

**Parkinson's Disease Clinic and Research Center
University of California, San Francisco
505 Parnassus Ave., Rm. 795-M, Box 0114
San Francisco, CA 94143-0114
(415) 476-9276
<http://pdcenter.neurology.ucsf.edu>**



Exercise and Physical Therapy for Parkinson's Disease

Should I exercise?

Research has shown that regular exercise benefits people with Parkinson's disease. Exercise reduces stiffness and improves mobility, posture, balance and gait. Aerobic exercise increases oxygen delivery and neurotransmitters to keep our heart, lungs, and nervous system healthy. General exercise may also reduce depression. Learning-based memory exercises can also help keep our memory sharp (www.positscience.com; www.lumosity.com).

What types of exercise are best for people with Parkinson's disease?

There is increasing evidence that aerobic and learning-based exercises could be neuroprotective in aging individuals and those with neurodegenerative disease. Facilitating exercise programs that challenge our heart and lungs as well as promote good biomechanics, good posture, trunk rotation and normal rhythmic, symmetric movements are the best. Dancing to music may be particularly good for decreasing stiffness.

Although research on this subject is ongoing, it does appear that beyond aerobic activities performed with healthy movement patterns, exercises challenging the individual to change tempo, activity, or direction (what is referred to as "random practice" exercise) benefits people with Parkinson's disease. It is also important to keep variety in exercise activities, because individuals with Parkinson's disease often have difficulty in shifting from one activity to another or in performing two activities at the same time. Exercises that require balance and preparatory adjustment of the body are also important along with rhythmic activities such as dancing, skipping and cycling can maintain the ability to perform reciprocal movements. Finally, exercises that promote attention and learning are beneficial.

Types of exercises that do this:

- Walking outside or in a mall
- Dancing
- Yoga classes
- Tai Chi classes
- Stepping over obstacles
- Marching to music with big arm swings
- Sports (ping pong, golf, tennis, volleyball)

- Aerobic/Jazzercise classes

Types of exercises that promote cardiopulmonary fitness:

- Paced walking (treadmill walking at different speeds and different inclines)
- Hiking using walking sticks
- Swimming with different strokes with the eyes open and closed (+)not only challenge motor learning but also increase heart rate and provide good cardiopulmonary conditioning.
- New bodyweight-supported treadmills can also be helpful to protect from falling, and to facilitate easier coordinated movements for fast walking with a long stride or jogging.

Types of exercise that do NOT challenge motor planning:

- Riding a stationary bicycle without doing other activities
- Weight lifting
- Treadmill walking at a slow speed
- Lap swimming can be very habitual and also automatic.

These exercises for cardiovascular, endurance and strengthening could be enriched by performing simultaneous activities such as reading, writing, problem solving, singing, watching the news or a movie or throwing and catching balls. Exercises that demand attention, repetition, progression of difficulty with spaced practice over time are the best exercise routines to promote learning.

You can purchase learning programs from www.positscience.com and www.lumosity.com. Currently Dr. Dowling and Dr. Melnick in collaboration with Red Hills Studio are developing fun motor learning programs that can improve posture and balance. The Wii sports games and balance activities may be generally fun and helpful.

Is there any value in strength training?

Weight lifting per se is not the best choice of an exercise program for the person with Parkinson's disease, particularly if it is the only exercise activity. Individuals need to be careful how they perform strengthening exercises to minimize increasing stiffness and rigidity. When performed properly, strengthening exercises do have some value.

As one ages, more exercise must be performed to maintain muscle mass. Muscle mass and strength allow an individual to complete daily chores and to maintain balance. Additionally, strengthening postural muscles may help to maintain a more upright posture. Integrative, functional exercises other than weight-training may strengthen muscles in ways that are more beneficial to individuals with Parkinson's disease.

Examples of alternative exercises to weight lifting:

- Activities in a standing position strengthen legs

- Pushing up to rise on the toes
- Modified squats
- Repetitively rising and sitting from a chair
- Wearing ankle and wrist weights around the house or out on a walk
- Push-ups or wall push-ups for arms

Light weights are just as effective as heavy weights in maintaining muscle tone and do not increase stiffness as much. Walking with ankle and wrist weights can help strengthen while encouraging increased awareness of arm swinging and high stepping. Moderation is the best word for strength training without other forms of exercise. However, integrating strengthening and flexibility exercises into aerobic, rhythmic and learning-based exercise routines that are fun, engaging, progressing in difficulty and rewarding are the best.

What about swimming?

Swimming provides good cardiopulmonary training and maintains muscle strength. However, lap swimming does not challenge balance or stimulate variety of movements. Therefore, lap swimming is a second-choice activity. However, since the arms, legs and head may be doing different things, it may increase coordination. The resistance of the water increases stiffness in some people and decreases it in others.

Activities to try:

- Adding resistance with paddles and trunk support – provides more opportunity for reciprocal movements and circling movements of the arms and the legs
- Rolling and somersaults – in the pool are good for those who are particularly comfortable in the water

Remember:

For individuals with Parkinson's disease who have difficulty in breathing, swimming may not be a comfortable aerobic activity. Thus, swimming may be an appropriate choice of exercise for individuals who have enjoyed it in the past and are comfortable with the techniques and those with musculoskeletal conditions particularly of the knee and back. Swimming using certain strokes can also help increase shoulder range of motion.

Will exercise make my muscles less stiff?

Exercises that require large, rhythmical movements through a full range of motion have been shown to decrease rigidity. For example, in a program of aerobic exercise using music, there was a reduction in rigidity in 9 out of 10 participants immediately after the exercise program.

Exercises to decrease stiffness:

- Large, rhythmical movements
- Rotating the trunk

- Vibration, rocking and swinging

Other considerations to decrease stiffness:

- Avoiding tremors (e.g. touching the limb that is shaking to quiet the movement) can also decrease tension
- Decreasing stress in ones life – having fun, thinking positively about planning and carrying out challenging, socially engaging and learning-based activities
- Cooling or warming the tense extremity can sometimes be helpful.

When should I exercise in relation to medication?

The best time to exercise is when mobility is best. For individuals who take medications for Parkinson’s disease, the best level of function often occurs about 1 hour after a dose of medications. The answer to this question varies by individual. The individual reaction to the medication is also important.

How often should I exercise?

The guidelines for people with Parkinson’s disease are no different from those without the disease (i.e. 4-5 times a week for at least 30-40 minutes). This assumes that your heart is beating at 70 to 80% of maximum ($220 - \text{your age} \times 70 \text{ or } 80\%$).

Make the exercise time fun:

Engage in group exercise, movement or dancing classes. For many, participating in activities with other people, can be more stimulating and increase compliance.

Stay active and integrate exercise into your usual day:

- Walk whenever possible instead of driving
- Climb the stairs instead of taking the elevator
- Take regular 5 minute breaks every 30 minutes (lifting the arms up over your head, performing wall glides, breathing diaphragmatically, getting up to get a glass of water, or putting theraband on chairs to work on some strengthening)
- Avoid long periods of time watching TV and or using a computer

Is there anything else I should know?

A “cool-down period” is important. After exercise, allow yourself a longer time for a cool-down than others would need (Individuals who exercised before developing Parkinson’s disease typically double their cool-down time).

A cool-down period accomplishes 2 goals:

- 1) Promotes a slow decrease in heart rate
- 2) Allows the muscles time to cool down gradually so they do not become stiff.

A cool-down period consists of the same exercise activity but at a progressively slower pace. During the cool-down, all muscles need to go through a slow, full range of motion. If you feel exhausted and want to fall asleep immediately after exercise, then you are not cooling down slowly enough.

Learn something new every day:

If you listen to the news, talk to someone about it. Listen to educational programs and discuss what you learned. Do crossword puzzles or participate in memory training programs on the web or from a CD.

Challenge yourself to go out each day:

If you are retired, consider volunteering your time to help others (e.g. Red Cross, Meals on Wheels). Move about in the community and learn the tricks of keeping your eyes on a target to improve stability. Carry a cane to let people know that it would be best not to bump you.

Practice writing:

Learn to hold your pen lightly and write with big cursive type movements. Consider making the surface of your pen rough or sticky. This will help decrease the force of your squeezing the pen. Write by moving the whole arm, not just the fingers. Practice writing to music and even say the words out loud as you write. Circle making big movements. Get a drawing pad from a toy store where you can lift up the writing surface and erase your practice strokes.

Exercise your voice:

Talk slowly, clearly and loudly with a lot of expression of your eyes and your face. Have everyone speak loudly and slowly. If you find you continue to talk softly and quickly and people are having difficulty understanding you, then ask a friend to read and record some passages from a book. Then you put the head set on and hear your friend's voice as you read the same passages. This may strengthen the learning.

When should I request a referral for Physical Therapy?

When first diagnosed, all patients should have a consultation with a physical therapist to define the appropriate exercise program tailored to “you”. This will also establish a baseline of your current physical status.

Ideally, all patients with PD should have a good fitness program as well as specific exercises to maintain good posture and balance as well as improve symmetry in flexibility and strength. Then, one may benefit from a consultation with a physical therapist when signs and symptoms increase the risk for falling or limit comfortable community mobility and confidence. The therapist will also work on improving gait with practice using visual and auditory cues, as well as without those cues.

As the disease progresses, periodic re-evaluations are helpful to assure your exercise program is having the maximum benefit. A program of individualized exercises addressing posture, balance and gait has been shown to be beneficial in decreasing the risk of falling. In some cases, where

balance or musculoskeletal problems develop, supervised outpatient treatments a few times per week may be helpful for a few weeks.

Safe mobility may be enhanced by using a bodyweight supported treadmill to minimize discomfort, assure stability, decrease the fear of falling and facilitate normal movement.

In addition to physical exercise, it is important for everyone to maintain a high level of learning-based exercise activities to improve the ability to do multiple tasks simultaneously and safely without falling. The combination of learning-based memory training, aerobic exercise, over ground gait practice and integrative, engaging activities in the community are essential to positive health and well being despite aging or neurodegenerative disease.

Are there techniques to help me walk?

Often individuals with Parkinson's disease have problems with abruptly halting or "freezing," when walking.

To help decrease freezing, try:

- Reciprocal arm swinging
- High long steps
- Scanning the environment and using visual fixation on an object in the distance or auditory cues (listening to music, singing to yourself, counting)
- Thinking about making big steps to clear obstacles on the floor or marching (high steps)
- Walking hand-in-hand, swinging the arms with a friend or family member
- Having someone place their foot in front of you as a cue to step high and over
- One person found that throwing pennies and stepping over them was helpful ("But," he added, "don't bend down to pick them up.").
- Loud rhythmical clapping
- Paced walking with high stepping.
- Using walking sticks (using them for sensory feedback and sense of stability may be more important than using a cane. Of course, using a cane or a walker can be helpful if there is a lot of weakness and stiffness.)

Pushing one's self to stay active should be the goal.

Are there hints to help me get out of bed?

For some people with Parkinson's disease, getting out of bed may become difficult. First, you might practice rolling on your bed. Roll back and forth and get a rhythm. Then with some momentum, roll to your side and come to sitting. You might have a dresser near the side of your bed so you could touch the dresser for stability if you need to.

When specifically trying to come to sitting from lying in bed, roll over on your side. Push on your elbow and let your feet come over the edge of the bed and then sit up at the edge. Sit there for a minute to adjust and then rise to stand and then walk. This technique is not only easier but better for your back.

Techniques to make it easier to move around in bed:

- Wear satin pajamas or use satin sheets (but not both).
- Practice standing up and sitting down quickly from a chair without using your hands to improve your transitional movement skills
- Practice getting up quickly from a chair and taking a few big steps and then turn around and go sit back down.
- Practice safe skills by climbing and descending stairs.

If you are seeing a physical therapist, the last three bullets are some of the activities that should be practiced.

Will exercise make my pain worse?

Exercise is considered the best conservative treatment for everyone, particularly as we age, with or without Parkinson's disease. Further, we also know that putting people to bed or long term immobilization of a limb is not healthy for the patient. Temporary immobilization of an injured limb may be necessary to facilitate healing, particularly in the case of a fracture. However, in general, aerobic exercise can increase our natural endorphins to help control pain. In addition, aerobic exercise increases the delivery of oxygen in our body and oxygen is a critical element for healing. We are learning more about inflammatory conditions in patients with Parkinson's disease. In addition to the degenerative joint problems that occur with aging, patients with PD may be more likely to experience some additional inflammatory responses. Also, often patients with PD have joint replacements that may become painful with exercise. The good news is that new equipment is available to help patients decrease the loading of their joints when exercising by using a bodyweight supported treadmill system. Be sure to check your gym to see if this type of equipment is available to you. Further, talk to your physician about whether you need to consider anti-inflammatory medications to help minimize your pain, particularly if you have a flare.

Will aerobic exercise slow down the progression of my Parkinson's disease?

Aerobic exercise, particularly when combined with learning activities, should be a core component of your treatment routine. Aerobic exercise keeps your heart and lungs healthy and learning activities help maintain the receptors for dopamine as well as keep you demanding the activation of the dopamine neurons. We tend to lose dopamine neurons with aging and this is accentuated in PD. In drug-induced animal models of PD, there are reports that learning-based aerobic exercise actually stopped the onset of the signs and symptoms of PD. While this is exciting, we cannot be positive that drug-induced PD and PD in individual patients are

equivalent. Clinical trials are now underway to try and answer this question. There are definitely positive correlates between exercise and PD in terms of impacting positive metabolic responses throughout the nervous system. It will take years with longitudinal studies to confirm that aerobic exercise slows down disease progression. This research is also confounded because most patients with PD are on medications. It is difficult to surrender the standard treatment for a new or supplementary approach to disease management (e.g. exercise, vitamins, and holistic-type treatments). Keep exercising as long as you can. It is good for you but we do not know if exercise will slow the progression of your disease.

"Forget Me Not" – Forced Use

Frequently patients with Parkinson's disease have one limb or one side that is more involved. It is easy to stop using the more involved side because it is too difficult. This leads to overuse of the lesser affected side and neglect of the more affected side. This disuse of the affected limb can lead to a worsening of the signs and symptoms. There is evidence that constraining the least affected side, and forcing the use of the more affected side can lead to improved function and increased "mindfulness" of the limb.

Forced use and constraining the least affected side has been effective in driving neural adaptation. This has been demonstrated in animal studies with drug induced PD. It has also been demonstrated in patients post-stroke. This forced use can be enhanced not only by physical practice, but mental practice as well. Each day, time should be spent on strengthening, range of motion, task performance and coordination exercises of the more involved limb. Force yourself to do as many tasks as possible with the involved upper limb, using the other limb only to help stabilization. In addition, do some drills like tap the fingers, tap the wrist and then tap the forearm moving from the elbow as fast as possible. You can also practice turning the palm up and down as fast as possible, throwing and catching balls, putting small objects in small containers, taking your index finger to quickly touch objects that are moving those that are still. Do similar activities with the leg.

This principle of targeting specific task-oriented use of an extremity is similar to forcing yourself to exercise at an intense versus a low level. 'Forced,' in this context, means that you work harder than you would usually work. In other words, in your general exercise routine, you want to work with a faster speed and potentially for a longer period to keep your nervous system and your cardiovascular system adaptable and responsive. This will also allow your nervous system to respond more crisply when faced with unexpected and surprise events. This will also facilitate better balance responses and improved postural alignment.

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