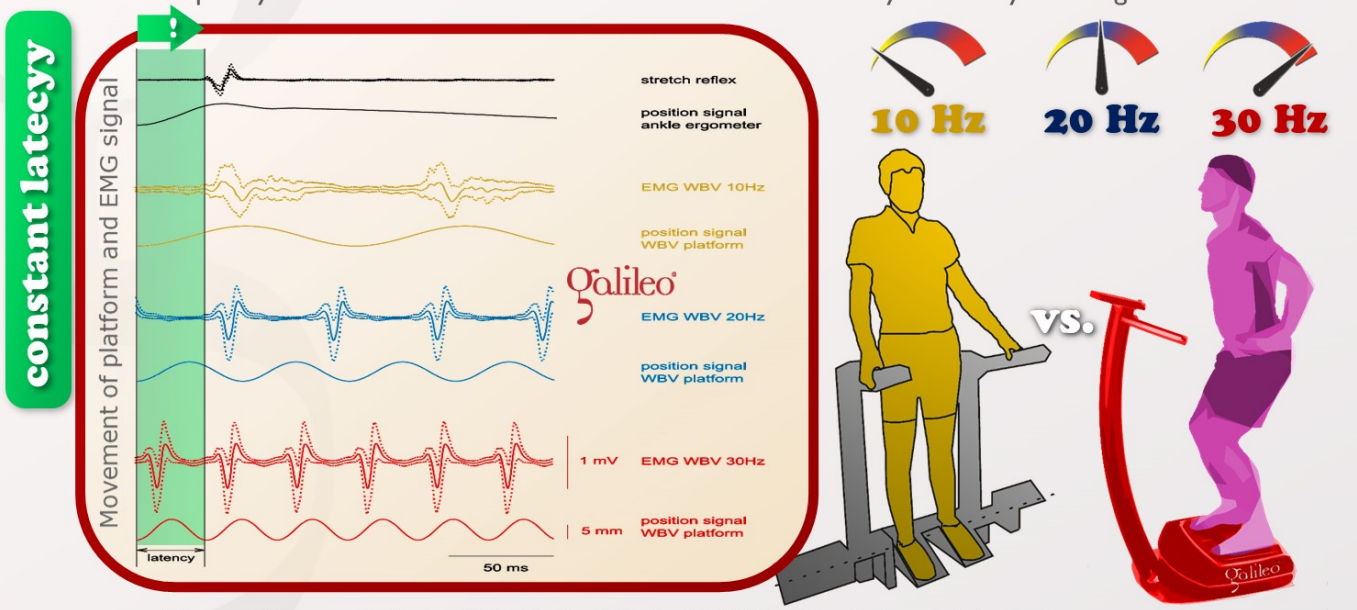
Does Galileo Training trigger a stretch-reflex with each upwards movement of the platform?

The answer is: YES

This study proved that Galileo Training triggers a stretch reflex with each upwards movement of the platform. It also proved that the EMG signal corresponding to the vibration frequency is not a motion artefact but an actual activation of the corresponding muscle. The measured latency is therefore not dependent on the vibration frequency but on the individual and is identical with the latency caused by one single tilt movement.



Ritzmann R, Kramer A, Gruber M, Gollhofer A, Taube W: EMG activity during whole body vibration: motion artifacts or stretch reflexes; Eur J Appl Physiol., 110(1):143-51, 2010; PMID: 20419311; GID: 2242

Galileo Research Fact Sheet #101 Common: Stretch-Reflex, EMG www.galileo-training.com

This study proves an important principle: For a long time researchers simply assumed all components of an EMG signal at the vibration frequency would be movement arteficts and should therefore be neglected for analysis.

However, this study proved that each upwards movement of the Galileo platform actually triggers one stretch-reflex and therefore causes an EMG signal with a fixed delay (latency) to the start of the movement of the platform.

This delay is independent of the frequency but dependent on the individual and is equivalent to the delay for this individual as a reaction on a single tilt (single stretch reflex). (If it had been a movement artifact it would have been dependent on the vibration frequency).

This has a major implication on results of many studies performed with Galileo and EMG measurements because they significantly underestimated muscle Activation because they filtered this dominant frequency component.

This study also proved that each movement of the Galileo platform triggers a stretch-reflex – one important basic effect which is one of the causes of the effectiveness of Galileo Training because it does not simply “shake” the muscles but actually causes muscle activation: the Mechano-Stimulation.

Eur J Appl Physiol. 2010 Sep;110(1):143-51. doi: 10.1007/s00421-010-1483-x. Epub 2010 Apr 24.

EMG activity during whole body vibration: motion artifacts or stretch reflexes?

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Abstract

The validity of electromyographic (EMG) data recorded during whole body vibration (WBV) is controversial. Some authors ascribed a major part of the EMG signal to vibration-induced motion artifacts while others have interpreted the EMG signals as muscular activity caused at least partly by stretch reflexes.

The aim of this study was to explore the origin of the EMG signal during WBV using several independent approaches.

In ten participants, the latencies and spectrograms of stretch reflex responses evoked by passive dorsiflexions in an ankle ergometer were compared to those of the EMG activity of four leg muscles during WBV. Pressure application to the muscles was used to selectively reduce the stretch reflex, thus permitting to distinguish stretch reflexes from other signals. To monitor motion artifacts, dummy electrodes were placed close to the normal electrodes.

Strong evidence for stretch reflexes was found: the latencies of the stretch reflex responses evoked by dorsiflexions were almost identical to the supposed stretch reflex responses during vibration (differences of less than 1 ms). Pressure application significantly reduced the amplitude of both the supposed stretch reflexes during vibration (by 61 +/- 17%, $p < 0.001$) and the stretch reflexes in the ankle ergometer (by 56 +/- 13%, $p < 0.01$). The dummy electrodes showed almost no activity during WBV (7 +/- 4% of the corresponding muscle's iEMG signal).

The frequency analyses revealed no evidence of motion artifacts.

The present results support the hypothesis of WBV-induced stretch reflexes. Contribution of motion artifacts to the overall EMG activity seems to be insignificant.

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