

**RESULTS OF A STUDY OF THE LEVEL OF SERUM CORTISOL AS A
HORMONE AFFECTING CONNECTIVE TISSUE METABOLISM IN
ADOLESCENTS WITH HIGH MYOPIA**

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Annotation. Cortisol is a hormone produced in the adrenal cortex. It protects the body from stress, regulates blood pressure, and is involved in the metabolism of proteins, fats, and carbohydrates. The secretion of cortisol is regulated by adrenocorticotropic hormone (ACTH), which is produced in the pituitary gland, a small gland located at the bottom of the brain. The concentrations of ACTH and cortisol in the blood are regulated by the feedback method. A decrease in the concentration of cortisol increases the production of ACTH, which stimulates the production of this hormone until it returns to normal. An increase in the concentration of cortisol in the blood, on the contrary, leads to a decrease in the production of ACTH.

Key words. Cortisol, ACTH, ST, PVHRD.

Results of the study of serum cortisol levels as a hormone that affects connective tissue metabolism, in adolescents with high myopia

Cortisol is a hormone produced in the adrenal cortex. It protects the body from stress, regulates blood pressure, and is involved in the metabolism of proteins, fats, and carbohydrates. The secretion of cortisol is regulated by adrenocorticotropic hormone (ACTH), which is produced in the pituitary gland, a small gland located at the bottom of the brain. The concentrations of ACTH and cortisol in the blood are regulated by the feedback method. A decrease in the concentration of cortisol increases the production of ACTH, which stimulates the production of this hormone until it returns to normal. An increase in the concentration of cortisol in the blood, on the contrary, leads to a decrease in the production of ACTH. Therefore, the concentration of cortisol in the blood can change with an increase or decrease in the secretion of both cortisol itself in the adrenal glands and ACTH in the pituitary gland, for example, with a pituitary tumor that secretes ACTH. A decrease in the production of cortisol can be accompanied by non-specific symptoms: weight loss, weakness, fatigue, decreased blood pressure, abdominal pain. With a combination of reduced cortisol production and severe stress, an adrenal crisis sometimes develops, which requires emergency medical care. The results were analyzed using cortisol level data obtained in local laboratories. As is known, metabolic processes of the connective tissue are under the direct and diverse influence of hormonal factors: glucocorticoids and steroid hormones (cortisol, testosterone, estradiol). Hormones regulate the synthesis and catabolism of collagen, having anabolic (androgens) and catabolic (cortisol and its derivatives) effects on metabolism. As noted above, studies of the pathogenesis of progressive myopia reveal metabolic disorders in the connective tissue system of the body. Most likely, among the many causes of impaired general metabolism of connective tissue and metabolism of collagen structures of the sclera, one of the leading ones is hormonal shifts. The few studies devoted to the study of hormonal status in adolescents with progressive myopia have found an imbalance of both sex (testosterone and estradiol) and glucocorticoid (primarily cortisol)

hormones. Obviously, for more complete information and a reliable assessment of the hormonal influence on the development of myopia and its complications, studies in The research in this direction should be continued. The aim of this fragment of the work was a comparative study of the cortisol level as an active regulator of connective tissue metabolism in the blood serum of children and adolescents with different clinical refraction. To solve the problem, 155 children and adolescents aged 9 to 17 years (13.4 ± 2.1 years) with different clinical refraction were examined: 20 with mild myopia, 32 with moderate myopia, 85 with high myopia, including 36 with congenital and 49 with acquired (mainly at an early age) myopia. In 32 children (20.6%), various forms of peripheral vitreochorioretinal dystrophies (PVCRD) were detected in the fundus. To assess the hormonal status, the cortisol level in the blood plasma was determined in the morning on an empty stomach using the generally accepted method. According to laboratory practice, normal values of cortisol levels for children and adolescents under 16 years of age are within 83-580 nmol/l, but these data were obtained without taking into account refraction. In this regard, a control group was formed in our study, which consisted of 18 children with emmetropia or mild to moderate hyperopia. The range of serum cortisol values obtained in this group was used by us as a reference interval for comparison with the values obtained in children and adolescents with myopia. The results of the study are presented in Table 7 and Fig. 17. 76 Table 7. Cortisol level (nmol/l) in the blood serum of children and adolescents with different clinical refraction ($M \pm m$).

Table 1. Cortisol level (nmol/l) in the blood serum of children and adolescents with different

Control group	Acquired myopia					Congenital high myopia		
	Weak degree	Medium level	High degree			full	without complications	complicated
			full	without complications	complicated			
335.8 ± 40.9	290.7 ± 58.6	250.9 ± 26.4 *	243.9 ± 20.5 *	247.6 ± 30.1 *	236.3 ± 29.3 *	339.4 ± 33.2 **	413.7 ± 48.8 **	287.4 ± 38.6 ***

clinical refraction ($M \pm m$).

- the difference with the control is reliable, $p < 0.05$.

** - the difference with the corresponding indicator of acquired myopia is reliable, $p < 0.05$.

***- the difference with the corresponding indicator of uncomplicated myopia is reliable, $p < 0.05$

Our studies have shown that as refraction increases, children and adolescents experience a relative decrease in serum cortisol levels. If in mild acquired myopia the cortisol level was 290.7 ± 58.6 nmol/l and was slightly lower than the control (335.8 ± 40.0 nmol/l), then in moderate myopia it was reduced to 250.9 ± 26.4 nmol/l and the differences with the control

values became statistically significant ($p < 0.05$). The data obtained suggest that hormonal imbalance, namely, impaired cortisol metabolism, may be both one of the causes of general biomechanical disorders in the connective tissue system of children and adolescents with progressive myopia and a sign indicating the presence of such disorders. It is possible that, under certain conditions, during the period of active growth of the child, the features of the hormonal status, which initially do not go beyond the norm, under the influence of a certain lifestyle, unbalanced nutrition, unfavorable physical and psychological factors can lead to a shift in the hormonal balance, which in turn can negatively affect the metabolism as a whole and, as a consequence, cause a disorder in the functioning of organs and systems, including the sclera, i.e. become a factor involved in the disruption of the supporting properties of the sclera.

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