Influence of Vibrating Platform on Modulation of H-reflex in Lower Legs
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Introduction

Hoffman Reflex (H-reflex)
H-reflex is a spinal reflex reaction of the muscle that is evoked by electrical stimulation to the sensory fibres. The H-reflex test is performed by using an electrical stimulator and muscle responses are recorded by EMG amplifier [2]. The response called H-wave appears 28–35ms after stimulus, the amplitude of which would decrease with the increase of stimulus and eventually disappear at supramaximal stimulus.

Whole Body Vibration (WBV)
WBV may enhance neuromuscular excitability, hence lower the sensitivity of muscle spindles (stretch sensors), which could be of great value in rehabilitation. H-reflex is widely established as a neurophysiological method for the assessment of spasticity. Hence, given its potential decreasing effects on H-reflex, WBV could be considered as a management method for spasticity.

Objectives

1. Set up protocols to measure the influence of the WBV on the H-reflex of calf muscles in healthy adults.
2. Record the acceleration transmission during WBV by using accelerometers data.
3. Establish the algorithm to check the knee joint angle during WBV.
4. Analyse data and bring it to a context of the background knowledge.

Method

Healthy subjects were asked to seat straight and comfortably with a stable knee angle of 110 degrees. H-reflex Testing:
The passive surface EMG electrodes were placed in a bipolar configuration on the soleus muscle, gastrocnemius medialis and gastrocnemius lateralis muscles of dominant leg. The recruitment curves for H-reflex and M wave were obtained followed by one set of H-reflex test with the intensity that gives 20%Mmax.

WBV Measurement:
The WBV applied in 5 bouts of two minutes duration each with a frequency of 20Hz. Subjects’ feet were placed at mark 2 and fixed by velcro tapes on the WBV platform (Galileo Basic, Novotec Medical GmbH, Germany) as Figure 3 shows. 5 accelerometers were placed on the right leg and platform to collect accelerations data as shown in Figure 6.

Results

Conclusions

Figure 5 shows that vertical acceleration is transmitted well to the lower limb. If vibration modulates H-reflex, then this should be observed in the soleus muscle with the proposed setup. Figure 7 and 8 illustrate that the amplitude of H-reflexes were decreased acutely after WBV and the latency time after stimulus is longer for both H-reflex and M-wave. The results indicate that WBV can lower the sensitivity of muscle spindles thus enhance the neuromuscular excitability acutely.

References