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MYOTONPRO: A FAST-TRACK COTS PAYLOAD TO ENHANCE THE HUMAN PHYSIOLOGY RESEARCH ON ISS AND BEYOND.

Abstract

The development of a sustainable permanent / long-term human presence in space can be greatly enhanced by the technological development of physiological monitoring systems able to monitor crew health during and after missions. Musculoskeletal deconditioning during prolonged spaceflight is well-documented, and includes loss of muscle mass and function and loss of bone mass, which increase the risk of injury. However, no information is currently available on the microgravity-induced changes of the human myofascial tension system. Muscle Tone in Space (Myotones, Principal Investigator D. Blottner) experiment has been selected for flight on the International Space Station (ISS) to provide key biomechanical parameters (e.g. tone, stiffness, elasticity) critical for the neuromuscular status when exposed to long term continuous microgravity. The tone, biomechanical and viscoelastic properties of superficial skeletal muscles or other soft biological tissues will be non-invasively measured by a commercial-off-the-shelf (COTS) small hand-held Digital Palpation Device (MyotonPRO), developed by Myoton AS. The device is already used on Earth and proved on several Parabolic Flight Campaign. It could then be beneficial for open field studies and space scientific and clinical applications as well. The device is equipped with a COTS Lithium- Ion Polymer battery pack integrated in the system, making it portable and not-depending from additional infrastructure during the measurements. The paper will present the approach followed on the COTS hardware to achieve the full flight certification for the ISS utilization over a 7 months schedule project. The main steps followed from the identification of device's adaptations to the Lithium-Ion Polymer battery certification will be reported as example of fast-track payload to ISS. The approach for the ISS compatibility will be presented. It will include the design assessment, safety aspects for manned environment and mission suitability. The experiment will be executed in the Columbus Module on the ISS and it will be complemented by ultrasound measurements and blood sample collection. The device

will be launched with SpaceX in March 2018 and ESA astronaut Alexander Gerst (flying to ISS in the summer 2018) will be the first subject. National Sponsors: DLR Bonn e.V. 50WB1718, 50WP1604, ESA contracts .4000120611/17/NL/PG/eg and 4000120612/17/NL/PG/eg