

SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Applications of Space Medicine to Earth-Related Health Issues (3)

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EXPERIENCE IN CLINICAL REHABILITATION APPLICATIONS OF SPACE MEDICINE  
TECHNOLOGIES

**Abstract**

Investigations pursued at IBMP in recent years showed that the major trigger of the aggregate of adverse effects of microgravity such as muscular deconditioning, central coordination disorders, orthostatic insufficiency and shifts in cardiorespiratory parameters is elimination or a sharp decrease of support stimulation resulting in automatic deactivation or significant suppression of the tonic system and subsequent development of a number of physiological and structural changes in a variety of body systems. On this assumption the IBMP investigators carried out a broad range of experiments looking for the ways to directly stimulate tonic mechanisms for prevention of the micro-g induced disorders. These efforts resulted in development and use of an axial loading suit, a mechanostimulator of foot support zones, and a LF suit-stimulator for long wearing. Tests of the devices both in ground-based and space experiments demonstrated their effectiveness in preventing the structural and functional changes in muscles and motor control disorders under the conditions of microgravity. Since the sensorimotor disorders in microgravity have close similarity to pathologies, IBMP in collaboration with academic, clinical and commercial partners embarked on an aggressive program of promoting the space hypokinetic syndrome prevention technologies for rehabilitation of patients with serious motor disorders caused by perinatal encephalopathy, infantile cerebral paralysis, cerebral infarction, craniocerebral trauma, spinal pathologies, cardiovascular and other diseases. The space medicine technologies were successfully adapted to the needs of clinical rehabilitation. For instance, the axial loading suit, a modification of space suit PINGUIN, has become the main method used in over 100 Russian ICP rehab centers. Another suit modification has passed clinical trials and is being actively commercialized as an offer for rehabilitation of patients with cerebral infarction, Parkinson's disease, and craniocerebral traumas. Foot stimulator PION, LF myoelectrostimulator and immersion bath also proved high effectiveness. Hence the cooperation of space physiologists and clinicians offers strong possibilities of developing ingenious technologies for more rapid recovery of patients' health and motor activity, facilitation of social adaptation and making easier the everyday life of patients who till recently have been undergoing continuous unsuccessful treatment and qualified as hopeless.