

## 2013 Pain Day Poster Competition

### Human/Clinical

#### SEX DIFFERENCES IN CORTICAL RESPONSES TO PAIN UNPLEASANTNESS

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Studies investigating the encoding of pain affect in the human brain are rather scarce, and, to our knowledge, none have ever investigated sex-differences in pain unpleasantness, although men and women are known to differ with respect to general emotional processing. Our objective, therefore, was to study sex-differences in the cortical representation of pain unpleasantness. Twenty-four healthy young adults (13 women) participated in our study. A matched perception paradigm consisting of non-painful and painful transcutaneous sural nerve shocks (equated for subjective intensity across participants) was used. The brain network related to pain processing was assessed in men and women separately, using shock-evoked somatosensory-brain potentials (SEPs). SEPs were transformed from scalp recordings to intracranial current sources using sLORETA. Changes in pain-related activity associated with pain unpleasantness were revealed by regressing subjective pain unpleasantness scores (assessed with numerical rating scale) onto change in pain-related brain activity (corrected for multi-voxel comparisons using SnPM). Analyses indicate that increased anterior cingulate cortex activity (BA24 – activated 115 ms after shock-onset) positively predicted pain unpleasantness in women ( $r=.86$ ;  $p<.05$ ), whereas decreased orbitofrontal/medial prefrontal cortex activity (BA47/BA11 – also activated 115 ms after shock-onset) predicted increased pain unpleasantness in men ( $r=-.90$ ;  $p<.05$ ). This sexually dimorphic pattern of activity occurred independently from any sex-difference in subjective pain intensity or unpleasantness (both  $ps>.05$ ). These results indicate that pain unpleasantness is associated with early anterior cingulate cortex activity in women – a brain region closely tied to sensory and affective integration. On the other hand, pain unpleasantness is closely tied to early orbitofrontal/medial prefrontal cortex activity in men such that increased activity here prevented the experience of pain unpleasantness. This is consistent with recent evidence suggesting that this part of the brain is responsible for executive-level reappraisals/inhibition of negative affect – a process which may be more active when men, but not women, experience pain.