NEUROMUSCULAR RESPONSES TO TWO WHOLE-BODY VIBRATION MODALITIES DURING DYNAMIC SQUATS

INTRODUCTION: Whole Body Vibration (WBV) is a method used to stimulate skeletal muscle reflexes and has been shown to elicit training responses in muscle strength and power. **PURPOSE:** The purpose of this study was to determine the acute neuromuscular response of the vastus lateralis (VL), biceps femoris (BF), gastrocnemius (GS), and tibialis anterior (TA) during two different modalities of WBV compared to baseline. **METHODS:** Ten males and six females performed squats with a stance width of 21.6cm from 10^{o}–40^{o} of knee flexion. Subjects squatted at a cadence of 4s down and 4s seconds up without vibration (BL) and on two different WBV platforms. The first platform (VV) vibrated vertically with 4mm of vertical displacement at 30Hz. The second platform (RV) rotated about an axis with a vertical displacement of 4mm at 30Hz. The order of WBV modes was balanced, and a BL squat was performed immediately before each WBV trial. Simultaneously with knee angles (optoelectronic motion capture), surface EMG data were collected from the right VL, BF, GS, and TA during the squats. The data were filtered using band stop filters at 25-35Hz and 55-65Hz to remove artifact associated with vibration and line interference, and the root mean square of the filtered data were calculated using a 100 ms time constant over each trial. A 2 x 2 Repeated Measures (RM) MANOVA followed by RM univariate ANOVAS and t-tests (Sidak adjustment) to evaluate main effects of vibration (VB), and modality (M) and their interactions for each muscle. **RESULTS:** These data show a significant (p<0.05) multivariate VB and VB x M interaction effect. Follow-up tests showed EMG activity of the GS (d=.431), VL (.286), and TA (.415) but not BF were significantly greater (p<0.05) during RV vibration compared to BL. VV increased EMGrms above BL in GS (d=.341), VL (.238), and TA (.604) but not BF. **CONCLUSION:** These data suggest that WBV enhances muscle activation in the lower- and upper-leg during dynamic squats. RV elicits a greater response in the GS while VV elicits larger responses in the TA, possibly due to the effects of anteroposterior VV platform instability. **PRACTICAL APPLICATION:** WBV may enhance responses to lower-body strength training, possibly through the mechanism of increased motoneuron activation.

William E. Amonette[1], Andrew F. J. Abercromby[2, 3], Martha Hinman[4], and William H. Paloski[5]
[1]Wyle Laboratories, [2]University of Houston, [3]National Space Biomedical Research Institute, [4]University of Texas Medical Branch, [5]National Aeronautics and Space Association