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THE EFFECTS OF 7 DAYS OF WHOLE BODY UNLOADING USING A HYPER BUOYANCY FLOTATION (HBF) BED ON SKELETAL MUSCLE MASS

Abstract

INTRODUCTION: The loss of skeletal muscle mass and function is one of the major outcomes of exposure to a micro-gravity (G) environment. A recently introduced analogue of microgravity centres on a hyper saline filled water bed (hyper buoyancy flotation, HBF), which has been shown to induce other features of G exposure, such as spinal extension. The aim of the present study was to determine the feasibility of undertaking 7 days of supine unloading on the HBF and to determine the effects on skeletal muscle. **METHODS**: Twelve healthy male subjects aged (28 4 yrs) completed the study. Subjects undertook testing before and after a 7 day control period, followed by a six week wash-out, and before and after an unloading period. Total and upper leg skeletal muscle mass was measured using magnetic resonance imaging (MRI) (Siemens MAGNETOM Verio 3T, Germany). Biopsy samples of the vastus lateralis muscle were obtained (Bergstrom technique) before and after the unloading period. Muscle tissue was snap frozen for fiber size and typing using histochemical staining for myosin ATPase. For the unloading period the subjects were asked to lie supine on the HBF for 7 days, where they were fed a controlled diet. A maximum of 15 min per day was permitted off the HBF. Data were analyzed using ANOVA with repeated measures, followed by Tukey post hoc test. **RESULTS**: All subjects successfully completed the 7 day period of unloading. The control period resulted in no change in whole body muscle mass (32.065.14 v 31.835.07 kg) as well as the upper leg (10.41.8 v 10.21.7 kg) determined by MRI. The unloading period showed a significant (p¡0.002) change in both whole body (32.195.33 v 31.255.33 kg) and upper leg (10.41.8 v 10.01.8). There was no change in histochemical fiber typing (Type I; 5522 v 6434, Type IIa; 6238 v 6024, Type IIx; 1716 v 1211 **DISCUSSION**: The HBF was shown to be a feasible model for longer-term studies of unloading. Seven days of unloading was sufficient to induce a significant loss of total skeletal muscle mass that was not detected when isolating the quadriceps at a single muscle or cellular level.