

Adaptation toward odor stimuli in humans : investigating into respiratory rhythm and the limbic activations

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Previously we tested simultaneous recordings of electroencephalograms and respiration in normal subjects during threshold and recognition levels of olfaction. The study identified changes of respiratory pattern during odor stimuli and found that inspiratory phase-locked alpha oscillation (I- α) from the averaged potentials were triggered by inspiration onset. We performed dipole analysis of I- α and found the dipoles were located in the olfactory-related areas: the entorhinal cortex, hippocampus, amygdala, and the orbitofrontal cortex. As we often experienced that olfaction is habituated with constant exposure of odor presentation, we compared the respiratory patterns, I- α , and dipole localizations of I- α during recognition of odor with those of adaptation in odor. We found that changes in tidal volume and respiratory rate returned to the normal breathing level during the adaptation period. From averaging EEGs triggered as the inspiration onset, I- α was observed in all electrodes positions during perception of odor; on the other hand, power spectra of frontal areas decreased during the adaptation period. During the adaptation period, dipoles were not estimated in the orbitofrontal cortex, but sustained activations in the entorhinal cortex and hippocampus were observed.