

MAXIMIZING FUNCTION IN PARKINSON'S DISEASE

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End Falls This Falls Conference

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One Step Ahead Mobility

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)

Phase		Description
I	Preclinical PD	PD- specific pathology present, supported by molecular/imaging markers. No symptoms
II	Premotor PD	Presence of early non- motor symptoms
III	Motor PD	Motor manifestations.

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.

PD Stages of Progression: Hoehn and Yahr (H&Y) Classification (Hoehn and Yahr, 1967, Goetz et al, 2004)

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

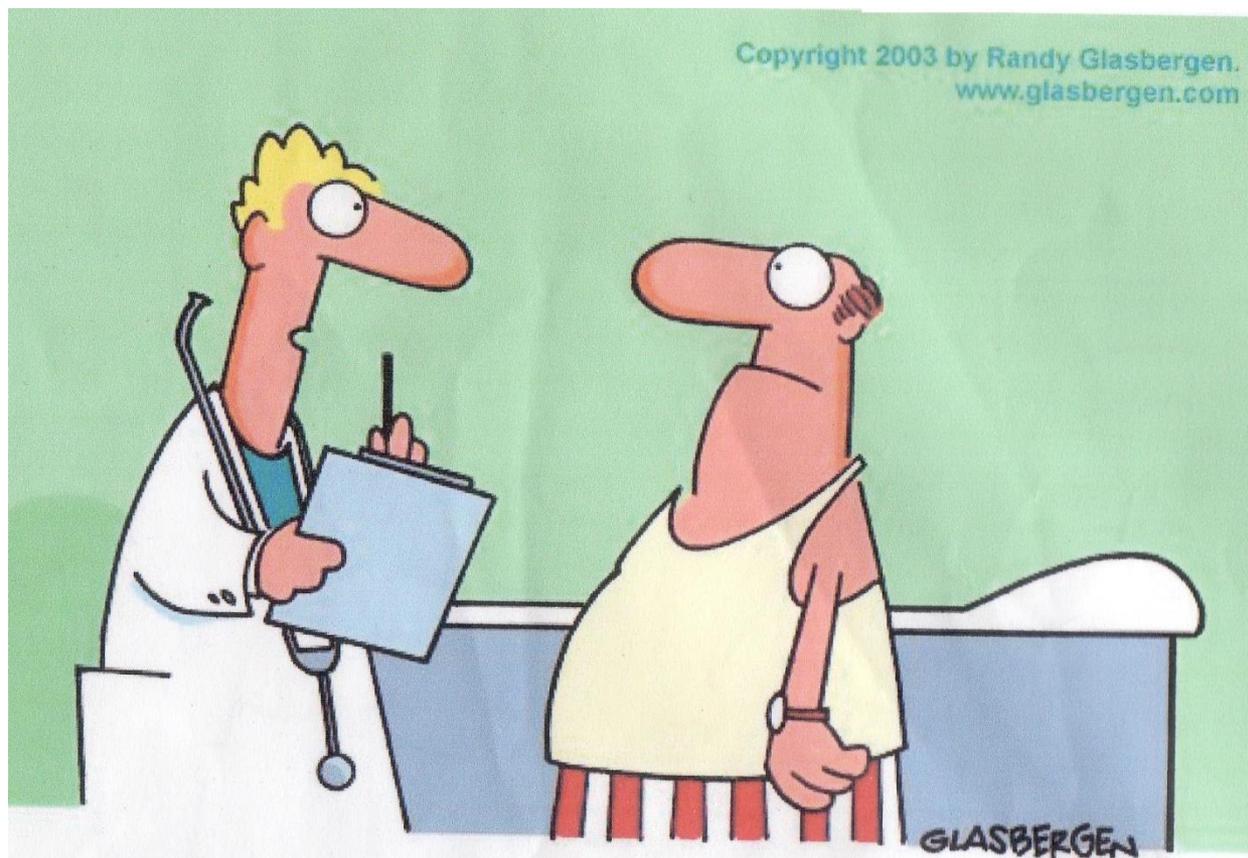
Stage 5: Wheelchair bound or bedridden unless aided.

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?”

PD: Physiotherapy and Exercise Approaches

- 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

- Physical activity affects motor recovery and is neuroprotective in basal ganglia-lesioned mice (Fisher et al, 2004, Petzinger et al, 2007, Tillerson et al, 2001).
- Intensive physical activity contributes to improved walking, balance, strength, and CNS changes in adults with PD (Dibble et al, 2006, Fisher et al, 2008, Miyai et al 2002, Protas et al, 2005).

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)



Neuroplasticity- Based Treatment Approaches

- Tandem cycling at high intensities (Ridgel et al, 2009, Alberts et al, 2011)
- Body- weight supported treadmill training (Fisher et al, 2008, Herman et al, 2007, Miyai et al 2000, Miyai et al, 2002, Pohl et al, 2003).

LSVT BIG® (Ebersbach et al, 2010, Farley et al, 2008, Farley and Koshland, 2005)

- 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.

LSVT BIG® (Farley, 2002, Farley and Koshland, 2005, Farley et al, 2008)

- 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($p \leq 0.001$); 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



T5



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
- Attentional/cueing strategies and equipment (Nieuwboer et al, 2007, 2008, 2009; Donovan et al, 2010)
- 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 (Mirlleman et al 2016)

A multi- faceted approach to maximizing function in PD

- Medications
- Exercise
- Efficient movement strategies
- Neuroplasticity principles
- Equipment

One Step Ahead Mobility

Please contact us at:

One Step Ahead *Mobility* Physiotherapy

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www.onestepaheadmobility.com

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- Upcoming courses in Rehabilitation in PD in Nov.
- Parkinson's Retreat July 2017

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