HYPERURICEMIA DEVELOPMENT MECHANISMS AND ITS EFFECT ON MENTAL ACTIVITY AND GENERAL PHYSICAL WORKING CAPACITY

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***Abstract**: study of different pathological states genesis and mechanisms of general physical and labor working capacity enhancement is one of the most important problems of the modern medicine.*
General physical and labor working capacity is influenced by many factors, including morphofunctional features of the individual, athletic training regime and nutrition, functional state of breathing passages and uric acid blood level.
Breathing passages have an effect on the internal environment and the state of general physical working capacity of the organism.
One may consider that breathing passages dysfunction, except for its effect on vital organs, provide conditions for development of hyperuricemia and its concomitant diseases.
***Keywords**: hyperuricemia, uric acid, general physical working capacity, nasal breathing*

МЕХАНИЗМЫ РАЗВИТИЯ ГИПЕРУРИКЕМИИ И ЕЕ ВЛИЯНИЕ НА УМСТВЕННУЮ АКТИВНОСТЬ И ОБЩУЮ ФИЗИЧЕСКУЮ РАБОТОСПОСОБНОСТЬ

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***Аннотация:** изучение генеза различных патологических состояний и механизмов повышения общей физической и трудовой работоспособности представляет собой одну из важных проблем современной медицины.*
На состояние общей физической и трудовой работоспособности оказывает влияние множество факторов, в том числе морфофункциональные особенности индивидуума, режим спортивной тренировки и питание, функциональное состояние дыхательных путей и уровень мочевой кислоты в крови.
Дыхательные пути оказывают влияние на внутреннюю среду и состояние общей физической работоспособности организма.
Можно считать, что нарушение функций дыхательных путей, кроме влияния на жизненно важные органы, создают условия для развития гиперурикемии и сопутствующих ей заболеваний.
***Ключевые слова**: гиперурекимия, мочевая кислота, общая физическая работоспособность, носовое дыхание*

Hyperuricemia has a substantial impact on the human health [6,7,8,13,16,17].

V.P. Efroimson in his work “Biosocial factors of increased mental activity of a human” describes hyperuricemia effect on personality becoming [8].

Efroimson relied on the studies conducted by the scientists of USA Massachusetts Technology Institute. According to these studies, there is a correlation between individual’s uric acid blood level and IQ (intelligent quotient). IQ was determined via traditional psychometric test, and double-blind method was used.

Based on the above mentioned research V.P. Efroimson believes that the interrelation between hyperuricemia and high mental capacity is proved. This is testified by the list of podagra genius, who left a noticeable imprint in the global history, including Martin Luther King, Charles Dickens, Michelangelo Buonarroti, Peter the Great etc.

Nowadays there is no doubt that mental capacity and intellectual activity of humans are under the multifactorial genetic control [5]. However, the above mentioned data show that in case of the corresponding background there is a linkage between definite level of hyperuricemia and mental capacities.

It is generally believed that in the first week of life uric acid is a physiological doping for newborns nervous system, secures its more effective operation and particularly, reflexive stereotypes formation and phenomenon of neonatal imprinting [5].

After the birth a child is in a critical transition state, and one of such states is a transitory hyperuricemia. It is promoted by mass destruction of newborn's erythrocytes and leukocytes in the first days after the birth. This process runs under influence of stress hormones released during childbirth and via a change in blood oxygenation conditions. Worth to notice that among children with neuro-arthritic diathesis, manifestation of diathesis is mainly related to urates accumulation in the organism and caffeine-like action of uric acid on nervous and muscular tissues. That is why, M.S. Maslov considered that children with neuro-arthritic diathesis have to be under supervision of physicians and pedagogues, since despite the liability to diseases, "they are well developed mentally and frequently are differed by talent" [6].

Hyperuricemia causes a wide range of pathophysiological changes.

Hyperuricemia causes not only podagra itself, but also other changes, such as abdominal obesity, diabetes mellitus type II, dyslipidemia, and functioning disorders of cardiovascular system [4, 12].

Uric acid hyperproduction belongs to pathogenetic mechanisms, which underlie hyperuricemia. Uric acid hyperproduction may occur because of increase of endogenic purines or due to entering of large quantities of exogenic purine compounds with food. In addition, hyperuricemia may develop due to uric acid excretion decrease resulting from disorder of uric acid release by kidneys that is observed in 90% of all cases of hyperuricemia. It may occur as the result of effect of both mechanisms, that takes place during mixed type of hyperuricemia.

Physical load has an impact on hyperuricemia development. It may be noted that human body constitution characteristics, which are presented by the unity of morphological, physiological and psychological features, undergo changes under influence of external factors, including physical training and sport and in its turn, has an effect on adaptive, compensatory and pathological (adverse) reactions of a human, including hyperuricemia development risk.

Physical exercises and especially weight trainings cause uric acid concentration gain in blood, and blood pH decrease.

At the same time, a physical load promotes testosterone hormone synthesis intensification. As is known, testosterone is an anticatabolic hormone, i.e. it assists decay processes in the organism. In addition, testosterone promotes muscle mass gain and, therefore, uric acid level increase. Nutritional supplements with protein content stimulate testosterone synthesis, as well. Thus, nutrition and physical load factor are conductive to hyperuricemia. Based on this fact, it is interesting to determine uric acid concentration during different types of physical exercises.

Among athletes, even minimal values of uric acid are considered as a strong antioxidant, while high figures are regarded as one of components determining tissue hypoxia state during insufficient adaptation to physical load [14, 15].

Worth noticing the works of M.S. Eliseev et al., which explore hyperuricemia frequency among professional athletes, and hyperuricemia relation to other types of disorders. According to above mentioned authors, serum uric acid (sUA) level is reliably high. The mentioned fact is of practical importance, since it may become a risk-factor of development of such diseases, as podagra, chronic liver disease, hypertensive disease (high blood pressure), lipid and hydrocarbon metabolism disorder regardless of the gender [18-20].

Gender differences in the hyperuricemia frequency among athletes may be explained by the role of estrogen. Estrogens have a strong uricosuric action [21-23].

In the studies conducted by M.S. Eliseev et al. (2018) the high level of testosterone serum was 16,4% among male athletes and only 5% in female athletes [4]. At the same time, testosterone level was in direct correlation with serum uric acid level that may be one of the reasons of hyperuricemia frequent occurrence among men due to the fact that testosterone opposites uric acid excretion by kidneys [24].

The above-mentioned authors have established, as well that hyperuricemia is of wide occurrence among professional athletes and it is associated with the parameters, which display kidney function, lipid metabolism disorder, body weight index.

General physical and labor working capacity are influenced by many factors, including dietary and exercise regimen, free flow of metabolic processes and state of breathing passages [9-11].

Nasal breathing difficulty during physical load promotes arterial blood pressure increase [1,2,9-11].

Tracheal breathing assists diuresis decrease. Mouth breathing promotes delay of tissue fluid movement, in addition, changes breath efficiency, reduces respiratory minute volume, and shifts blood pH towards acidity [3].

The data given above point at the fact that nasal breathing difficulty and transfer to mouth breathing may become a risk-factor of hyperuricemia development and progression of related diseases.

Thus, athletes have to undergo preventive measures aimed to the normal functioning of breathing passages in order to reduce manifestation of hyperuricemia and related diseases.

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