

## The Importance of Physical Therapy and Exercise for People with PD

The traditional view of how to treat people with neurodegenerative conditions is that exercise has little or no effect, or that it can actually worsen the disease! However, recent research in both humans and animal models suggests that physical therapy — including gait and balance training with external cues to improve walking, resistance training for the lower extremity muscles, balance training, and regular exercise — can be an important component of an exercise program that may help improve or hold the signs and symptoms of Parkinson's disease (PD) at bay.

### Gait and Balance

Gait and balance impairments are cardinal symptoms of PD. If left untreated, impairment in walking or balance can lead to falls, fractures, hospitalization and loss of independence. In fact, roughly 40 percent of nursing home admissions are preceded by a fall, and falls occur more frequently in people with Parkinson's than they do among other individuals.

Recently, a large number of studies have focused on improving gait in people with Parkinson's through a training exercise known as "cueing." People with PD sometimes have difficulty generating internal cues to take a step. They may "freeze" while standing or walking, which in turn can cause falls and injuries. External cues, such as providing a cane to trigger a stepping movement, placing horizontal lines on the floor, giving instructional cues (such as asking the person to "take long steps") or walking to a rhythmic metronome, can all improve a person's stride length and walking velocity, and reduce shuffling and freezing.

In one such study — cueing training was used to improve walking in participants' home environments. The results, though modest, showed measurable improvements in gait and balance, as well as reduced freezing and greater confidence to carry out functional activities. However, after the training ended, the improvements were gradually lost, reminding us that it is important to continue exercising if those improvements are to be long lasting.

Recent research has also suggested that a person with PD needs to exaggerate his or her effort (amplitude) of movement for it to have the same impact of normal movement in a person without PD.

### Improving Strength

Studies have generally shown that exercise improves speech and swallowing, posture, tremor, dexterity, cognition and depression. Other studies have shown that treadmill training, and lower extremity resistance and balance training, can be effective at improving muscle strength, gait and balance.

There has been considerable interest recently in therapies designed to increase muscle mass, known as "muscle hypertrophy." Several studies have shown that individuals who improved the size of their muscles also demonstrated improvements in functional activities such as climbing or descending stairs or balancing. Muscles shrink when they are not used; conversely, muscle tissue increases in girth with intense resistance training. As we age, we often become more sedentary and muscle loss becomes inevitable — underscoring the need for exercise.

In the late 1980s, studies began to show that older adults — many already in their 80s and 90s, and some of them in nursing homes — could improve strength, muscle bulk and function in response to high-intensity resistance training. Despite this evidence — and because some researchers and therapists believed that resistance training might itself increase muscle stiffness — strengthening was not advised for people with PD out of fear that it might be harmful.

More recent studies have further challenged this view. Results of one study of people with mid-stage Parkinson's suggest that high-intensity resistance training results in a six percent increase in muscle volume, 17 percent improvement on how far participants could walk in six minutes, and a 22 percent and 13 percent improvement in stair descent and ascent time. In another study, high-intensity resistance training for the lower extremity muscles was found to im-

*(over please)*

prove balance and to reduce the occurrence of falls.

While resistance training does pose risks that other types of training do not (e.g., risk of hernias and other musculoskeletal injuries), the risks of not participating in such a program and remaining sedentary are not insignificant.

### **Animal Studies on Exercise and the PD Brain**

In addition to helping with movement, researchers now believe that exercise may influence the progression of Parkinson's disease. While the mechanism for these effects in Parkinson's are poorly understood, researchers are coming to believe that when a person with PD engages in a novel activity such as beginning an exercise program — especially when there are opportunities to interact socially — changes in the structure and function of the brain may result. Most of this research is based on animal models of Parkinson's, but some of the findings may apply to humans.

The timing of training in relation to a PD diagnosis may also be relevant. In a recent series of studies, rats were forced to rely on an impaired forelimb during exercise, while their less impaired forelimb was restricted from movement by a cast. In these studies, animals forced to exercise immediately after the PD lesion demonstrated greater retention of the nerve cells that produce dopamine and less severe symptoms down the road. Rats that began the exercise program later (three to seven days after the PD lesion) fared far worse. They had more pronounced Parkinson's symptoms and showed greater PD-related damage in the brain. In other words, the earlier the training is begun after a diagnosis, the better.

In another animal study, it was shown that exercise (represented by rats running on a wheel) increased the number of new dopamine-producing neurons as compared to rats that did not exercise. In these animal models of Parkinson's, exercise seems to have a neuroprotective effect on the brain. Studies showing the effect of exercise and physical therapy on the human PD brain structure and function are forthcoming.

### **What Does This Mean for People with PD?**

If the animal studies are found to hold up in humans, it would appear that early referral to a physical therapist or exercise program may prevent or delay some disabling aspects of Parkinson's. We will not

know this for sure until more human trials have been done. What we do know is that people with Parkinson's disease are well advised to begin or continue exercise and therapy after a diagnosis has been made.

A major problem in getting people with PD to exercise is that many medical professionals still do not understand the value of exercise. Education of patients and families could certainly improve this situation, as could the increased availability of community-based health clubs or wellness facilities that are equipped to provide services for special populations, such as people with Parkinson's. It is important to remember to ask your physician for a referral for physical therapy, as it may be essential to obtain coverage from insurance or Medicare.

In addition, motivating older adults to exercise and to stay physically fit requires skills on the part of the practitioner that are not traditionally taught in allied healthcare programs. People with PD often require hands-on guidance during exercise in order to minimize the occurrence of injuries, to stay motivated and to continue with a program. Of course, anyone thinking of beginning an exercise program should consult with his or her physician beforehand to make sure that it is safe.

Both younger and older people with a diagnosis of Parkinson's disease can benefit from physical and occupational therapies, or a home-based exercise program. Neither the age of the patient nor the stage of their Parkinson's disease should be seen as limiting factors in the decision to exercise. The results of studies to date are encouraging and the message to people with Parkinson's is clear: look for opportunities to exercise!

Please contact PDF for a list of the research studies referenced in the article.

*David Lehman, Ph.D, is Associate Professor at Tennessee State University with an emphasis in neurorehabilitation and Parkinson's disease. He is President-elect for the Middle Tennessee Chapter of the American Parkinson Disease Association. Mark A. Hirsch Ph.D, is on the faculty of the Department of Physical Medicine and Rehabilitation at Carolinas Rehabilitation in Charlotte, NC, and has worked extensively in motor therapy. He is a Board member of the Parkinson Association of the Carolina's.*

If you have or believe you have Parkinson's disease, then promptly consult a physician and follow your physician's advice. This publication is not a substitute for a physician's diagnosis of Parkinson's disease or for a physician's prescription of drugs, treatment or operations for Parkinson's disease.

**The development of this fact sheet was supported by an educational grant from Novartis Pharmaceuticals**

*Adapted from the PDF News & Review, Fall 2007*

© 2008 Parkinson's Disease Foundation