

## Thinking and Memory

**By Zoran Grujic, MD and Michael Mercury, PhD**

People with Parkinson's disease may experience changes in how their brain processes information. Young people often find that staying focused and multi-tasking are more difficult for them and that their memory is not as good as it used to be. Typically, three areas of thinking are impacted in Parkinson's disease: memory, speed of processing information, and executive functioning. Any changes in mental functioning are often best evaluated by neurologists and neuropsychologists associated with memory and cognitive assessment centers.

### Memory

In general, normal memory consists of three components: encoding, storage, and retrieval. People with PD are typically able to learn (encode) and store new information. The problem in PD lies, instead, with the retrieval of newly presented information.

Specifically, when someone with PD tries to remember something, they may not be able to spontaneously recall the information. They may think that they have forgotten what they had learned. In most cases, what is happening is that the information is in the memory stores; however, the individual is having problems accessing the information. If the person is given cues or reminders he or she will usually be able to "remember" the information.

Not being able to spontaneously recall can lead to feelings of anxiousness and frustration, compromised attention, and difficulties with initial learning and recall. Additionally, people with PD have a greater risk for clinical anxiety and depression which can further impact memory. Treatment of these conditions can enhance the ability to encode, store and retrieve information.

In today's technology-centered world, use of Palm or Blackberry devices allow someone with retrieval memory problems to be cued for important events in an efficient and developmentally appropriate manner. A key point here is that in PD, people are not actually forgetting, even though it may appear that way. Being aware of how the recall process is impacted, and learning how to modify behavior to maximize recall, can be very helpful.

### Speed of Processing

Speed of processing refers to how quickly the brain is able to process and use information. Diminished speed of processing may result in an individual

remembering something better after some time has elapsed, than when trying to recall it immediately. Speed of processing can impact several areas of thinking by compromising a task that one can otherwise, intellectually, do appropriately. For example, extra time may be needed to accomplish certain tasks such as balancing a checkbook or giving a presentation at work. "Thinking on your feet" when asked a question may present a challenge. It can be reassuring to remember that it is the speed of processing, not intelligence, that is being affected.

## Executive Functioning

Executive functions include cognition (thinking) and behavior. Cognition involves problem solving, organizing, planning, and being able to shift easily between tasks (e.g., multi-tasking). Behavior involves modulating actions in response to social cues. People who experience problems with executive functioning may have difficulty making decisions or completing projects at work (cognition) or may act out in impulsive ways (behavior). Problems with behavior may result in actions that are interpreted as more extroverted, with individuals more prone to say exactly what is on their mind. In extreme cases, individuals can have difficulties controlling impulses which can lead to embarrassing or dangerous situations (e.g., inappropriate remarks, high-risk behaviors such as gambling). The impulses can be difficult to control even though, intellectually, the person knows the appropriate way to behave. These behaviors are not conscious choices people are making. Some medications used to treat PD symptoms as well as the progression of the disease may be contributing to the behaviors (see *Impulsive Behaviors* section).

## Treatment

Cognitive and memory decline in people with Parkinson's disease is often misinterpreted as laziness, carelessness, or willful lack of cooperation and participation in activities of daily living. This is usually not the case. It is important to discuss any changes in memory, thinking, or behavior with your physician as early as possible so an appropriate course of action with regard to assessment and treatment can be determined.

Treatment decisions for memory loss associated with PD are based on several factors including the degree of memory loss, the severity of the PD motor deficits, and other medical conditions the person may have. As with any other chronic disease, it is important to look for potential causes other than

PD that may account for changes in memory. Medical problems such as infections, sleep disorders, vitamin deficiencies, and medication toxicity can also lead to confusion and memory loss.

Mood disturbances such as depression or anxiety can cause significant problems with attention and also need to be recognized as potential causes of a decline in mental functioning. Treatment choices for anxiety and depression include psychotherapy and medications. Psychotherapy can be helpful in reinforcing the fact that the person with PD is not “forgetting,” and can provide support and direction in developing compensatory strategies.

At this point in time, there are no pharmacological therapies that have been approved by the Food and Drug Administration (FDA) for the treatment of “simple” memory loss or executive dysfunction associated with PD. However, the FDA has approved rivastigmine (Exelon®) to treat Parkinson’s-related dementia. Exelon® is an acetylcholinesterase inhibitor. It increases a chemical in the brain called acetylcholine which is involved in memory processing. The B vitamins (B12, B6) and folic acid may have a role in decreasing the risk of developing a dementia by lowering a chemical in the blood called homocysteine. High levels of homocysteine have been associated with arteriosclerosis and memory loss. Regular physical exercise has also been shown to delay the onset of dementia. Studies have also found that keeping one’s brain active in intellectual and social activities delayed the onset of memory loss or decreased the risk of developing Alzheimer’s disease. These studies seem to confirm the idea: “Use It or Lose It.”

One question which often arises is whether cognitive changes inevitably lead to dementia. Dementia is defined as a disease of the brain in which at least two areas of cognitive functioning (e.g., memory, executive functioning) are impaired. Activities of daily living must also be compromised by these changes to qualify for a diagnosis of dementia. In Parkinson’s disease, cognitive changes do not inevitably lead to dementia. In fact, it is believed that dementia occurs less frequently in individuals with young onset Parkinson’s disease. However, if you feel you are having difficulties in any of these areas, memory assessment clinics are available in many hospitals and can be helpful in determining the cause(s) and prescribing treatment for changes in memory or cognitive functioning. Movement disorders centers may also be able to provide referrals for appropriate evaluations.