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Medical Care for Humans in Space (3)

Author: Dr. Alina Saveko

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

Ms. Maria Bekreneva

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

Mr. Ivan Ponomarev

Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation,
ponom.96@mail.ru

Dr. Elena Tomilovskaya

Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation,
finegold@yandex.ruCOMBINED ELECTROMYOSTIMULATION MODE AS A POTENTIAL COUNTERMEASURE FOR
FIGHTS TO THE MOON AND BACK**Abstract**

As a rule, a habitable volume of lunar ships is small and has no place for active countermeasures (like a treadmill). But even short space flights (SF) can cause significant deconditioning of the musculoskeletal system. Within this problem, the development and applications of passive countermeasures approaches are of particular interest. Electromyostimulation (EMS) can serve as one of such solution. There are views that low-frequency EMS is preferable for slow-fiber muscles, while high-frequency EMS is for fast-fiber ones (Shenkman B.S. et al., 2007; Tanaka M. et al., 2016). We assumed the complex strategy may be more effective for maintaining the motor skills. The report is devoted to the results of the study of the effectiveness of combined (low frequency + high frequency) EMS in balance and walking disorders prevention during 7-day SF effects modeled by Dry Immersion (DI). The study involved 26 men: 10 – under the 7-day DI exposure without countermeasures, 10 – under the 7-day DI exposure with combined EMS, and 6 – in the control group. For combined EMS group low frequency was applied in the first half of the day, and high frequency – in the second one. In general, the results demonstrate a positive preventive effect of this approach. At the same time, the results of viscoelastic properties measures of the leg muscles before and after each EMS session allow us to propose a further modification of the used EMS mode for different adaptation periods to support unloading – acute and chronic. The study was supported by the Ministry of Science and Higher Education of the Russian Federation under agreement #075-15-2022-298 from 18 April 2022 about the grant in the form of subsidy from the federal budget to provide government support for the creation and development of a world-class research center, the “Pavlov Center for Integrative Physiology to Medicine, High-tech Healthcare and Stress Tolerance Technologies”.