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PARKINSON'S DISEASE: DEVELOPMENT MECHANISMS AND MODERN CORRECTION METHODS

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Abstract: Parkinson's disease (PD) is a progressive neurodegenerative disease of the central nervous system, manifested by movement disorders and symptoms of immobility. The relevance of the disease is determined by its prevalence, disability, and high socio-economic burden. The main pathophysiological mechanism of PD is the progressive loss of dopaminergic neurons in the substantia nigra pars compacta, which leads to dopamine deficiency in the striatum. The purpose of this thesis is to analyze the mechanisms of development of PD and modern methods of correction.

Keywords: Parkinson's disease, rotenone

Development mechanisms

Genetic and environmental factors play an important role in the development of PD. Among the genetic factors, mutations in genes such as SNCA, LRRK2, PARK2, PINK1, and DJ-1 are of particular importance. The proteins of these genes play an important role in the normal functioning of neurons, in particular, in mitochondrial function, lysosomal degradation, and synaptic transmission. Among environmental factors, exposure to pesticides (e.g., rotenone, paraquat), heavy metals (manganese, lead), and industrial toxins (trichloroethylene) has been found to increase the risk of developing PD. In addition, age,

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brain injuries, and certain diseases (e.g., diabetes, depression) may also contribute to the development of PD [1, 2].

Modern correction methods

Currently, there is no cure for PD, but symptoms can be controlled and quality of life improved. Medications play a major role in the treatment of PD. Levodopa is a precursor of dopamine, which increases dopamine levels in the striatum and significantly improves motor symptoms. Dopamine agonists (pramipexole, ropinirole) stimulate dopamine receptors and have fewer side effects than levodopa. MAO-B inhibitors (selegiline, rasagiline) and COMT inhibitors (entacapone, tolcapone) slow the breakdown of dopamine and prolong the effect of levodopa [3].

Neurosurgical procedures, in particular deep brain stimulation (DBS), are used in cases where medication is not effective. DBS helps control symptoms by placing electrodes in specific areas of the brain. Pallidotomy and thalamotomy aim to reduce tremor by surgically removing specific parts of the brain [4].

Rehabilitation plays an important role in improving the quality of life of patients with PK. Physiotherapy helps improve motor functions, speech therapy helps correct speech disorders, and occupational therapy helps maintain daily living skills [5].

Conclusion

PD is a complex neurodegenerative disease in which genetic and environmental factors play a significant role. Currently, there is no cure for PD, but modern medications, neurosurgical techniques, and rehabilitation can help control symptoms and improve quality of life. Future research should focus on developing gene therapy, neuroprotective drugs, and early diagnosis methods.

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