# Chapter 12
# Parkinson's Disease:
## A Progressive Disorder of the Nervous System That Affects Movement

**Vaibhav Walia**
*Maharshi Dayanand University, India*

**Ashish Gakkhar**
*Maharshi Dayanand University, India*

**Munish Garg**
*Maharshi Dayanand University, India*

## ABSTRACT

*Parkinson's disease (PD) is a neurodegenerative disorder in which a progressive loss of the dopaminergic neurons occurs. The loss of the neurons is most prominent in the substantia nigra region of the brain. The prevalence of PD is much greater among the older patients suggesting the risk of PD increases with the increase of age. The exact cause of the neurodegeneration in PD is not known. In this chapter, the authors introduce PD, demonstrate its history, pathogenesis, neurobiology, sign and symptoms, diagnosis, and pharmacotherapy.*

## INTRODUCTION

Parkinson's disease (PD) was first introduced by James Parkinson and arises by the progressive death of the dopamine neurons in the midbrain (Dauer & Przedborski, 2003). Neuronal cell death in the SN region in PD gives rise to the deficiency of dopamine in various region of brain including striatum, basal ganglia (BG) and subthalamic nucleus (STN) (Forno, 1996; Hornykiewicz & Kish, 1987). Increase in the age generally above 65 years increased the risk of the PD development; only a small number of individuals develop PD in early ages suggesting aging increased the risk of PD (Olanow & Tatton, 1999; Tanner, 2003). Thus older age individuals are particularly susceptible to PD (Fahn, 2003; Moghal et al,

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1994). The death of the dopaminergic neurons in PD results in the development of the motor symptoms of the PD (Goldenberg et al, 2008). The exact mechanism of the neuronal cell death in PD is not known completely, however it suggested that the mutations in the number of genes linked PD (Mizuno et al, 2001; Van Den Eeden et al, 2003). The prevalence of the familial PD is approx. 5% whereas for sporadic forms it is about 95% (Farrer, 2006; Tanner, 2003). In this chapter authors demonstrate the history, pathogenesis, neurobiology, symptoms, diagnosis and pharmacotherapy of PD.

## BACKGROUND

SN region of the brain is rich in the dopamine containing neurons and the neuronal cell death in the SN region increases with the increase in the age and thus increased the risk of PD (Olanow & Tatton, 1999; Tanner, 2003). The death of the dopaminergic neurons in PD results in the development of the motor symptoms of the PD (Goldenberg et al, 2008). The exact mechanism of the neuronal cell death in PD is not known completely. Further it has been reported that besides SN region the neuronal cell death also occurs in the various other regions of the brain responsible for the complexity of the pathogenesis and the variety of the symptoms observed in the patients of the PD. However there are several therapeutics options are present for the pharmacotherapeutics of the PD patients but till date there is no suitable pharmacotherapeutic agent which can stop the neuronal degeneration in the PD. Further the complexity of the symptoms often makes the diagnosis and the therapeutics of the PD patients difficult. The present chapter demonstrates the history, genetics, neuronal degeneration, symptoms and the therapeutics of PD in details

## HISTORY OF PARKINSON'S DISEASE

In 1817 James Parkinsons wrote "Essay on the Shaking Palsy" and described features including flexed posture, resting tremor, and shuffling gait in his monograph (Parkinson, 1817). After Parkinson, 50 years later use the term "Parkinson's disease". He demonstrated that the PD patients did not have tremor necessarily. He suggested that PD patients performs all task, but performs the task slowly suggesting the problems lies in the execution. Charcot defines two prototypes of PD, rigid and tremorous PD (Charcot, 1872). William Gowers, suggested that males are more susceptible to PD and described the impairment in the movement of fingers in PD patients (Gowers, 1898). Richer and Meige demonstrated the clinical and morphologic details regarding the various stages of PD (Richer & Meige, 1895). Adams and colleagues first described the degeneration of neurons in the SN region (Adams et al, 1964). Brissaud described the neuronal damage in the SN region as the anatomical seat of PD (Brissaud, 1895). Involvement of midbrain in context of PD were then described (Foix & Nicolesco, 1925; Tretiakoff, 1919). Greenfield & Bosanquet, described the involvement of brainstem in PD (Greenfield & Bosanquet, 1953). Hoehn & Yahr, described the stages to described the clinical progression of the PD (Hoehn &Yahr, 1967). The development of MPTP proves beneficial as it damages SN regions, so that the potential compounds can be tested in the preclinical studies (Langston et al, 1983).