Chronic post-herpetic neuropathy pain modulation by lidocaine patch: An fMRI-pharmacological study

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**INTRODUCTION**

Chronic neuropathic pain conditions are usually resistant to pharmacotherapy. LidoDerm patch is shown to be effective in reducing post herpetic neuropathy (PHN) pain. Here we present brain activity for PHN allodynia (painful touch), before and after LidoDerm therapy (acute and long-term), and compare it to brain activity for inflammatory pain and chronic back pain.

**METHODS**

- 11 PHN patients were studied with fMRI for tactile pain (allodynia). They refrained from analgesic medications for 24 hours prior to the study.
- We compare brain activity for arthritis pain (1 subject) and chronic back pain (average of 13 patients for spontaneous back pain).
- PHN patients were scanned prior, 6 hours, and 2 weeks post continuous use of LidoDerm patches.
- Patients were trained to use the finger-scan device to rate magnitudes (fig. 1).
- In the scanner the patients rated fluctuations of their pain to mechanical stimuli applied either to the body area having PHN or to a control area (fig.2).
- The signals for pain and various control scans are used to calculate vectors used to search for the BOLD signal and to control for various contaminants.
- BOLD responses are determined using FSL software (fmrib, Smith et al. 2001).

**RESULTS**

- On-line signal for pain subjectivity
  - Pain subjectivity signal is generated when the subject is instructed to rate the pain using the finger-scan device.
  - Visual control signal is generated when the subject is instructed to follow a recorded pain rating projected on a screen using the finger-scan device.

- Pain ratings are reduced with LidoDerm use
  - A binary vector (P) for high - low ongoing pain upon external stimulation to the affected area is generated. The mean value of stimulus pain rating signal is calculated. Pain ratings having a value larger and smaller than the mean are designated by 1 and 0, respectively.

- Stimulus-evoked brain activity increases after LidoDerm use
  - A binary vector (P) for high - low ongoing spontaneous fluctuations of PHN pain. The mean value of the pain rating signal is calculated. The peak ratings are averaged across all patients in figure 4, for each condition.
  - A binary vector (P) for tactile stimulus timing upon stimulation to the control area is generated.

- Brain activity co-varying with allodynia pain decreases after LidoDerm use
  - When mechanical stimulation results are correlated with pain rating, a very different pattern of activity is observed, for Session 1 (pre-LidoDerm), across 11 patients.

**CONCLUSIONS**

- Initial analyses indicate that PHN allodynia pain involves similar brain regions as in back pain, and different from arthritis pain.
- LidoDerm treatment seems to decrease brain activity for allodynia pain and increases activity for touch.

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