Whole Body Vibration Increasing Bone Density in the Osteoporotic Rats by Tail Suspension

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Purpose: Osteoporosis is a skeletal pathology characterized by low bone density. High frequency, extremely low-level mechanical signals can be anabolic to bone formation using whole body vibration (WBV). In this study we evaluated the influence of WBV on the bone mineral density (BMD) in osteoporotic rats by hindlimb unload (HU).

Methods: Twelve adult male disuse rats (n=12) were done with HU (Fig.1) for 35 days by tail suspension and 12 non -disuse rats were not. All the rats were divided into four groups with 6 in each: control, control with WBV, HU, and HU with WBV. Rats received WBV stimulation (BodyGreen AV-001) at 1.2 g (Fig.2). Each received vibration for 30 min/day, 5 days/wk for 5 weeks. BMD measurements were performed using DEXA. Four different regions of interest (ROI's) were analyzed (Fig. 3): ROI 1 the femoral condyles area, ROI 2 the whole femoral bone, ROI 3 the proximal metaphyseal ti bial area and ROI 4 the proximal epiphyseal and metaphyseal tibial area.

Results: Rat weights didn't significantly change in the HU groups, but increased in the control groups compared to their initial weight (Fig. 4). BMD in the HU groups decreased after 5 weeks compared to that in the control groups. In the HU groups, BDMs increased in ROI3 and ROI4 after the rats received the WBV, but they had no significant change in ROI1 and ROI2 (Fig.5). Four ROI's in the control groups, however, did not change.

Conclusions: WBV stimulation could increase osteoporotic rats' BMDs in the proximal tibial metaphysic and epiphysis area. However, distal femoral epiphysis did not respond. Thus, the distance from the source of vibration may influence the response to WBV.