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THE ROLE OF THE HUMAN INSULAR CORTEX IN PAIN PROCESSING

I. Mutschler¹, J. Wankerl², E. Seifritz³, T. Ball^{4,5}

¹Department of Psychology, University of Basel, Basel, Switzerland, ²Department of Psychology, University of Freiburg, Freiburg im Breisgau, Germany, ³Clinic for Affective Disorders and General Psychiatry, Psychiatric University Hospital Zurich, Zurich, Switzerland, ⁴Epilepsy Center, University Hospital Freiburg, ⁵Bernstein Center for Computational Neuroscience, Freiburg im Breisgau, Germany

The human insular cortex is involved in a wide range of functions. A recent study done by conducting an activation likelihood estimate (ALE) meta-analysis suggests that there are anatomical subregions with functional specializations for motor processing, auditory perception and homeostatic control, which plays an important role in emotional processing (Mutschler et al., 2009). An increasing number of studies propose the involvement of the anterior insula in experiencing pain and empathy for pain, e.g. when someone perceives a loved one feeling pain (Craig, 2009, Singer et al., 2004). In this present work, the activation likelihood estimate (ALE) method (Turkeltaub et al., 2002) was applied and 59 studies reporting pain processing and 19 investigating empathy for pain entered the meta-analysis to investigate the questions whether there are functional specializations within the insular cortex for pain processing and empathy for pain. Pain studies revealed activation in the posterior and mid-anterior part of the insula. In contrast, the ALE-maximum of studies investigating empathy for pain was located more anterior than studies investigating physically induced pain. The present findings provide insights into the organization of the human anterior insula and support the posterior-to-anterior gradient for interoceptive representations in the Insula proposed by Craig (2009). According to this view, an increasingly elaborate and complex representation of bodily states may progress from the posterior to the anterior insula region. Meta-analyses represent an important methodological approach for ruling out false positive results and contribute to the generation of hypotheses which can be experimentally proven.