

Cytokine Status Level in Menopausal Women Who Have Covid-19

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Menopause symptoms can persist into old age, reducing women's quality of life. Estrogen deficiency leads to an acceleration of bone turnover and bone loss, forming a "vicious circle" of interaction with atherosclerosis, vascular calcification and leading to disorders of the immune status, increasing the risk of developing immunopathology.

And if you also consider that in recent years the human body has been exposed to the coronavirus infection - COVID-19, which mainly affects people aged 50+, then you can understand how difficult it is for women in the pre- and menopausal period

The SARS-CoV-2 virus has been shown to induce both direct and indirect damage to the central nervous system (CNS). The ability of the SARS-CoV-2 virus to infect cells of the nervous system carries potential risks of long-term neurological complications. According to a number of authors, there was an assumption that coronavirus infection is easier in young women. In fact, it turned out that in the group of women 50+, cases of prolonged COVID-19 are more common, and post-Covid syndromes are more common. A particularly vulnerable group were peri- and postmenopausal patients.

COVID-19 is accompanied by excessive inflammation and elevated serum levels of cytokines and chemokines, suggesting the development of cytokine release syndrome or cytokine storm. Cytokine storm is a condition caused by widespread activation of the immune system and resulting extremely high production of cytokines and chemokines. Because cytokine storm can lead to multiple organ failure, it is important to understand the mechanisms that govern this condition.

In the lower respiratory tract, SARS-CoV-2 primarily infects type 2 alveolar epithelial cells, a cell type that does not actively participate in gas exchange. After replication and separation of the epithelial layer of the lungs, the virus enters the underlying tissue and infects or is captured by macrophages, dendritic cells and neutrophils, resulting in further spread of the virus.

In connection with the above, we conducted studies to study the level of cytokines - IL-1 β , IL-2 and IL-6 in premenopausal women who had COVID-19. The comparison group consisted of 42 women who were premenopausal and did not have COVID-19. The control group consisted of 22 practically healthy women of reproductive age.

Among the markers of neurodestructive mechanisms recently studied in menopausal syndrome, special attention is paid to cytokines, which play a major role in the implementation of bidirectional communication between the nervous and immune systems of the body. Research has established that cytokines are involved in psychoneuroimmune reactions and ensure the combined functioning of the nervous and immune systems. The balance of cytokines regulates the process of regeneration of defective or damaged neurons.

The nervous system cannot interfere with a specific immune response, but it can influence its intensity, kinetics and localization. On the other hand, products of the activated immune system

can generate a feedback signal that can inhibit, enhance, or regulate neuronal activity. Particular attention is paid to the study of the role of individual cytokines, in particular IL-1 β , IL-2 and IL-6.

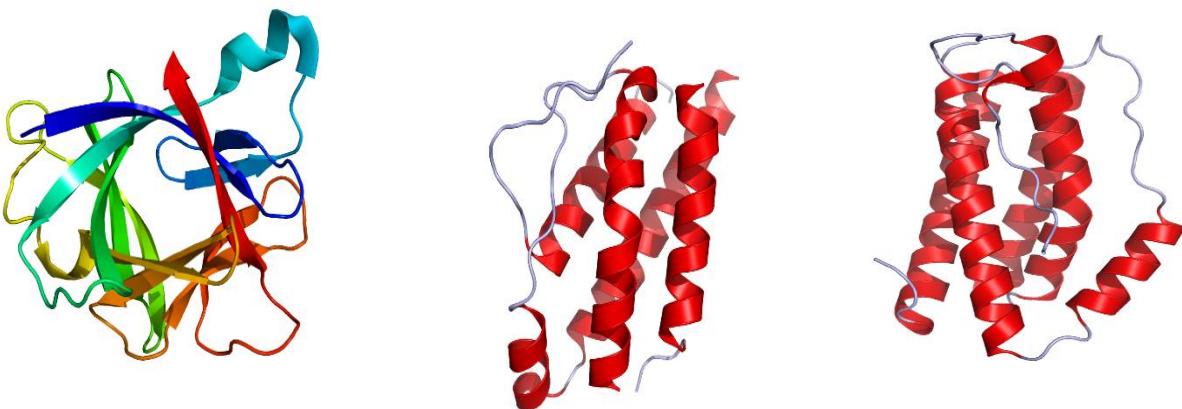


Рис.1. Interleukin 1 β ,

Interleukin -2,

Interleukin -6

As you know, inflammation is one of the ways to protect the body from the influence of various exo- and endogenous factors. When they appear in the body, immune cells release many signaling molecules - cytokines. And this happens under the direct control of the nervous system. Thus, mental instability (namely, the inability to concentrate and general anxiety) increases the level of the inflammatory cytokine - IL-6, which can easily lead to impaired carbohydrate metabolism.

In the opposite direction, the immunoregulatory effect on the brain is mediated by the autonomic nervous system through the sympathetic and vagus nerves. Neurons are able to respond to pro-inflammatory cytokines released by immune cells: through the activation of neural reflex circuits, they are able to regulate acute and chronic immune responses.

The causes of menopause are not fully understood, but for some women, menopause is accompanied by an increased risk of a number of diseases or conditions that affect various tissues. And the “conductor” of these states are proteins of intercellular interactions - cytokines, the level of which varies depending on the influence of factors of the nervous and hormonal systems.

Cognitive dysfunction during the menopausal transition is often described in the literature using the figurative expression “brain fog.” A direct relationship was revealed between the frequency of complaints about deterioration of cognitive function (deterioration of test results for attention, verbal-verbal, operational-short-term memory) and the duration of menopause. The influence of menopausal status on the development of symptoms such as causeless anxiety, depressed mood, restlessness, memory impairment and sleep dysfunction has been noted.

A number of researchers describe a significant decrease in memory and speed of cognitive processes, starting from the transition period, due not only to organic changes in the central nervous system, but also to the negative influence of vasomotor symptoms, sleep dysfunction, and psycho-emotional disorders. All of these changes are consistent with changes in the hormonal and immune systems.

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