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

Aaron Robinson\(^1\), Jenny Kent\(^1\), Shane R. Wurdeman\(^2\), Adam L. Jacobsen\(^3\), Nicolas Stergiou\(^1,4\), Kota Z. Takahashi\(^1\)

\(^1\)Department of Biomechanics, University of Nebraska at Omaha, Omaha, NE 68182
\(^2\)Department of Clinical and Scientific Affairs, Hanger Clinic, Houston, TX USA
\(^3\)Veterans Affairs Medical Center, Omaha, NE USA
\(^4\)College of Public Health, University of Nebraska Medical Center, Omaha, NE USA

**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**

**Monofilaments**

Varied from a diameter of 1.65mm to 6.65mm.

Diameter of 5.07 = protective sensory threshold\(^2\).

**Conditions**

1) No vibration
2) White noise vibration
3) Pink noise vibration

**Results**

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

![Image of vibration application](image)

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

**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.

**References**