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# THE FIRST RESULTS OF 21-DAY DRY IMMERSION: GENERAL INFORMATION AND COMPARISON TO SHORT TERM EXPERIMENTS

**Abstract**

The model of Dry Immersion (DI) has been developed at the SSC RF – IBMP RAS in the 1970s as a model for organism deconditioning in the interests of manned space flights development. Since that time it is actively used in the field of gravitational physiology and space medicine in Russia. In recent years, interest in this model has increased due to publication of quantitative evidence of the benefits of Dry Immersion over other models. Studies conducted at the Institute of Biomedical Problems have shown that even short term exposure to Dry Immersion is accompanied by the development of changes in the physiological systems of the body, similar in depth and dynamics to the changes observed after short term space flights: postural muscles atony, changes in the order of involvement of motor units, hyperreflexia of spinal reflexes, motor coordination disorders, orthostatic instability, etc. The model reproduces accurately such factors of space flight as a support/ weightbearing withdrawal, axial weight unloading, body fluids redistribution, hypodynamia. The use of DI model is not limited to fundamental studies of the role of gravity in the activity of physiological systems. The model is traditionally used for the studies of the efficacy of countermeasure means and methods. So, in recent years, in the immersion experiments the effects of electrical myostimulation of the leg muscles, axial weight loading, as well as support stimulation have been studied. It should be noted that the accumulated experience of DI studies covers the effects of exposures with the duration from several hours to 7 days and describes, respectively, the range of changes characterizing the stage of acute adaptation to weightlessness. Unfortunately, there is almost no information about the peculiarities of the dynamics and nature of the development of chronic adaptation processes. In 2018-2019 SSC RF – IBMP RAS has launched a new line of unique research on the chronic effects of DI in sensory-motor, cardiovascular, bone, immune, digestive and other systems

of the body, as well as related medical risks. The subject of the report will be the first results and features of the experiment completed in the spring of 2019 under the conditions of 21-day Dry Immersion exposure. In general the experiments have shown the possibility and safety of long term DI and revealed in comparison to short term exposure some specific changes which can be connected with the chronical processes of physiological adaptation to microgravity. The sensory-motor studies were supported by the Russian Science Foundation (project No. 19-15-00435); other physiological studies were supported by the Russian academy of sciences (63.1, 64.1 and 65.1).