Advances Topics in Psychology

Lecture 1: Parkinson's Disease

PART 1: PARKINSON'S DISEASE

Motor disorder associated with:

- Rigidity – when you can't bend, or force patients arm or other body parts out of shape / akinesia – loss or impairments in power of voluntary movement
- Resting tremor – also known as shaking
- Bradykinesia – slow movement
- Freezing of gait – short and temporary episode of inability to move
- Posture instability

Cognitive effects?

- PD is associated with reduced dopamine levels in the basal ganglia
- Basal ganglia is associated with all kind of movement over the body – thus reduction causes some of the symptoms of Parkinson's
- Dopaminergic medication is used to treat motor symptoms – such as levodopa, MAO inhibitors and dopamine agonists

Sex ratio

- PD is more common among men than women – reason is unknown
- 2/3 is male and 1/3 is female

Stages of PD

- It is a progressive disorder – becomes worse over time
- Treatments are often not effective for severe patients

STAGE 1	• signs and symptoms on one side only • symptoms are mild - inconvenient but disabling • usually presents with tremor of one limb • friends have noticed changes in posture, locomotion and facial expression
STAGE 2	• symptoms are bilateral • minimal disability • posture and gait affected
STAGE 3	• significant slowing of body movements • early impairment of equilibrium on waling or standing • generalized dysfunction that is moderately severe
STAGE 4	• severe symptoms • can still walk to a limited extent • rigidly and bradykinesia • no longer able to live alone • tremor may be less than earlier stages
STAGE 5	• cachectic stage • invalidism complete • cannot stand or walk • requires constant nursing care

UPDRS scale – 4 sections

1. Mode
2. Activities of daily living (salivation, swallowing)
3. Motor severity
4. Therapy complications (dyskinesia – movement is reduced)

Neurologists usually administer motor severity section, which measure severity of tremor, bradykinesia, akinesia etc.

Medication withdrawal studies

- Medication withdrawal studies refer to testing Parkinson's disease patients ON and Off medication.
- PD On means testing the patients normally, as they take medication usually 3 or 4 times a day, which is usually in the morning, noon, afternoon, and night.
- To test PD patients Off medication, we tell them not to take their afternoon, night, and morning medication on the day before testing.
- And in fact, by doing that, we see a massive difference in the patients. When patients are off medications, it is hard for them to drive to the lab. Also their tremor (shaking) increase, they cannot walk very well. They also seem more stressed, and so on.
- But in addition, their cognition changes as well. Sometimes, when they are off medication, it is hard for them to pay attention and focus.

PART 2: MOTOR IMPAIRMENTS

Impairment	Description and causes
Akinesia	• Difficulty initiating movement
Bradykinesia	• Slow movement ^both most likely related to dopamine depletion in basal ganglia
Tremor	• **Resting tremor** – shaking while at rest • **Essential tremor** – shaking while moving • Subthalamic nucleus, cerebellum and thalamus dysfunction are associated with tremor
Freezing of gait	• Occurs in advanced PD patients • Different from other motor symptoms • Related more to cognitive dysfunction rather than motor machinery issues – usually related to the complexity of the environment around them • Only happens when patients are challenged. More common when - Patients pass through a **narrow door** – because they're not sure if they will fit, not sure what kind of movement they need to do while moving through the door to fit - **Initiation of movement** – as they are required to think of a motor plan on how to move - Turning - **Dual tasks** e.g. walking and talking - Exacerbated by **stress** - When **obstacles** get closer • Most common while walking – but also occurs with hand movements and speaking • Occurs due to disconnection among cortex and basal ganglia • Along with freezing, postural instability causes falls and injuries
Eye movement	• Impaired in Parkinson's disease

	• Basal ganglia also projects to superior colliculus which regulates eye movement – if damaged, then the projection to superior colliculus is effected which in turn effects eye movement
Facial muscles	• Patients show impairment controlling facial muscles • Most patients have flat face – worse when they're off medication than on • Associated with decrease in dopamine and damage to basal ganglia
Handwriting	• Usually smaller letters than healthy patients • Patients with Tremor – has shaky writing
Language and speech	• Hypophonia (reduced volume), Slurred speech and stuttering in some patients – - basal ganglia plays a key role in stuttering – the core dysfunction in stuttering is suggested to be impaired ability of the basal ganglia to produce timing cues for the initiation of the next motor segment in speech - freezing of gait and stuttering correlate
Swallowing	• Dysphagia – difficulty swallowing • Levodopa can reduce swallowing problems but only a little bit
Movement *	• PD patients have difficulty with self-initiated movements • patients are same as controls on externally triggered movements

*Self-initiated vs. externally triggered movements

- Self-motivated movement = do a movement themselves
- Externally triggered = stimulus from the environment triggers a person to move

What is the worst (and most concerning) symptom of Parkinson's disease?

- Swallowing, freezing of gait and postural instability

PART 3: COGNITIVE DYSFUNCTION

- Cognitive dysfunction affects quality of life
  - QoL – questionnaire about leisure activities

Bradyphrenia

- Analogous to bradykinesia
  - Cognitive slowing
- PD patients show this – Slow thinking patterns
- Dopamine medicates can ameliorate these symptoms
- It is not known if same brain mechanism leads to both bradykinesia and bradyphrenia

PART 4: SUBGROUPING

Young vs. old age	• Most common in older age – aged 65+ • Younger PD patients (<50) usually develop this due to genetic abnormality (e.g. the parkin gene) • Older patients (>50) usually due to environmental factors
Severity if akinesia vs. tremor	• Some have some symptoms as more prominent than other symptoms or may have some symptoms not present at all • Patients with akinesia are way more impaired at work and memory than controls and patients with severe tremor • Patients with main symptom as Akinesia has reduced dopamine in stratum