P139_Loudness dependence of the auditory evoked N1m/P2m component: A magnetoencephalography study

Wyss C.1,2, Boers F.2, Arrubla J.2, Dammers J.2, Kawohl W.1, Neuner I.2,3, Shah N.J.2,4
1Department of Psychiatry, Psychotherapy and Psychosomatics, Zurich University Hospital for Psychiatry, 8021 Zurich, Switzerland
2Institute of Neuroscience and Medicine – INM 4, Forschungszentrum Jülich, 52425 Jülich, Germany;
3Department of Psychiatry, Psychotherapy and Psychosomatics, RWTH Aachen University, 52074 Aachen, Germany
4Department of Neurology, Faculty of Medicine, JARA, RWTH Aachen University, 52074 Aachen, Germany

Introduction: Loudness dependence of auditory evoked potentials (LDAEP) has been suggested by a number of studies as an indicator of the central serotonergic system [1-3]. The most common strategies used to determine the LDAEP by means of EEG are single-electrode estimation and dipole source analysis. A recent study found a significant difference between scores obtained with these two methods [4]. Confounding activation of a frontal source in the single-electrode method may cause this difference. Several authors suggest a frontal protective mechanism being activated during presentation of high tone intensities [5, 6]. Therefore, a detailed investigation of the LDAEP generators and their temporal dynamics is needed.

Methods: In the present study, we investigated 19 healthy volunteers (male, mean age 26.1 ± 3.9) by means of magnetoencephalography (MEG). Evoked responses to brief sinusoidal tones of six intensities (10-60 dB SL) were recorded using a whole-head 248 magnetometer system. Volunteers were instructed to not pay attention to the tones while watching a silent movie for distraction. After artifact rejection applying independent component analysis [7] the MEG data were averaged and magnetic field tomography (MFT) [8-9] was applied. MFT provides full 3D reconstruction across time to analyse the N1m and P2m components. Voxelwise MFT RMS values were calculated for each subject in time windows of 50 ms between 0-400 ms. The group analysis was performed using the generalized linear model. One-sample permutation t-test was performed for each tone intensity in order to identify the activation of the group. A voxel based whole brain analysis with statistical thresholds set at p=0.05 and family-wise error correction for multiple comparisons was performed.

Results: We found significant activation in the time window of the N1m wave (75-125 ms, according to the global field power maps calculated in MEG sensor space) for the highest tone (60 dB SL) in inferior, medial and superior temporal gyri, operculum, pre- and postcentral gyri and superior parietal gyri. In the time window of the P2m wave (175-225 ms) there were additionally activated regions mainly in the right superior occipital gyrus, right inferior and middle frontal gyrus, right insular gyrus and left posterior cingulate gyrus.

Conclusion: Preliminary results show that activations after presentation of auditory stimuli became more widespread comprising multimodal areas in the time window of the P2m compared to that of the N1m. The current findings provide insight into the neurophysiological mechanisms of LDAEP and will therefore have a direct impact on the methodology used to analyse data recorded during LDAEP.

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References