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Title: THE EFFECTS OF BIO-NORMALIZER (JAPANESE FUNCTIONAL FOOD) ON IMMUNE STATUS AND BIOCHEMICAL HOMEOSTASIS OF HUMAN AIR-OPERATORS

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Abstract :

To enhance the working capacity and safety of human operators under flying conditions, it is of utmost importance to enlarge the homeostatic range of physiological functions and latent potency of an organism. In principle, the pharmacological correction of their health conditions can be achieved by two approaches: (1) by administration of specific pharmacological agents, which acts directly to target organ or system, and (2) by application of non-specific natural adaptogens capable of enhancing the subjects' endurance to external stress of any origin. Nutritional approach could be assumed as a very perspective one for non-specific recruitment of all the body capacities. It has been shown in numerous basic research studies and clinical trials that Bio-Normalizer (BN), a natural Japanese functional food prepared by the fermentation of *Carica papaya* (Sun-O International, Gifu, Japan) is a powerful immunomodulator and antioxidant. The main aim of the present study was to elucidate the effects of BN on some biochemical parameters and immunity of human operators under hypobaric hypoxia, dynamic physical loading and the other factors of the flying situation such as psycho-emotional and audible stresses. A pilot, double-blind, randomized trial was performed, in which all participants played roles either control or experimental subjects depending on intake of Bio-Normalizer or placebo powder which resemble BN in taste and sachet design. The clinical study design was constructed of main principles of occupational physiology for military workers, air pilots, cosmonauts and others who are professionally subjected to stressful conditions and hostile environment. The experiments were carried out on 18 healthy male volunteers aged between 20 to 35 years after their informed consent. The Military Health Commission admitted all participants to work as military servicemen, air pilots and cosmonauts after a preliminary examination. The scheme of BN administration was as following: 6 grams at bedtime daily for 3 days and 3 grams an hour before physical and psycho-emotional stress connected with imitation of flying situation. The instrumental and clinical laboratory tests were done three times: at the background level, after a short-term BN administration, and after hypobaric hypoxia, physical and psycho-emotional loading. To determine immunological and biochemical parameters, the venous and capillary blood and urine were used. On the grounds of the results obtained, it was concluded that BN was an anti-stress agent directed to improve the organism's adaptation to high altitude hypoxia, psycho-emotional stress with a flying situation and stress induced by physical overload. At the cellular and metabolic levels, BN activated the energy metabolism, protein synthesis and the T-lymphocyte and macrophage / monocyte chains of body's immune. Under exposure to physical loading, BN administration increased efficiency of energy metabolism, improved lipid metabolism and enhanced the impact of anaerobic sources in the energy metabolism.

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