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NOVEL CONCEPT OF COMPACT PHYSIOLOGICAL COUNTER-MEASURING EQUIPMENT IN
QUEST OF PARTIAL OR LOW GRAVITY HABITABILITY

Abstract

Space race currently revolves around the targeting manned missions on Mars and Moon, specifically terraforming Mars. To make a mission successful, the cost and time consuming, complex human dimension should be concerned. Beyond Earth life is inhospitable but regardless of any atmosphere, human needs stay the same. Constant gravity on earth majorly influences physiological human body functions. Thus far, studies say exposure to micro(μg)/partial gravity($\mu\text{g} < \text{p.g} < 1\text{g}$) over a significant period of time appears to be insufficient for cardiovascular, musculoskeletal and pulmonary system maintenance. For indemnification of such lacks, necessary countermeasures in form of mechanical exercising systems are being used. In not so ordinary environment, mechanical aspects come with challenges i.e. vibration induced issues in craft, mass and size constraints and body part specific equipment limitation. Exploiting such challenges as research opportunities, this article brings the idea going radially beyond conventional ways for innovating useful design solutions. An introduction to develop a Universal Exercising Equipment is briefed in this work. That benefits multiple physiological systems from maximum integration of feasible specific bodily requirements for optimal effectiveness in design decisions from limited exercise resources. It further outlines possibilities of going from ideas to prototyping the concept of mixed, compact, most economical, ergonomic and easy manufacturing making it most efficient exercise machine for astronauts in ISS who would return back to normal gravity after mission or for future Mars colonials, who would be exposed to harsh environment and anticipated lacking of Earthly gravitational forces for a prolonged perspective of time.

Keywords - Countermeasures, Compact Exercise Equipment, Micro or Low Gravity, Extraterrestrial, Space Physiological Adaptation