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Baituni S., Marian J.

DEVELOPMENT OF NEW TREATMENTS FOR MELANOMA AND PARKINSON'S DISEASE

Tutors: PhD, associate professor Volchok A.V., senior lecturer Rashkevich O.S.
Department of Pharmacology
Belarusian State Medical University, Minsk

Its frequency ranges from 60 to 140 people per 100,000 populations, and the number of patients increases significantly among the older age group. The proportion of people with Parkinson's disease in the age group over 60 years is 1%, and over 85 years – from 2.6% to 4%. Invasive melanoma of the skin is the fifth most common malignant tumor in men and the sixth most common tumor in women, accounting for about 5% of all newly diagnosed cases of malignant tumors. Parkinson's disease (PD) and melanoma represent two distinct medical conditions–one a progressive neurodegenerative disorder, the other a malignant skin cancer–but recent research has highlighted a significant and intriguing association between the two. PD is characterized by the gradual loss of dopaminergic neurons in the substantia nigra pars compacta, leading to a depletion of dopamine in the striatum and the formation of Lewy bodies, which are abnormal protein aggregates primarily composed of α-synuclein. In contrast, melanoma arises from the uncontrolled proliferation of melanocytes, the cells responsible for producing melanin, a pigment that protects the skin from ultraviolet radiation.

To study the relationship between the incidence rate and the cause of Parkinson's disease and melanoma. To identify the factor stimulating the development of these diseases and, based on its framework, to propose a potential way to develop new treatment Materials and Materials and methods.

According to the literature Parkinson's disease and skin cancer are caused by a single protein, scientists from the Oregon Health and Science University have found that a small protein alpha-synuclein, known for its role in the development of Parkinson's disease, can also provoke the development of melanoma, a serious form of skin cancer. [Arnold MR, Cohn GM, Oxe KC, et al. Alpha-synuclein regulates nucleolar DNA double-strand break repair in melanoma. Sci Adv. 2025.]

Alpha-synuclein is known for its ability to repair double breaks in the DNA of neurons, which normally helps brain cells survive. However, in Parkinson's disease and dementia, this protein begins to malfunction. It leaves the cell nucleus and forms toxic clusters – Lewy bodies, which leads to the destruction of neurons. In the case of melanoma, alpha-synuclein acts differently. Experiments on mice and human tissues have shown that in skin cells this protein remains inside the nucleus and acts too actively. It effectively repairs damaged DNA, preventing cells from collapsing in a timely manner. This contributes to their uncontrolled reproduction, a key mechanism for the development of cancer. Additional analysis showed that in melanoma cells, alpha-synuclein actively interacts with another protein, 53BP1, which is also involved in DNA repair. As a result, the pathological replication process characteristic of malignant tumors is triggered.

The relationship between Parkinson's disease and melanoma underscores a complex interplay of genetic, environmental, and biochemical factors. The elevated risk of melanoma in PD patients, alongside shared genetic mutations and environmental exposures, points to potential common pathways that could elucidate the mechanisms behind this co-occurrence. Further research into the roles of melanin, neuromelanin, and cellular processes like autophagy is essential for unraveling these connections. Understanding these dynamics may lead to novel therapeutic strategies that address both conditions, ultimately improving patient outcomes and quality of life for those affected by PD and melanoma. The data obtained can become the basis for the development of new treatment Materials and Materials and methods. In particular, they are studying the possibility of reducing the level of alpha-synuclein or modulating its activity in melanoma, and also consider the 53BP1 protein as a potential target for the treatment of Parkinson's disease.