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CHANGES IN HUMORAL IMMUNITY INDICATORS IN PATIENTS WITH PRIMARY HIV INFECTION

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Abstract: The aim of this study is to evaluate the characteristics of the humoral immune response in patients with primary HIV infection based on the analysis of serum levels of major immunoglobulin classes.
Materials and Methods. The study included 90 patients with primary HIV infection and 20 healthy individuals. Serum levels of IgA, IgM, IgG, and IgE were measured using standard immunoturbidimetric methods and ELISA. Statistical analysis included comparisons of means, standard deviation calculations, and evaluation of the significance of differences ($p<0.05$).
Results. Patients with primary HIV infection showed a significant increase in all immunoglobulin classes compared to the control group. The most notable changes were observed in IgE (85-fold increase) and IgG (2.5-fold increase).
Conclusion. Primary HIV infection is accompanied by hyperproduction of immunoglobulins, reflecting systemic polyclonal B-cell activation and dysregulation of the humoral immune compartment.

Keywords: HIV, humoral immunity, IgA, IgM, IgG, IgE, B-cell activation

Introduction. Immune dysfunction in HIV infection affects both the cellular and humoral components of the immune system. While most attention is given to CD4+ T cells, humoral immunity plays a significant role in the pathogenesis and progression of the disease [1,2]. At early stages of HIV infection, there is marked polyclonal B-cell activation, accompanied by hypergammaglobulinemia, impaired production of neutralizing antibodies, and increased synthesis of IgE [3]. The objective of this study was to assess the serum levels of major immunoglobulin classes (IgA, IgM, IgG, IgE) in individuals with primary HIV infection and compare them with those in a control group.
Materials and Methods. A total of 90 patients with newly diagnosed HIV infection aged 21 to 60 years were examined. The control group included 20 conditionally healthy individuals, matched by age and sex. All participants provided informed consent. IgA, IgM, and IgG levels were measured by immunoturbidimetry using standard reagents from "Vector-Best" (Novosibirsk, Russia). IgE concentrations were determined using enzyme-linked immunosorbent assay (ELISA). All analyses were conducted in accordance with the manufacturer's instructions.
Statistical analysis was performed using Student's t-test. Differences were considered statistically significant at $p<0.05$. Data are presented as mean ± standard deviation.
Results. The data obtained indicate pronounced hyperimmunoglobulinemia in HIV-infected patients, especially with respect to IgG and IgE.

Parameter	Control (n=20)	HIV-infected (n=90)	p-value	Change
IgA (g/L)	1,26 ± 0,15	2,46 ± 0,06	<0,001	↑ в 2 раза
IgM (g/L)	1,32 ± 0,14	1,99 ± 0,09	<0,001	↑ в 1,5 раза
IgG (g/L)	13,53 ± 0,89	33,22 ± 0,06	<0,001	↑ в 2,5 раза

IgE (IU/mL)	0,64 ± 0,06	54,32 ± 3,20	<0,001	↑ в 85 раз

Discussion. The results of this study confirm that primary HIV infection is associated with hyperactivation of the humoral immune component. Elevated IgG and IgA levels reflect B-cell activation and antibody class switching in response to viral antigenic stimulation. This phenomenon is driven by nonspecific polyclonal activation, in which antibody production is largely non-functional and insufficient for effective viral control [4]. The increase in IgM may be associated with the primary response to HIV antigens; however, its significant elevation also indicates impaired class-switch recombination, characteristic of early immunosuppressive phases [5]. The most striking finding — an 85-fold increase in IgE — deserves particular attention. HIV infection has been linked to a predominant Th2-type response, which promotes IgE production. Furthermore, IgE hyperproduction may result from stimulation of basophils and mast cells, involvement of IL-4 and IL-13, and dysregulation of CD4+ T-cell regulatory function [6,7]. Hyperproduction of immunoglobulins can be considered a marker of immune dysregulation and may have prognostic value for assessing disease progression.

Conclusion. Patients with primary HIV infection show significant increases in all major immunoglobulin classes. These changes reflect systemic polyclonal B-cell activation and a dysregulated humoral immune response. The most prominent increases are seen in IgG and IgE, which may serve as markers of immune activation during the acute phase of HIV. Further investigation into antibody profiles may be important for prognosis and personalized therapeutic approaches.

Conflict of Interest: The author declares no conflict of interest.
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