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GENE THERAPY OF PARKINSON'S DISEASE

Parkinson's disease (PD) is a disease that manifests itself as a chronic, progressive neurodegenerative disorder, most commonly recognized as the deep degeneration of dopamine neurons in the middle brain associated with severe motor symptoms. Pathways, complex pathologies and a wide range of symptoms of the central nervous system (CNS) and non-central nervous system [1]. The disease has the following symptoms: tremor, bradykinesia and muscle rigidity, disorder of walking and posture. In addition, about 50% of PD patients also demonstrate mediated by-front-end executive dysfunction, including lack of attention, low speed of mental processing, verbal disorder, work memory disturbances and impulsivity. Patients in the risk group may have the following factors: elderly, older age of onset of the disease, limited cognitive reserve, hallucinations, and prevailing dysfunctional stroke [2].

In the modern treatment of Parkinson's disease (PD), substitution therapy is used, namely dopamine, which does not stop the progression of the disease, and also causes various side effects. The field of gene therapy provides the means to improve current therapy.

Patients who took the AXO-Lenti-PD vector for 3 months showed a pronounced improvement in motor functions (by 42%) and a sharp decrease in the number of dyskinesias without any serious side effects.

The standard treatment for parkinsonism is currently taking the drug, which is a precursor of dopamine, a neurotransmitter deficient in this disease. Such drugs show an effect only at the initial stages of Parkinson's disease and resistance to them develops rapidly.

Experimental gene therapy for Parkinson's disease involves a single introduction of a lentiviral vector, after which the expression of three genes is initiated that encode three key enzymes involved in the biosynthesis of a neurotransmitter deficient for such patients. This forces other structures to synthesize and release their own dopamine, sensorimotor shell neurons that are not affected by Parkinson's disease.

It is assumed that the introduction of additional copies of the gene responsible for the synthesis of GABA, will lead to the normalization of the brain, controlling motor functions.

The first stage of the study of a new method of gene therapy with the participation of 12 volunteers was conducted in 2007, and showed the safety of this technique. At the second stage, it was supposed to evaluate not only the safety, but also the effectiveness of the proposed method of therapy. To do this, however, it was necessary to conduct a double-blind, placebo-controlled study, in which neither the participants nor the doctors watching them know which particular treatment (present or placebo) a particular patient received. It was not easy to fulfill these requirements, since the gene therapy drug was injected directly into the brain through an opening in the skull. 45 volunteers with Parkinson's disease between the ages of 30 and 75 were enrolled for the new study. 22 participants of the experiment received gene therapy. The rest, who formed the control group, also underwent the procedure of drilling a hole in the skull and was simulated the introduction of the drug. The hole was not through to reduce the risk of complications, but nobody knew about it, except the surgeons who performed the manipulation.

Observation of the subjects lasted for 6 months after the experiment. After that, they passed the standard test for assessing motor abilities for patients with parkinsonism. In patients who received gene therapy, they improved by an average of 23%. In the control group, the improvement averaged 12.7% [3].

Thus, the results suggest that Parkinson's disease gene therapy is a safe and effective treatment that deserves further research.

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