

# Cognitive Changes in Parkinson's Disease

## Cognitive symptoms

Cognitive symptoms in Parkinson's disease (PD) are common, though not every person experiences them. Cognitive changes range from mild problems that do not impact daily functioning, to more severe deficits that do impact daily functioning.

Cognition refers to the mental abilities we use to process information and apply knowledge. There are many different kinds of cognitive skills. Executive function and visual-spatial skills are the cognitive abilities most frequently affected in PD. Attention, working memory, and language can also be affected as the disease progresses.

**Executive function:** Executive function includes the ability to plan, organize, initiate, and regulate activities with a specific goal in mind. These activities may include solving problems, starting new tasks, and switching tasks.

**Visual-spatial skills:** Visual-spatial skills allow us to estimate distances, navigate in space, use mental imagery, copy drawings, or construct objects. Examples include being able to give someone directions by tracing the route in your mind or putting together a puzzle.

**Attention and working memory:** Attention is the ability to selectively focus on a particular part of one's environment, even in the face of distraction. In PD, people may find it difficult to concentrate on a conversation, read a book, or talk to someone while walking. Working memory refers to the process of temporarily storing information in one's mind and manipulating it over a short period. Doing mental arithmetic requires working memory, as does carrying on a conversation.

**Language:** The most common language problem in PD is finding the "right" words. This is sometimes referred to as tip of the tongue phenomenon. People with PD also tend to speak less and use simpler speech. Language difficulties can be frustrating for the person with PD and care partners because verbal communication is such an important part of human interaction.

## Cognitive evaluation

There are several ways to assess cognition. Reports from the person with PD and the care partner are important. The physician may ask questions about cognitive function, whether the person with PD's cognitive problems represent a change from prior functioning, and what impact the problems are having on activities of daily living or work. In some cases, the physician will want to refer the person with

PD for a comprehensive neuropsychological evaluation. This includes multiple tests with oral or written answers that assess different cognitive domains. Evaluations range from about 45 minutes to several hours.

## Mild cognitive impairment and dementia

Mild cognitive impairment (MCI), also referred to as mild neurocognitive disorder, is an early stage of cognitive difficulties that does not interfere with a person's ability to perform activities independently. Someone with MCI has thinking problems that are greater than expected for a person's age and level of education, and they are often aware that their thinking is not what it once was. MCI occurs in about 25% of people with PD. We now recognize that these mild cognitive changes can occur early in the course of PD and even at diagnosis.

Dementia refers to deficits in more than one cognitive area which do impair everyday functioning. There may be as high as a 50% conversion from MCI to dementia over a 5-year period. When dementia develops early in PD, the correct diagnosis may be Dementia with Lewy bodies.

## Causes of cognitive impairment in PD

PD is characterized by abnormal protein accumulation in multiple brain regions. In some people, this occurs in brain regions responsible for cognitive processes, and this is believed to contribute to cognitive impairment in PD. People with PD may also develop the kind of brain changes seen in Alzheimer's disease, or they may have cerebrovascular disease (impaired blood flow in the brain), both of which cause cognitive impairment.

It is important to note that there are treatable causes that can worsen cognitive function. If these are identified and addressed, then cognitive function may improve. These include: thyroid disease, vitamin B12 deficiency, intercurrent infection such as urinary tract infections or pneumonia, seizures, strokes, head trauma, medication side effects (including those causing sleepiness or confusion), hearing loss, orthostatic hypotension, dehydration, hearing loss, and poor sleep. Depression may mimic cognitive impairment. Correcting the underlying problem where possible can lead to improvement.

Some medications used to treat PD, such as anticholinergic medications, may increase the risk for hallucinations and confusion, especially in older people. These include

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trihexyphenidyl (Artane®) and benztropine (Cogentin®). Anti-cholinergic medications can also be used to treat some of the non-motor symptoms of PD such as urinary difficulties, so reviewing all medications for their potential contribution to cognitive issues is vital. Dopaminergic medications which work to increase dopamine in the brain may also cause hallucinations and confusion in some. For other people, they may find that their dopaminergic medications improve aspects of their cognition.

## Management strategies

If cognitive problems develop abruptly, the physician may first search for an infection, new neurological problem (e.g., stroke), or newly prescribed medication. If the cognitive problems gradually develop, the evaluation may differ, and examination by a neurologist, neuropsychologist, or specialist in cognition may be helpful.

Medications used to treat dementia in PD are the same as those used in Alzheimer's disease. The medications include donepezil (Aricept®), rivastigmine (Exelon®), and galantamine (Razadyne®). To date, only rivastigmine is FDA-approved specifically for PD dementia. Cognitive benefits of these medications in clinical research studies have been modest. Side effects include nausea, diarrhea, and in some, worsened tremor. Memantine (Namenda®) is another Alzheimer's medication; it requires further study in PD dementia. There are multiple medications currently being studied in clinical trials for their potential use in PD-related cognitive disorders.

Cognitive rehabilitation refers to interventions that aim to improve or maintain a person's participation in daily life activities by improving cognitive function. This could include restorative training in which a cognitive task is practiced, or compensatory training in which strategies are taught to work around cognitive challenges, such as using various organizational techniques and alarms.

Diet and exercise play important roles in maintaining cognitive health. There is evidence that cardiovascular fitness is associated with better cognitive scores in PD. There is also evidence that brain health may be enhanced by adherence to the Mediterranean diet which favors vegetables, fruits, grains, legumes, low fat proteins such as fish and poultry, and olive oil.

There are some steps that can be taken to make cognitive challenges easier. Simplifying activities into smaller steps, using daily planners to keep track of events and time, and making "to do" checklists are good strategies. Maintaining a regular routine for daily activities and exercise is important. Household items (e.g., utensils, glasses, keys) should be kept in the same place every day, and drawers can be labeled. People with PD often respond better when given choices or cues, particularly if word-finding difficulties or slowed thinking is present. Just like physical exercise, mental "exercise" is important. Mental activities can include doing puzzles, playing cards, reading books, going to lectures or concerts, or learning a new activity. These can be coupled with physical exercise such as learning new dance steps. Just like with physical exercise, there is no single "right" mental exercise. Social interactions are an important source of mental stimulation, and many activities can be done with friends or family members.

Driving is an important safety issue to address as it involves many cognitive and motor processes. Some occupational therapists perform simulated or on-the-road driving tests that can help physicians and families make decisions about driving abilities. Social workers can be valuable assets to help patients and care partners deal with the stressors and frustrations of cognitive impairment.

### National Headquarters

American Parkinson Disease  
Association  
PO Box 61420  
Staten Island, NY 10306

Telephone: 800-223-2732

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

Email: [apda@apdaparkinson.org](mailto:apda@apdaparkinson.org)

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