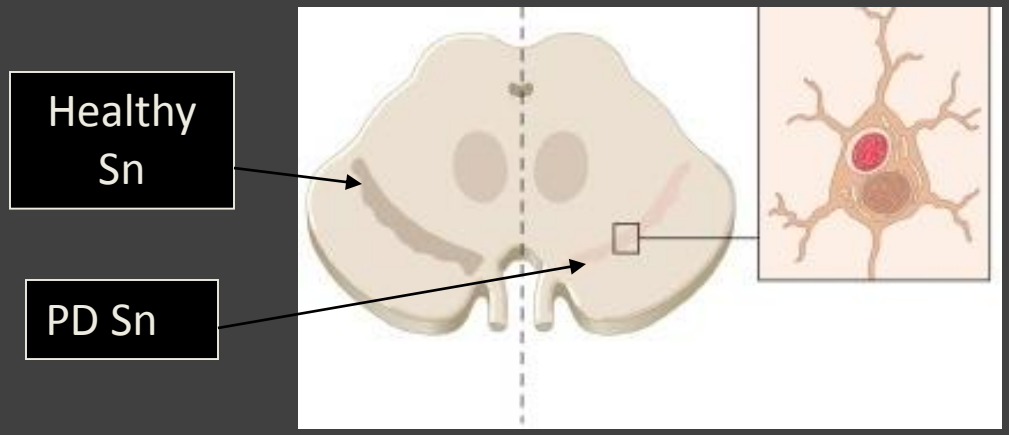
- Basal ganglia is associated with a variety of functions, including voluntary motor control, procedural learning relating to routine behaviors or "habits," eye movements, and cognitive emotional functions



- Question: What causes the dopamine deficiency?
- Answer: Degenerative changes in the substantia nigra and striatum portions of the basal ganglia reduce dopamine production.



Parkinson's Disease - Pathophysiology



Cells degenerate in substantia nigra (Sn)

↓

Substantia nigra destroyed

↓

Dopamine decreases

↓

Muscle cell activation decreases

↓

Movement control decreases

- **Lewy bodies are abnormal aggregates of protein that develop inside nerve cells in Parkinson's disease (PD).**

- **They are identified under the microscope when histology is performed on the brain.**