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An update on pathogenesis and clinical scenario for Parkinson's disease: diagnosis and treatment

Abstract

In severe cases, Parkinson's disease causes uncontrolled movements known as motor symptoms such as dystonia, rigidity, bradykinesia, and tremors. Parkinson's disease also causes non-motor symptoms such as insomnia, constipation, depression and hysteria. Disruption of dopaminergic and non-dopaminergic neural networks in the substantia nigra pars compacta is a major cause of motor symptoms in Parkinson's disease. Furthermore, due to the difficulty of clinical diagnosis of Parkinson's disease, it is often misdiagnosed, highlighting the need for better methods of detection. Treatment of Parkinson's disease is also complicated due to the difficulties of medications passing across the blood–brain barrier. Moreover, the conventional methods fail to solve the aforementioned issues. As a result, new methods are needed to detect and treat Parkinson's disease. Improved diagnosis and treatment of Parkinson's disease can help avoid some of its devastating symptoms. This review explores how nanotechnology platforms, such as nanobiosensors and nanomedicine, have improved Parkinson's disease detection and treatment. Nanobiosensors integrate science and engineering principles to detect Parkinson's disease. The main advantages are their low cost, portability, and quick and precise analysis. Moreover, nanotechnology can transport medications in the form of nanoparticles across the blood–brain barrier. However, because nanobiosensors are a novel technology, their use in biological systems is limited. Nanobiosensors have the potential to disrupt cell metabolism and homeostasis, changing cellular molecular profiles and making it difficult to distinguish sensor-induced artifacts from fundamental biological phenomena. In the treatment of Parkinson's disease, nanoparticles, on the other hand, produce neurotoxicity, which is a challenge in the treatment of Parkinson's disease. Techniques must be developed to distinguish sensor-induced artifacts from fundamental biological phenomena and to reduce the neurotoxicity caused by nanoparticles.

Keywords

Biomarker; Diagnostics; Disease management; Nanobiosensor; Neurodegenerative disease; Parkinson's disease