

## Case 4 : Parkinson disease



## ❖ Learning issues:

1. Structures and functions of basal ganglia
2. Role of basal ganglia in controlling fine movements
3. Neurotransmitters (particularly dopamine) responsible the normal function of basal ganglia and control of fine movements
4. Pathology of Parkinson disease
5. Interpretation of patient's clinical symptoms and signs
6. Biochemical and molecular mechanisms underlying the development of Parkinson disease
7. Pharmacology of drugs used in treatment of Parkinson disease



- Extra information

## ❖ Key information and Presenting problems:

- Male, 65 years old, retired security officer
- tremor of his right arm and hand
- stiffness in his shoulder region (**rigidity**)
- slow in his movements (**bradykinesia**) for last 6 months



### History:

- ❖ It increase when people comment about his tremor and when he is stressful situation.
- ❖ **No** pain on rest or with moving his shoulder
- ❖ Difficult to turn his body in bed or move from side to side
- ❖ He feels unsteady
- ❖ He walks in short steps
- ❖ Disturbance in his sleep for the last 4-5 years
- ❖ He was admitted to hospital when he was 12 years old for appendectomy
- ❖ He has **no** history of any medical problems in his family.
- ❖ **NO** Smoking
- ❖ **NO** Medication and Allergy



New terms	
Tremor	involuntary, rhythmic and alternating movements of one or more body parts
stiffness	Lacking ease or comfort of movement.
Cogwheel resistance	Rigidity in which the muscles respond with cogwheel-like jerks to the use of force in bending the limb.
Myopathy	Disease of muscle

- Cogwheel resistance: <http://youtu.be/8xxe2WWWoY>
- Parkinsonian gait: <http://youtu.be/j86omOwx0Hk>

## Clinical examination

-Decreased facial expression (**masked face**)

-speaks in low tone voice

-he rests his right arm on his body while sitting ,his right arm and hand show tremor.

-No evidence of hypothyroidism .

## Motor Power

**Gait**

He stands in a slow movement and his body is leaning forward .he walks in slow and short steps (**festinating gait**)

**Motor power examination**

On flexion of his right elbow There is **cogwheel like resistance** (initial resistance followed by a release of movement )

## Sensory system examination

**Normal**

## Musculoskeletal system

No evidence of myopathy

## vital signs

**Normal**

## Cranial nerves

**all are Normal**

## CVS and Respiratory Examinations

**Normal**

## ■ Investigation:

- investigation are not needed for diagnosis of Parkinson disease
- It is diagnosed through: History + Clinical examinations

## ■ Management:

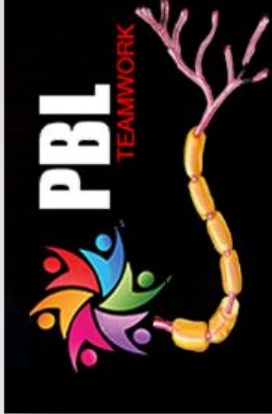
- Levodopa coupled with a peripheral decarboxylase inhibitor (PDI) tablets.
- The doctor advises him to revisit in five weeks

## ■ Prognosis:

- ✓ Five weeks later ,he feels much better. His arm and hand tremor are much less than used to be .
- ✓ Over the next 5-6 months Mr Saad shows some improvement . He much less tremor and his walking is more stable. He is able to do work that needs fine movements such as unbutton his shirt or tie his shoe laces .

## ■ Diagnosis:

- ✓ Parkinson disease



## Explanation of the treatment:

LEVODOPA (L-DOPA)

The precursor to Dopamine

It will be decarboxylated to DOPAMINE in the brain and periphery.

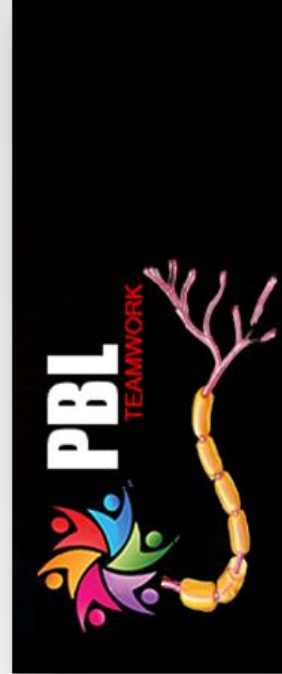
**N.B:** the doctor didn't give Dopamine directly, because Dopamine doesn't cross blood brain barrier

Peripheral decarboxylase inhibitor (PDI)

- **Without PDI:** Since L-DOPA will be decarboxylated to DOPAMINE

DOMPAMINE in the blood causes side effects (nausea, Vomiting)

- **Therefore,** PDI is given to reduce the incidence of nausea and vomiting and inhibit peripheral decarboxylation.



### ❖ Progress 1:

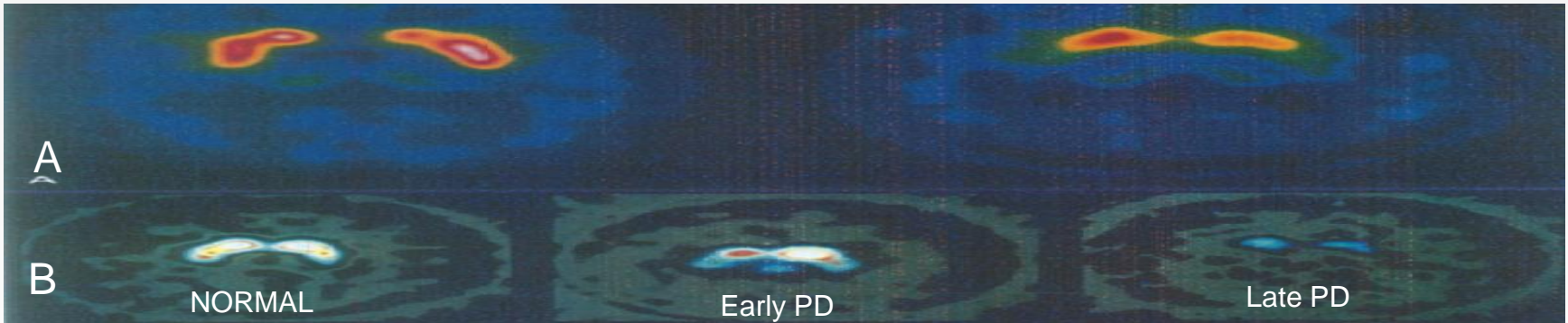
- The doctor asks Saad if he wants to be part of the doctor's RESEARCH. He explains to him the value of the research for possible new discovers that could help in treating patients with PARKINSON disease. Saad agrees to join the research project.

### ❖ Progress 2:

- Research objects could help in:
  - ✓ Understand the progression of the disease
  - ✓ Mechanism of the medication
  - ✓ Role of therapy in delaying disease progression
- The images show a reduction in the uptake of 18F DOPA, and beta-CIT spect uptake by the putamen of patients wit parkinson disease (PD) compared to normal. Saad's images confirm that he has an early PD. N.B: these investigations only for the research requirements

NORMAL

PD patient



**A:** 18F DOPA PET uptake in the Putamen is reduced in patients with PD compared with normal controls.

**B:** Reduction in Beta- CIT spect uptake in the Putamen correlate with the severity of PD

↑ Severity = ↓ Uptake



# **PARKINSON DISEASE:**

- ❑ Is a degenerative disorder of the CNS. The motor symptoms of Parkinson's disease result from the death of dopaminergic neurons of the substantia nigra or their projection to the striatum.
- ❑ the cause of this cell death is unknown (idiopathic), but several factors appear to play role, including specific genetic mutations and/or environmental triggers (Drugs affecting neuron e.g. Dopamine antagonists)
- ❑ Symptoms:
  - ✓ Masked face
  - ✓ Bradykinesia
  - ✓ Festinating gait
  - ✓ Tremor
  - ✓ Low tone voice
  - ✓ Rigidity
  - ✓ Cogwheel resistance





# Questions



<b>Q1</b>	<b>Can the doctor use Dopamine instead of Levodopa?</b>	<b>Q5</b> <b>What is the scientific basis behind these investigations were in the research?</b>
	<b>No, because Dopamine can not cross BBB.</b>	<b>Assessment of the functional status of the different parts of the basal ganglia</b>
<b>Q2</b>	<b>If levodopa is given without PDI, what will happen?</b>	<b>Q6</b> <b>Research objects could help in:</b>
	<b>Levodopa will decarboxylate to Dopamine, causing nausea and vomiting. And small amounts of Levodopa will reach the brain.</b>	<ul style="list-style-type: none"><li>✓ <b>Understand the progression of the disease</b></li><li>✓ <b>Mechanism of the medication</b></li><li>✓ <b>Role of therapy in delaying disease progression</b></li></ul>
<b>Q3</b>	<b>What is the appropriate diagnosis method for Parkinson disease?</b>	<b>Q7</b> <b>What is the location lesion of parkinson disease?</b>
	<b>History + Clinical examination.</b>	<b>Substantia nigra.</b>
<b>Q4</b>	<b>What is the type of rigidity in the elbow?</b>	<b>Q8</b> <b>Describe the festinating (parkinsonian) gait?</b>
	<b>Cogwheel resistance</b>	<b>he walks in slow and short steps + leaning forward</b>



Done by:  
**Nasser alQahtani**  
**Omar alhas**  
**Mohammad alnafisah**



[PBLteamwork433@gmail.com](mailto:PBLteamwork433@gmail.com)

Revised by:  
**Alaa AlHarbi**

