Therapeutic Strategies for Parkinson’s Disease: Updates on Alpha Synuclein (Role for Exercise)

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RESEARCH ARTICLE
Running wheel exercise reduces α-synuclein aggregation and improves motor and cognitive function in a transgenic mouse model of Parkinson’s disease

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Fig 3. Y39C human mutant α-synuclein transgenic mice performed daily running wheel exercise for three months which led to improved motor and cognitive function.

Fig 4A. Exercise increased DJ-1, Hsp70 and BDNF levels in 15-month old Y39C transgenic mouse brain (and also increased DJ-1 levels in muscle and plasma.)
Effect of High-Intensity Treadmill Exercise on Motor Symptoms in Patients With De Novo Parkinson Disease
A Phase 2 Randomized Clinical Trial

Are changes in motor symptoms sufficient to warrant further investigation? YES
Less worsening of motor symptoms in high intensity!!!
Aerobic Exercise Plus Cognitive Skill-based Exercise
Brain Changes in People with Early PD

Progressive Treadmill Training and Skill Training
50’, 3x/week; 6 weeks; 75-85%

Multidisciplinary Intensive Rehabilitation Training
3 hours/day; 5 days/week; 4 weeks
Fontanesi, et al. 2015

Noisy circuits are silenced
More Dopamine receptors
Protective factors available

Intensive Rehabilitation Enhances Lymphocyte BDNF-TrkB Signaling in Patients With Parkinson’s Disease

Rating of Perceived Exertion Chart
(Cardiovascular Endurance)

I am dead!!!
I am probably going to die!
I can grunt in response to your questions and can only keep this pace for a short time period.
I can still talk but I don’t really want to and I am sweating like a pig!
I can still talk but I am slightly breathless and definitely sweating.
I’m just above comfortable, I am sweating more and can talk easily.
I’m sweating a little, but I feel good and I can carry on a conversation comfortably.
I am still comfortable, but I’m breathing a bit harder.
I’m comfortable and I can maintain this pace all day long.
I’m watching TV and eating but not bored.

- Step count in people with de novo PD who were not regular exercisers approached sedentary lifestyle levels.
  - 5362 steps per day
- Higher step count was associated with higher cardiorespiratory fitness and no fear/worry of falling, more recent DX, low symptom severity (UPDRS)
- Clinicians should consider exercise and activity behavior modification immediately after diagnosis of PD to attenuate the potential adverse health consequences of chronically low ambulatory activity

Is vigorous exercise neuroprotective?

Progressive Aerobic Exercise Literature Review
Ahlskog J. Neurology 2011;77:288-294

- Ongoing vigorous exercise and physical fitness should be highly encouraged.
- PD physical therapy programs should include structured, graduated fitness instruction and guidance for deconditioned patients with PD.
- Levodopa and other forms of dopamine therapy should be used to achieve maximum capability and motivation for patients to maintain fitness.

Conclusion!