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STUDY OF THE PLASMA COMPONENT OF THE HEMOSTASIS REGULATION SYSTEM IN HEALTHY SUBJECTS IN THE 240-DAY ISOLATION EXPERIMENT SIRIUS-21

Abstract

It is known that various adverse environmental factors, including long-term exposure to confined spaces, can cause functional shifts in various components of the blood coagulation system. The balance between pro- and anticoagulation processes largely determines the stress resistance and adaptive abilities of the human organism, and also serves as an integral indicator, reflecting the functional state of various organ systems. The results of previous studies of the hemostasis regulation system in similar experiments showed that a prolonged stay in a sealed facility is accompanied by an increase in the procoagulant potential at the beginning of isolation, and its' subsequent weakening at a later date. One of the features of this experiment was a countermeasure program, which consisted of cycles of daily physical activity of various durations that took place throughout the experiment. The main goal of this work was to study the effect of a combination of physical inactivity with a countermeasure regimen of physical activity on the potential of the coagulation system. The study involved 5 subjects of both sex aged 29 to 44 years. Venous blood sampling was carried out in the background period 28 days before the experiment, on the 60th, 135th and 240th days of the experiment, and on the 7th day of the recovery period. In citrated plasma, the concentrations of fibrinogen and D-dimer, activity of plasminogen, antithrombin III, protein C and -2-antiplasmin, thrombin time, activated partial thromboplastin time, prothrombin time, and fibrinolytic activity were measured. The results of the experiment indicate a significant decrease in the D-dimer level relative to the background on the 60th day, and a subsequent return to the background values on the 240th day, as well as during the readaptation period. An increase in anticoagulant potential was also shown in early stages, expressed in prolongation of the prothrombin time relative to background values and a subsequent return to them at a later date. An increase in the coagulant potential of the coagulation system was found, expressed by a shortening of the thrombin time in the early stages of the experiment, and its subsequent lengthening before the end of isolation and during the readaptation period. These shifts indicate the multidirectional nature of the environment of the hermetic object on human organism, and possibly, compensatory changes in the blood coagulation system in response to this impact. This study was sponsored within the framework of topic 65.1, Russian Academy of Science.