Occupational whole-body vibration

Occupational whole-body vibration (WBV) increases the risk of developing low back and neck pain; yet, there has also been an increased use of therapeutic WBV in recent years. Although the resonant frequency (fr) of the spine decreases as the exposure acceleration increases, effects of varying the vibration profile, including peak-to-peak displacement (sptp), root mean squared acceleration (arms) and frequency (f), on pain onset are not known. An established in-vivo rat model of WBV was used to characterize the resonance of the spine using sinusoidal sweeps. The relationship between arms and fr was defined and implemented to assess behavioral sensitivity - a proxy for pain. Five groups were subjected to a single 30-minute exposure, each with a different vibration profile, and a sham group underwent only anaesthesia exposure. The behavioral sensitivity was assessed at baseline and for 7 days following WBV-exposure. Only WBV at 8Hz induced behavioral sensitivity, and the higher arms exposure at 8Hz led to a more robust pain response. These results suggest that the development of pain is frequency-dependent, but further research into the mechanisms leading to pain are warranted to fully understand which WBV profiles may be detrimental or beneficial [1].

1)
Holsgrove T, Zeeman M, Welch WC, Winkelstein BA. Pain after Whole-Body Vibration Exposure is Frequency Dependent and Independent of the Resonant Frequency: Lessons from an in vivo Rat Model. J Biomech Eng. 2019 Aug 1. doi: 10.1115/1.4044547. [Epub ahead of print] PubMed PMID: 31513714.