Exercise to Reduce PD Symptoms

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2025 APDA Iowa Empowering you PARKINSON'S CONFERENCE







What is Parkinson's Disease?
General treatment management
Evidence for benefits of exercise
Exercise Recommendations
What am I looking for in my exercise sessions/Why do I do them?

Oscar Wilde Is Not Alone

'To get back my youth I would do anything in the world, <u>except take exercise, get up early, or be respectable.</u>'



The Picture of Dorian Gray, 1891

1994 and Thoughts on Exercise



ARTICLES | March 1, 1994

Physical therapy and Parkinson's disease A controlled clinical trial

Cynthia L. Comelia, MD, Glenn T. Stebbins, PhD, Nancy Brown-Toms, BA, and Christopher G. Goetz, MD

March 1994 issue • 44 (3_part_1) 376 • <u>https://doi.org/10.1212/WNL.44.3_Part_1.376</u>

At a small seminar Cindy Comella presented her PT data and David Marsden asked how much cost was associated with the program in terms of each patient. In his usual British style, the question was seemingly a point of information, and Cindy fell right into the trap by quoting some number that David then pounced on with glee and declared:

"I'd feel better and move faster if you gave me that much money. Why don't you just give them a check and skip the PT?"

What is Parkinson's Disease? Degeneration Of Nigrostriatal Dopaminergic Neurons





Major cause of the cardinal symptoms of Parkinson's disease

"Comma" Lang and Obeso 2004 Healthy control Mild (early) PD Moderate PD



Cardinal Signs of Parkinson's Disease

Bradykinesia Hypokinesia Akinesia

Tremor at rest

Rigidity

Postural Instability – pull test used by clinicians Freezing Of Gait (FOG) MANAGEMENT OF PARKINSON'S DISEASE



Natural course / management of PD

Solution Theoretical

www.nature.com/scientificreports

AD dysregulated genes reversed by exercise (human dataset).



- Stimulatio

- - Inhibition

FIGURE 2. Summary of the main myokines, their putative effects, and the molecular signals/pathways involved AMPK, AMP-activated protein kinase; BONF, brain-derived neurotrophic factor; CREB, CAMP response-element-binding protein; CX-C R2, CX-C receptor 2; FA, free-laty acid; FGF21, fibroblas; growth factor 2; Fndc5, fibronecin type III domain-containing 5 protein; Fat1, follistatin-like 1;

IGF, insulin-like growth factor; IL-1ra, IL-1 receptor antagonist; Insl6, insulin-like 6; LIF, leukemia inhibitory factor; NO, nitric oxide; NOS, nitric oxide synthase; PGC-1a, peroxisome proliferator-actived receptor-y coactivator 1a; PI3K, phosphatidylinositol 3: Alsnaes; SIR11, sitrium 1; SPARC, secreted protein acidic and rich (n systeine; STN-R) soluble TNF receptor; trikB, tropomyosin receptor kinase; UCP1, uncoupling protein 1.

Fiuza-Luces et al. Physiology 2013.







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)



Corcos et al. Movement Disorders (2013)

Motor Unified Parkinson's Disease Rating Scores



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



Chest Press





Latissimus

Individual Montreal Cognitive Assessment Scores



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

Why is maintaining strength important?

Maintain physical function
 Avoid frailty/sarcopenia
 Maintain cognition
 Optimize physiological functions
 Delay mortality

Rationale for Endurance Exercise

- Increased dopamine metabolism
- Angiogenesis
- Neurogenesis
- Increase VO₂ 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

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



Aerobic Exercise Delays Disease Progression



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 Α **Post-Exercise** Baseline 3.0 1.0 0.5 1.5 0.0 0.0

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

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



Exercise Prescription

- 1. Weight training 2 times per week.
- 2. Endurance training 3 times per week.
- 3. Flexibility training several times times per week.
- 4. Neuromotor/balance agility training 1-2 times per week.







"To help your Parkinson's disease, take one aspirin every day. Take it out for a run, then take it to the gym, and then to tai chi class"

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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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

Parkinson's: How to Reduce Symptoms Through Exercise





Kristine Meldrum, BA, ACE with Jay Alberts, PhD, and Daniel M. Corcos, PhD

Foreword by International Parkinson's Expert Bastiaan R. Bloem, MD, PhD, FRCPE

Parkinson's: How to Reduce Symptoms Through Exercise

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 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.





Exercise is Transforming Lives





Need to Shift The Balance



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



WHEN I DON'T WORKOUT