Tactile intervention for children with cerebral palsy: A framework to guide clinical reasoning and future research

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**Tactile impairments in children with unilateral CP** (Auld et al 2012)
- 40% of children with UCP have registration and perception deficits
- An additional 37% have tactile perception deficits
- 23% of children with UCP do not have a tactile impairment

**Tactile intervention systematic review summary** (Auld et al 2014)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Quality</th>
<th>Tactile outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIMT (Gordon et al 2006; Charles et al 2001)</td>
<td>Both IV</td>
<td>No change</td>
</tr>
<tr>
<td>UL surgery (Dahlin et al 1998; Eliasson et al 1998)</td>
<td>Both IV</td>
<td>Conflicting results</td>
</tr>
<tr>
<td>Sensory motor therapy (Bumin et al 2001)</td>
<td>II</td>
<td>No change</td>
</tr>
</tbody>
</table>

**Studies in adults**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number of studies</th>
<th>Improves tactile function?</th>
<th>Feasible in children with CP?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulus specific training</td>
<td>6</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Electrical stimulation</td>
<td>5</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Sensory motor therapy</td>
<td>5</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Pneumatic cuff</td>
<td>3</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Ice/ thermal therapy</td>
<td>2</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>EMLA</td>
<td>1</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Mirror therapy</td>
<td>1</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
New Studies

• Intervention: Surgery (n=27), Botox (n=19), Rehab (n=7)
• Outcome: No significant change in stereognosis.

• Intervention: Stimulus specific training 3x/ wk for 6 weeks compared to control (standard care)
• Outcome: Trend towards improvement in Functional Tactile Object Recognition Test (not significant).

• Intervention: Vibration via a bimanual track-ball device linked to a gaming system for 6 weeks at home; control used without vibration.
• Outcome: No statistical difference in tactile registration, texture perception or stereognosis.

• Intervention: Intervention - HABIT (82hrs) + directed tactile training vision occluded (8hrs) vs Control - HABIT (82hrs) + undirected tactile play with vision (8hrs) over 3 weeks.
• Outcome: Found no difference amongst groups, but all improved in GOT and tended to improve in stereognosis.

• Intervention: Single session of mirror-based training.
• Outcome: Significant improvement in spatial tactile perception.
## Choosing the right approach

<table>
<thead>
<tr>
<th>Approach</th>
<th>Example</th>
<th>Appropriate population</th>
<th>Supporting evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting another way</td>
<td>Looking at and paying attention to hand during a task involving tactile stimulation</td>
<td>Children with sufficient vision and attention ± movement</td>
<td>1 hour of mirror based training improved spatial tactile perception (Auld et al 2016)</td>
</tr>
<tr>
<td>Sneaking in the door</td>
<td>Actively using hands to explore objects of variable tactile input</td>
<td>Children with sufficient movement and attention</td>
<td>82 hours of bimanual training ± 8 hours of texture training improved texture perception (Kuo et al 2016)</td>
</tr>
<tr>
<td>Pressing the buzzer</td>
<td>Passively stimulation of hand with a particular texture</td>
<td>Children who are able to attend to the stimuli, but may have visual and motor impairments</td>
<td>Nil</td>
</tr>
</tbody>
</table>

### References


Auld M, Johnston L, Russo R, Moseley GL. A single session of mirror-based tactile and motor training improves tactile dysfunction in children with unilateral


Mann GE, Burridge JH, Malone LJ, Strike PW. A pilot study to investigate the effects of electrical stimulation on recovery of hand function and sensation in


