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

<table>
<thead>
<tr>
<th>Groups</th>
<th>Total</th>
<th>Gender</th>
<th>Age (yrs)</th>
<th>Height (m)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unilateral Transtibial Amputee</td>
<td>20</td>
<td>F=4</td>
<td>M=16</td>
<td>59.7±15</td>
<td>100.2±15.9</td>
</tr>
<tr>
<td>Healthy Control</td>
<td>17</td>
<td>F=4</td>
<td>M=13</td>
<td>54.1±16</td>
<td>85.5±18.8</td>
</tr>
</tbody>
</table>

**Conditions**

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

Monofilaments

Varied from a diameter of 1.65mm to 6.65mm.

Diameter of 5.07 = protective sensory threshold².

Results

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

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

This work was supported by NIH P20GM109090 and NIH R15HD08682.

References