

## MODERN MANAGEMENT OF PARKINSON'S DISEASE – PHARMACOLOGICAL, SURGICAL, AND NEUROPROTECTIVE APPROACHES

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**Abstract:** The management of Parkinson's disease has evolved from solely symptomatic treatment to a multifaceted strategy combining pharmacological therapy, surgical interventions, and multidisciplinary care. This article reviews current treatment options, including emerging neuroprotective and disease-modifying strategies.

**Keywords:** Parkinson's disease, levodopa, deep brain stimulation, dopamine agonists, neuroprotection, stem cell therapy, GDNF.

### Introduction

The primary therapeutic goal in Parkinson's disease is to alleviate symptoms, maintain functional independence, and improve quality of life. While no definitive cure exists, early and individualized treatment can significantly delay disability.

### Pharmacological Treatment

Levodopa remains the most effective medication for PD, usually combined with peripheral decarboxylase inhibitors (carbidopa or benserazide). Dopamine agonists (pramipexole, ropinirole, rotigotine), monoamine oxidase B (MAO-B) inhibitors (selegiline, rasagiline), and catechol-O-methyltransferase (COMT) inhibitors (entacapone, opicapone) are widely used.

Long-term therapy often results in motor complications, including wearing-off phenomena and levodopa-induced dyskinesias, necessitating complex medication adjustments.

### Surgical Treatment

Deep brain stimulation (DBS) is an established treatment for advanced PD with motor complications refractory to medical therapy. Common targets include the subthalamic nucleus (STN) and globus pallidus internus (GPi).

Patient selection, surgical accuracy, and postoperative programming are critical determinants of success.

### Rehabilitation and Multidisciplinary Care

Physical therapy, occupational therapy, speech and language therapy, and nutritional counseling play major roles in maintaining mobility and functional independence. Exercise has been shown to improve motor function and neuroplasticity.

### **Emerging and Experimental Therapies**

Ongoing research focuses on disease-modifying strategies, including  $\alpha$ -synuclein-targeted immunotherapies, gene therapy, stem cell transplantation, and neurotrophic factors such as glial cell line-derived neurotrophic factor (GDNF).

### **Non-Motor Symptom Management**

Depression, anxiety, cognitive impairment, psychosis, sleep disturbances, autonomic dysfunction, and pain require targeted treatment and significantly affect quality of life.

### **Future Perspectives**

Precision medicine approaches based on genetic and molecular profiling may allow tailored therapies for individual patients in the future.

### **Conclusion**

The management of Parkinson's disease is increasingly complex and requires a personalized, multidisciplinary approach. Continued research is essential to develop truly disease-modifying therapies.

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