Exercise Smarter! Evidence-Based PD Specific PT-Informed Exercise

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Objectives

- Who are Physical Therapists?
- PD specific mobility concerns
- Evidence guiding PT practice
- Exercise recommendations and movement principles
- PT as Coach
- Tying it all Together – What I can do Now!

Physical Therapy

- **Clinical Doctorate Degree (DPT)**
  - 4 yrs bachelors degree
  - 3 yrs entry level clinical doctorate
- **Post Doctoral education**
  - Clinical specialty certifications
    - Includes neurologic clinical specialty in PT (NCS)
  - Residency programs
  - Fellowship programs

PD Specific Mobility Concerns

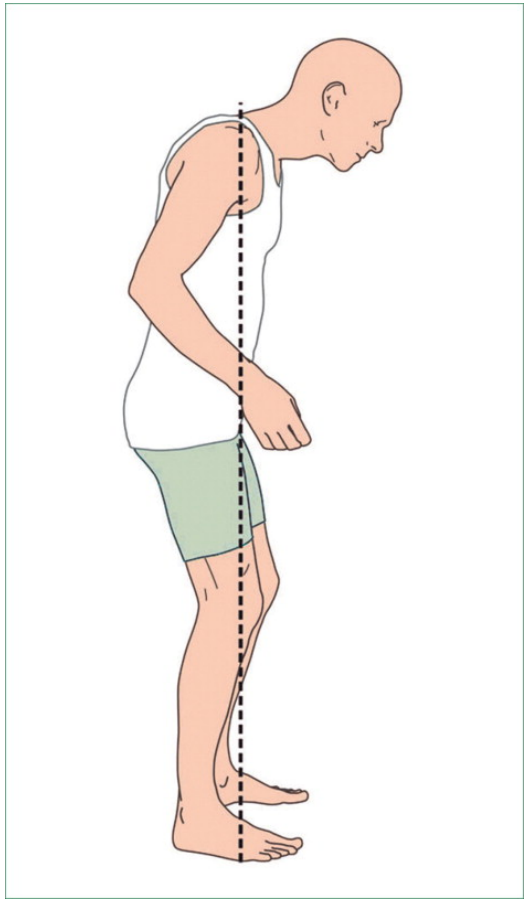
Factors Affecting Your Balance Systems – General Population

- **Vision**
  - Vision changes as we age
  - Co-morbid factors: DM retinopathy, macular degeneration
  - Bifocals, Trifocals, and Progressive Lenses while walking
- **Sensation/Somatosensory**
  - Peripheral neuropathy
- **Vestibular**
  - Decreased head movement with age or immobility
  - Reliance on other balance systems

Parkinson's and Postural Instability

Faulty Processing of:

- *Sensory organization:*
  - One or more of the orientational senses (visual, vestibular, and somatosensory) are involved and integrated within the basal ganglia.
- *Motor adjustment process*:
  - provides a properly scaled neuromuscular response (anticipatory, reactionary)
- *Background muscle tone:*
  - Hypertonic in PD



Parkinson's and Postural Instability

Sensory Organization

Visual	Vestibular	Somatosensory
▪ Decreased visual acuity + contrast sensitivity ▪ Decreased eye movements, motion perception, visual processing speed ▪ Over-reliant on visual information	▪ Delayed and decreased righting reactions ▪ Delayed and decreased postural reactions to head movements ▪ "Hypofunction" due to slow movement or immobility	▪ Decreased limb position sense ▪ Decreased discrimination in direction of movement ▪ Decreased discrimination of movement amplitude

Parkinson's and Postural Instability

Motor Adjustment Processes

Delayed Muscle Activation	Inappropriate Amplitude	Reversal of Normal Sequencing
▪ Delay in muscle activation for postural and balance correction = FALL RISK	▪ Too LARGE of a movement or response to perturbation ▪ Too SMALL a movement or NO movement in response to perturbation	▪ Smaller than normal ankle strategies ▪ Incorrect muscle firing ▪ Hip muscles turn on BEFORE ankle muscles (this is abnormal)

Parkinson's and Postural Instability

Abnormal Background Muscle Tone

- **What is Rigidity and What Does it Look Like?:**
  - Muscle hypertonia
  - Increased stiffness with passive movemer
  - Impaired arm swing during gait
  - Head moves with body during turning
  - Increases forward trunk flexion
- **How Does it Affect Balance?**
  - Reduces body rotation during sleep
  - Abnormal head-trunk coordination during walking and turning
  - Neck rigidity may affect vestibular balance

"How are the new relaxation techniques going?"

Evidence Guiding Physical Therapy Practice

PT helps improve how you move

Exercise and Task Specific Training

- Early referral to PT
- Physical therapist as coach
  - “dental” model (check ups)
- Interdisciplinary team approach to care
  - PT, OT, SLP
  - MD – movement disorder specialist
  - Neuropsych

Referral to Physical Therapy – EU Guidelines

Table 1 Referral criteria for pwp to physiotherapy

Based on*	Description
Stage: Early	Soon after the diagnosis of Parkinson's disease for: • self-management advice, education and coaching, including support to stay physical active • if required, tailored intervention to prevent limitations in functional mobility through motor learning, to reduce fear of falling and to improve physical capacity
Specific impairments or limitations in activities	Presence of: • Reduced physical capacity • Functional mobility limitations regarding: - transfers, such as rising from a chair or rolling over in bed - gait, including freezing - balance, including falls - manual activities • Pain, non-related to medication
Context: hospital or nursing home	If admitted to a hospital for any cause, or to a nursing home, aiming to educate and, if necessary, train pwp and health professionals to improve physical capacity or limitations in functional mobility, or to support prevention of falls (e.g. using walking aids) and pressure sores

*In addition, specifically trained physiotherapists in the United Kingdom, have a qualification in non-medical prescribing. They have the ability to prescribe, as well as supply and administer medicines to individually named patients.[80] The terms by which this process occurs are legislated and monitored under strict guidance

EU Guidelines – Chart Review

Table 3 Information supportive upon referral

Essential

- Reason for referral
- Diagnosis, distinguishing Parkinson's disease from atypical parkinsonisms
- Year of diagnosis and disease stage: provide a Hoehn & Yahr classification?
- Motor complications, such as on and off state predictability, dyskinesias and dystonia: provide MDS-UPDRS item scores?
- Mental complications, such as executive dysfunction (concentration, holding and using information, decision-making, planning, shifting attention), anxiety, apathy, depression, hallucinations and impulse control disorders (which can also be related to exercising)
- Other health complications influencing physiotherapy options, such as heart failure, osteoporosis, COPD, arthritis and diabetes
- Current medical treatment, including neurosurgery and non-Parkinson's medication, with possible adverse events influencing physiotherapy options

Helpful

- Other interventions already trialled for the problems referred for, and results thereof
- Other current interventions, such as by a speech and language therapist or a psychologist
- Expected outcome of physiotherapy intervention
- Preferences regarding communication

What to Expect from your PT: Patient Interview

- **Medication?**
  - What type?
  - Timing?
  - When was the last dose?
- **Falls & Freezing of Gait (FOG)**
  - When? Where? How? How often?
  - Assistive Device? Caregiver assistance?
- **Exercise**
  - What type? How often?
  - Gauge patient's interest in exercise/willingness

Other Recommendations/Referrals

- Appropriate Assistive Device/s
- Caregiver training and support
- Nutrition
- Medication optimization – timing and low protein
- Referral to mental health/therapy
- Urology referral

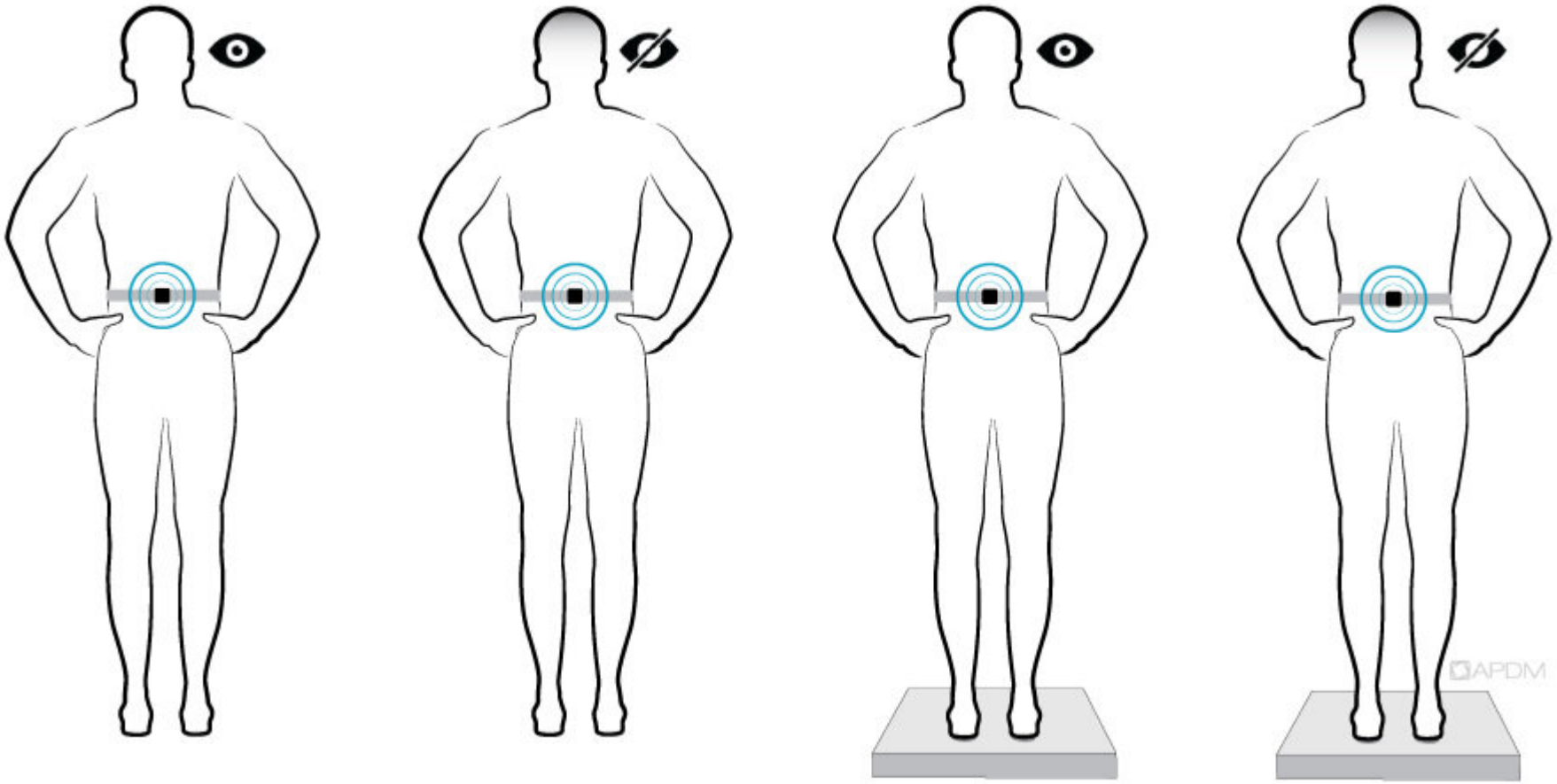
Examination – Evidence Recommendations

Highly recommended measures:		Recommended Measures for Specific Constructs
<u>Body Structure and Function</u> MDS-UPDRS revision* - part 3 MDS-UPDRS – part 1 <u>Activity</u> 6 minute walk 10 meter walk Mini BESTest MDS-UPDRS – part 2 <u>Participation</u> PDQ-8 or PDQ-39	Montreal Cognitive Assessment Functional Gait Assessment Sit to stand 5 times 9 hole peg test	<u>Freezing of Gait</u> Freezing of Gait questionnaire <u>Fatigue</u> Parkinson's Fatigue Scale <u>Fear of Falling</u> ABC Scale <u>Dual Task</u> Timed Up and go Cognitive

5x sit to/from stand - Timer

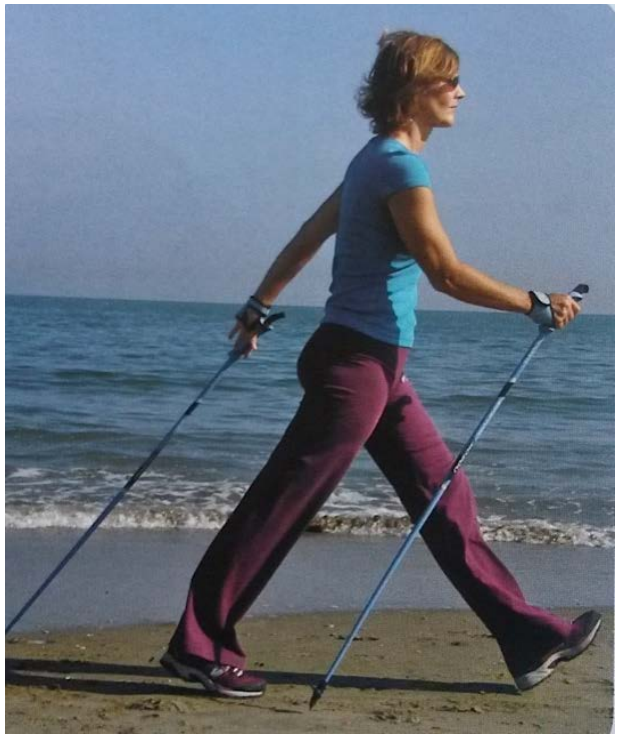
https://www.online-stopwatch.com/

Modified CTSIB



Functional Gait Assessment (FGA)

Exercise Recommendations & Movement Principles




Meg Morris' Work:

"Evidence of **increased reliance on frontal-cortical 'attentional' mechanisms** to sustain the execution of complex movements, **due to defective BG mechanisms** subserving movement automaticity"

"The current model for physical therapy intervention in people with PD is based on the assumption that **normal movement can be obtained** by teaching patients strategies to **bypass the BG pathology**."

PT Clinical Practice Guideline (CPG) for PD (2022)

- WHO? – PwP – idiopathic/typical Parkinson's
- WHAT – Literature review with most studies of early to mid-stages of PD from H&Y

Aerobic Exercise	Strength/ Resistance Training	Balance
STRONG	STRONG	STRONG
Mod to High intensity reduces motor disease and improves outcomes	Decreases severity & improves strength, power, non-motor, function, Quality of Life (QoL)	Improve postural control, balance, gait, & mobility. Improve confidence and QoL

CPG for Parkinson Disease (2022)

External Cueing	Gait Training	Task-Specific Training
STRONG	STRONG	STRONG
To reduce motor disease severity and freezing and freezing of gait. To improve gait outcomes	Improve cadence, step length, transitional movement	Turning, upper extremity, dual task, fall prevention and floor recovery, bladder training, multimodal intervention

CPG for Parkinson Disease (2022)

Flexibility	Behavior-change Approach	Telerehab for balance
WEAK	MODERATE	WEAK
There is evidence for rotation to decrease rigidity and improve function. Consider as an adjunct to other interventions	Why do you think this is not as strong in the literature?	Why do you think?

CPG for Parkinson Disease 2022

Community-Based Exercise

STRONG

57 studies

Defined as:

programs in which groups of individuals exercise together

Programs in which individuals follow a predetermined exercise program in a community setting at home or in a facility

Academy of Neurologic PT (ANPT) Exercise Recommendations:

Aerobic Exercise H&Y 1-3 H&Y 3-4 seated	Strength/ Resistance Training H&Y 1-3	Balance H&Y 1-4 ambulators
3x/wk Moderate Intensity (60-75% HR max) to High Intensity (75-85% HR max) 30-40 min Stationary cycling and treadmill walking have similar benefit ?incline	2 non-consecutive days/wk 30-60 min per session Progress as tolerated with good form Target Extensors Beginners: 40-60% 1RM, or 1 set of 20-30 reps, progress to 2 sets of 15 Experienced: 80% of 1RM, or 3 sets of 10-12 reps working to mm fatigue	Type of intervention, dosage, and intensity varied greatly *refer to ANPT "Balance training fact sheet" https://www.neuropt.org/practice-resources/anpt-clinical-practice-guidelines/pt-management-of-parkinson-disease

Evidence Conclusions

In summary, **EXERCISE** may be prophylactic (preventative) and capable of protecting DA neurons.

WHAT TYPE OF EXERCISE:

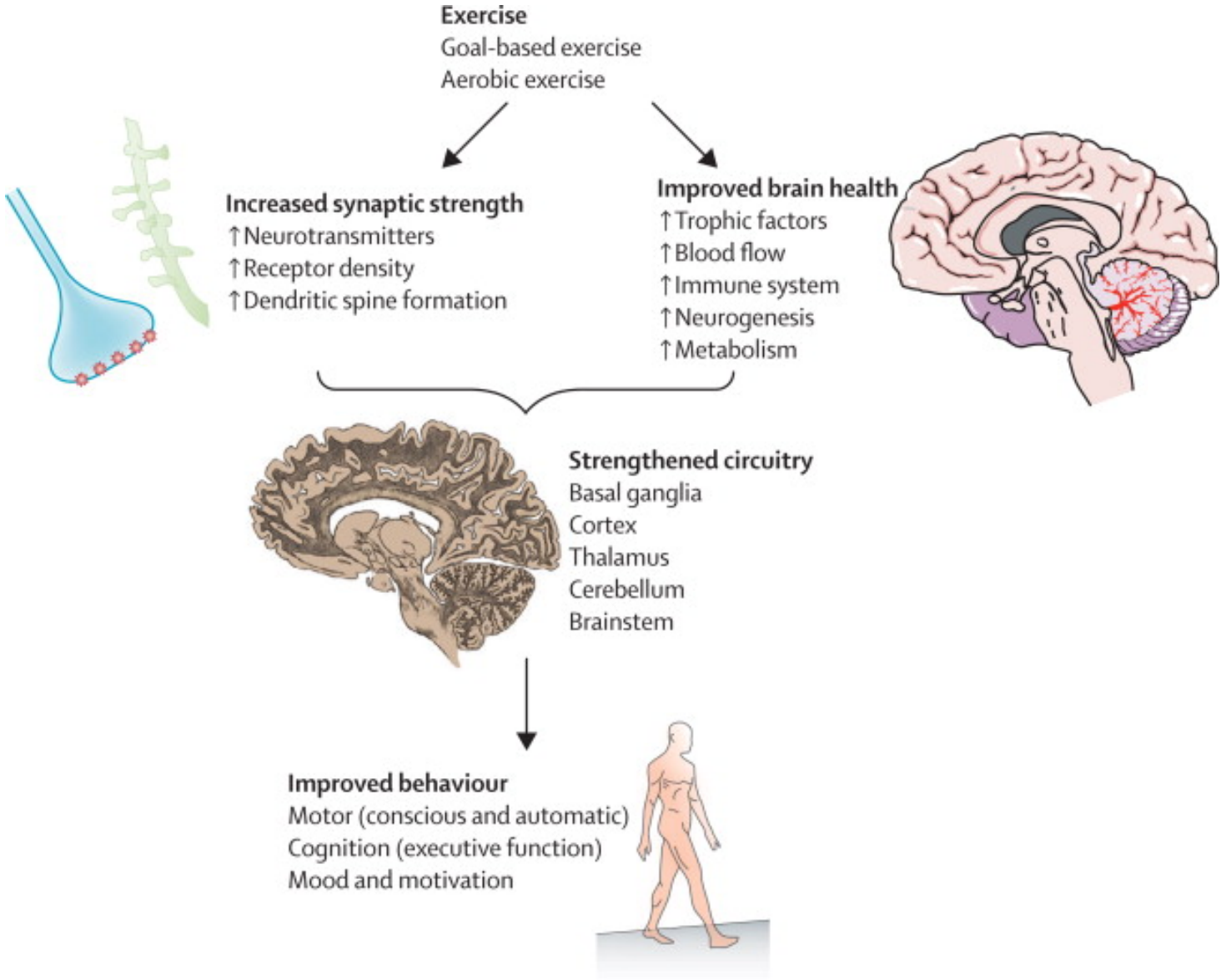
- "A combination of regimes (ie, skilled learning vs aerobic training) may be better than one specific task to trigger multiple mechanisms… and force continuous use of nigrostriatal circuits… to extend the neuroprotective benefits…"

Hirsch M, Farley B. Exercise and neuroplasticity in persons living with Parkinson's disease. *European Journal of Physical and Rehabilitation Medicine*. 2009;45:215-229.

Evidence Conclusions

Exercise:

- **may restore function**… through a variety of molecular repair mechanisms from within the damaged basal ganglia circuits…
- however**, progressively higher intensity, longer duration practice, and task-specific paradigms may be required…”**



Hirsch M, Farley B. Exercise and neuroplasticity in persons living with Parkinson’s disease. *European Journal of Physical and Rehabilitation Medicine*. 2009;45:215-229.

Evidence Conclusions

"PD patients without specific contraindications should be encouraged to begin exercise training programs that focus on achieving a higher training intensity, **beyond what they may self-select."**

Hirsch M, Farley B. Exercise and neuroplasticity in persons living with Parkinson's disease. *European Journal of Physical and Rehabilitation Medicine*. 2009;45:215-229.

Movement Principles

- **High Amplitude**
  - Move BIGGER than you think you can!
- **High Intensity**
  - Re-set your preferred motor drive
- **High Effort**
  - Increase complexity as able
  - Don’t Hold back!
- **Self Monitoring**
  - How am I doing?
- **Dual Tasking**

Movement Principles

- **Weight Shift**
  - Anti-freezing technique
  - Initiation of movement
- **Posture**
  - Stretch pectoral muscles
  - Strengthen back muscles
  - Improve upright posture to improve balance
- **Stepping Activities**
  - Transitional movements
  - Agility
- **Rotation**
  - Decreases rigidity
  - Improves flexibility
  - Ie: bed mobility,

Potential Motor & Non-Motor Targets of Aerobic Exercise

Speelman, AD *et al. Nature Reviews Clinical Neurology* Sept2011;7:528-534

- Prevention of cardiovascular complications
- Arrest of osteoporosis
- Improved cognitive function
- Prevention of depression
- Improved sleep
- Decreased constipation
- Decreased fatigue
- Improved functional motor performance
- Improved drug efficacy
- Optimization of the dopaminergic system

What Do These Look Like?

Tell me in the chat some of what you already do!

Simple ideas to do now

Fall Prevention and Balance with PD

- **<u>Balance System Integration</u>**
  - Use a corner for safety
  - Feet apart vs. together
  - On vs. Off foam/pillow
  - Head rotations
  - Eyes open vs. Eyes closed

Fig 1. CTSIB position 4.

- **<u>Stretching and Flexibility</u>**
  - Rotational Exercises in bed, sitting, standing
  - Yoga
  - Head/Neck Rotation

Fall Prevention and Balance with PD

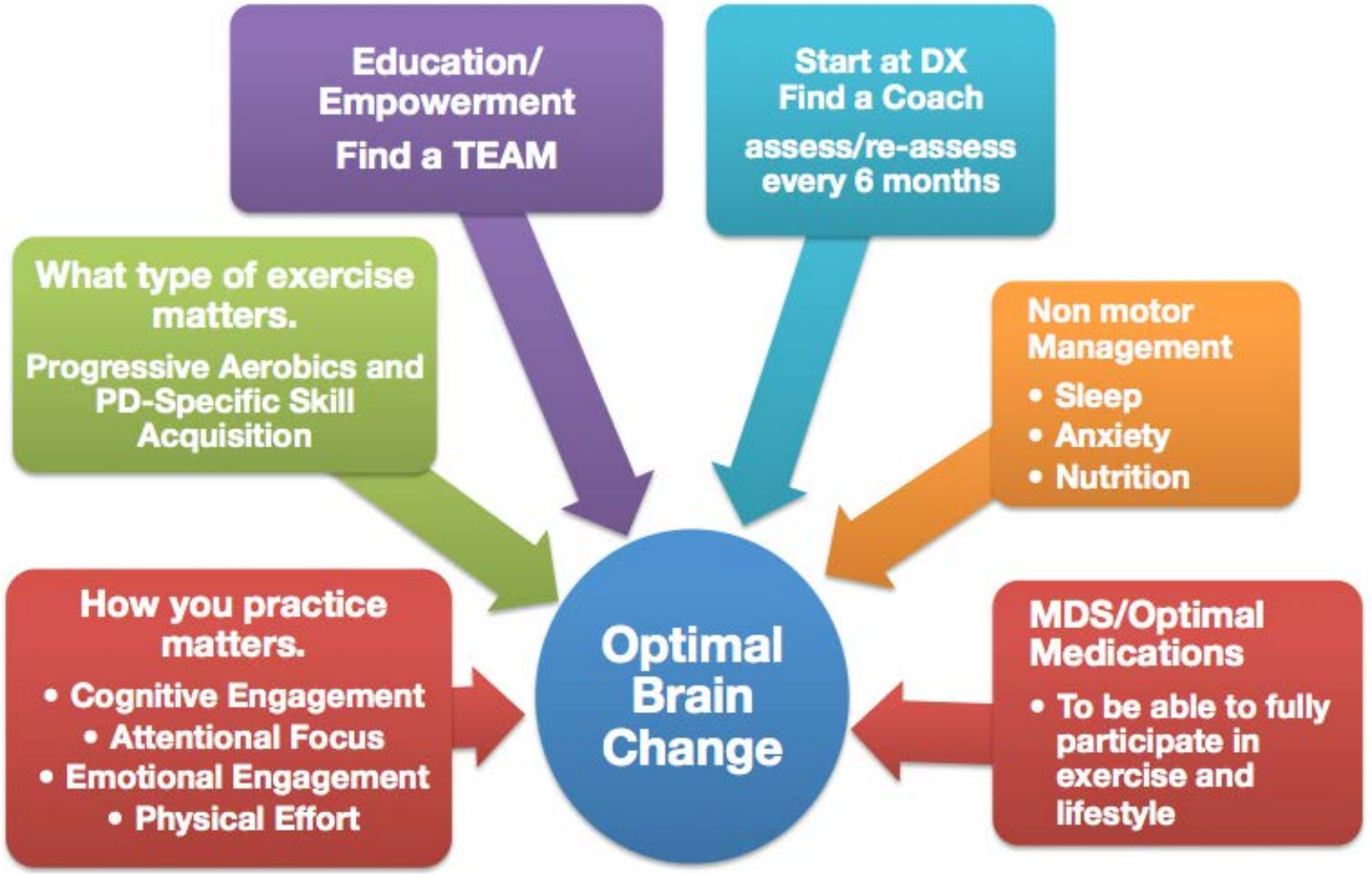
- **<u>Weight Shifting and Balance strategy practice</u>**
  - Keep Feet wide and apart (anti-freezing!)
  - Shift from one foot to the other and pick your feet OFF the ground
  - Step forwards, back, and sideways

PT as Coach

What can a PT do for you?

- **Why not just take exercise classes?**
  - It's important to have an **individual assessment** and **tailored recommendations.**
  - It's important to have someone who knows the literature on exercise recommendations and holds the **bird's-eye view** of your overall exercise program.

PWR! Model of Care



Summary of Key Messages

Summary: Key Messages

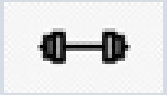
1. **Build a team, and include a PT in a coach role. The PT should specialize in neurology.**
   - The team should also include exercise/fitness instructors, broadly defined—personal trainers who teach exercise classes, dance teachers, yoga teachers & yoga therapists…
   - YOU are the hub. The healthcare system isn't always good at coordination of care, so it's up to you. Know that the PT is there to help support you in that role.

Summary: Key Messages

2. **Your exercise program should include aerobic training and PD-specific skills training— posture, weight-shifting, twisting, and stepping.**
   - Aerobic exercise→improves function, non-motor symptoms, & possible disease-modifying effects (at least 30-45 min, 3x/week)
   - High-level balance training→improves balance, walking speed, & dual-tasking

Summary: Key Messages

3. Your exercise program should **include classes** that you attend and activities that you practice at home **and throughout your day.**
4. Harness the power of planning! Make a log as a weekly roadmap. Try different things and have fun!

Vital categories to include	Examples:	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Cardio: • 30-60 min • 3-5x/week • Moderate intensity exercise								
								
Strength • 2-3x/week • 10-15 reps per set • 2-3 sets								
Flexibility: • 10 min/day at the end of exercise • 10-30 seconds per stretch								
Balance: • 20-30 min • 3x/week								
								
								
								
								
PWR! Moves • Daily. Move Big! • 10x or each movement								

Resources at Samuel Merritt University

- **Pro-Bono Experiences (PBE)**
  - Group Class/es in the Fall between Sept. 9th – Dec. 2nd. Typically held in the PM hours 1:00 – 5:00pm
  - Contact: Jose Reyna – jreyna@samuelmerritt.edu
- **Community Participant Lab (CPL)**
  - Individual sessions (5 total) with 2 PT students and supervising PT
  - Tailored sessions to each individual starting mid Feb on Tuesday afternoons for 5 sessions. Please commit to all 5
  - Contact: Krissy Waller – kwaller@samuelmerritt.edu

THANK YOU! QUESTIONS??

- References available upon request
- Angela Rusher contact: Arusher@samuelmerritt.edu