BIOCHEMICAL BIOMARKERS FOR PARKINSON DISEASE

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Introductions. In recent years, due to the increase in the elderly population in developed countries, there has been a steady increase in neurodegenerative diseases, which include Parkinson's disease (PD). PD is one of the most severe and widespread human neurodegenerative diseases, characterized by a chronic progressive course, dysfunction of the basal ganglia and severe disability of patients. The prevalence of PD ranges from 100 to 300 people per 100 thousand of the population. In the age group over 65, the prevalence is characterized by higher rates - from 1280 to 1500 per 100 thousand. Despite sufficient knowledge about the disease, PD is diagnosed in the later stages of the disease. One of the reasons for the late diagnosis is the delayed visit to the doctor. Analysis of the patients with PD in Ukraine showed that the majority of patients first sought medical help during a period when there were already quite pronounced manifestations of the disease: 67% had the 2nd stage of the disease with bilateral symptoms, 5% were at the 3rd stage and only 28% had stage 1. The second most important factor in untimely diagnostics is imperfection of diagnostic criteria. Today, the diagnosis of PD is based on the clinical picture of the disease. For the diagnosis of PD, UK Parkinson’s Disease Society Brain Bank Diagnostic Criteria are used. However, their use gives up to 24% of misdiagnoses of PD. Therefore, the question arises of finding additional criteria (biochemical, neuroimaging, neurophysiological, genetic) that can improve the accuracy of diagnosis.

Aim. Research and study early biochemical markers of Parkinson's disease.

Materials and methods: literature analysis, study Ukrainian and foreign literature, comparison, theoretical analysis and synthesis.

Results. The neurochemical biomarkers of early PD, which are currently considered promising, include the following substances and/or processes:

Orexin is a neuropeptide hormone secreted by lateral and posterior neurons of the hypothalamus, regulates many physiological functions, including the sleep – wakefulness cycle, cardiovascular reactions. The concentration of orexin A in PD patients is lower than in healthy people, and its level is associated with the severity of the disease: the more severe the disease, the greater the loss of hypocretin neurons and the lower levels of orexins in the cerebrospinal fluid (CSF).

Glial fibrillar acid protein (GFAP) is a cytoskeleton protein that is expressed mainly in astrocytes, its level in PD is increased in the CSF, hypophosphorylation and overexpression of this protein in astrocytes are often found, which probably plays a role in the pathogenesis of the disease.

8-hydroxy-2'-deoxyguanosine (8-OHdG) is a biomarker of oxidative stress and damage to nuclear or mitochondrial DNA; in PD, an increase in its level in the blood serum and CSF of patients is found

Peripheral proteasome and caspase activity - in PD mutations, the impaired proteasome activity can lead to the accumulation of aggregated α-synuclein and is presumably associated with the formation of Lewy bodies.

Dopamine, dopamine receptors and dopamine transporter activity. In PD, the loss of dopaminergic neurons leads to a decrease in the level of dopamine, which can be detected using modern methods of functional neuroimaging. The dopamine transporter (DAT) controls dopamine levels by facilitating its reuptake into the cytosol. Free dopamine is toxic to neurons and the vesicular monoamine transporter retains excess dopamine in the vesicles. Thus, any change in dopamine or DAT levels could be an indicator of PD.

Serum and CSF 3-methoxy-4-hydroxyphenylglycol (biogenic metabolite of amine and norepinephrine) may be useful for the detection of PD and the differential diagnosis of a number of neurodegenerative diseases.

3,4-dihydroxyphenylacetic acid - its low concentration in the CSF is characteristic of the preclinical stage of PD and makes it possible to determine the

risk group among healthy people.

Apolipoprotein A1 (apoA1) is synthesized mainly by the liver and small intestine and responsible for the collection of additional cholesterol from cells; together with ApoE, it is involved in the transport of lipids in the brain. In the CSF of PD patients, a lower level of one isoform of apoA is found.

MicroRNAs are short, 21-14 nucleotides, noncoding RNA molecules that regulate gene expression after transcription; they are able to penetrate the blood-brain barrier and are present in CSF and blood in free form and in exosomes. A panel of biomarkers for the early diagnosis of PD has recently been determined based on microRNAs.

Conclusions. Today it is impossible to talk about any specific biochemical marker of the disease. A number of characteristic changes were revealed, specific not only for PD, but also for a number of other neurodegenerative diseases. Work in this direction will continue, and, perhaps, after some time, it will be possible to select specific markers, the detection of which will allow the patient to be included in the PD risk group.