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Abstracts

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Ethical requirements

Experiments on animals or animal tissue

For work conducted in the UK all procedures must conform with current UK legislation. For work conducted elsewhere all procedures must accord with current national guidelines or, in their absence, with current local guidelines.

Experiments on humans or human tissue

All procedures must accord with the ethical standards of the relevant national, institutional or other body responsible for human research and experimentation, and with the principles of the World Medical Association's Declaration of Helsinki.

PCB162

Evaluating of the intellectual quality coefficient of young adults with various types of functional asymmetry

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Introduction. In these days due to the development of brand new information technologies number, strength and impact of both biological and social factors on the human body are increasing. However an increasing intellectual intensity has influence not only on the development of cognition but also on the emotional and volitional sphere, it affects motivation and needs of a person. Cognitive abilities of a person determine his learning ability and memory. There is a positive relationship between the level of intelligence and information processing speed, specified by one or more genes, which approximate position is set in the chromosomes.

Studying of general resistance mechanisms to physical activity, depending on the condition of the functional asymmetry of the human, is very important because it causes more effective and oriented prevention of disadaptation violations. Objective: to find the possible relationship between individual characteristics of functional asymmetry and of the intellectual quality coefficient that determines the adequacy and effectiveness of adaptive responses.

Materials and methods: The research involved 136 second-year medical students who have been examined. Control group comprised 48 persons with the right type of functional asymmetry (RTFA). Comparison group involved 42 persons with the left type of functional asymmetry (LTFA), 26 persons with the mixed type of functional asymmetry (MTFA) and 20 persons with socio-modified type of asymmetry (SMTA). The intellectual quality coefficient (IQC) was evaluated according to the formula.

Results: The results of bicycle ergometer testing show that people with LTFA (142,1 sec), have the highest physical toughness, people with MTFA and SMTA got approximately equal results (125,1 and 125,3 accordingly), and people with RTFA ranked the lowest place (111,5 sec).

The IQC of students with different types of functional asymmetry when undisturbed is established to be the following: 3,5 RTFA; 4,3 LTFA; 4,6 MTFA and 4,0 SMTA. The IQC of people with MTFA increases right after physical activity and in 2 minutes of rest (5,5 and 6,3 accordingly). People with RTFA have the lowest index (4,0 and 4,1 accordingly). People with RTFA have the lowest IQC in all 3 conditions (3,5; 4,0 and 4,1 accordingly).

Conclusion:

1. Young adults with LTFA demonstrate high physical endurance.
2. People with MTFA has the most significantly increasing quality of intellectual activity under the effect of physical exercises. People with RTFA shows the lowest quality.
3. Individuals quickly demonstrate the strong adaptive reaction as a result of the dominating excitative process. However, the vegetal "price" of such adaptation combined with high anxiety and aggression is too high, which rapidly exhausts the adaptive resources of the human body.

Jeanine M., George W. et al. The Role of Education and Intellectual Activity on Cognition: *Journal of Aging Research*, vol. 2012, Article ID 416132, 9 pages.

De Geus E.J., Wright M.J. et al. Genetics of brain function and cognition // *Behav. Genet.* 2001. – 31 (6). – P. 489.

Where applicable, the authors confirm that the experiments described here conform with the Physiological Society ethical requirements.

PCB163

Intensive physical activities induce changes in innate immunity and perforin-mediated cytotoxicity

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Physically active lifestyle affords healthier life while sessile way of life reduces quality of life. Many different factors may change the immune functions: young or elderly people, chronic diseases or exhausted people and person after intensive physical exertion. Exercise-induced factors such as oxidative stress, increased metabolic rate, heat shock proteins, catecholamine, cortisol and insulin-like growth factor can influence pathogen recognition by altering expression of recognition molecules such as Toll-like or scavenger receptors, cell trafficking by altering hematopoiesis, cell death and adhesion molecule expression. Some evidence has shown that athletes included in heavy training programs were susceptible to infection. Regulatory T cells (Tregs) play a crucial role in peripheral T-cell tolerance. Tregs represent a subpopulation of suppressor T cells that mediate immune tolerance by suppressing autoreactive T cells. Immune system's capacity to distinguish between innocuous and harmful foreign antigens is controlled by mechanisms of central and peripheral tolerance. Mechanisms of peripheral tolerance involve induction of cell death or the development of a non-responsive state (anergy) of T cells. Lymphatic cells could be stimulated to release perforin causing induction of apoptosis. An important mechanism for activation of Tregs is by immature dendritic cells. The aim of this study was to investigate the percentage of innate immune cells and perforin positive cells in lymphocyte subpopulations of peripheral blood of professional athletes. Subjects were selected from a stratified population sample of adults of both sexes during a routine examination of professional athletes, as well as, with "recreational" or noncompetitive athletes. The study was approved by the ethical committee and all study subjects gave their written informed consent. The phenotypic profiles of peripheral blood lymphocytes were done by flow cytometry. Our preliminary data showed that the percentage of cells of innate immunity: NK (CD3-CD56+), NKT (CD3 + CD56 +) and regulatory T cells (Tregs: CD4+C-D25+FoxP3+) in professional athletes compared with healthy controls and noncompetitive athletes were significantly elevated in professional athletes. Total perforin positive cells and double positive (perforin+ NK+cells) in professional athletes were increased in comparison with blood donors. Percentage of B cells was increased in trained athletes. Intensive physical activity in professionally trained athletes had a positive impact on immune response, particularly intensive in innate immunity, which is the first line of defense in the body against the effects of adverse factors. Tracking changes in the percentage of T regulatory cells may contribute to better understanding the interdependence of hormonal and immunological network during physical activity.

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