

# Parkinson's Disease

## Symptoms/Etiology

Parkinson's disease is a neurodegenerative disease characterized by motor impairments, such as a resting "pill-rolling" tremor, bradykinesia and cogwheel rigidity (1, 2, 3, 4, 5, 6). Specifically it involves the dysfunction of the substantia nigra within the basal ganglia and the frontostriatal circuits in the brain (3, 5). The motor impairments result from cell loss in the substantia nigra, also known as apoptosis. Apoptosis is a normal process that occurs in fetal development in order to rid the body of unnecessary cells (1). However, in Parkinson's disease, an excess number of cells are rid from the body, resulting in the loss of good cells and the depletion of the neurotransmitter, dopamine (1, 3). The cause of apoptosis in Parkinson's disease is unknown, however, there are several theories as to why this occurs, including genetics, environmental toxins, infection, and excitotoxicity (1). The presence of Lewy Bodies, which are abnormal cell inclusions, in the substantia nigra and brainstem is another indicator of Parkinson's disease (1, 2).

Parkinson's disease affects about 500,000 people in the United States (1). The age of onset is around 60 years with prevalence increasing until the 9th decade (2, 5). More men are diagnosed with Parkinson's disease than women. In general, it is classified as a movement disorder that results in tremors, rigidity, posturing and unstable gait.

Motor difficulties are initially unilateral and tend to become bilateral as the disease progresses, although asymmetry in severity is often present (4). Difficulty typically starts in the upper extremities and may result in a decrease in dexterity, aching or tightness in muscles, unsynchronized swinging of arms and feet and a shorter, unsteady gait (4). As the disease progresses, the individual may have difficulty swallowing, drooling, difficulty maintaining balance, and/or the inability to move. PET and SPECT scans show decreased activation in the motor areas (1). Other symptoms of Parkinson's disease include masked facies or hypomimia (decrease in spontaneous blinking and facial expressions), micrographia (small handwriting), postural instability, festinating gait and bradyphrenia (slow but accurate responding). Anxiety and depression also frequently accompany the symptoms of Parkinson's disease.

## Cognitive Functioning

People with Parkinson's disease often report a significant amount of distress regarding their day to day functioning (4). Problems with attention, concentration, problem-solving, planning, sequencing and memory are often reported. These types of problems are reflective of the dysfunction in the frontostriatal regions of the brain that often express themselves early in the course of the disease (3, 5). Decreased processing speed and cognitive slowing are also commonly reported problems. Studies have shown that individuals tend to have difficulty on executive functioning tasks, as well as on measures of divided or selective attention. Another common finding is impaired facial matching skills. (2). One study found that 19% of individuals diagnosed with Parkinson's disease demonstrated cognitive impairment in addition to physical symptoms. More specifically, 25% of individuals in a study had impaired scores on 3 or more cognitive tests, specifically those assessing executive functioning and memory (5). The progression of Parkinson's disease is usually insidious over the course of 5-15 years and 20-40% of cases progress to a level of dementia (4, 6). Decline in physical functioning, including activities of daily living and self-care, is expected

to increase as the disease progresses (4).

## Treatment

In terms of treatment, dopaminergic medication may have an ameliorative affect on cognitive functioning. In particular, there is evidence that Levodopa (L-dopa) may improve some aspects of cognitive functioning, particularly executive functioning skills, but may also have an impairing effect on others, such as inhibitory control (6). Some of the side effects of L-dopa include sweating, dizziness, tachycardia, pain, restlessness, anxiety, panic attacks, confusion, depression, decreased alertness, etc. Other forms of treatment include surgical treatments such as a pallidotomy or deep brain stimulation (DBS). These options are available for patients with severe motor symptoms, however, they may result in some level of specific cognitive decline (6). A neuropsychological evaluation can be beneficial in identifying and tracking areas of cognitive decline, as well as providing recommendations and compensatory strategies for dealing with such decline.

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## References

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