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Research article

**sEMG during Whole-Body Vibration Contains Motion Artifacts and Reflex Activity**Karin Lienhard<sup>1,2</sup>, Aline Cabasson<sup>1</sup>, Olivier Meste<sup>1</sup>, Serge S. Colson<sup>1,2</sup>[More Information >>](#)

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**ABSTRACT**

The purpose of this study was to determine whether the excessive spikes observed in the surface electromyography (sEMG) spectrum recorded during whole-body vibration (WBV) exercises contain motion artifacts and/or reflex activity. The occurrence of motion artifacts was tested by electrical recordings of the patella. The involvement of reflex activity was investigated by analyzing the magnitude of the isolated spikes during changes in voluntary background muscle activity. Eighteen physically active volunteers performed static squats while the sEMG was measured of five lower limb muscles during vertical WBV using no load and an additional load of 33 kg. In order to record motion artifacts during WBV, a pair of electrodes was positioned on the patella with several layers of tape between skin and electrodes. Spectral analysis of the patella signal revealed recordings of motion artifacts as high peaks at the vibration frequency (fundamental) and marginal peaks at the multiple harmonics were observed. For the sEMG recordings, the root mean square of the spikes increased with increasing additional loads ( $p < 0.05$ ), and was significantly correlated to the sEMG signal without the spikes of the respective muscle ( $r$  range: 0.54 - 0.92,  $p < 0.05$ ). This finding indicates that reflex activity might be contained in the isolated spikes, as identical behavior has been found for stretch reflex responses evoked during direct vibration. In conclusion, the spikes visible in the sEMG spectrum during WBV exercises contain motion artifacts and possibly reflex activity.

**Key words:** Stretch reflex, vibration training, power spectral density, frequency analysis, filtering, spectral linear interpolation

**Key Points**

- The spikes observed in the sEMG spectrum during WBV exercises contain motion artifacts and possibly reflex activity
- The motion artifacts are more pronounced in the first spike than the following spikes in the sEMG spectrum
- Reflex activity during WBV exercises is enhanced with an additional load of approximately 50% of the body mass

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