

Electrodynamics of olfactory induced signals: an electro-encephalographic study

ABSTRACT

The goal of our study is to find the spatio-temporal behavior of the olfactory induces oscillation. Independent component analysis algorithm is used for potential of the scalp electrode. Electroencephalographic response to pleasant and unpleasant smell is recorded. Boundary element head model is used to represent the head volume conductor. Artifact rejection is performed by visual and semi-automatic method. After rejection of unwanted signal independent component analysis (ICA) is performed with the Electroencephalography (EEGLAB). Current source localization is done by fitting an equivalent current dipole model. Oscillatory phenomena as; delta, theta, alpha, beta and gamma are responses to an event, are observed. We find that, 0.5-13Hz activity is pronounced for pleasant odor in frontal regions and 13-50Hz is more active for unpleasant smell in occipital and temporal regions. After stimulation, 200 to 400ms is active time window for the signal amplitude and frequency as well for unpleasant smell. Dipole analysis shows higher residual variance (RV) for pleasant odor than unpleasant. These results would be cutting-edge steps in solving inverse problem and digitizing the odor.

Keyword: Electroencephalograph; Spatio-temporal; Source localization; Artifact