KEYNOTE LECTURE

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Topic:

Bed rest as a model for studying mechanisms of functional decline

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Abstract:

The lifestyle of humans included physical activity on a regular basis throughout their evolutionary history except for the past two or three generations (Malina, Little, 2008). Currently global physical inactivity is implicated in the recent worldwide epidemic of obesity and indicated as a major risk factor for morbidity and second leading risk factor for global death in adults as well as an independent risk factor for metabolic morbidity in children and adolescents (American College of Sports Medicine, 2001; Caballero, 2007; Strong et al., 2005; World Health Organization, 2005, World Health Organisation, 2014).The force of gravity has a very important role in forming the structure and function of the human organism and its demands necessary adaptations of the human organism, which are mostly determined and conditioned by physical activity. Scientists approach to this problem in different manners – many of them research how prolonged physical inactivity affects the human body. Among such studies we can classify prolonged living in space (Harm et al., 2001; LeBlanc et al., 2000; Stein et al., 1999), simulated weightlessness (Pavy-Le Traon et al., 1998, Adams et al., 2003; Blottner et al., 2006; Mekjavić et al., 2005; Kortebein et al, 2007; Pišot et al., 2008, 2009, 2012, Paddon-Jones, 2009), and the immobilisation of healthy (Rittweger et al., 2006, Ferrando et al., 1996) or injured (Hyeteok et al., 2003; Pathare et al., 2005) parts of the human body. Bed rest was standardized as a ground based model for studying the effect of microgravity in space physiology but can be also a perfect model to mimic physical inactivity and affect functional decline. In Slovenia, simulated weightlessness studies have been introduced at the University of Primorska, Science and Research Centre, Institute of Kinesiology Research a few years ago. Until today, we have performed five extensive studies in cooperation with numerous partners. Healthy volunteers are included in those studies and they are studied before, during, and after submitting to bed rest. Thirty-seven males (approx. average age: 24±3 years) and 16 older adults (59.7±3.5 years) have been submitted to horizontal (BR 2006, 2007, 2012) and 7 degrees head down tilt bed rest (BR 2008); ten of them each year from 2006 to 2008. There were two types of interventions carried out: during BR 2012 were included cognitive training intervention; during BR 2007, 2008 and recovery 2012 were included nutrition countermeasures with individually balanced energy intake. The changes and mechanisms of effects of bed rest and subsequent recovery of specific subsystems of human organism were studied and will be presented.