CENTER FOR RESEARCH IN HUMAN MOVEMENT VARIABILITY

The Effects of Vibrations on the Light Touch Perception Threshold of Transtibial Amputees

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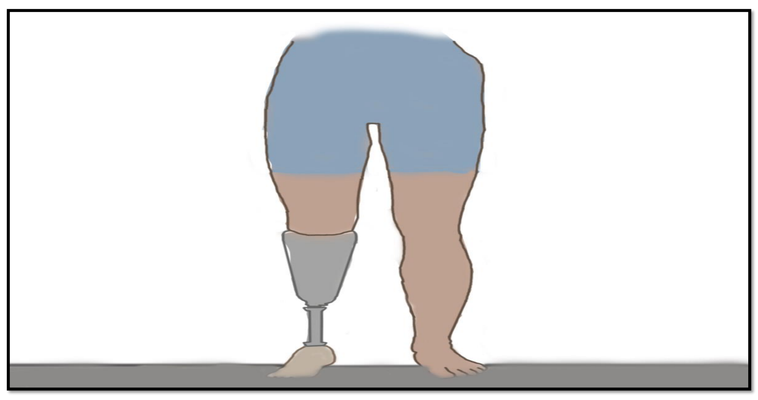
Introduction

Sensations deriving from the residual limb and the prosthetic socket interface may be important for mobility/balance following an amputation. One potential way to improve sensation in the residual limb-socket interface is the use of sub-threshold vibrations.



Purpose: To determine whether the use of sub-threshold vibrations can improve light touch sensation in transtibial amputees.

Hypothesis: The application of a sub-threshold pink noise vibration will improve an amputee's ability to perceive a light touch stimulus in the residual limb surrounding the area of amputation.

Methods

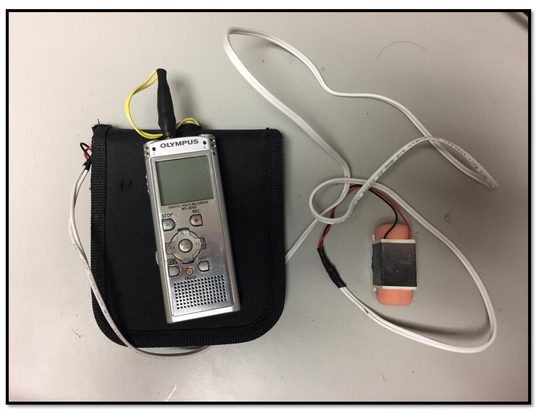
Groups	Total	Gender	Age(yrs)	Height(m)	Weight(kg)
Unilateral Transtibial Amputee	20	F=4 M=16	59.7±15	1.79±.06	100.2±15.9
Healthy Control	17	F=4 M=13	54.1±16	1.72±.09	85.5±18.8

Conditions

1) No vibration

2) White noise vibration

3) Pink noise vibration



The baseline and the three conditions were administered to the mid-thigh of the residual limb by a vibrating tactor.

Methods

Monofilaments

Varied from a diameter of 1.65mm to 6.65mm.

Diameter of 5.07 = protective sensory threshold[2].

Results

The light touch sensation threshold was significantly greater in amputees than healthy controls ($p<0.001$).

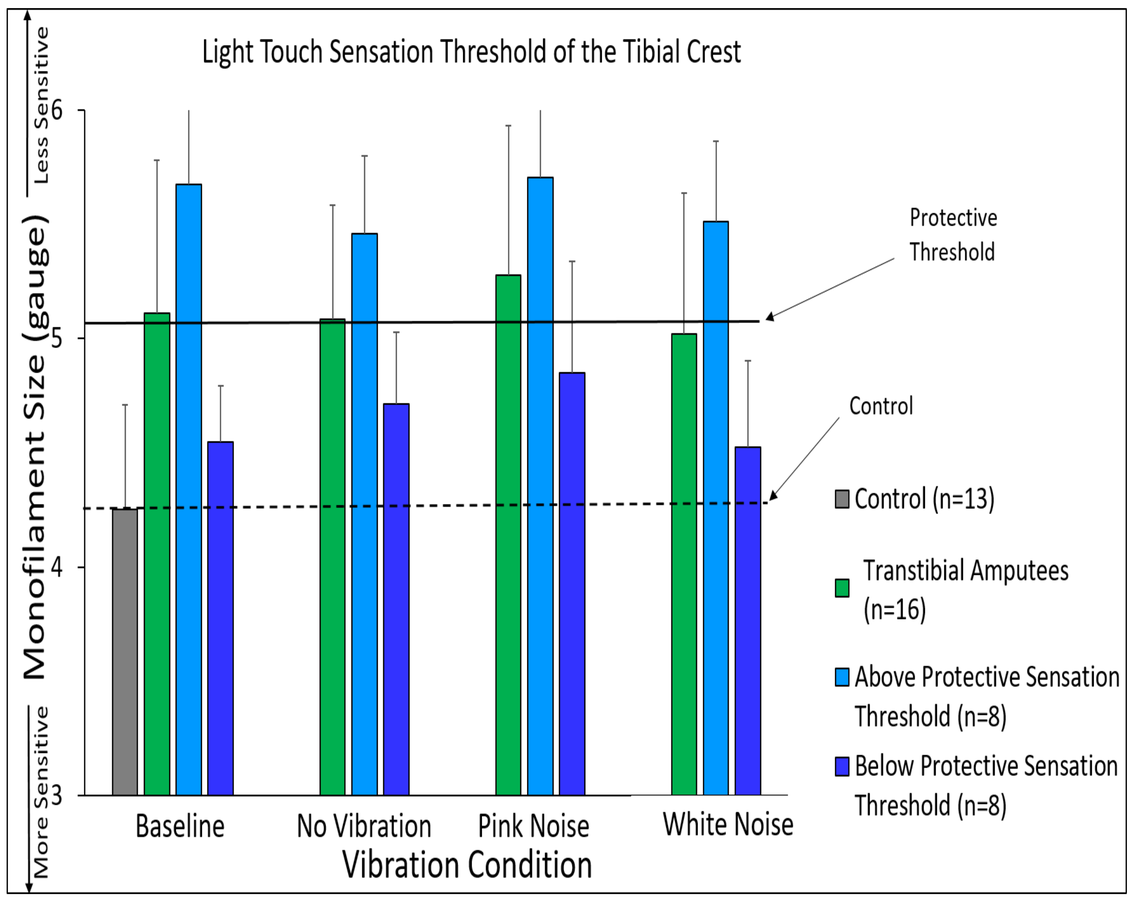


Figure 1: The application of vibrations (White and Pink Noise) had no significant effect on the perception of light touch in the residual limb (tibial crest) of individual with transtibial amputation ($p=0.44$).

Discussion

Our hypothesis was not supported, even though some interesting trends were present especially for the below protective sensation threshold amputees. We are currently testing whether sub-threshold vibrations can improve other functions, such as walking and standing using biomechanical analyses

Acknowledgements

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References

1. Galica, A.M., et al. (2009) *Gait & Posture*, 30(3), 383
2. Wang, Fengyi, et al. (2017) *J Diabetes Res*, 1–12.

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