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MULTI-MODEL VISUALIZATION OF THE TOTAL INTAKE OF ABIOTIC METALS IN THE DIAGNOSIS OF MICROSATURNISM IN CHILDREN

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Among the large variety of environmental factors that affect human body, the leading place is taken by chemical, in the spectrum of which special place is occupied by heavy metals (HM) and, above all, such a global and potentially dangerous toxin, like lead [1].

Despite the numerous developments of domestic scientists, not all aspects of the problem are investigated in sufficient volume. The majority of them is associated with incompleteness of the data on toxicokinetics of lead in the child's body because of its technogenic accumulation. Regional characteristics of complex influence of lead as abiotic element, quantitative correlation of lead concentration in the environment with possible prenozological changes in the health of children are insufficiently studied [2].

Due to the intensive development of industry, transport, use of agricultural chemicals the increasing human impact of the environment with heavy metals (HM) leads to increasing of their concentrations in the environment – air, water, soil, food and, in turn, to accumulation in the human organism, creating a real danger to public health. It is known that HM and their com-

pounds belong to highly toxical elements for the human body. From all the spectrum of HM lead (Pb) is the most toxic. Therefore, lead pollution is one of the most relevant problems of hygiene in the world, including in Ukraine.

Technogenic lead pollution increases the likelihood of human exposure to not biological but alredy toxic concentrations through environmental features.

It is known that an excess of lead in the body leads to a decrease in the content of vital abiotic elements – calcium, iron, zinc, copper, selenium [3]. Microelements belong to essential food components, which adequate supply to the body is a prerequisite for health and work qualification, especially in childhood. Such elements, as zinc and copper play an important role in ensuring adequate growth, hematopoiesis, immune response, forming antioxidant status of a child. These vital metals are physiological antagonists of lead.

The intake of abiotic metals with air, water, food creates a total daily dose and forms the basis for further improvement of single hygienic regulation. Therefore, the problem of its determination in relation to the impact on the child's health is relevant for the modern hygiene.

Summary of our previous studies of the content of lead in the environment has allowed to calculate the total daily load (TDL) and the contribution of different ways of receipt of this element to the body of a child in industrial and control surveillance areas. The calculation was performed on the absolute daily amount (mg / day) for a child under the age of 5-6 years. The data was compared with the acceptable daily intake (ADI), which is set for xenobiotic metals in accordance with requirements of the Joint Committee of experts FAO / WHO for nutritional additives, as well as the data from scientific literature on the subject. For metals – trace elements derived daily values were compared with their physiological needs.

Analysis of calculations shows that TDI of lead for children is 0.08 mg with maximum value 0.153 mg in the first industrial area and 0.09 mg with 0.150 mg as a maximum value in the second one. If, according to the average value, the receiption of lead in the first region does not exceed ADI, and in the second exceedes at 0.01 mg, then the maximum of it is almost doubled for this contingent of the population. There is adifferent values of various ways of income. The contribution of food into the TDI is the largest – 98.8% and 93.8%, with drinking water and air enters the smallest number of lead.

Thus, such a toxic and dangerous xenobiotic as lead, is always defined in the vital objects of the environment, creating conditions for complex effect on the body of a child.

Children population of industrial Leninsky district receives on average 1.45 mg of copper and 1.5 mg zinc per day, which mainly come from food (98.9% and 96.5% respectively).

Proportion of income of these metals from drinking water and by air is negligible and is respectively for copper 0.5 and 0.6% and for zinc – 2.2 and 1.3%. Average TDI OF copper fits the physiological needs for this age group (0,95-1,52 mg). However, daily intake of zinc to the body is 1.5 mg an average, which is 5 times lower than physiologically necessary need for healthy child (7.6 mg) [4].

The children of the industrial Samarskiy district receive 1.63 mg to 1.49 mg of copper and zinc on average per day, mainly with food (87,9-98,9% and 97.5% respectively). Proportion of income of these metals from drinking water and by air is negligible and, respectively, 1.3% copper, and zinc – 1.4%. In this area the TDI of copper a bit exceedes physiological need for this age group (0,95-1,52 mg).

The average revenue of zinc into the children`s organisms of the area is 1.5 mg per day, which is 5.1 times lower then the required physiological needs for healthy children (7.6 mg). Insufficient intake of zinc in the body of a child also may stipulate developmental disability of child's body, reducing oa immune system and weakening of protection against the influence of environmental contaminants due to the emergence of zinc deficiency.

The data of TDI of metals into the children's bodies of the control (unindustrial) area show that the total daily intake of lead is 0,042 mg / day and does not exceed the acceptable in average, but 1.12 times higher according to the maximum value. The dominant path of income of this xenobiotic is alimentary, as its proportion is 50.2% of the TDI. 48.8% of lead id supplied with drinking water, and almost 1.02% with air. The surveyed contigent of children population of the area on average receives 1.59 mg of copper and 5.96 mg of zinc per day, mainly by the alimentary path of intake, the proprtion of which is 98.5% -96.8% respectively, while hte income from drinking water and inhaled air is small and correspond on average 1.5% and 0.02% for copper and 3,18% and 0,02% for zinc. The TDI of copper meets daily needs for the age group and for zinc is slightly lower then it should be.

Thus, the analysis of conducted studies allows to make certain generalizations, such as: from 50.2% to 98.9% of all the daily intake of lead gets into the children's bodies with the food products. Furthermore, the study of complex income of metals into the children's organisms with air, water, food showed that despite the allowable averages of TDI of metals, there is an exceed of complex income of priority pollutant – lead in the industrial areas, and the income of trace elements – copper and zinc is on the contrary reduced compared with the control areas.

Summarizing the above, it should be emphasized that the significantly worsened level of health of children has reasonable evidence of valid contribution of chemical load of environment into this process, among which HM and, especially lead, occupies the prior place as potentially dangerous, which

hences the need to develop measures to prevent ekological-dependent pathology and strengthening the state of children's health in general [5].

Thus, the problem of studying the adverse effects of lead as a prior technological pollutant of the environment on children's health refers to the actual scientific directions of preventive medicine, since there is justification of hygienic implementation of active preventive measures to prevent eco-dependent pathology, decrease morbidity and strengthen the health of children.

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