The Exercise Prescription for Parkinson's Disease

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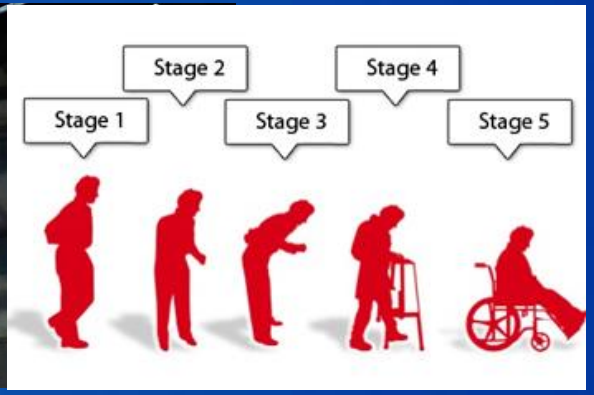
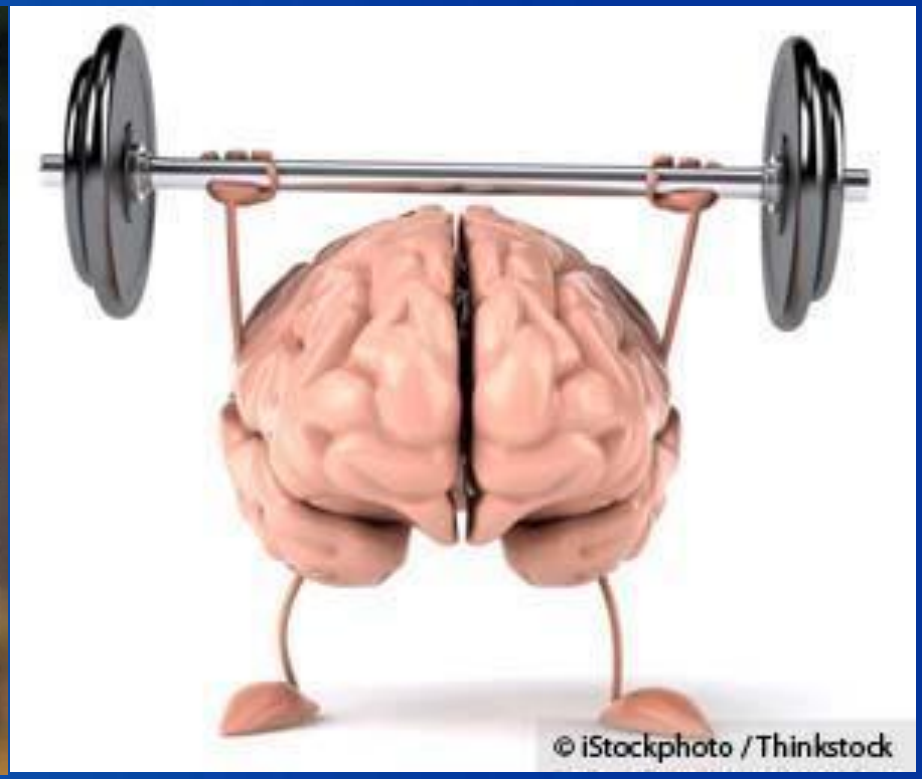


3rd Annual PD Care Connection Experience Event

Objectives

- At the conclusion of this presentation, you should:
  - Know the importance of perfoming:
    - progressive resistance exercise twice a week
    - endurance training 3 times per week
    - flexibility exercises
    - balance training 2 times per week.

Exercise



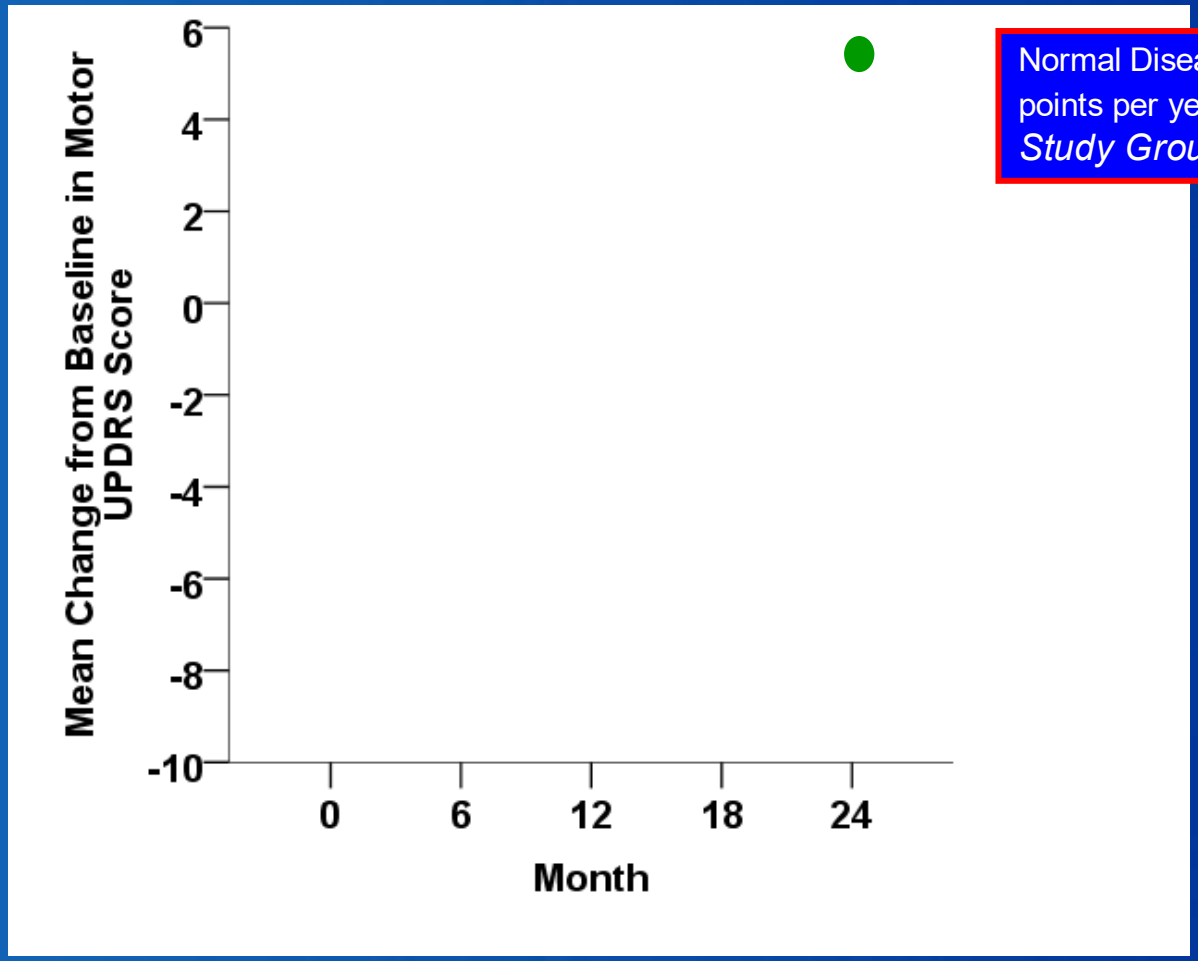
Why study progressive resistance exercise?

Rationale for Progressive Resistance Exercise

- Increase brain volume and cortical thickness
  Suo et al. Molecular Psychiatry (2016)
- Reverse progression of white matter hypointensities
  Suo et al. Molecular Psychiatry (2016)
- Angiogenesis
  Jiang et al. J PhysTher Sci (2016)
- Increase levels of neurotrophic factors such as brain derived neurotrophic factor (in males)
  Nuvagen Forti et al. J Frailty Aging (2017)

Progressive Resistance Exercise Trial (PRET)

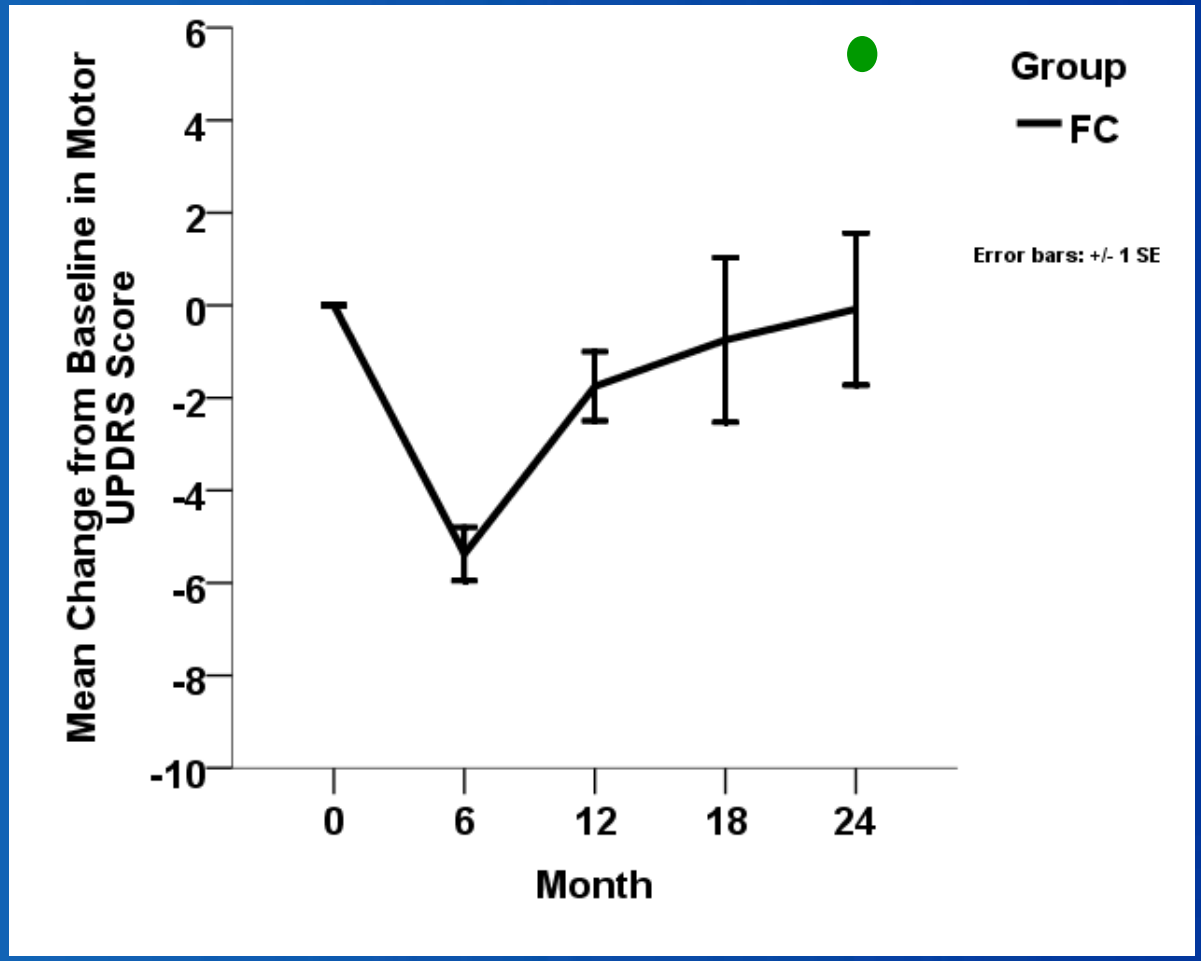
Progressive Resistance Exercise Trial (PRET)



Normal Disease progression at 2-3 points per year – *Parkinson Study Group; NEJM (1993)*

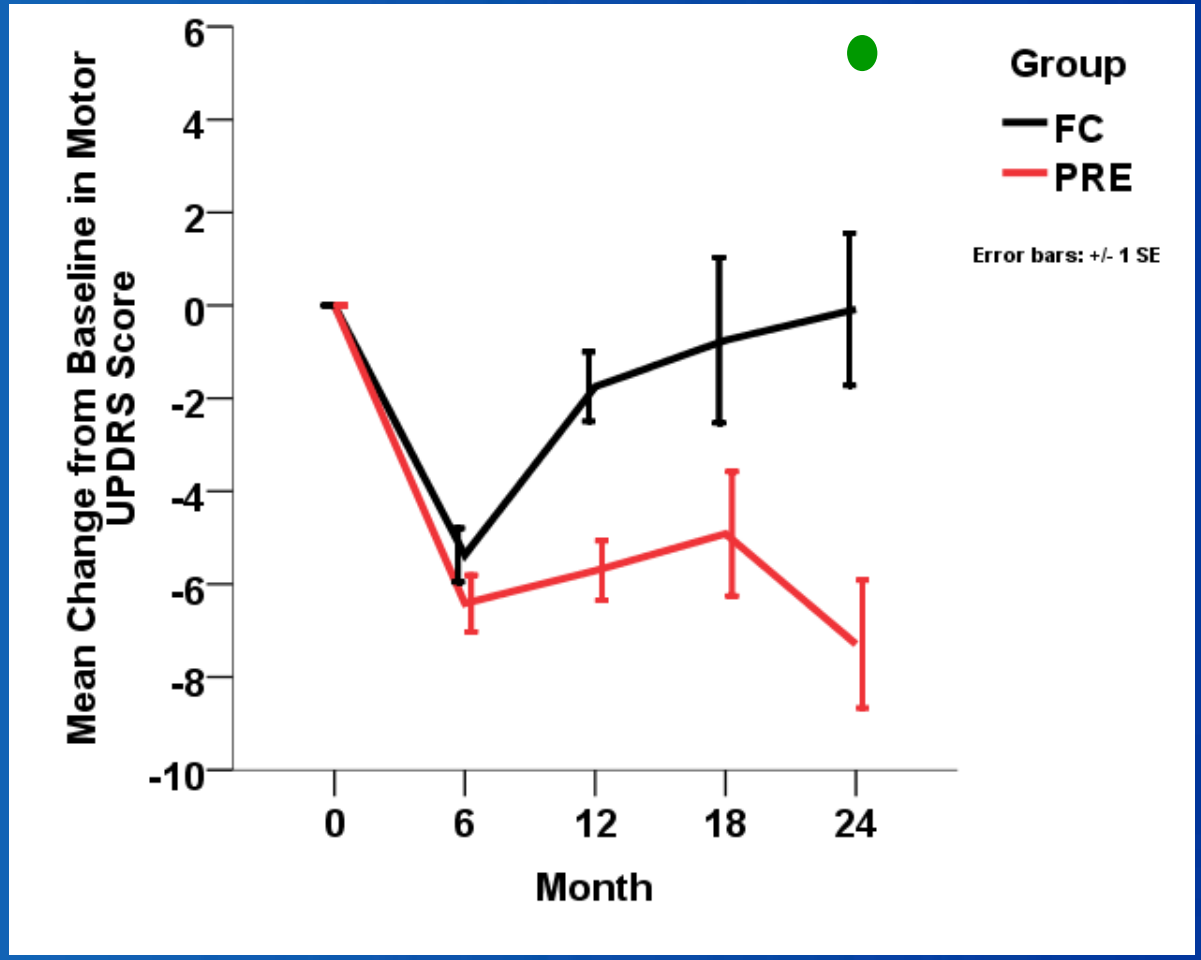
Corcos et al. Movement Disorders (2013)

Motor Unified Parkinson's Disease Rating Scores



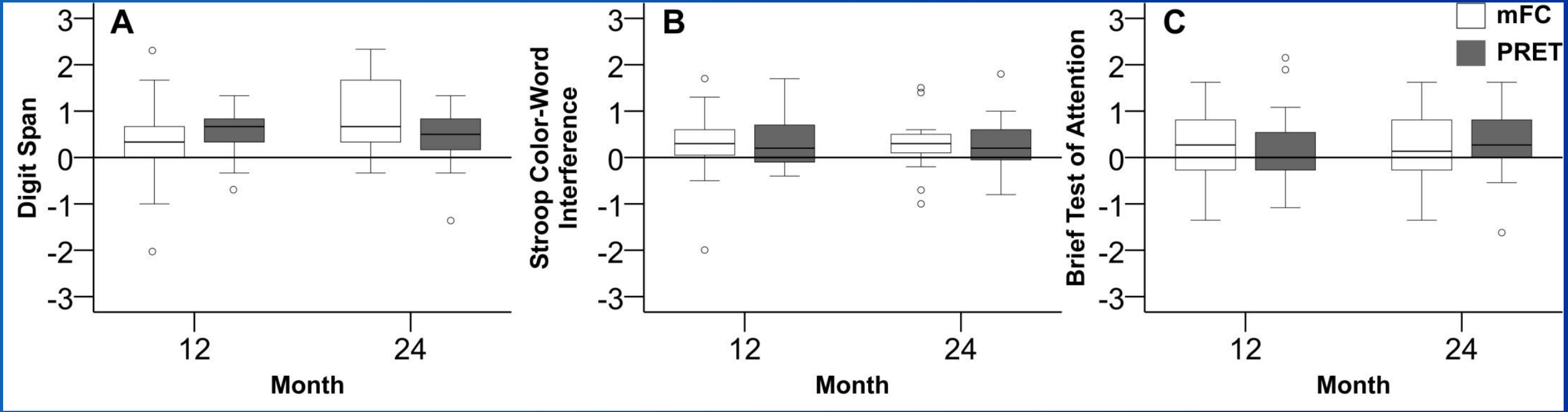
Corcos et al. Movement Disorders (2013)

Motor Unified Parkinson's Disease Rating Scores



Corcos et al. Movement Disorders 2013

Cognitive Outcomes Improve



David et al. Movement Disorders 2015
Voted the best original research article for 2015 by the editorial board of Movement Disorders

Progressive Resistance Exercises with Instability

Leg Press

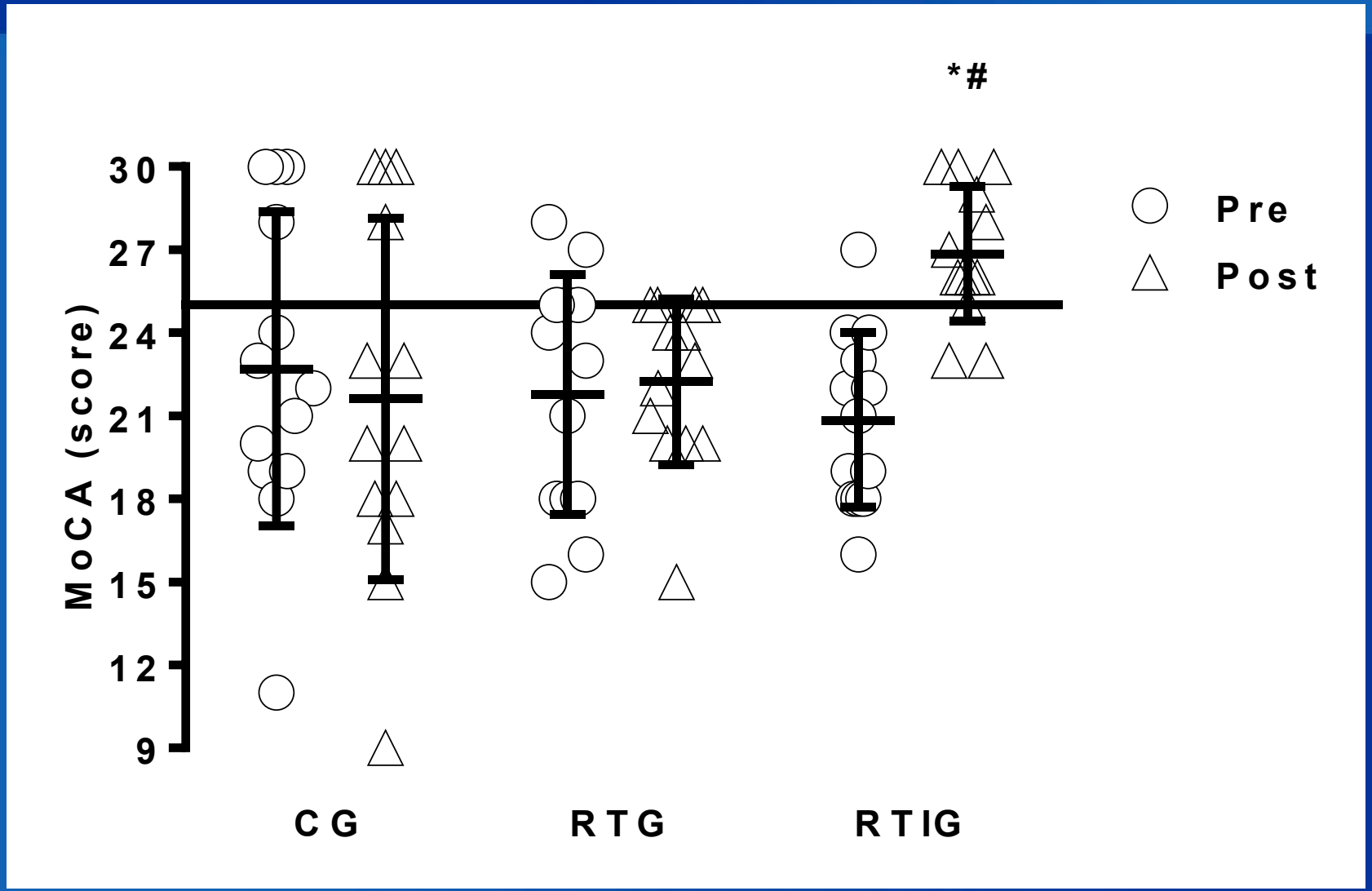
Plantar Flexion

Half-squat

Latissimus dorsi pull-down

Chest Press

Individual Montreal Cognitive Assessment Scores



Silva-Batista et al. Medicine & Science in Sports and Exercise 2016

Rationale for Endurance Exercise

- Increased dopamine metabolism
- Angiogenesis
- Neurogenesis
- Increase VO_2 max
- Possibly improve walking economy
- Neuroplasticity
- Anti-inflammatory effect
- Improve mitochondrial function and oxidative stress
- Increase brain connectivity
- Increase levels of neurotrophic factors such brain derived neurotrophic factor

Lamotte et al. Parkinson's Disease 2014

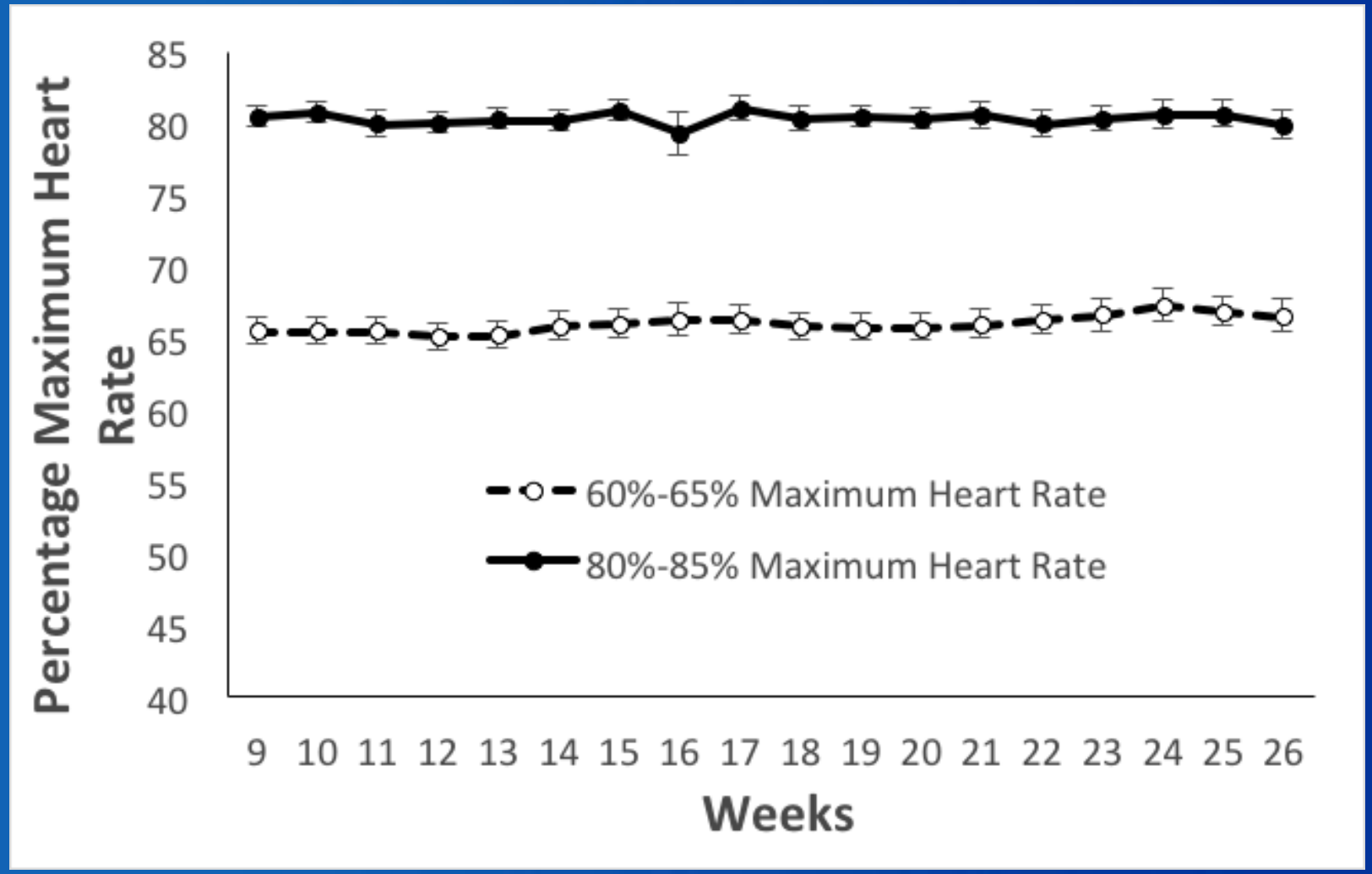
Study in PARkinson's disease of eXercise [SPARX]

Schenkman et al. JAMA Neurology 2018

Purpose

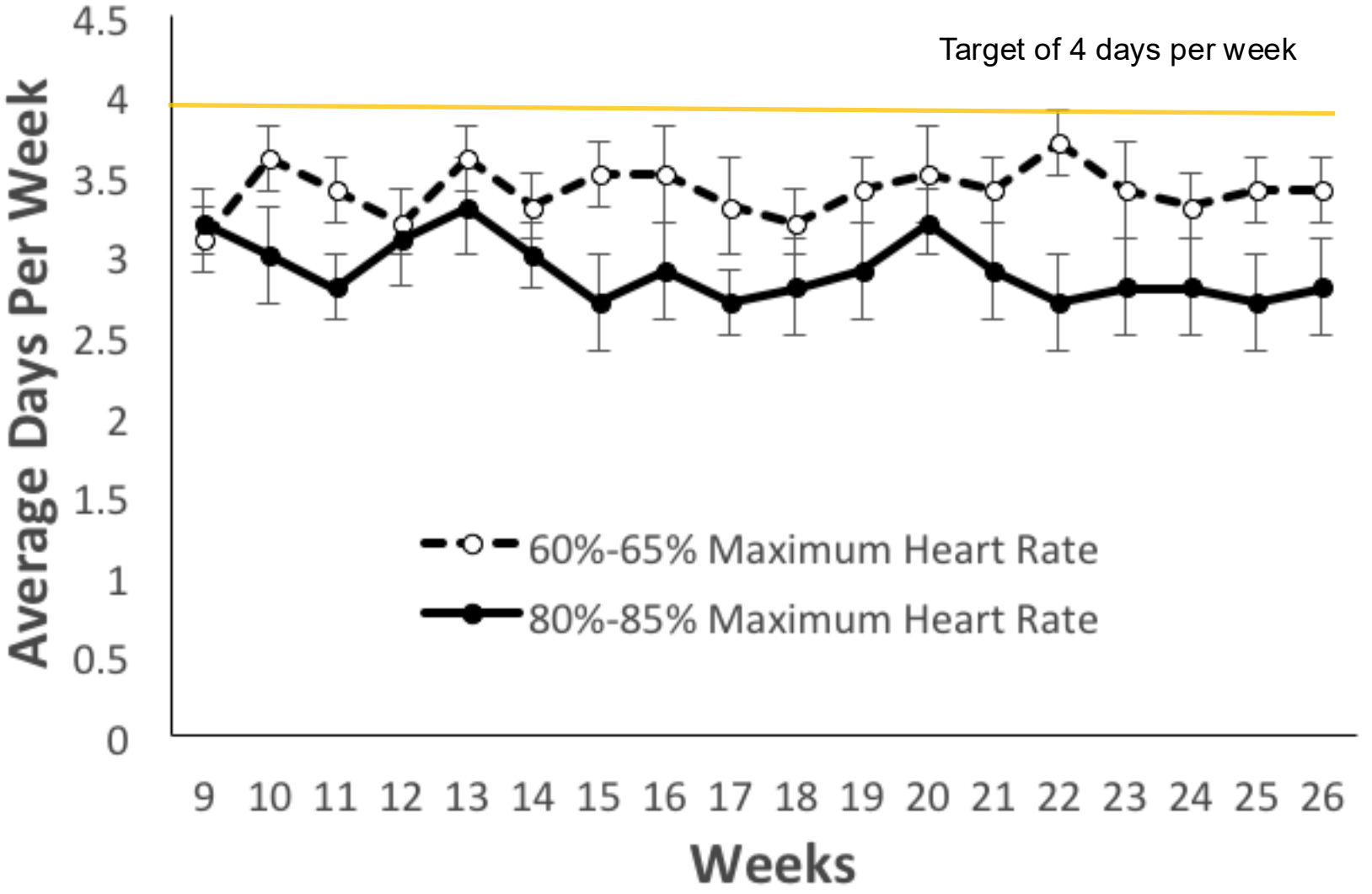
- The feasibility and safety of high-intensity endurance exercise was unknown. Can patients who have not yet taken medication for PD exercise at high intensity (80 – 85% max heart rate) for 4 days a week? Is it safe?
- The effect on motor signs of Parkinson's disease had not been established. Do the effects observed warrant a Phase 3 Clinical Trial?

Percentage Maximum Heart Rate



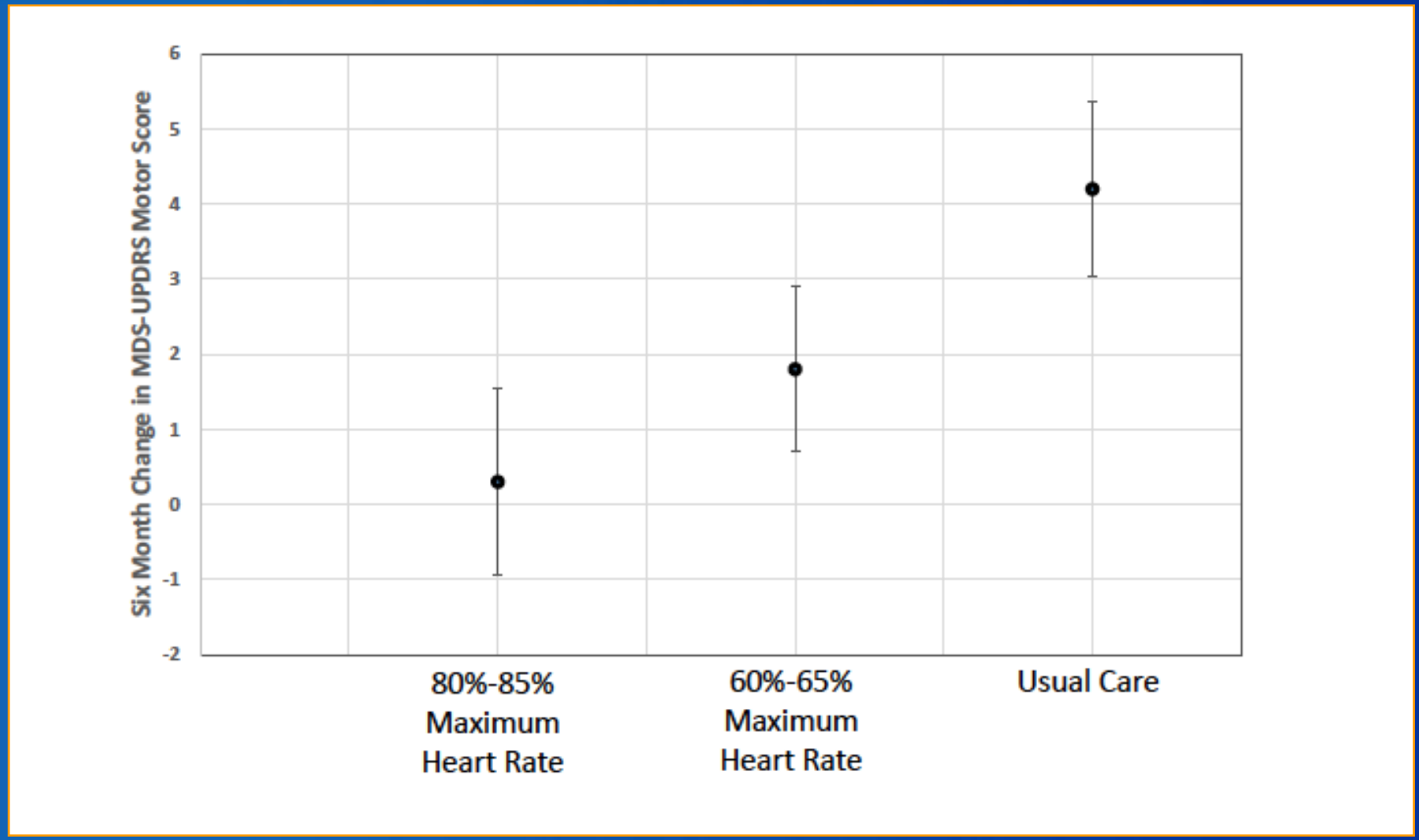
Schenkman et al. JAMA Neurology 2018

Average Number of Days Per Week



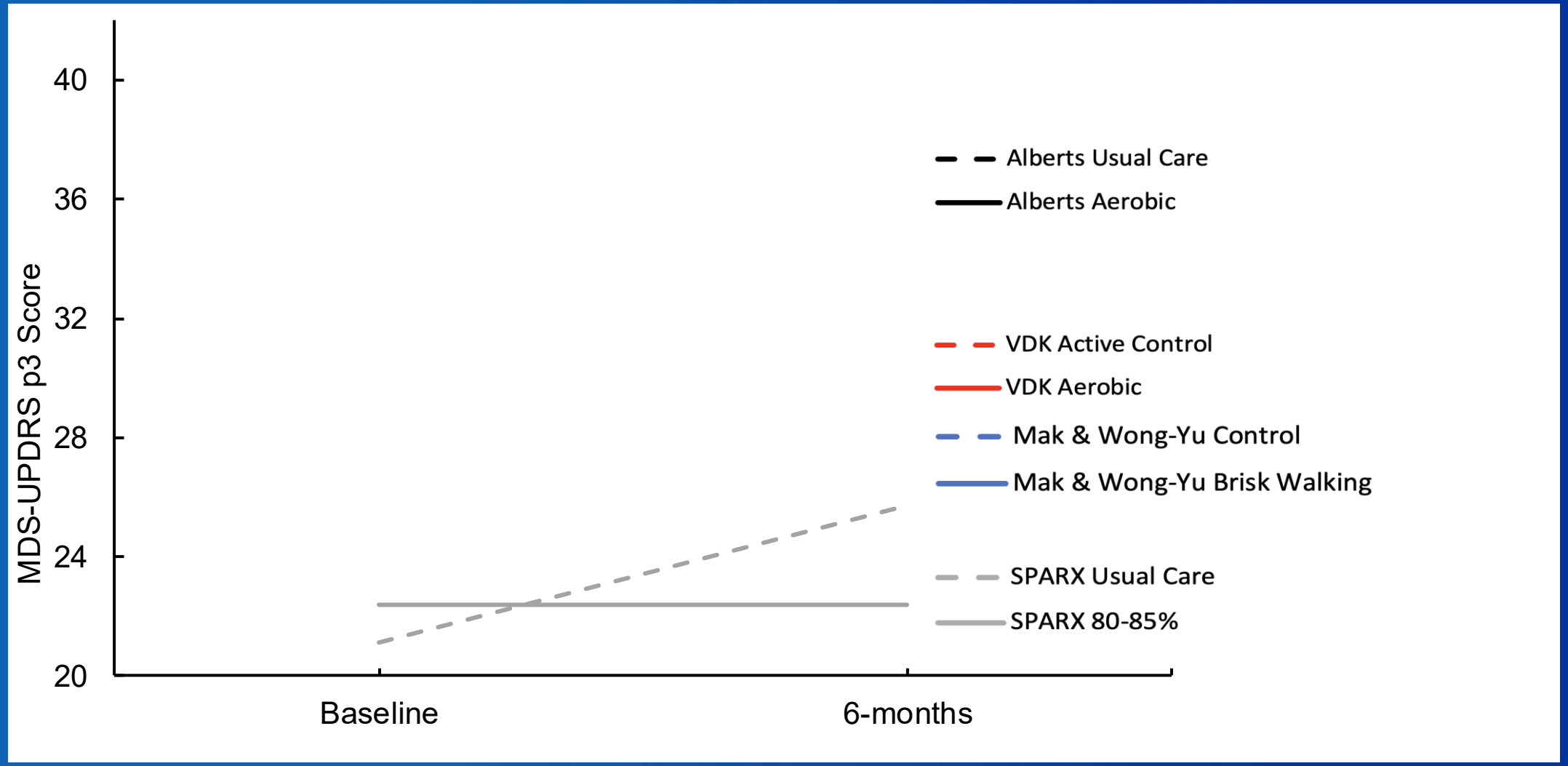
Schenkman et al. JAMA Neurology 2018

MDS-UPDRS PART III SCORES



Schenkman et al. JAMA Neurology 2018

Aerobic Exercise Delays Disease Progression



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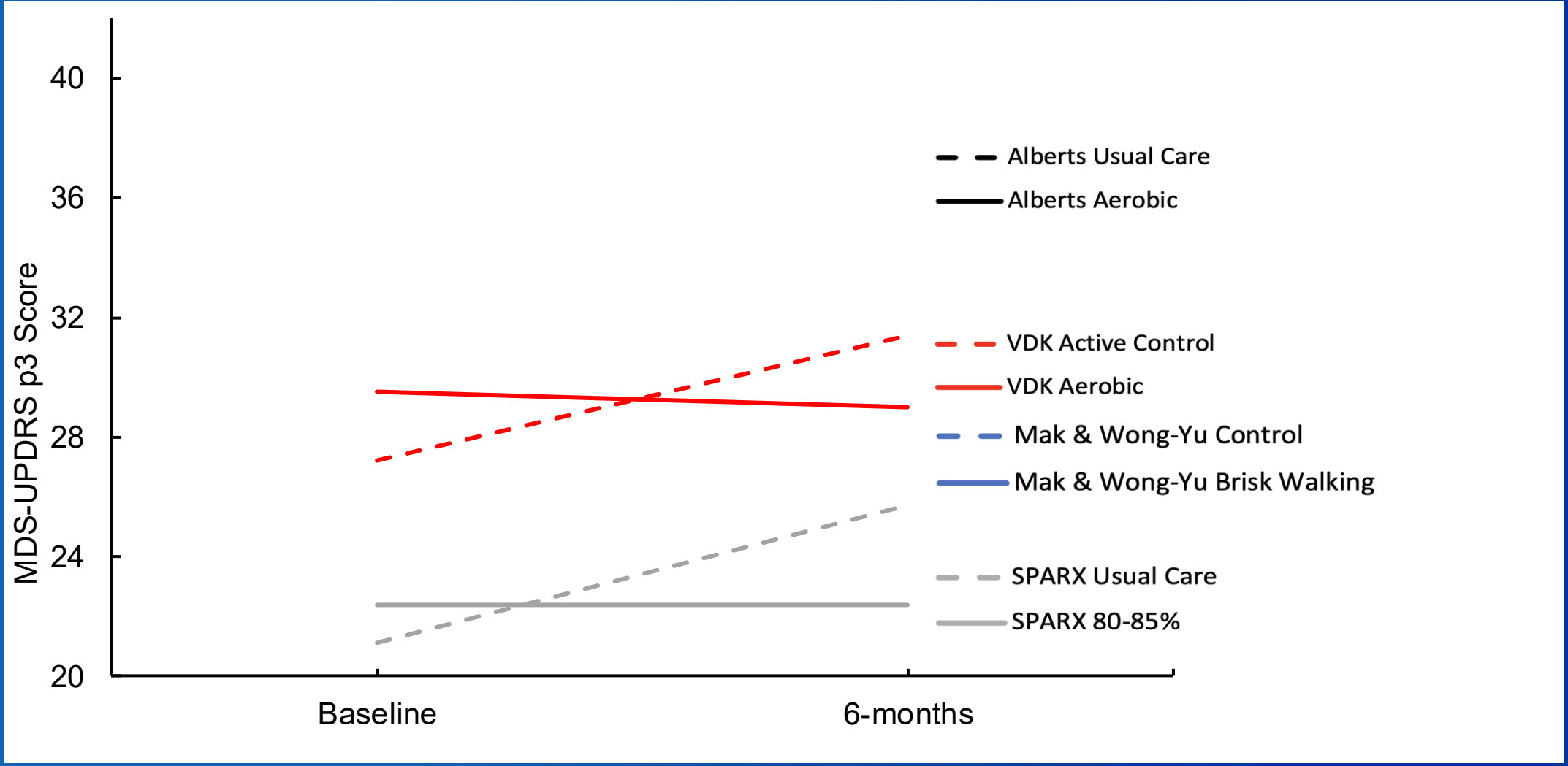

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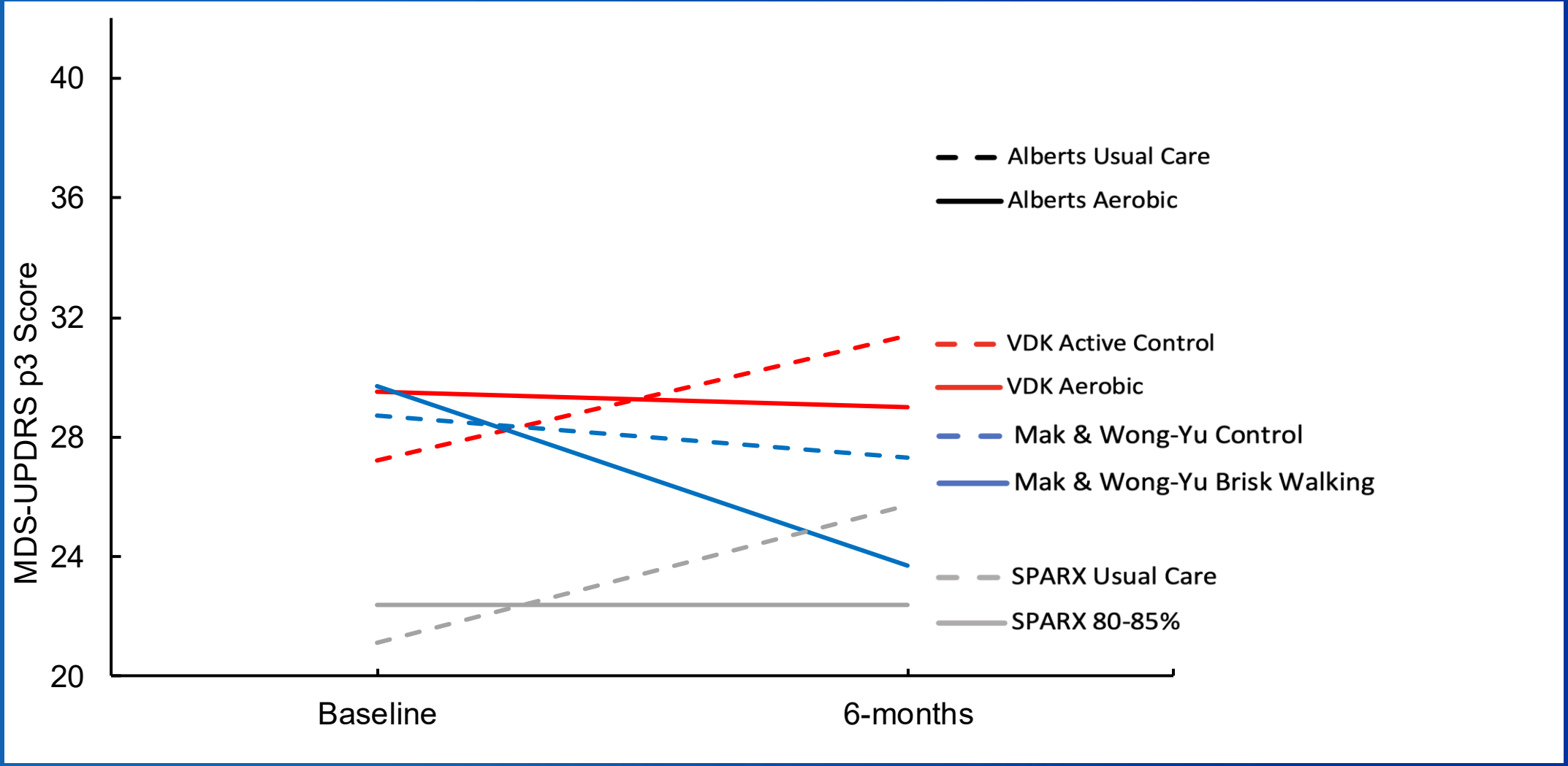

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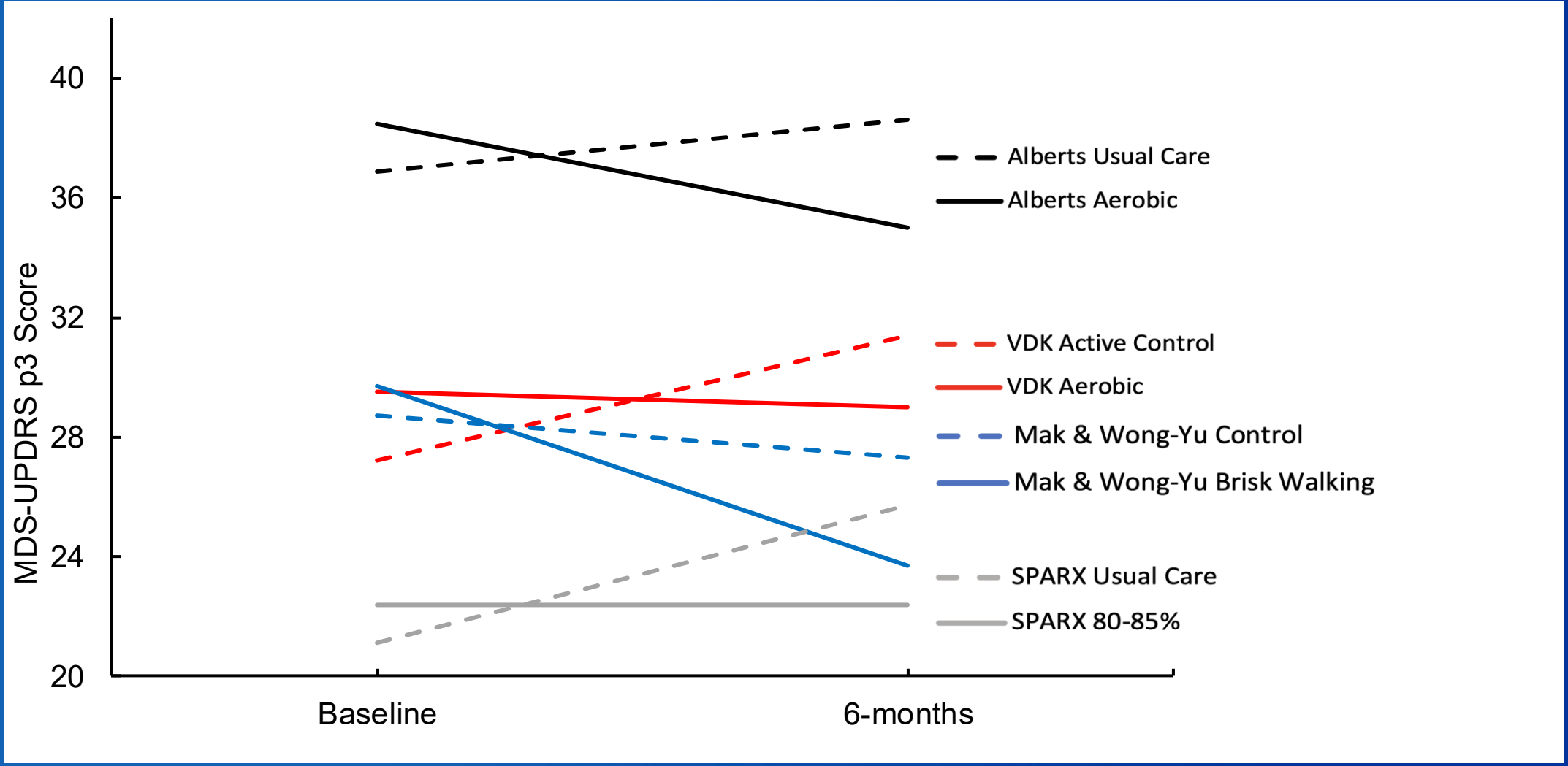


Increased Dopamine Transporter

Fig. 1: Dopamine Transporter Levels Pre- and Post-Exercise.

From: Intense exercise increases dopamine transporter and neuromelanin concentrations in the substantia nigra in Parkinson's disease

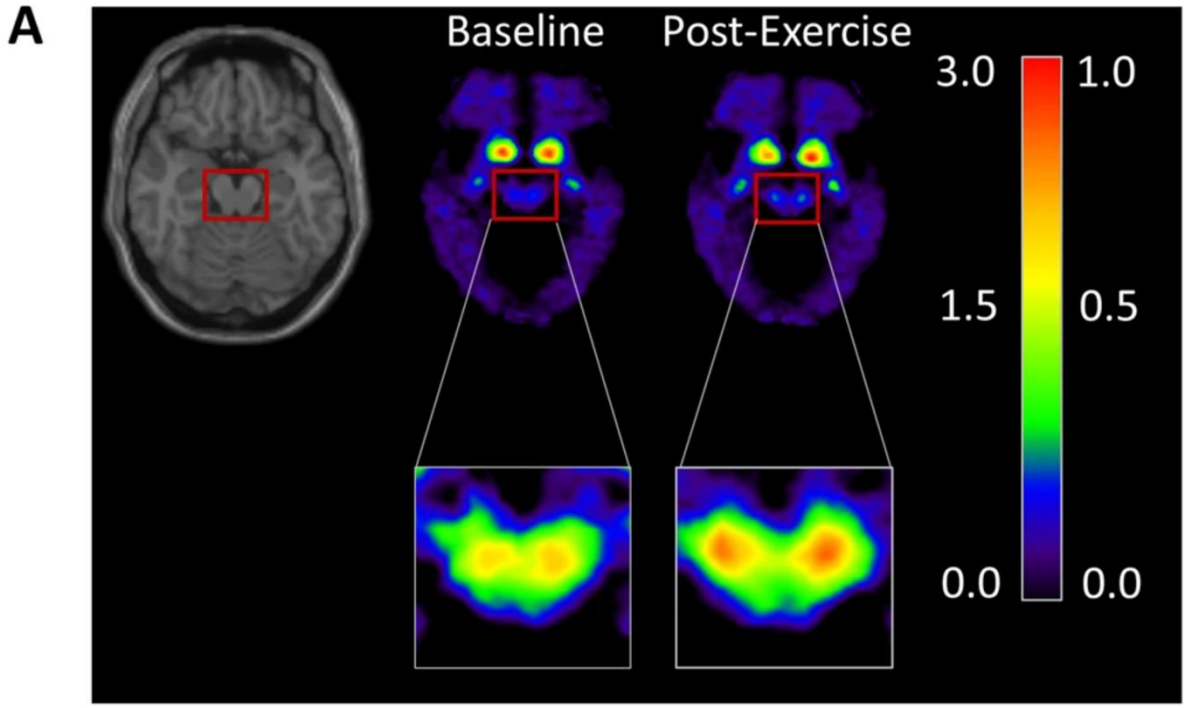
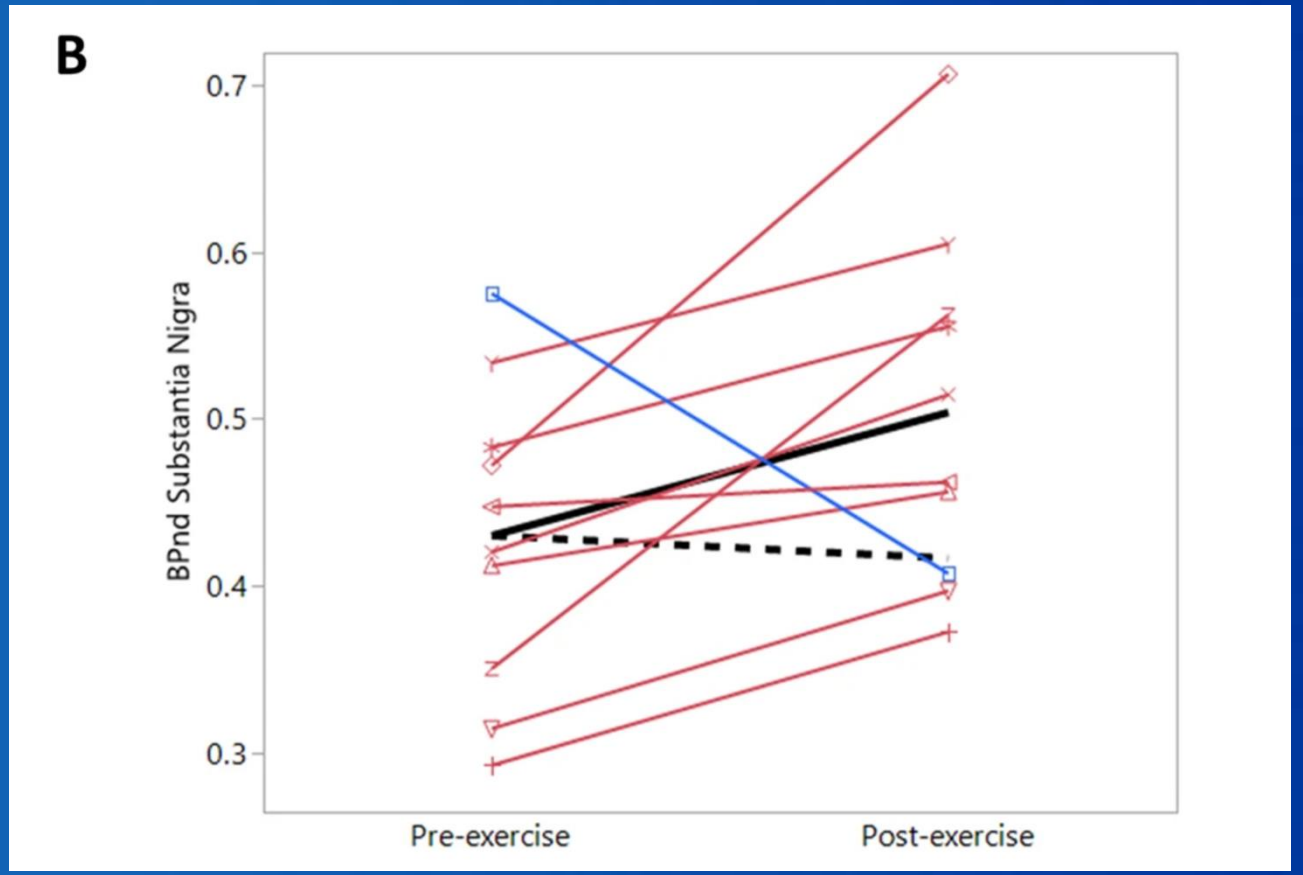


Fig. 1 Dopamine Transporter Levels Pre- and Post-Exercise.
A Average 18F-FE-PE2I DAT BPND images before and after six months of exercise. The red box including the midbrain and SN is enlarged.
Note: The left side of the color bar (0.0–3.0) corresponds to the DAT BPND in the striatum and the right side (0.0–1.0) to the DAT BPND in the SN shown in the inset images. BPND is unitless. Orientation is axial.

de Laat et al. 2024 npj Parkinson's Disease (2024) 10:34

SN pre- and post-exercise by study participant



B 18F-FE-PE2I BPND in the SN pre- and post-exercise by study participant. Individual lines are red if an increase was observed, blue if a decrease was observed. The solid black line represents the mean of our cohort, the dashed black line represents the expected decrease from the pre-exercise average in the absence of intervention[25].

Endurance Exercise Film Clip

Other Exercise Modalities

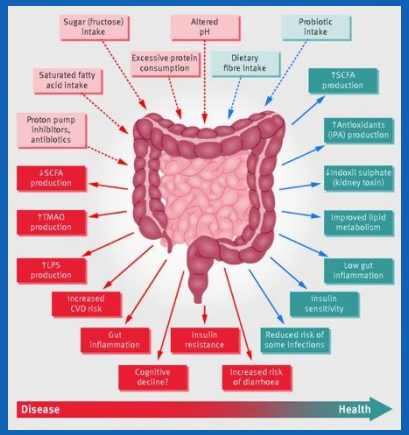
- **Cycling** With 17 million residents and 23 million bicycles, the **Netherlands** already has more bikes than people!!

- **Aqua Aerobics**
- **Move Big**
- **Dance**
- **Boxing for Parkinson's Disease**

Dose quantification is hard.

Boxing for Parkinson's Disease

Think Like an Athlete



Advice to People with Parkinson's in My Clinic: Exercise

Journal of Parkinson's Disease 14 (2024) 609–617
DOI 10.3233/JPD-230277
IOS Press

Commentary

Advice to People with Parkinson's in My Clinic: Exercise

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Table 1
The exercise prescription for Parkinson's disease

FITT	FITT Recommendations for people with parkinson's disease			
	Aerobic	Resistance	Flexibility	Neuromotor
Frequency	3–4 days / week	2–3 days / week	2–3 days / week with daily being most effective	2–3 days / week
Intensity	High-intensity (80–85% HRmax) for mild – to – moderate PD; Moderate intensity (60–65% HRmax) for deconditioned individuals or those with more advanced PD; attempt to progress to 80%–85% HRmax	30%–60% of 1RM for beginners; 60–80% 1RM for advanced	Full extension, rotation, or stretch to the point of slight discomfort	N/A
Time	≥ 30 minutes accumulated high-intensity exercise (not including warm up/cool down or rest-intervals) Progress to total of 150 min/week	1–3 sets of 8–12 repetitions Progress to 2–3 hours/week	Hold static stretch for 10–30 s; 2–4 repetitions of each exercise	30–60 min
Type	Prolonged, rhythmic activities using large muscle groups (e.g., walking, running, cycling, swimming, rowing, elliptical)	Major muscle groups of upper and lower body – challenging all major muscle groups on nonconsecutive days. Avoid free weights for those in advanced disease stage, use weight machines, body weight, resistance bands instead	Slow static stretches for all major muscle groups working on increasing range of motion.	Exercises involving motor skills (e.g., balance, agility, coordination, gait, dual tasks) multidirectional step training and instability training

FITT, Fitness, Intensity, Time, Type; HRmax, maximum heart rate; PD, Parkinson's Disease; 1RM, one repetition maximum.

How to Get People to Exercise!!

- The challenge is how to implement programs that have clear and obvious therapeutic benefit.
- Options include:
  - Physical therapy – prescription and tune ups
  - Individual training – personal trainers – exercise facilities
  - Group training
  - Train caregivers to administer exercise interventions
  - Dyad training
  - Computer apps and support groups

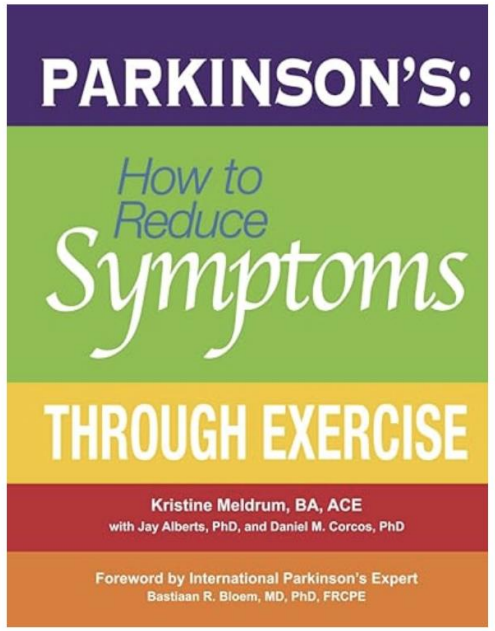
What am I looking for in my exercise sessions/Why do I do it?

- Acute benefits of exercise – many people just feel better after exercise.
  - Adrenergic effect
- Chronic effects of exercise
  - Brain
  - Bone
  - Muscle
  - Cardiorespiratory system
  - Immune system
- Sign and symptom effects in Parkinson's disease
- May influence disease progression

Why is exercising important?

1) Maintain physical function
2) Avoid frailty/sarcopenia
3) Maintain cognition
4) Optimize physiological functions
5) Delay mortality

Parkinson's: How to Reduce Symptoms Through Exercise



Parkinson's: How to Reduce Symptoms Through Exercise

Paperback – December 14, 2023

by Kristine Meldrum (Author), Bastiaan R. Bloem (Foreword), Jay Alberts (Contributor), Daniel M. Corcos (Contributor)

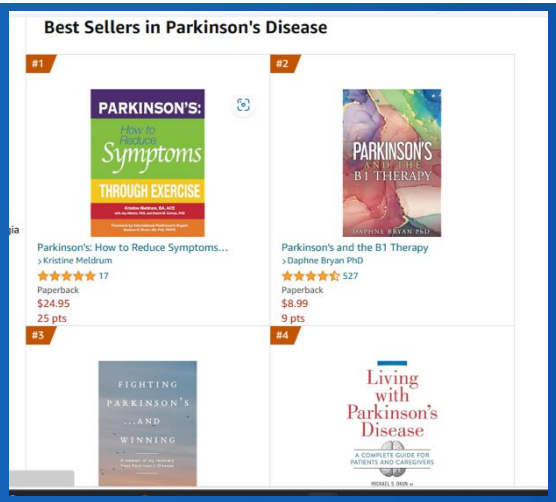
5.0 ★★★★★ 3 ratings

See all formats and editions

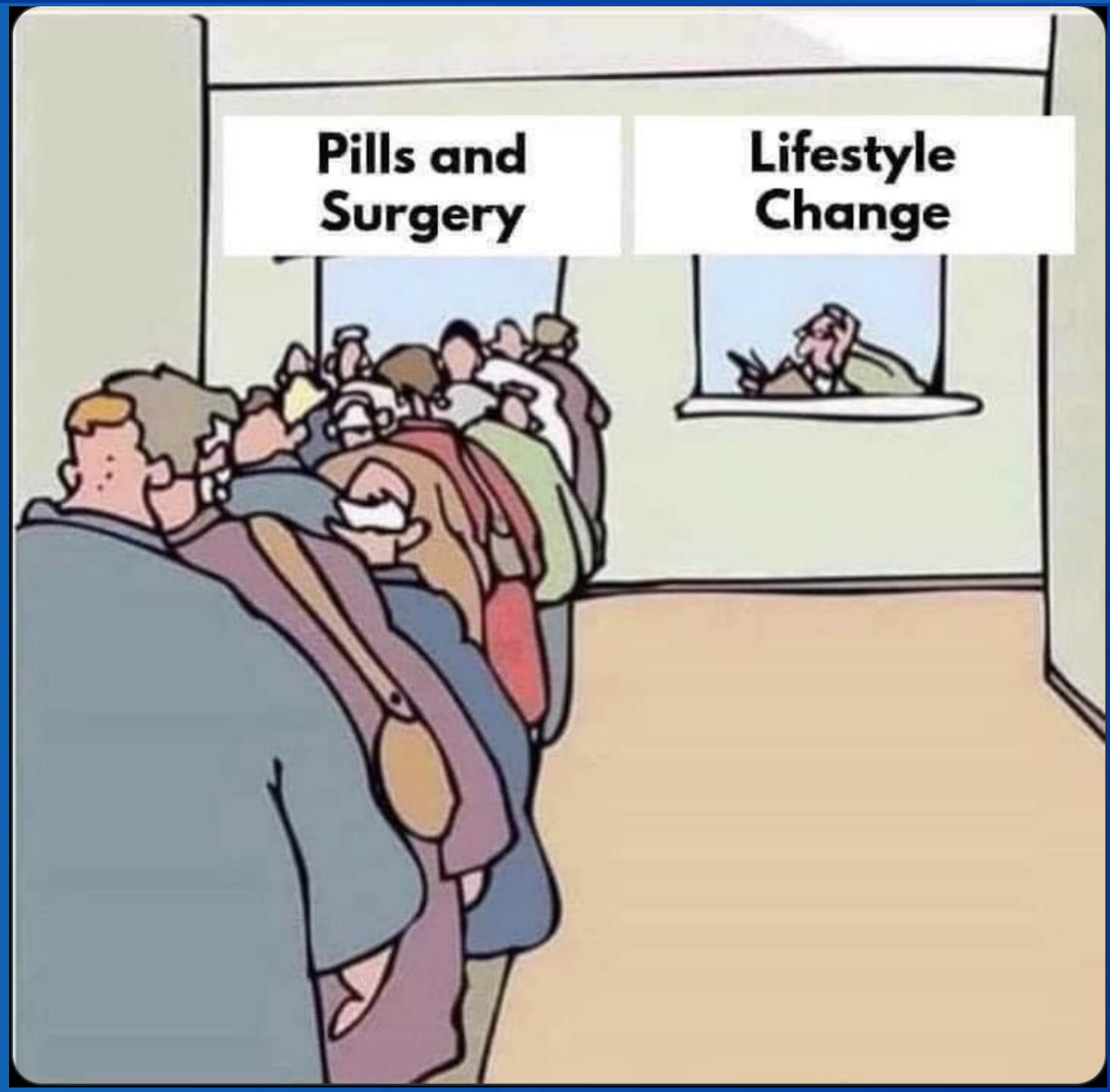
Do you have Parkinson's disease? Are you looking for ways to reduce your symptoms? Then *Parkinson's: How to Reduce Symptoms Through Exercise* is the book for you! It explains in detail the benefits of specific types of exercise for those with Parkinson's Disease (PD).

This book gives instructions, based on scientific studies and the authors' recommendations, on how to make your own "PD Exercise Cocktail Plan™." The many detailed chapters and appendixes will also be a resource to guide you throughout your PD journey.

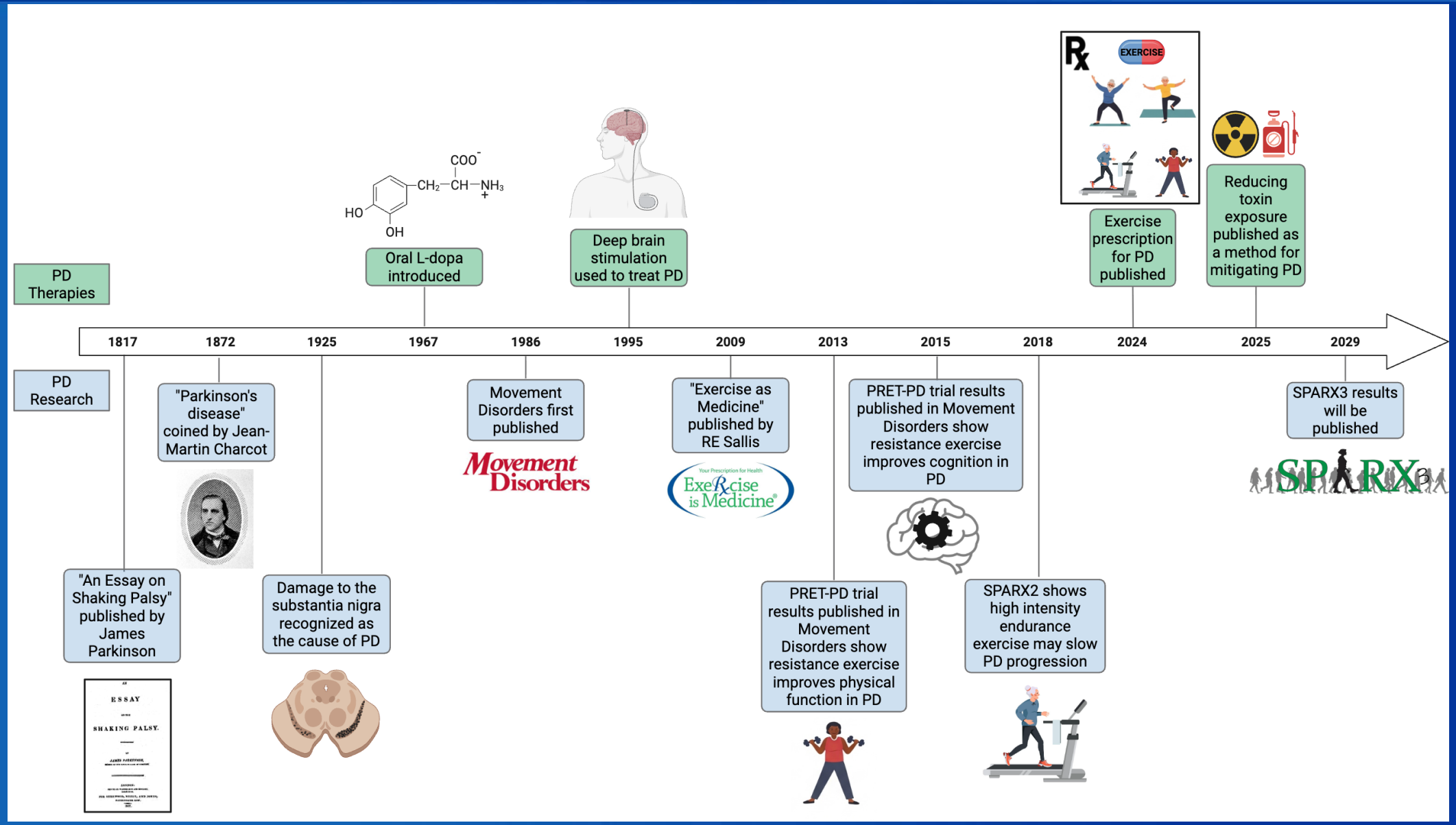
Read inspiring stories of people with PD who have used the exercise protocols in this book to reduce their symptoms and help slow the progression of their disease. With *Parkinson's: How to Reduce Symptoms Through Exercise*, you'll discover how to use exercise as a powerful tool to help manage, stabilize, and reduce symptoms; improve your quality of life; and enhance your overall well-being. Start fighting back against PD today with this comprehensive and motivating book.



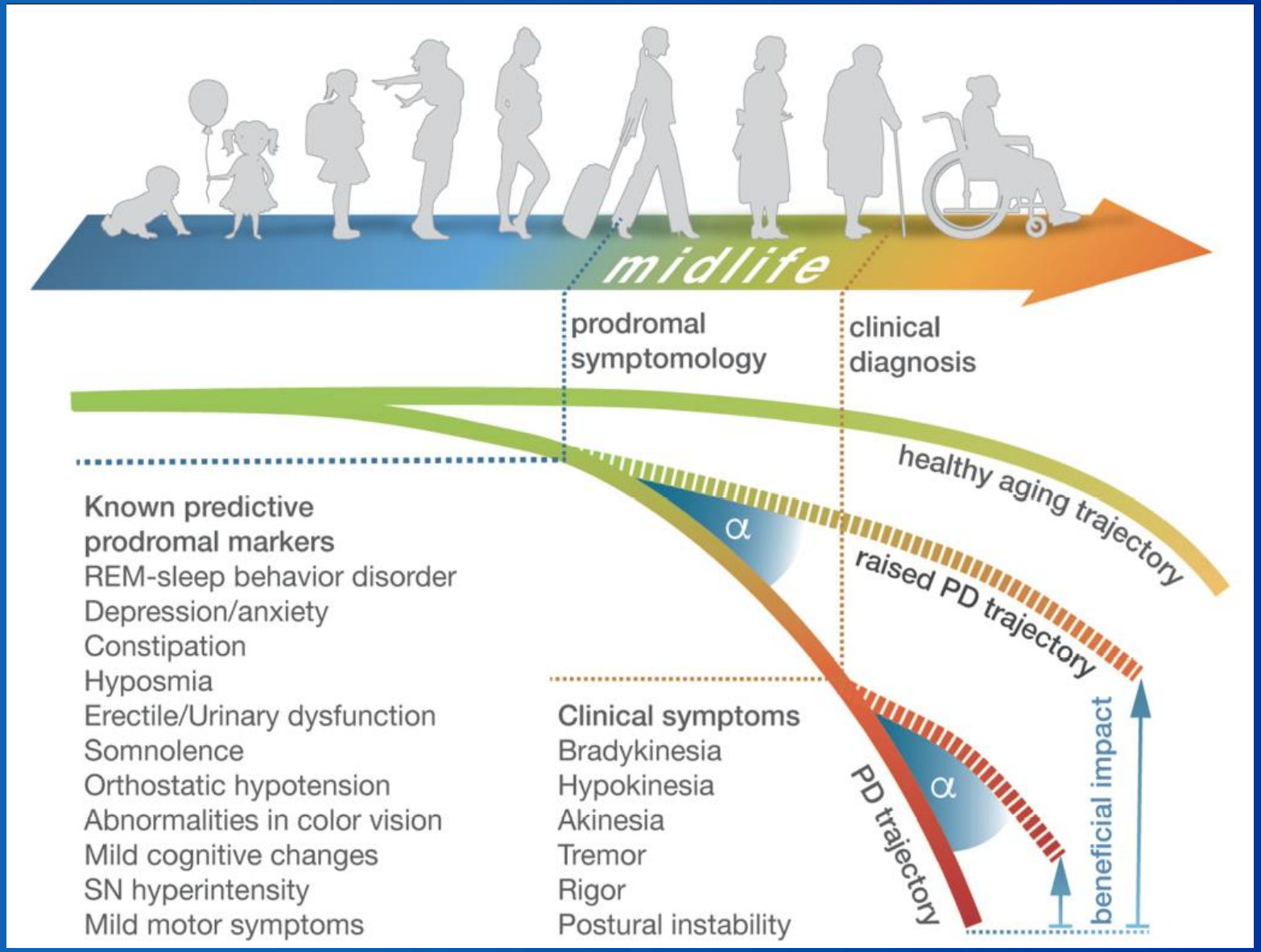
Need to Shift The Balance



What Are The Four Treatments for Parkinson's Disease?



Healthspan



Kilzheimer A, Hentrich T, Burkhardt S and Schulze-Hentrich JM (2019) The Challenge and Opportunity to Diagnose Parkinson's Disease in Midlife. Front. Neurol. 10:1328. doi: 10.3389/fneur.2019.01328

Practice What You Preach

Thank You


HOW I FEEL ...
BEFORE I WORKOUT
DURING MY WORKOUT
AFTER MY WORKOUT
WHEN I DON'T WORKOUT