Relationship between Personality Accentuation and Humoral Immunity

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Subjects with various types of personality accentuation are characterized by specific features of immunity. This proves a relationship between the function of the central nervous and immune systems. The detected features of immune response in subjects with various types of personality accentuation can be important for the formation of immunosuppression or hypersensitivity in various diseases.

Key Words: *neuropsychoimmunology; immunoglobulin; R proteins; types of personality accentuation*

Studies laying the basis for a new discipline in physiology — neuropsychoimmunology — have been carried out in different countries starting from the 1950s [11]. Conditioned reflex regulation of immune response (IR) was proven in the 1970-80s [13]. A. D. Ado and his school made a great contribution to the understanding of the relationships between the nervous and immune systems, interactions between immunocyte receptors, on the one hand, and antigens and different low-molecular ligands, on the other [2].

After discovery of neurotransmitters, the immune system has been regarded as a sensory organ percepting the signals mediated by these endogenous compounds. Neuropeptides affect the IR in health, stress, and disease [9,10]. Numerous hormonal factors and modulators form the molecular basis for the relationship between the nervous and immune systems; neurons and lymphocytes possess specific surface receptors for the perception of these factors and modulators [2]. The immune system products are capable of inducing mental and behavioral shifts [8]. There is phenotypical and functional similarity between cellular elements of the immune and nervous systems, and the integrative links between them can be disturbed by unfavorable environmental factors [1].

Different models have been developed to stimulate or suppress immunoreactivity by modulating behavioral functions [10]. However, there are no data on the relationship between the immune and biochemical characteristics, on the one hand, and different types of personality accentuation (PA), on the other. Our aim was to study these relationships.

MATERIALS AND METHODS

Personality accentuation type was assessed in healthy men aged 18-20 years using a pathocharacterological diagnostic questionnaire. Each group consisted of 22-45 men. Mixed PA types were assessed judging from the predominating features [5]. The levels of immunoglobulins M, G, A, and D in peripheral blood and serum complement activity (SCA) were measured routinely [6], the content of R proteins (proteins whose structure is similar to that of the active centers of antibodies and which are regarded as universal regulators of IR and a system for antigen recognition parallel to antibodies) was determined as described elsewhere [4]. The content of prealbumins in the serum was measured as described previously [7]. The control level of R proteins and prealbumins was taken for 100%. The results were statistically processed using Student's *t* test.

RESULTS

The immune system parameters were virtually unchanged in the subjects with the hyperthymic PA

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TABLE 1. Immunological Values and Prealbumin Content in Subjects with Different Types of Personality Accentuation (PA)

PA type	*n*	IgM, g/liter	IgG, g/liter	IgA, g/liter	IgD, g/liter	SCA, units	Content (%)	
							prealbumins	R protein
Control	216	1.00±0.05	11.37±0.30	2.25±0.02	0.16±0.002	62.5±2.5	100.0±19.5	100.0±12.8
Hyperthymic	43	1.05±0.09	10.87±0.40	2.00±0.14	0.13±0.02	62.7±5.5	93.0±13.7	68.2±11.6*
Labile	45	0.84±0.09	11.19±0.41	2.10±0.11	0.18±0.01*	65.6±5.4	81.1±12.0	84.1±13.3
Epileptoid	30	0.89±0.15	10.34±0.64	2.22±0.18	0.16±0.02	69.4±6.7	151.6±10.6*	120.0±14.8
Schizoid	22	0.87±0.20	11.68±1.01	1.96±0.36	0.16±0.04	55.6±7.8	97.1±26.6	91.2±15.9
Hysteroid	28	1.52±0.11*	10.76±0.75	2.03±0.23	0.21±0.02*	58.7±6.9	87.0±22.2	69.1±17.2*
Unstable	25	1.39±0.13*	10.76±1.11	2.43±0.33	0.12±0.02	45.1±7.3*	70.9±27.2	128.5±10.2*
Psychasthenic	23	0.49±0.20*	13.59±0.79	3.02±0.36*	0.19±0.04*	93.7±7.7*	119.3±24.3	133.5±12.6*

Note. *n*: number of subjects; *$p<0.05$ compared with the control.

type, except a 32% decrease in the content of R proteins ($p<0.05$, Table 1). In addition, a tendency toward a decrease in IgA and IgD production was observed. The labile PA type was characterized by increased production of IgD. A negligible decrease in IgM, prealbumin, and R protein levels was noted. Examination of subjects with the epileptoid PA type showed a marked (1.5 times) increase in prealbumin production, a statistically negligible increase in blood R protein level (120% of the control level), a slight decrease in IgM production, and an increase in SCA ($p<0.01$). In schizoid PA type no significant changes in the studied values were detected, except a slight decrease in production of IgM, IgG, IgA, and R proteins and in SCA. The hysteroid PA type was characterized by a notable increase in IgM and IgD production and a decrease in R protein level. Other parameters were within the normal range, and there was a statistically negligible decrease in IgA and prealbumin levels. In subjects with unstable PA type, the production of IgM was increased by 39%, R protein content increased by 28%, and SCA decreased by 28% ($p<0.05$). The following shifts were observed in subjects with the psychasthenic PA type: a 51% drop in IgM production and increase in IgA, SCA, and R protein levels by 34, 50, and 33%, respectively. The production of IgG, IgD, and prealbumins was slightly ($p<0.05$) increased. On the whole, the production of prealbumins was in inverse proportion to immunoglobulin production.

By the mean percent of absolute values of shifts in the studied parameters, which characterize integral difference from the control level, the studied PA types can be ranked as follows: psychasthenic (32.3) → unstable (24.1) → hysteroid (16.7) → epileptoid (16.6) → hyperthymic (10.5) → labile (8.0) → schizoid (5.5). Presumably, in mental distress the mean absolute value of shift is directly related to the probability of IR disorders which may eventually induce immunodeficiency or hypersensitivity. During primary IR, immunosuppression develops primarily in the psychasthenic subjects, as well as in schizoid and epileptoid ones. Subjects with the schizoid PA type can probably develop similar states in secondary IR.

The detected shifts can be explained by the specific features of the main histocompatibility complex in subjects with different PA types. The HLA structures regulating the production of a number of complement components are known to be localized near the genes directly responsible for IR [3].

The relationship between PA types and some immunity parameters can be realized both at the genetic level and through mediated effects of hormones, neurotransmitters, and neuropeptides [13] which determine the level of IR and psychophysiological characteristics of personality. The immune system products, specifically, "anticerebral" antibodies, interferons, and interleukins, are capable of inducing mental and behavioral shifts [8].

There are good grounds to believe that further studies of psychoimmunology will elucidate molecular mechanisms of interactions between nervous and immune systems and identify immunological markers of mental disease [13].

Thus, subjects with certain PA types are characterized by specific immunological parameters, which proves a close relationship between the functions of the central nervous and immune systems. The detected features of IR in subjects with different types of PA can be important for the formation of immunosuppression or hypersensitivity in various diseases.

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Effects of Sex Hormones on Plasma Lipid Peroxidation *In Vitro*

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The effects of sex steroid hormones on the level of plasma lipid peroxidation are studied *in vitro*. Estradiol shows pronounced antioxidative activity; progesterone and testosterone slightly suppress lipid peroxidation only when used in high concentrations.

Key Words: *lipid peroxidation; sex hormones; blood plasma; chemiluminescence*

Sex steroid hormones are a component of endocrine regulation system of cardiovascular activity [8]. Estrogen, gestagen, and androgen imbalance plays an important role in the pathogenesis of many diseases [3,8,10]. On the other hand, experimental and clinical reports indicate that cardiovascular diseases involve intensification of free-radical processes [1,2]. Moreover, steroid compounds are known to possess antioxidant activity, which explains their antiatherogenic and anti-ischemic action; their efficacy in prevention and correction of the extreme states has been reported [3,8,10]. However, the role of sex hormones in the regulation of free-radical oxidation in the blood is so far unclear.

Our purpose was to compare the effects of estradiol, progesterone, and testosterone on the level of lipid peroxidation (LPO) in blood plasma of experimental animals.

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MATERIALS AND METHODS

Estradiol, progesterone, and testosterone were from Sigma. LPO was assessed in the plasma of adult outbred albino rats of both sexes. Plasma was prepared by centrifugation of whole blood at 600*g* for 15 min. Antioxidant activity of the preparations was assessed from a decrease in the intensity of Fe^{2+}-induced chemiluminescence (CL) and the content of product acummulation reacting with thiobarbituric acid (TBA). Antioxidant activity of sex hormones was assessed in suspension of multilayer liposomes from yolk lipoproteins [4]. The kinetics of CL and time course of LPO products in this series of experiments was studied by the methods described previously [4,5]. Registration of "fast flash" of plasma CL was described in detail [6]. Plasma concentration of TBA-reactive products was measured as described elsewhere [9]; in order to study the effect of steroids on the time course of LPO products accumulation, the tested compounds in concentrations 10^{-4}-10^{-9} M were added to the reaction mixture instead of ionol.

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