THE IMPORTANCE OF IMMUNOLOGIC METHODS IN THE DIAGNOSIS AND MONITORING OF OPPORTUNISTIC INFECTIONS

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Assessment of the immune system provides significant assistance in the diagnosis and monitoring of this group of infections. It allows to establish the presence of immunodeficiency at the level of different parts of the immune system and apply adequate immunomodulatory therapy. More often the disease develops in an immunocompromised organism, and the most severe damage to various organs and systems is observed when the cellular level of immunity is impaired [1,2,3].

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In immunodeficient individuals, toxoplasmosis often occurs as a mixtinfection. Most commonly, children (including newborns) and adults have an active course of CMVI, which exacerbates immunodeficiency as a result of the immunosuppressive effects of cytomegalovirus (CMV) on the cells of the immune system. In the case of infection with toxoplasmas on the background of primary or recurrent CMVI, as a rule, toxoplasmosis passes into a chronic form. In this case, CMVI is an important pathogenetic factor in the formation of pathology with the involvement of various organs and systems [4,5,6,7,8].

In newborn children against such a background there is a generalization of one or another infection, there is often a progressive course of the disease with the development of micro- or hydrocephalus, which can lead to an adverse outcome. In this connection, in case of toxoplasmosis detection, CMVI should be excluded (with determination of its activity in case of a positive result of the patient's examination) and, on the contrary, in case of CMVI detection, it is advisable to test blood serum for the presence of antibodies to toxoplasmas of IgM and IgG class (screening test) with connection of additional tests in case of seropositivity at the subsequent stage of examination. Often in infections there is a decrease in T-lymphocytes, activation of the humoral link of immunity is registered (increase in the level of total IgM, IgA and IgG, as well as circulating immune complexes - CIC, CIC) and there is a decrease in

phagocytic activity. At the same time, given the limited capacity of the treatment network to perform immunophenotyping of lymphocytes, tests to assess the state of the humoral link can be recommended for widespread use [9,10,11,12,13].

Important for monitoring toxoplasmosis (especially in the case of mixtinfection) is the determination of serum CICs, which consist of antigen, antibodies, and associated complement components C3, C4, and C1q. Normally, CYCs formed in the bloodstream are phagocytized and destroyed by both phagocytes and the liver. However, in case of antigen excess and presence of IgM and C1q-component of complement in their structure, which occurs in acute toxoplasmosis, as well as in case of combination of chronic toxoplasmosis with active cytomegalovirus or herpetic infection or candidiasis, the complexes can be deposited in the perivascular space and renal cortex, causing complement activation and aggravating inflammatory processes [14,15,16].

Pathologic reactions to immune complexes may be due to an increase in the rate of their formation over the rate of elimination, deficiency of complement components, or functional defects of the phagocytic system. At the same time, the results of laboratory (immunologic) studies should be compared with the severity of clinical manifestations and the level of specific antibodies. It should be remembered that in the case of an active process (acute or subacute form, exacerbation of chronic infection) and especially in mixtinfection, low levels of CIC and total immunoglobulins indicate an inadequate immune response as a result of impaired synthesis of one or more classes of immunoglobulins (immunodeficiency) or increased destruction of immunoglobulins [17].

When synthesis is impaired, cell type immune response reactions mediated by T-lymphocytes are impaired. Increased production of antibodies or a decrease in the intensity of their breakdown leads to an increase in their content in the blood (hypergammaglobulinemia). Assessment of the content of C3 and C4 complement components along with the determination of general and specific immunoglobulins and CICs allows to assess the adequacy of the immune response and gives the doctor valuable information about the tactics of management of this patient. The complement system is of great importance not only in the processes of cytolysis, but also in enhancing phagocytosis, neutralization of viruses, as well as in immune adhesion, due to which antigen-antibody complexes are attached to some cells, including B-lymphocytes.

Defects in the complement system are accompanied by a decrease in the body's anti-infective defense. Control of the content of total immunoglobulins, CIC (preferably the determination of CIC by Dijon and their dimension), C3 and C4 - components of complement should be carried out both at the stage of detection of the disease, and in the course of treatment and at the stage of assessing the effectiveness

of therapy. It is advisable to determine the content of total IgM, IgA and IgG, as well as complement components by turbidimetry using commercial test systems (quantitative determination of concentration) or by nephelometry [18].

The Manchini immunoglobulin assay (a less sensitive reaction) has less diagnostic value for the physician, and its use is currently limited. In recent years, the study of cytokine system in norm and in various pathological conditions has attracted the attention of specialists in order to develop diagnostic and prognostic criteria. The greatest diagnostic value is the determination of TNF-α, interleukins IL-1β, IL-4, and IL-6, as well as the evaluation of the interferon system. Currently, it has been shown that the most profound changes in immunoreactivity are found in patients with recurrent CMVI and HSV infection, especially when combined with toxoplasmosis. Laboratory signs of immune dysfunction, manifested primarily by increased serum IL-1β and total IgA, occur in the majority of patients both during exacerbation and remission [19].

Multidirectional changes in the cytokine system in persons with chronic forms of the studied opportunistic infections, accompanied by a decrease in the content of IL-1ß and TNFα (such patients have a more aggressive course of the disease) or a significant increase. No similar changes were found in the assessment of the interferon system. In chronic toxoplasmosis and in chronic viral infection (both in mono- and mixtinfection) against the background of pronounced activity of the pathogen there is an imbalance of the interferon system, with serum IFNγ more often determined at the level of control values against the background of a sharp decrease in IFNγ production, which indicates a pronounced depression of the interferon system [1,5,8,9].

Thus, assessment of the content of the above cytokines is important in terms of selection of drugs for immunotherapy and immunorehabilitation.

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