Use of accelerometry to classify activity beneficial to bone in premenopausal women

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This study aims to quantify the relationship between ground reaction force (GRF) and peak acceleration from hip and wrist-worn accelerometers and to determine peak acceleration cut-points associated with a loading rate previously demonstrated as beneficial to bone. Short bursts of dynamic activity characterised by high impact forces and loading rates have been found to increase bone mineral density in pre-menopausal women. Forty seven premenopausal women performed a range of activities whilst wearing GENEActiv and Actigraph GT3X accelerometers (sampling frequency of 100 Hz) worn on the hip and wrist. Peak vertical GRF was recorded using a force plate for 8 steps per activity. ROC curves were used to determine the optimal peak acceleration cut-points in 37 participants. These cut-points were cross validated in the remaining 10 participants. For all activities combined, peak accelerations were positively and significantly correlated with peak GRF and peak loading rate. Overall classification agreement was over 85% for both monitors worn either at the wrist or hip in the cross-validation sample. Wrist-worn accelerometers are more acceptable to study participants and thus results in greater wear-time. Both the GENEActiv and Actigraph GT3X accelerometers can be used to identify the occurrence of loading rates which may be beneficial to pre-menopausal women.

The complete abstract can be viewed or publication purchased by following the link: