

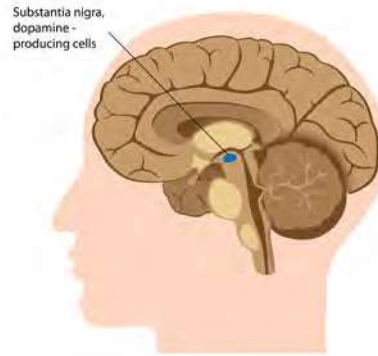
No cure for PD exists today, but research is ongoing and medications or surgery can often provide substantial improvement with motor symptoms.

What causes the disease?

2 Parkinson's disease occurs when nerve cells, or neurons, in the brain die or become impaired. Although many brain areas are affected, the most common symptoms result from the loss of neurons in an area near the base of the brain called the *substantia nigra*. Normally, the neurons in this area produce an important brain chemical known as *dopamine*. Dopamine is a chemical messenger responsible for transmitting signals between the substantia nigra and the next "relay station" of the brain, the *corpus striatum*, to produce smooth, purposeful movement. Loss of dopamine results in abnormal nerve firing patterns within the brain that cause impaired movement. Studies have shown that most people with Parkinson's have lost 60 to 80 percent or more of the dopamine-producing cells in the substantia nigra by the time symptoms appear.

PD does not only affect the brain or the central nervous system, but the entire body. In fact, it is widely believed that the disease starts in the peripheral nervous system, in areas such as the intestine, where the nature and features of the disease can be present many years before involving the brain. The autonomic nervous system, which controls many automatic functions such as breathing and movements of the intestines, is affected, leading to characteristic signs and symptoms ranging from constipation to pain to skin changes. While the brain involvement is

Parkinson's disease



responsible for the core features, other affected locations contribute to the complicated picture of PD.

The affected brain cells of people with PD contain Lewy bodies—deposits of the protein alpha-synuclein.

Researchers do not yet know why Lewy bodies form or what role they

play in the disease. Some research suggests that the cell's protein disposal system may fail in people with PD, causing proteins to build up to harmful levels and trigger cell death. Additional studies have found evidence that clumps of protein that develop inside brain cells of people with PD may contribute to the death of neurons. Some researchers speculate that the protein buildup in Lewy bodies is part of an unsuccessful attempt to protect the cell from the toxicity of smaller aggregates, or collections, of synuclein.

Genetics. Scientists have identified several genetic mutations associated with PD, including the alpha-synuclein gene, and many more genes have been tentatively linked to the disorder. Studying the genes responsible for inherited cases of PD can help researchers understand both inherited and sporadic cases. The same genes and proteins that are altered in inherited cases may also be altered in sporadic cases by environmental toxins or other factors. Researchers also hope that discovering genes will help identify new ways of treating PD.

Environment. Exposure to certain toxins has caused parkinsonian symptoms in rare circumstances (such

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