Neuronal correlates of impaired habituation in response to repeated trigemino-nociceptive but not to olfactory input in migraineurs: an fMRI study.

Abstract:
Using functional magnetic resonance imaging (fMRI), we aimed to explore the habituation behaviour to trigemino-nociceptive as well as olfactory stimuli in migraine patients. We exclusively focussed on intrasessional behavioural rating patterns and the related blood oxygen level dependent (BOLD) signal changes. We observed that groups significantly differ in the time course of pain intensity ratings during the stimulation session: whereas interictal migraineurs sensitized (increasing pain ratings), control subjects habituated (decreasing pain ratings). Pain ratings of ictal patients remained unchanged. This behaviour is accompanied by a similar time course of neuronal activity in the bilateral anterior insula, in the middle cingulate cortex and in the thalamus. In these areas, the brain activity increased in migraineurs but decreased in the control group during the session. In contrast to these findings, the rating patterns for the olfactory stimuli (rose odour) did not differ between patients and controls and a gradual decrease of perceived stimulus intensity was found in all three groups. This stimulus specific response may occur because the olfactory system is the only sensory system not passing the thalamus. Our data suggest that impaired habituation in functional brain systems in migraine is fundamental only to specific modalities including the trigemino-nociceptive, but, at least, excluding the olfactory system. Our
findings further suggest that there is no single neuronal modulator responsible for the altered rating pattern in migraineurs.