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SERUM LEVELS OF BONE METABOLISM MARKERS IN RATS AFTER 7 AND 21 DAYS OF HINDLIMB SUSPENSION AGAINST A BACKGROUND OF VITAMIN D3 INTAKE

Abstract

It is known that changes in mineral metabolism and bone tissue (BT) that develop under space flight (SF) conditions require constant monitoring and preventive measures. One of the countermeasures is the intake of vitamin D, the active forms of which play a fundamental role in the BT metabolism. Vitamin D deficiency can aggravate degenerative changes in BT during full or partial support unloading. Considering the role of vitamin D in the body as a global regulator of homeostasis, and current data on its pleiotropic effects, we conducted a series of experiments with hindlimb suspension (HLS) in rats consuming vitamin D (daily dose of 4 MU).

The experiment used 64 male Wistar rats (=192, IQR[169,5; 207,0]), randomly divided into 8 groups (n=8). Each experimental series (7 and 21 days) included 4 groups: control + placebo (Cp), control + vitamin D (CvitD), HLS + placebo (HLSp), HLS + vitamin D (HLSvitD). One of the tasks of our work was to analyze the concentrations of bone metabolism markers, hormones, and pro-inflammatory cytokines in blood serum, which was measured by multiplexed fluorescent bead-based immunoassay.

It was shown that the OPG level in 21 CvitD animals was significantly higher than in the 21Cp group (p=0.013) and in the 21HLSvitD group (p=0.019). The OPG serum level in the 21Cp group was significantly lower than in the 7Cp group. At the same time, the 21HLSp and 21HLSvitD groups did not differ significantly from each other. The highest concentration of FGF23 was in 21HLSp animals, which was significantly higher than in 21HLSvitD (p=0.012) and in 21CvitD animals (p=0.032). In addition, the level of serum FGF23 in 21Cp was higher than in 21CvitD (p=0.021). Although we did not find significant differences in serum levels of PTH and ACTH, an increase of FGF23in serum may indicate a disorder of calcium-phosphorus metabolism in animals with a longer suspension.

Analysis of the studied indicators does not allow us to state with accuracy about the direction of bone processes under the influence of short-term HLS and the intake of an increased dose of vitamin D. However, the data obtained indicate the need to continue studies with a longer exposure of animals. This will make it possible to clarify the role of vitamin D in the processes of adaptation of a living organism to SF conditions and to determine the body's need for it in the absence of support load.