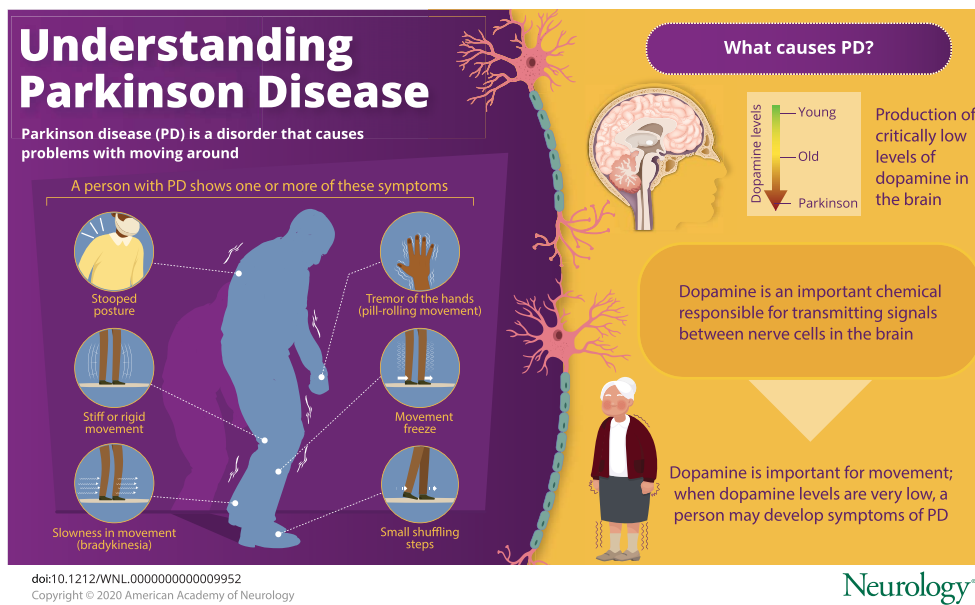


# Parkinson disease

## The long-term benefits of early use of deep brain stimulation

Steven Karceski, MD

*Neurology*® 2020;95:e436-e438. doi:10.1212/WNL.0000000000009952



### Related Article

#### Deep brain stimulation in early-stage Parkinson disease: Five-year outcomes

<http://dx.doi.org/10.1212/WNL.0000000000009946>

In their article “Deep brain stimulation in early-stage Parkinson disease: Five-year outcomes,”<sup>1</sup> Dr. Hacker and colleagues compared 2 groups of people with Parkinson disease (PD): those who only took medication for their PD and those who combined medications with deep brain stimulation (DBS). Other studies have taken a similar approach, but this study was different because it looked at people who had early PD. Most past studies have focused only on people with moderate or advanced PD. In addition, this study looked at outcomes after 5 years. Most studies are shorter, and do not look at how people do over a long period of time.

### How was the study done?

The study was conducted at Vanderbilt University. A total of 28 people participated in the study, and all had early PD. In other words, their symptoms were mild, and they had been taking medication for only a short time (6 months–4 years). Because this group had early PD, no one in the group had dyskinesias at the start of the study. Dyskinesias are unwanted movements that occur late in the course of PD. When they enrolled, the study participants were between 50 and 75 years old (66 years old was the average).

The group was randomized to 1 of 2 treatments: medications (called optimal drug therapy) or medications plus deep brain stimulation (DBS). For the study, each person was seen every 6 months for 2 years, and then once per year for 3 years, for a total of 5 years. At each visit, PD was assessed and graded, and patients were evaluated carefully for side effects (from medications or the stimulator).

### What were the results?

There were 3 important discoveries. First, the authors found that the group that received the DBS treatment needed less of the medication levodopa. In fact, they were 1/4 (0.26) as likely to need increasing doses of this medication. Levodopa is the main treatment for PD. It is an extremely effective medicine. However, over time, higher doses are needed.

Furthermore, with time, side effects like dyskinesias emerge, and there is a greater likelihood of other side effects like nausea and dizziness. Because the group with DBS was on a lower dose of levodopa, they had fewer side effects.

Second, the authors found that after 5 years, the people who had the DBS were much less likely to require multiple medications for their PD. In PD, as the disease worsens, more medication is needed to keep the symptoms under control. More medicine means a higher dose as well as multiple medications. The use of multiple medications is often referred to as polypharmacy. In this study, members of the group who had DBS were 1/17th (0.06) as likely to need polypharmacy.

Third, the authors found that people who had DBS experienced much less tremor. Not only was the tremor less, but the progression or worsening of the tremor was much slower. The people with the DBS were 1/5 (0.21) as likely to experience a worsening of tremor over the 5-year time period of the study.

In addition, the authors looked at the occurrence of unwanted movements, or dyskinesias, in the patients. None of the participants had these when they entered the study. At the end of 5 years, the group with DBS had fewer dyskinesias. However, the numbers were small, and the result

did not reach statistical significance. In other words, it looked like the group who had DBS was doing better with regard to dyskinesias, but the statistical analysis did not show this.

### Why is this important?

This is a unique study that looked at the use of DBS in early PD. It showed that when used early, DBS helps to reduce the amount and number of medications a person with PD will need; helps minimize side effects from medications; improves motor function and slows the progression of tremor; and may even help with motor problems that occur in late-stage PD, like dyskinesias.

There are limitations to a study like this. One is that it was a small study. That being said, the findings were so strong that the Food and Drug Administration has already approved a much larger trial based on this study's results. The larger trial will occur in 20 medical centers across the United States. The hope is that the larger study will provide even better information for people with PD. It may also tell us more about how early use of DBS can improve daily activities, and how it may improve long-term quality of life for people with PD.

## About Parkinson disease

### What is Parkinson disease (PD)?

PD is named after James Parkinson, who first described the illness in 1817. PD mostly causes problems with movement. One of the most common problems that PD causes is called bradykinesia. This means that a person moves very slowly, almost like he or she is moving in slow motion. In addition, people with PD appear stiff or rigid. As they walk, they often have a slightly stooped posture. Their gait transforms into a very characteristic walking pattern. Patients shuffle their feet and take very small, frequent steps (this pattern is called festination). At times, a person with PD may appear to suddenly freeze up or be unable to move for a short time. Someone who has PD will often have one or more of these symptoms.

A tremor of the hands is common, as well. In fact, this symptom, known as pill-rolling tremor, is the most characteristic physical finding in PD. It gets its name because of how the tremor looks. Many years ago, pharmacists used to make their own tablets. To make the medications into a pill, they would roll the medicine into a small round ball. The action that the pharmacist would use to roll the small balls looks similar to the tremor in PD.

Many people with PD take medications to help with their movements. With longer duration of treatment, a person with PD may develop dyskinesias. These are unwanted, sudden movements. They can be jerky, or in some people, they are slow, almost writhing-type motions. The dyskinesias can be very disruptive. Often, people with dyskinesias tend to avoid social situations because they are embarrassed by these awkward-appearing, uncontrollable movements.

### What causes PD?

In PD, the underlying problem has to do with a neurotransmitter called dopamine. A small number of very specific brain cells make dopamine. These brain cells reside in an area of the brain called the substantia nigra. The substantia nigra is in a deep part of the brain called the brainstem. Though only a few cells make dopamine, these cells send it to many different regions of the brain. Because of this, changes in dopamine levels can have widespread effects within the brain.

When we are young, our brains make plenty of dopamine. As we get older, this amount decreases. In PD, the amount

of dopamine becomes critically low. The changes occur very slowly, as the amount of dopamine gradually decreases over time. The gradual loss of dopamine causes the gradual worsening of movement. In early PD, as in this study, the symptoms may be mild.

### Treatments for PD

There are many medications to treat the symptoms of PD. Many decrease the tremor. They also improve mobility, posture, and gait. Over time, as a person's PD worsens, he or she may require more medicine (and often, combinations of medications). With more medicine comes more side effects. The most common side effects include nausea and dizziness.

Deep brain stimulation (DBS), most often directed to a specific brain region called the subthalamic nucleus, has been used for many years to treat the symptoms of PD. DBS sends very small electrical signals to brain cells that are important in a person's movement. These impulses improve movement and reduce tremor without the side effects associated with medications. This treatment is considered safe and effective for PD.

### For more information

#### **Brain & Life**

[brainandlife.org](http://brainandlife.org)

#### **Parkinson's Resource Organization**

[parkinsonsresource.org/](http://parkinsonsresource.org/)

#### **American Parkinson Disease Association**

[apdaparkinson.org/](http://apdaparkinson.org/)

#### **Michael J. Fox Foundation for Parkinson's Research**

[michaeljfox.org/](http://michaeljfox.org/)

### Reference

1. Hacker ML, Turchan M, Heusinkveld LE, et al. Deep brain stimulation in early-stage Parkinson disease: five-year outcomes. *Neurology* 2020;95:e393–e401.

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DOI 10.1212/WNL.00000000000009952

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