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Perspective

Neuroscience & Therapeutics Parkinson's Disease

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PERSPECTIVE

Parkinson's disease (PD) is the second most common neurodegenerative disorder, marked by age-related movement impairment and dopaminergic neuron loss in the midbrain. A pathogenic characteristic of PD and related illnesses such as dementia with Lewy body (LB) is the deposition of neuronal inclusions, known as Lewy bodies (LB), in the affected regions (DLB). Synuclein aggregation and fibrillation are thought to be the first steps in the development of Lewy bodies. Researchers continue to be challenged by experimental experiments based on the knowledge gained from epidemiological and genetic studies to make PD risk foreseeable and surmountable. In this respect, the development of PD experimental models has aided in the knowledge of the disease's origin and therapeutic development.

Parkinson's disease therapy options have been evolving in a variety of ways. Various solutions using cell therapy, electrical stimulation, and neurotrophic agents are becoming a reality, in addition to medication, surgery, rehabilitation, and other known therapies. In basic research, the pathological condition of PD, animal model development, and mechanisms to progress disease status and exert therapeutic benefits by each treatment should all be examined in tandem. The pathological situation, disease progression, and future therapy options for PD are all discussed in this Special Issue on neurobiology research in PD. In the rotenone rat model of PD, daily administration of pomegranate juice enriched in ellagitannins exerted neuroprotective effects via anti-apoptotic actions connected to anti-oxidative potentials.

Well-known foods or medications may have neuroprotective properties against a variety of central nervous system pathologies. In the MitoPark mice model of PD, gender differences in dopamine deficit phenotype were also investigated. Gender had a significant impact on dopamine secretion and tyrosine hydroxylase expression; female MitoPark mice had stronger dopaminergic potential preservation than male MitoPark mice. Ovariectomy reversed the female predominance, underscoring the need to reconsider estrogen's neuroprotective properties. One of the most critical aspects in the pathogenesis of Parkinson's disease is alpha-synuclein aggregation. Disaggregation of alpha-synuclein could be a promising treatment for Parkinson's disease. In the 6-hydroxydopamine mouse model of PD, peucedanocoumarin III treatment decreased dopaminergic neuronal death.

Optimizing dopaminergic medication treatment is critical for balancing efficacy and side effects. The findings of intestinal levodopa infusion trials show that efficacy and tolerability are determined by steady plasma concentrations as well as individualised drug doses. The study is the first to report on the clinical usage of the levodopa/entacapone/carbidopa intestinal gel, a recently marketed infusion therapy for Parkinson's disease in Europe. Some individuals who had previously received levodopa/cabidopa infusions saw the lower pump size as a significant improvement.

Infusion treatments may be too invasive in the early stages of the disease, thus non-invasive therapy options that aim for continual dopaminergic stimulation are desired. The continuing development of a mucoadhesive film containing the dopamine agonist ropinirole for buccal delivery is one such example. Another oral method of administration example is the dispersible levodopa/carbidopa microtablet formulation, which is approved in a few European countries and allows for dose changes in 5 mg of levodopa increments. PD sufferers may find this treatment to be effective and user-friendly. The inconsistent stomach emptying is one of the biggest issues with oral levodopa delivery in PD patients in the fluctuation phase, which is why infusion therapies have been developed. Gastroparesis affects 70–90% of Parkinson's disease sufferers, according to reports. The present renaissance of research in the involvement of the gastrointestinal system in Parkinson's disease will almost certainly result in new PD therapeutics in the near future [1-5].

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