

# NEUROPSYCHOLOGY TODAY

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## Demographics, Symptoms, & Treatment of Parkinson's Disease

Parkinson's Disease (PD) affects about 1.5 million people in the US, with 60,000 new cases diagnosed each year. It is the most common neurodegenerative disease after Alzheimer's disease. More males than females are diagnosed with PD. Older age is also associated with this condition; however, early onset PD may strike around age 40 years. Ethnicity has not been found to be related to PD.<sup>1</sup>

PD is a chronic progressive neurodegenerative disorder of the brain and a movement disorder. PD results from neuron death or impairment in the "substantia nigra" region of the brain, which is linked to movement (see image below). When most of dopamine-producing cells in substantia nigra are damaged, the smooth function of muscles and body movement is interrupted, and the symptoms of PD become evident.<sup>1,2</sup>

Importantly, research evidence suggests that in addition to dopamine system, PD affects other neurotransmitters such as serotonergic, noradrenergic, and cholinergic systems. This finding possibly explains the wide range of motor and non-motor

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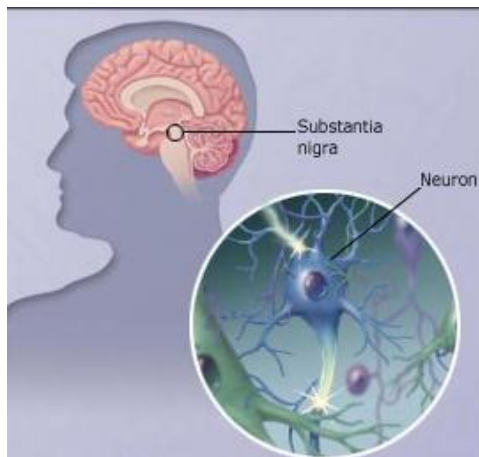
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## Dementia in Parkinson's Disease

Dementia is referred to as a global decline of intellect, memory and personality. Dementia is found in 20%-44% of PD patients, and in as many as 90% of PD patients residing in nursing homes.<sup>2</sup> Older age of onset of disease (65 years or older), more severe motor symptoms, lower level of baseline cognitive functioning, presence of psychotic symptoms due to medications, and dementia in other family members have all been linked to an increased risk of dementia among the PD patients.<sup>2</sup>

PD-related dementia involves cortical and subcortical neuropsychological impairments, including impairment of executive, attentional, and visuospatial functions, in addition to pronounced behavioral disturbances. Development of dementia is a poor prognostic factor associated with a greater risk of admission to a nursing home and an increased mortality.<sup>2</sup>



## It's Not Just the Tremor: Cognitive Dysfunction in PD and its Treatment

Cognitive symptoms are frequent in non-demented PD population. It has been documented that about 50% of PD patients experience cognitive impairment that is not severe enough to be classified as dementia and may appear even at early disease stages. Executive dysfunction is among the primary cognitive impairments in PD and is characterized by deficits in planning, sequencing, multitasking, temporal structuring, set shifting, and monitoring of goal-directed behavior. Deficits in executive functioning have been linked to damaged frontal-striatal circuitry of the brain. Other neurocognitive symptoms may include slowed thinking (bradyphrenia), poor attention, working memory, and visuospatial ability.<sup>2</sup>

It has been established that depression, which affects as many as 40% of PD patients may mediate the extent of cognitive impairment in PD.<sup>3</sup> It is unclear whether cognitive symptoms are related to the age of disease onset, disease duration, and motor symptoms.<sup>1</sup>

As mentioned earlier, pharmacological treatment has been generally ineffective in addressing cognitive symptoms of PD. Moreover, the dopaminergic replacement therapy, which may

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In addition to the typical for PD tremor, rigidity, loss of balance and coordination, and slowness of movement, symptoms of PD may include restricted facial expression, difficulties with speech and swallowing, stooped posture, bladder/bowel dysfunction, hypersensitivity to cold or hot temperatures, abnormal sweating, sexual dysfunction, sleep disturbances, and pain.<sup>1,2</sup>

In many cases, PD patients may experience symptoms unrelated to their physical functioning. They include cognitive dysfunction and dementia, emotional difficulties (anxiety, depression), and personality and behavior changes (poor impulse control, paranoia and hallucinations).<sup>2</sup> These symptoms are often less appreciated than the motor manifestations of PD, but may be more disabling and distressing for both the patients and their caregivers compared to physical impairments. Non-motor symptoms may appear early or late in the disease and sometimes before the onset of the first motor symptoms.

The treatment of PD generally involves surgical or pharmacological interventions that mainly target physical impairments of the patients. Non-pharmacological interventions have been successfully employed in some studies, but again, they mainly focused on physical features of the disease and included occupational therapy, physiotherapy, and speech therapy.<sup>2</sup> As for the non-motor symptoms of PD, they are frequently not responsive to medications utilized for the treatment of PD. Emerging research studies have been partially successful in addressing non-motor symptoms of PD.<sup>4,5</sup>

*“It’s Not Just the Tremor: Cognitive Dysfunction in PD and its Treatment,” continued from p. 1)*

partially improve cognitive functioning in PD is often complicated by such side effects as psychosis, delirium, and other behavioral disturbances. Some promising results have been reported with regard to the effectiveness of cholinesterase inhibitors on cognitive and behavioral functioning in PD. However, more research needs to be done in this area in order to draw more definite conclusions.<sup>2</sup>

Cognitive Rehabilitation (CR) is a non-pharmacological treatment of cognitive deficits that involves consistent exercises aimed at improving the patients’ cognitive functioning or compensating for their neurocognitive deficits. CR has been successfully utilized for the treatment of Traumatic Brain Injury (TBI) and stroke-related cognitive impairment.<sup>4</sup>

In our own practice, we develop an individualized CR treatment program for each patient based on his or her objectively identified neurocognitive deficits, subjectively reported difficulties in daily living, premorbid intelligence, current level of functioning, and lifestyle. For instance, if a person experiencing cognitive decline is a professional who is still working, the focus of CR is to prolong his/her employment and independence for as long as possible. Thus, the exercises would be targeting organization, multi-tasking, prioritizing, comprehension, memory, and information processing skills.<sup>6</sup>

Even though limited research has been performed in the area of CR in PD, the existing literature provided some promising results with regard to the effectiveness of this treatment for PD patients. Specifically, it has been shown that

CR may improve executive abilities, nonverbal reasoning, verbal fluency, and narrative memory in non-demented individuals with PD.<sup>5,7</sup> These findings are significant in the light of the progressive nature of the disease associated with continuous worsening of symptoms.

#### **About Dr. Rimma Danov**

Dr. Rimma Danov received her PhD in clinical psychology from Adelphi University in NY. She completed her internship in clinical psychology and neuropsychology at Harvard Medical School and postdoctoral fellowship in pediatric and adult neuropsychology in a private clinic affiliated with NJ Medical School and the Robert Wood Johnson Medical Center. She is an assistant clinical professor at NYU School of Medicine, Dept. of Neurology, Penn State University, Dept. of Kinesiology, and Adelphi University, Derner Institute. In the past, she worked as a neuropsychologist for the NJ Devils Hockey Team and was engaged as a co-investigator of TBI in boxers at the NYS Athletic Commission.

Presently, Dr. Danov maintains a full-time private neuropsychology practice where she examines neurocognitive and neurobehavioral functioning of patients 2-90 years of age with various neurological and neuropsychiatric disorders, such as MS, TBI, CVA, Parkinson’s, Alzheimer’s, dementia, ADHD, PDD, Autism, learning disabilities, seizures, and many others, using state-of-the-art neuropsychological techniques. Dr. Danov also conducts and publishes research in these areas. She is available for medico-legal consultations and testimony.

## Daily Functioning of Patients with Parkinson's Disease

The researchers and clinicians conventionally refer to the patients' everyday functioning as Activities of Daily Living, or ADLs. Physical ADLs are basic tasks such as feeding and grooming, while instrumental ADLs are more complex tasks requiring multi-step procedures, such as going shopping or cooking. Additionally, the term "cognitive failures" refers to every day cognition-related difficulties, including the use of the wrong words, forgetfulness, and distractibility. Cognitive failures may seriously threaten safety of PD patients and their caregivers in such instances as when they forget to take their medication or to turn off the stove.<sup>7</sup>

Difficulties in ADLs are usually explained by underlying cognitive deficits, unless they are due to the motor or psychiatric symptoms. It has been established that many non-demented PD patients exhibit a wide range of neurocognitive deficits, as assessed by the objective neuropsychological (NP) tests.<sup>2</sup>

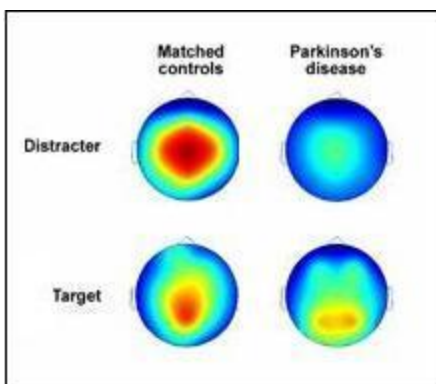
However, NP exam is not the only source of information used to evaluate the cognitive functioning of individuals with PD. Subjective reports from both the patients and their caregivers provide the information with regard to how the patients' cognitive symptoms affect their daily functioning. It is possible for a person to score normally on a test but complain of problems in daily life. It may also happen that the person with objectively identified cognitive deficits functions well in day-to-day situations.<sup>8</sup>

Nevertheless, some research findings provide evidence for the link between NP scores and daily functioning,<sup>8</sup> which underlines the importance of multi-dimensional

assessment that includes both the objective NP exam and the subjective self- and caregiver reports.

According to research, scores on the measures of executive functioning predict the patients' ability to engage in instrumental ADLs. Of note, executive dysfunction is thought to be at the heart of cognitive dysfunction found in PD and is usually among the earliest cognitive impairments in PD patients. Additionally, such activities as reading, watching television, and keeping appointments have been linked to performance on attentional and verbal NP tests.<sup>8</sup>

The link between NP scores and instrumental ADLs, in addition to the presence of cognitive symptoms early in the disease point to the importance of early NP assessment of neurocognitive functions and their close monitoring over time. Early detection of cognitive deficits through objective NP exam allows addressing these deficits before they become evident in patients'



*The image above shows topography mappings of brain activation among Parkinson's Disease (PD) patients and healthy matched controls during a visual task. The task involved responding to target stimuli with distracter ("Distracter") and without distracter ("Target"). Evidently, PD patients exhibited lower activation of 1) dopaminergic pathways in frontal attentional operations and 2) norepinephrine pathways in temporoparietal memory operations.*

ADLs and before these deficits significantly limit patients' quality of life.<sup>8</sup> Additionally, NP exams may provide useful information with regard to the progress of neurocognitive decline and the possibility of developing PD dementia in the future.<sup>9</sup>

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### Image credits:

1. Background image (pp 1 & 4): Jeff Johnson Biological and Medical Visuals.
2. Substantia Nigra (p1): webmd.com
3. Topography image (p3): Polich et al. (2007). scripps.edu/news/sr/sr2007/mind07polich.html

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**Next Issues** July'09: Seizure Disorders; August'09: Dementia

**We take the following insurance plans:**

Aetna	HIP
Americhoice	Magnacare
Amerigroup	Medicare
BCBS	MHN
Cigna	Multiplan
Elderplan	No-Fault
Fidelis	Tricare
First Health	UHC/Oxford
HealthNet	Workers' Comp
Health Plus	1199

Case dependent:

Affinity	GHI HMO
Atlantis	Health First

Each insurance carrier determines the medical necessity of every requested neuropsychological exam differently. Our billing staff determines whether the exam will be covered by the insurance before the exam

begins and works very hard to obtain an authorization, if needed. If you have questions about a plan that is not listed here, contact our office to find out whether we can obtain an authorization or have recently joined that plan.

**Languages**

We are very much open to diverse cultures in this practice and value the quality of a bilingual neuropsychological exam performed in the patient's native language. Dr. Danov is a native Russian speaker. Her current clinical staff include native **Russian, Spanish** and **Hebrew** speakers.

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