

Research Results: Parkinson's Disease and Forced Exercise - Abstract of the tandem trial of the Kent State University, USA-

Forced, Not Voluntary, Exercise Improves Motor Function in Parkinson's Disease Patients

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Background. Animal studies indicate forced exercise (FE) improves overall motor function in Parkinsonian rodents. Global improvements in motor function following voluntary exercise (VE) are not widely reported in human Parkinson's disease (PD) patients.

Objective. The aim of this study was to compare the effects of VE and FE on PD symptoms, motor function, and bimanual dexterity.

Methods. Ten patients with mild to moderate PD were randomly assigned to complete 8 weeks of FE or VE. With the assistance of a trainer, patients in the FE group pedaled at a rate 30% greater than their preferred voluntary rate, whereas patients in the VE group pedaled at their preferred rate. Aerobic intensity for both groups was identical, 60% to 80% of their individualized training heart rate.

Results Aerobic fitness improved for both groups. Following FE, Unified Parkinson's Disease Rating Scale (UPDRS) motor scores improved 35%, whereas patients completing VE did not exhibit any improvement. The control and coordination of grasping forces during the performance of a functional bimanual dexterity task improved significantly for patients in the FE group, whereas no changes in motor performance were observed following VE. Improvements in clinical measures of rigidity and bradykinesia and biomechanical measures of bimanual dexterity were maintained 4 weeks after FE cessation.

Conclusions. Aerobic fitness can be improved in PD patients following both VE and FE interventions. However, only FE results in significant improvements in motor function and bimanual dexterity. Biomechanical data indicate that FE leads to a shift in motor control strategy, from feedback to a greater reliance on feedforward processes, which suggests FE may be altering central motor control processes.

Key Words: *Parkinson's disease; Exercise; Manual dexterity; Motor control; Grasping forces; Movement disorder*