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EFFECTS OF LOW INTENSITY PULSED ACOUSTIC WAVE RETAINS BONE'S MICROSTRUCTURAL AND MECHANICAL INTEGRITY IN A DISUSE OSTEOPENIA MICE MODEL

Abstract

INTRODUCTION Long-term bedrest, brain/spinal cord injury, and space travel induce bone loss due to lack of mechanical stress, which lead to the risk of osteoporosis and fracture. Different anabolic and anti-resorptive agents have been used to mitigate bone loss under such conditions. However, the results for these treatments have been mixed, in part due to the localized nature of disuse induced bone loss which is concentrated on load bearing bones. It is hypothesized that modulated low intensity pulsed ultrasound (mLIPUS) generated acoustic wave can provide anabolic and targeted stimulus to reduce bone loss in disuse osteopenia. METHODS Four-month old C57BL/6 mice were randomized to five groups, age match (AM), non-suspended sham (NS), non-suspended –LIPUS (NU), suspended sham (SS), and suspended-LIPUS (SU). LIPUS for 20 min/day for 5 days/week. After four weeks of suspension, CT analyses were conducted for trabecular structural and density measurements on the parameters of bone volume fraction (BV/TV), bone mineral density (BMD), trabecular thickness (Tb.Th), and bone surface/bone volume (BS/BV). Histomorphometric analyses and mechanical testing were applied for the femur. RESULTS CT showed significant decreases in BV/TV (36%, p¡0.005), BMD (3%, p¡0.05), Tb.Th (12.5DISCUSSION This study explored the potential of mLIPUS as a non-invasive, non- pharmacological targeted therapy for disuse osteoporosis, suggesting that mLIPUS has very strong potential as a non-invasive and targeted anabolic agent for disuse osteoporosis.