

## Parkinson's Disease

### *What is Parkinson's disease?*

Parkinson's disease is common in the elderly, with most cases occurring after 50 years of age. It affects about 1% of the population at age 65, rising to nearly 5% by age 85. Parkinson's disease is a degenerative disease that slowly affects specific regions of the central nervous system. The area most usually affected is called the substantia nigra, which mainly contains cells producing dopamine to control certain movements. The cell death in the substantia nigra results in a loss of dopamine, causing movement-related symptoms such as tremor and muscle stiffness.

### *The symptoms and early signs of Parkinson's disease*

In most of the cases, movement-related symptoms are the first to be noticed. Majority patients have all or some of the typical movement symptoms, such as tremor at rest, stiff limbs with "lead-pipe" like muscle tone, slow movements, shuffling walk with short steps, and impaired balance. Similar signs can also be seen in other conditions, but in these cases they may not respond well to the medication that can work effectively on Parkinson's disease. Later symptoms in Parkinson's disease may include disabilities in attention, memory, producing and understanding language, making decisions, and problem solving. Other sensory, social disabilities, and emotional problems may also arise. Secondary complications, especially pneumonia and fall-related injuries, may be seen in the late course of Parkinson's disease.

### *The initial diagnosis*

An accurate diagnosis, especially in the early course of Parkinson's disease, largely relies on examination by an experienced neurologist to distinguish it from other similar conditions. With this in mind, the ideal specialists to seek for initial diagnosis would be neurologists with experience in movement disorders. To accept the initial diagnosis and to face the gradual loss of independence in life can be difficult, but being well informed about the disease can not only reduce anxiety for the patient about their future, but increase the awareness of their relatives and enable preparation for the possible changes in a supportive way.

### *The prognosis and current management*

Parkinson's disease will eventually affect every aspect of life, including work, social activities, and routine activities. It reduces longevity, but is not fatal. The average life span of Parkinson's disease patients is similar to that of the population without this disease. The worldwide mean duration of survival is more than 15 years from disease recognition until death. However, the duration varies from country to country due to the clinical condition and differing community care services. It also varies from individual to individual, as how fast the disease progresses in each individual can be quite hard to predict. With proper management, affected individuals can frequently survive two decades or longer. At the moment, there is no cure to Parkinson's disease, but management can provide relief of some symptoms and therefore improve quality of life.

### *The puzzle in Parkinson's disease*

It is not known what causes the death of dopamine brain cells in Parkinson's disease. Much of our current understanding on Parkinson's disease is based on autopsies from individuals dying in the late stages of Parkinson's disease, which always contains the other non-specific changes induced by ageing and/or other senile disorders. Identifying the changes in the brain purely affected by Parkinson's disease relies on research work focused on pathological and histological studies. This information is a crucial piece of the whole puzzle, which may reveal the cause and help understanding of the ongoing processes in the disease.

### *The future treatment strategies, predictions made from current priorities in Parkinson's disease research*

One of the important foci of research is to develop methods for diagnosis that can be used in the early course of Parkinson's disease and can provide objective and reliable results. The related attempts include establishing validated biomarkers that are detectable in blood or cerebral spinal fluid, looking for early signs shown in brain scanned images, and designing practical physical tests.

Research priorities also include the discovery of treatments to reduce brain cell death in Parkinson's disease, which includes two aspects — how to protect brain cells from degeneration and how to modify the progress of Parkinson's disease. The findings will be useful in potentially slowing down the progress of Parkinson's disease.

In some cases there is a family history of Parkinson's disease. Continued efforts have been made to discover how genetic mutations lead to Parkinson's disease, which may disclose the main cause of familial Parkinson's disease and contribute to the understanding of sporadic Parkinson's disease, since the pathological changes are similar in both types.

In addition, there is an urgent need to develop an accurate disease model, which is translatable to clinical symptoms and pathological changes of Parkinson's disease, and will allow the trial of novel drug targets.

Finally, it is also important to understand the normal development of brain cells, especially those cells producing dopamine. Some of the support factors are not only essential for the birth of dopamine-producing cells during the embryonic stages, but are also essential for their survival in a lifetime. Understanding the normal life cycle of

dopamine cells may facilitate the development of self-repair strategies and improve the current strategy used in stem cell treatment.