Parkinson's Disease Case Study

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- Specialty training and advanced knowledge in neurodegenerative diseases
  - Parkinson's Disease
  - Amyotrophic Lateral Sclerosis
  - Multiple Sclerosis
- Combination of didactic learning, clinical experiences, community service/outreach, and education/training activities
- Prepares students to become future evidence-based clinicians and advocates for neurodegenerative diseases
- https://www.med.unc.edu/ahs/neurostepup/

What is Parkinson's Disease?

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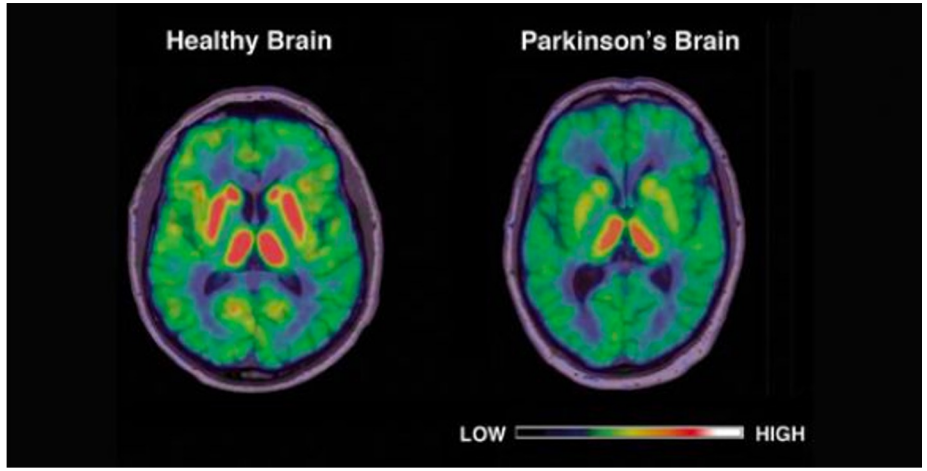
- A progressive neurodegenerative disease that affects dopaminergic neurons in the substantia nigra of the basal ganglia [1]

- Decrease of dopamine stores leads to dysfunction of basal ganglia and subsequent motor and non-motor symptoms



Epidemiology and Prevalence [2]

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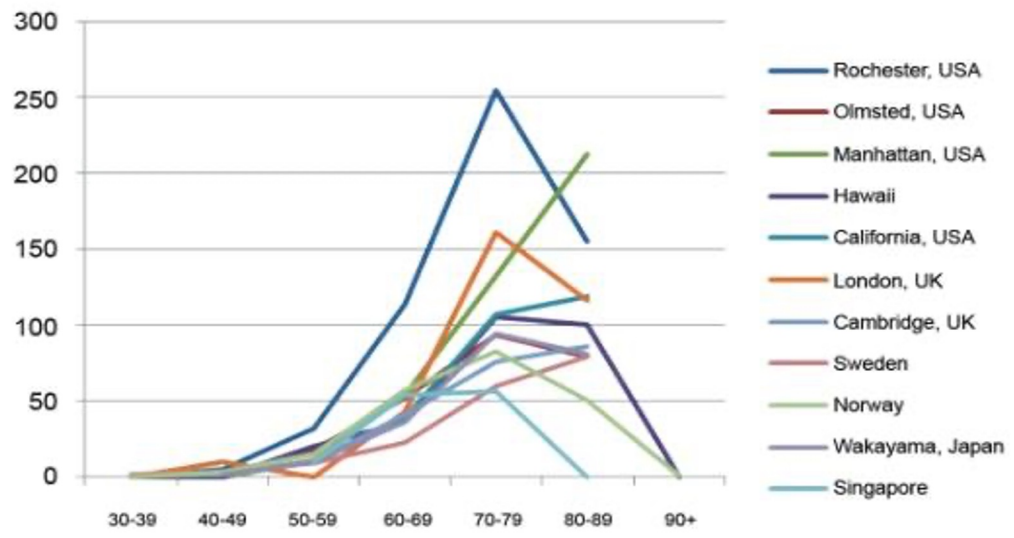
- Affects 1-2 per 1000 people
- Nearly 1,000,000 living in the US
- Prevalence increases with age



Common Signs & Symptoms

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- Affects motor and non-motor function
- Cardinal features:
  - Rigidity
  - Bradykinesia
  - Tremor
  - Postural instability

Stages of Disease [3,4]

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- Early Stages
  - Emergence of cardinal signs
  - Balance Difficulties
- Later Stages
  - Festination, dyskinesia
  - Episodes of “freezing”
  - Increased falls risk
  - Reduced activity and aerobic capacity
- Advanced stages
  - Wheelchair or confined to bed
  - Dependent for ADLs
  - Cognitive impairment

Modified Hoehn and Yahr scale

1.0: Unilateral involvement only
1.5: Unilateral and axial involvement
2.0: Bilateral involvement without impairment of balance
2.5: Mild bilateral disease with recovery on pull test
3.0: Mild to moderate bilateral disease; some postural instability; physically independent
4.0: Severe disability; still able to walk or stand unassisted
5.0: Wheelchair bound or bedridden unless aided

Common Treatments

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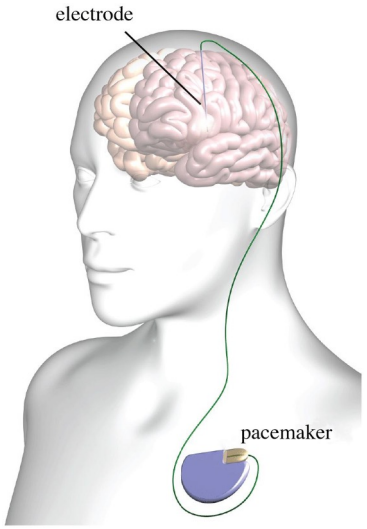
- Medications
  - Levodopa, Carbidopa, Sinemet, dopamine agonists, anticholinergics, COMT inhibitors, etc.
- Duopa pump
- Deep brain stimulation
- Exercise and lifestyle changes
- Alternative therapies



Special Considerations for PT [5]

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- On-off phenomenon with medications
- Balance and postural instability
- Education
- Dual-task challenges
- Use of external cues or compensatory strategies
- Large Amplitude Oriented Training
  - LSVT BIG
  - PWR!
- ICF Model

Meet “Patti Davis”

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Reason for Referral: 82 y.o female presents to clinic with impaired gait and balance; decreased amplitude of movement related to her dx of PD

Chart Review

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- Dx with Idiopathic Parkinson's Disease (10 years prior)
  - Intermittent resting tremor in bilateral lower extremities, increased tone in neck, and decreased amplitude of rapid alternating movements (RAM)
  - Started Levedopa in 2014, dosages continual altered and increased
    - Due to decreased postural control, stiffness, and gait initiation
  - Hx of falls increasingly after 2018
- Additional Past Medical History:
  - Cervical spine degeneration and bulging disc
  - Decompression surgery of L4-L5 (resultant numbness in lateral R hip and thigh)
  - Depression (treated with medication)

Evaluation: Subjective Component

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- Course of Disease
  - When was the diagnosis?
  - Symptoms?
  - How have symptoms progressed?
- Home Set-up
- Activities
  - Work/Hobbies?
  - Working?
  - Driving?
- ADLs?
- Exercise/Stretching Routine?
- Use of Assistive Devices?
- Patient/Family goals?
- Pain?
- Falls?

Evaluation: Objective Component

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- **Timed Up and Go**: 10.73 seconds (w/ SPC)
  - Veering to L after turning L for seat return (functional)
- **Cognitive Timed Up and Go**: 13.54 seconds
  - Slowed >10% (impaired dual tasking)
- **Five x Sit to Stand**: 9.03 seconds
- **Mini Best Test:** 18/28
  - Notable difficulty with reactive postural control and dynamic gait
- **ROM** Limited
  - L shoulder limited in forward flexion, abduction, and adduction (post L humerus fx)
- **MMT**
  - BUE Gross: 5/5
  - R LE Grossly: 4/5
  - L LE Grossly: 4/5
- **Transfers (without AD)**
  - Supine<>Sit → Independent
  - Sit<>Stand → Posterior LOB with first attempt, successful with no UE after the second
- **Balance**
  - Feet Together Eyes Open: 10s
  - Feet Together Eyes Closed: 10s
  - Tandem: 10s with instability and low balance confidence
  - Single Leg Stance 7s L LE, 10s R LE
- **Gait Analysis**
  - Shuffling gait, slight freezing at gait initiation, crossover stepping during turning, veering to the L after turning, use of SPC with proper placement
- **Rapid Alternating Movements**
  - Slightly decreased in amplitude with bilateral UE

Sample Videos

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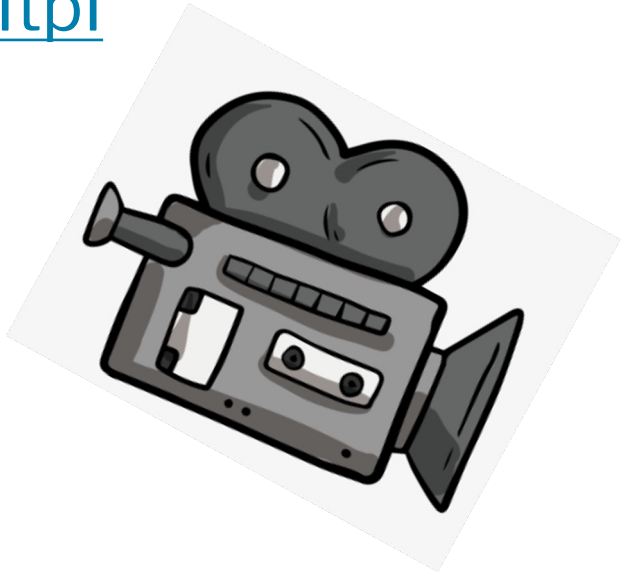
- FOG/Festination
  - https://www.youtube.com/watch?v=3-wrNhyVTNE
- Dyskinesia
  - https://www.youtube.com/watch?v=48evbuUMtpI



Goals

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- **Short Term Goals:** In two weeks
  - Patient will be able to properly demonstrate current HEP Independently x1 in clinic to build upon functional gains in PT
  - Patient will demonstrate appropriate technique to initiate gait without freezing/stutter steps on 5/5 attempts to decrease risk of falls when initiating ambulation and improve independence with community ambulation
  - Patient (and/or family member) will verbalize understanding of options to use fall detection on smart watch
- **Long Term Goals:** In six weeks
  - Patient will be able to properly demonstrate current HEP independently x1 in clinic to build upon functional gains in PT
  - Patient will demonstrate ability to turn 180 degrees on 6/6 attempts while ambulating with Least Restrictive Assistive Device (LRAD) without near LOB or veering to one side to demonstrate improved dynamic balance for decreased risk of falls
  - Patient will improve on the Timed Up and Go to 9.5s with LRAD and no LOB to decrease risk of falls.

Planned Interventions

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- Gait Training
- Neuromuscular re-Education
- Therapeutic Exercise
- Postural Exercises/education
- PT DME/Equipment recs
- Patient/Family Education
- HEP

Discharge: Results

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	Initial Visit	Discharge
TUG	10.73s (w/ SPC): Veering to the L w/ turn	10.02s (w/ SPC): No veering
Cog TUG	13.54s (slowed >10%) → dual tasking impairment	12.72s
5xSTS	9.03 seconds	8.34 seconds
Mini Best Test	18/28 (Anticipatory balance/dynamic gait)	24/28 (Dynamic Gait)
Balance	Tandem: 10s → instability/decreased confidence SLS 7s L LE, 10s R LE	Tandem: 10s SLS 10s L LE, 10s R LE
Falls	1-2x falls or near falls a week	<1 fall or near fall a week
Gait Analysis	Shuffling gait, slight freezing at gait initiation, crossover stepping during turning, veering to the L after turning, use of SPC with proper placement	Shuffling gait (but increased step length), freezing with initiation/transitions but able to correct, reduced crossover with turns (taking "BIG" steps
Patient Education		Able to complete HEP with min VC, able to demonstrate tactic for initiating gait 5/5 times, spouse educated on VC for HEP at home, appropriately using AD

References

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Thank you!

Questions?