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## Possible mechanisms of back pain under microgravity conditions

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Back pain is the common phenomenon observed at the initial stage of space flights and under the condition of simulated microgravity – Dry Immersion and Bedrest (N. Navassiolava, I.B. Kozlovskaya et al., 2011; P. Cao et al., 2005; D.L. Belayv et al., 2011; J. Sayson et al., 2013). Some of the researchers suggest that back pain development under gravitational unloading conditions is caused by possible changes in topography of dorsal roots of the spinal cord (S.L. Johnston et al., 2010). The other scientists suppose that the alterations of intervertebral discs structure play the leading role in this phenomenon (J. Sayson et al., 2013; S. Johnston et al., 2010). The studies that have been performed at the Institute of Biomedical Problems (Russia, Moscow) for many years have shown that decrease of back muscles extensors tone can be one of the reasons of hypogravitational backpain phenomenon. The aim of the study was to examine the validity of this suggestion. The study is carried out with the participation of 45 healthy volunteers signed the informed consent. Microgravity conditions were simulated with Dry Immersion model (DI)(Shulzhenko, 1976); duration of exposure consisted 6 hours (14 subjects), 3 days (23 subjects) and 5 days (8 subjects). Muscle tone of m. longissimus of both sides were evaluated by parameters of transverse stiffness using 2 methods – resonance vibrography (Timanin E.M., 1989) and myotonometry (S.M. Zinder et al., 2011). Testings were carried out twice before Dry Immersion (DI), daily during exposure to DI and twice after its accomplishment. Transverse stiffness of m. longissimus was measured at the level T12-L1 when back muscles were relaxed which was controlled by EMG registration. At the same time there were also measured the height of the subjects and the intensity of back pain (by subjective 10 points scale). Data analysis has shown that exposure to gravitational unloading is fololwed by drastic decrease of muscle tone of back extensors especially pronounced during the first hours of DI. These changes correlated with height increase of the subjects. The results of the study confirmed the suggestion on the possible connection of hypogravitational back pain phenomenon with back muscle atonia caused by gravitational unloading.

## Biography

Ilya Rukavishnikov graduated from Chuvash State University by I.N. Ulyanov, Cheboksari, Russia with the speciality "General surgery" at 2007. During the period from 2007 to 2013 he graduated several courses on specialities of Medical Management, Emergency medicine, Confirmation of surgery certificate and Aviation medicine. From 2009 he works at the Russian State Scientific Center – Insititute of Biomedical Problems on the position of researcher. His responsibility is the medical support of space flights. He is the key person in several space and simulated medical experiments.

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