Supraspinal modulation of pain and the nociceptive flexion reflex (NFR): Is emotional modulation correlated with conditioned pain modulation?

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Introduction
Conditioned pain modulation (CPM) and emotional controls of nociception (ECON) are, in part, due to activation of supraspinal structures that modulate pain signaling at the spinal level. The present study assessed CPM and ECON modulation of pain and a reflex used as a marker of spinal nociception (nociceptive flexion reflex, NFR).

Objectives
To determine whether CPM is related to ECON

Methods: Emotional Controls of Nociception [ECON]

Unpleasant Neutral Pleasant

- 24 pictures presented in pseudorandom order
- 8 pictures per valence (unpleasant, neutral, pleasant)
- Pictures presented for 6 s, 12-22 s inter-picture interval
- Painful electric stimulations delivered during 50% of pictures (balanced across picture valence)

Methods: Conditioned Pain Modulation (CPM)

Phase
Pre 5 stimulations 5 stimulations
Conditioning 5 stimulations with hand in cold water [10 °C] 5 stimulations with hand in warm water [36 °C]
Post 5 stimulations 5 stimulations

Data Analysis

Results: Means / SDs for Change Scores

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
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<tbody>
<tr>
<td>Δ Pain CPM</td>
<td>-6.60</td>
<td>6.91</td>
</tr>
<tr>
<td>Δ Pain Sham</td>
<td>-1.41</td>
<td>5.10</td>
</tr>
<tr>
<td>Δ Pain ECON</td>
<td>6.44</td>
<td>7.09</td>
</tr>
<tr>
<td>Δ NFR of CPM</td>
<td>-0.02</td>
<td>0.40</td>
</tr>
<tr>
<td>Δ NFR of Sham</td>
<td>0.01</td>
<td>0.30</td>
</tr>
<tr>
<td>Δ NFR of ECON</td>
<td>0.17</td>
<td>0.27</td>
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Conclusion
Results suggest that greater modulation of pain and spinal nociception in ECON is related to greater inhibition of pain and spinal nociception in CPM, but not CPM-Sham; however, the magnitude of the relationships are small, supporting relatively distinct processes. Furthermore, inhibition of NFR in CPM-Sham is related to inhibition of NFR in CPM which may suggest attention/placebo effects.