MAXIMIZING FUNCTION IN PARKINSON’S DISEASE

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End Falls This Falls Conference

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Toronto, Ontario
Outline

• An overview of Parkinson’s disease (PD):
  • epidemiology,
  • clinical manifestations
  • medical treatment
• The role of exercise in PD
• Specific exercise approaches for PD
• Falls in PD
• Review and wrap up
Parkinson’s Disease

• Progressive neurodegenerative condition with no known cure
• Average onset age: 55-60, 20% before age 50
• Young onset PD: 21-40, Late onset: ≥ 78
• Second most prevalent neurodegenerative condition.
PD: Epidemiology

Affects all races and ethnicities, in all world areas. Men diagnosed 1.5 times as often as women.

- Incidence: 26 per 100,000 per year
- Prevalence: 3% of adults 60 and over
- 6.5 million cases worldwide (>150,000 Canadians).

This means: over 2,500 diagnosed per year in the GTA;
PD: Etiology

- Dopamine- producing cell deterioration in the substantia nigra
- >50% cell death for clinical symptoms
- Usually idiopathic
- Etiology likely multi-factorial:
  - Genetic predisposition (usually mutation) plus-
  - Environmental toxins?
  - Dietary intake?
  - Folic acid deficiency?
Clinical Manifestations

Cardinal Signs:
- Tremor
- Rigidity
- Akinesia/ bradykinesia
- Postural instability.

Non-motor symptoms:
- Olfactory disturbances
- Depression/ anxiety
- Fatigue
- Postural hypotension
- Cognitive changes
- Sleep disorders
- GI, bladder and sexual dysfunction.
## Phases of PD Progression (Stern et al, 2012)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>Preclinical PD</td>
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<tr>
<td>II</td>
<td>Premotor PD</td>
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<tr>
<td>III</td>
<td>Motor PD</td>
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Diagnostic Criteria

• Presence of 2/3 cardinal signs (tremor, rigidity, bradykinesia) (UK Brain Bank)

• Hughes et al (1992): Most common signs- resting tremor, asymmetry of symptoms, responsiveness to levodopa

• Early PD is characterised by asymmetry, and is responsive to dopamine replacement. It is not characterised by postural instability.
PD: Medical Treatment

Medications:

• Dopamine replacement, dopamine agonists, COMT inhibitors, MAO inhibitors, anti-cholinergics, amantadine.

Surgical Therapies:

• DBS, stem cell research.
Complications of PD and Pharmacological Treatment

- Dyskinesia
- “On/Off” phenomena
- Dystonia
- Festination and freezing
- Drug- induced confusion, hallucinations.

Stage 1: Mild unilateral symptoms  
Stage 2: Bilateral involvement: no postural instability  
Stage 3: Mild to moderate bilateral disease; postural instability; physically independent  
Stage 4: Severe symptoms; partly disabled; independent standing and walking  
Stage 5: Wheelchair bound or bedridden unless aided.
Atypical Parkinsonism Disorders

- Early postural instability and falls
- Ineffective medications
- Gaze palsy
- Speech and swallow changes
- Orthostatic hypotension
- Cognitive decline
Atypical Parkinsonism Disorders

- PSP – Progressive Supranuclear Palsy
- CBD – Corticobasal Degeneration
- MSA – Multiple System Atrophy
- FTD – Frontotemporal Degeneration
- LBD – Lewy Body Dementia
"What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"
• Exercise is effective in improving mobility and quality of life in people with PD (Crizzle, 2006; Goodwin et al, 2008).

• Both symptom-specific and non-symptom specific PT intervention have been shown to be beneficial and relevant for people with PD (Jobges et al 2006).

• Early and intensive exercise group improved in all measures (Frazzitta et al 2014)
European Physiotherapy Guidelines for Parkinson Disease (2013)

• Evidence-based, comprehensive guidelines for PT assessment and intervention
  • www.parkinsonnet.info

• Early stage
• Mid-stage
• Late stage
Neuroplasticity

“The process of re-organisation in the brain that can lead to recovery from injury/illness” (Fisher and Yip, 2005)

“The ability of the nervous system to adapt to trauma or disease; the ability of nerve cells to grow and form new connections to other neurons.” (Taber’s Medical Dictionary)
Neuroplasticity Research Findings in PD


Principles of Neuroplasticity

• “Use it or lose it”
• Use it and improve it
• Repetition
• Intensity
• Specificity
• Saliency
• Time matters
• Age matters
• Transference
• Interference.

(adapted from Kleim and Jones, 2008)
My wife said “Watcha doin’ today?"
I said “Nothing”
She said, “You did that yesterday”
I said “I wasn’t finished.”
Neuroplasticity- Based Treatment Approaches

• Tandem cycling at high intensities (Ridgel et al, 2009, Alberts et al, 2011)


- Based on LSVT LOUD® (Fox et al, 2002)
- Adapted from communication for mobility training
- Standardised protocol
- Focus on amplitude of movement
- High effort and intensity
- High dosage of practice and repetition
- Functional saliency.

- Standardised protocol
- Focus on amplitude of movement
- High effort and intensity.
LSVT BIG® (Farley et al, 2008)

LSVT BIG® study results (RCT):
- faster walking with bigger steps
- better balance
- increased trunk rotation and
- improved quality of life

Benefits were sustained for at least three months post-treatment.
LSVT BIG® (Ebersbach et al, 2010)

LSVT BIG ® comparative study results (RCT):

• Improved UPDRS motor scores
• Faster walking (TUG, 10m walk)

Compared with Nordic walking and home exercise groups. Differences statistically significant (p≤0.001); deterioration in other groups.
The Problem

Movements are slower/smaller →
Problem perceiving movements have become smaller →
Problem making bigger movements →
Reduced size of movements →
Therefore even smaller/slower movements
Treatment Principles

- Axial Mobility
- Movement amplitude
- Aerobic
- Neuroplasticity
Functional Mobility Interventions

- Bed mobility
- Transfers
- Upper extremity function.
- Turning
- Gait and Balance
- Cognition
Equipment
Falls in PD

• Up to 70% of older people with PD fall each year (Bloem et al, 2001)
• People with PD who have fallen more than once in the last year have a very high likelihood of falling again in the next three months (Ashburn et al, 2001).
Freezing of Gait (FOG)

Defined as: “Brief, episodic absence or marked reduction of forward progression of the feet despite the intention to walk” (Giladi et al, 2008).

Includes:

• ‘Start Hesitation’
• Arrests in forward progression during walking/turning
• Shuffling with nearly- invisible steps forward
Freezing of Gait: Treatment

• Medication adjustment
• Treadmill training with visual and auditory cues (Frazzitta et al, 2009)
• Rotating treadmill training (Hong and Earhart, 2008)
• Training for multi-tasking (Canning et al, 2008)
• Virtual reality treadmill training (Mirleman et al 2016)
A multi-faceted approach to maximizing function in PD

• Medications

• Exercise

• Efficient movement strategies

• Neuroplasticity principles

• Equipment
One Step Ahead Mobility

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• Upcoming courses in Rehabilitation in PD in Nov.

• Parkinson’s Retreat July 2017
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