HORMONAL STATUS OF TEENAGERS THAT LIVE ON TERRITORY CLOSE TO OPEN MULTIMETALLIC ORE DEVELOPMENTS

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Teenagers that live close to open multimettalic ore developments, were studied on the subject of hormones' content. A disturbance in organism hormonal homeostasis is referred to one of significant deviation under various chemical loadings. The research has revealed some significant alteration in hormonal status indexes that testifies the development of endocrine pathologies.

Keywords: hormonal status, testosterone, cortisol, teenagers, open multimettalic ore development

Open ore mining leads to increase and accumulation of metal-containing products on vast territories. It is known, that neuroendocrinal system is the most reactive in response to exogenous stressors and plays a significant role in the development of metabolic processes that determine a pathogeny of ecologically-determined deviations' formation. Thyroid hormones have the widest activity range, they control protein, lipid, carbohydrate, water-sodium metabolism, and also processes of cell growth and differentiation. It is well known, that gluco-corticoids and adrenal steroids are the major adaptive hormones and serve as metabolism regulators [1, 2, 3].

In this case, the objective of our research is studying hormonal status of teenagers who continuously live in conditions of open multimettalic ore mining.

Materials and methods of research

A complex clinical-laboratory inspection of tenagers' health condition in age of 15-16 years that live close to open manganese-containing ore minings, has been carried out. All studied were divided into groups depending on their gender and location. 4 groups were formed: group 1 and 2 – teenagers who live in «relatively» clean region, group 3 and 4 – teenagers who live on territory that neighbors an open multimettalic ore mining. The criterion for including into the research were teenagers who continuously live in the studied district for no less than 10 years and go to school in their life location. The control group was formed by persons who live in region that is considered to be relatively clean, though, according to sanitary-hygiene, climate, and social conditions, does not differ from the comparison groups.

With usage of immune-ferment analyser Zenyth 340 st was carried out the definition of level of hormones T_3, $T_{4fr.}$, follicle-stimulating hormone (FSH), luteinizing hormone (LH), prolactin (PL), progesterone (PG), testosterone (TS), cortisol (C). Toolkit by Dia Sys Starbust MC15 was implemented. Blood in amount of 5 ml was taken from veins at 9-10 a.m. on an empty stomach, after receiving informed assent from parents. The level of non-organic iodine excretion with urine was defined by method of A.K. Myshkina [4].

Static processing of results was carried out with usage of parametric criterions and results' estimation on a normal distribution with usage of software pack STAT 5.5. Confidence interval (CI), including that for average values, was calculated with a fixed reliability level 95%.

Results of research and their discussion

Comparative analysis among various girls' groups showed that an increase in cortisol hormone content up to $310 \pm 19{,}8$ mmole/litre takes place among the third group (CI 290-390,6) in comparison with the first group (CI 220-270) (table). Similar trend is observed for prolactin, where its content in comparative group grows up to 68% (CI 223-390). While concentration of free T_{4fr} thyroxin decreases by 47% (CI 9,1-14,1). Antibodies level against TRO grows to the top of its physiological limit ($30{,}0 \pm 2{,}5$ units) ml., that exceed the same index of the first group more than 1,7 times (CI 27-33,2).

A forced utilization of iodine is observed within the third group, which reflects in its accumulation in urine by 29% more than in the first group (CI 133-162).

Within male teenagers (15-16 tears) we can observe a significant accumulation of cortisol in blood within the fourth group – up to $318{,}3 \pm 21{,}4$ (CI 310-335), which is 21% more, than that of the second group. Prolactin content has a similar trend, which is by 40% more in the comparative group against the second group. A decrease in free thyraxine T_{4fr} by 40% is observed, antibodies level against TRO grows two times. Intense iodine utilization in urine in averageof 40% (CI 153-191) is revealed (table).

The obtained results show, that alterations are typical for both boys and girls. Registered alterations possibly carry an adaptive character, considering active role of cortisol as an adaptive hormone under the impact of stress factors. The decrease in T_{4fr} shows an organisms' need for thyreoid group hormones within the period of pubertal mass-height hike that remains up to 16 years old inclusively. Thyreoid tissue is rich in blood vessels and, possibly, with the blood flow, a high number of toxic products goes through it, these products have a goitriferous effect upon thyroid follicles. One of the chemical loading'

destructive effects is a decrease in follicles' ability to link non-organic iodine, therefore, its content in urine grows. Possibly, dust that contain such metals as Mn, Pb, Hg that are goitreferous, suppresses thyreoid hormones' synthesis in follicular apparatus of thyroid. It is also possible, that disturbance in T_{4fr} secretion has a secondary character through the impact of unfavourable factors of atmosphere upon hypothalamo-, hypophysical, and thyroid system.

Teenagers hormone level in dependence on their location

Hormones	Group 1 – control, girls (n – 42)	Group 2 – control, boys (n – 36)	Group 3 – girls (n – 40)	Group 4 – boys (n – 38)
Cortisol (mmole/l)	230 ± 21,2	261 ± 33,4	310 ± 19,8*	318,3 ± 21,4*
FSH (miu/ml)	9,0 ± 1,3	5,0 ± 2,0	8,9 ± 0,9	6,2 ± 1,7
LH (miu/ml)	2,8 ± 1,4	3,01 ± 1,8	3,6 ± 1,9*	3,8 ± 1,7
Prolactin (miu/ml)	202 ± 29,4	208,3 ± 41,3	360,9 ± 20,7*	304,3 ± 22,7*
Progesterone (kmole/l)	3,4 ± 0,36	0,9 ± 0,09	3,6 ± 0,9	1,2 ± 0,06
Testosterone (mmole/l)	0,43 ± 0,02	14,3 ± 1,4	0,5 ± 0,05	11,4 ± 2,0
TSH(mkm/ml)	1,7 ± 0,49	2,2 ± 0,5	2,1 ± 0,31	1,8 ± 0,61
T_3 (thriiodothyronine) (nmole/l)	1,19 ± 0,50	1,2 ± 0,36	1,08 ± 0,3	1,4 ± 0,24
T_{4fr} (free thyroxine) (nmole/l)	19,4 ± 1,4	17,2 ± 1,02	10,4 ± 2,3*	10,1 ± 0,59*
Antibodies to TRO (U/ml)	10,8 ± 2,9	12,6 ± 2,1	30,0 ± 2,5*	29,4 ± 1,3*
Y content in urine (mkg/l)	114 ± 2	120 ± 3,4	148,1 ± 6*	171 ± 7,6*
Comment * – reliability *0,05				

As known, thyroid hormones provide anabolic and catabolic processes that are necessary for normal growth. Within processes of ossification and differentiation of skeleton thyroid hormones provide normal bone structure and significantly influence a body height that is expressed within the period of sexual maturing. Perhaps an increase in prolactin content is related to compensatory effect from the decrease in T_{4fr} content, as, being an anabolic effect hormone, it stimulates growth and protein synthesis.

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