

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Human Physiology in Space (2)

Author: Dr. Galina Vassilieva

Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation,
galvassilieva@mail.ru

Dr. Rinat Gimadiev

RUDN University, Russian Federation, gimadiev_rr@rudn.university

Mrs. Daria Sidorenko

Institute of Biomedical Problems, Russian Academy of Sciences, Russian Federation, sitni_ne@mail.ru

Dr. Agaptseva Tatiana

Russian Federation, info@imbp.ru

Mr. Kirill Gordienko

Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation,
k.vl.gordienko@gmail.com

Prof. Oleg Orlov

Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation,
orlov@imbp.ru

STUDY OF THE DYNAMICS OF BIOCHEMICAL MARKERS OF BONE METABOLISM IN THE
PARTICIPANTS OF A 120-DAY ISOLATION IN A HERMETICALLY CLOSED CHAMBER
(SIRIUS-19)

Abstract

Key words: isolation in hermetically closed facility, osteology, bone state markers

A study of the state of bone tissue by means of the DXA method, conducted in the experiments with long-term isolation in the pressurized chamber with the use of countermeasures (Mars-500 project, 12 male subjects), revealed changes in BMD and body composition similar to changes after prolonged SF [Morukov B. et al. , 2010; Novikov V. et al., 2016]. The changes in BMD and in levels of several biochemical bone markers were also revealed in the volunteers participating in the Luna-2015 and SIRIUS-17 experiments (9 female and 3 male subjects, without use of countermeasures), despite the short duration of their stay in the artificial habitat [Vassilieva G. et al., 2018]. The objectives of this work included the study of the SIRIUS-19 participants (3 male and 3 female subjects) with a 120-day isolation in the hermetically closed chamber of the dynamics of hormones regulating the metabolism of calcium in humans (parathyroid hormone, calcitonin, osteocalcin, cortisol), electrolytes and the bone remodeling markers (bone morphogenetic proteins 4 and 6, Dickkopf-1, Total P1NP, b-CrossLaps) in the venous blood and urine. ELISA, electrochemiluminescent and immunochemiluminescent methods were used. Data processing was performed using non-parametric methods of the STATISTICA 10 software. As a result of the analysis, a profile of individual reactions of the endocrine system of the test subjects was obtained. The preservation of normal regulatory mechanisms is shown, regardless of the gender of the participants. Reliable changes in the concentration of electrolytes (magnesium, potassium, chlorine) at different periods of the experiment and reliable relationships between the studied parameters were revealed.