Background

Deep brain stimulation (DBS) of subthalamic nucleus (STN) significantly alleviates cardinal motor symptoms and improves quality of life in Parkinson’s disease (PD)(1). Specifically, PD patients have problems with sensory processing, sensorimotor integration and kinesthetic awareness. Somatosensory evoked fields (SEF) is an effective tool to study the sensory perception and their cortical processing(2).

Methods

Six PD patients were recruited from the population of STN DBS treated patients at Aarhus University Hospital. Patients are asked not to take anti-PD medication from the evening before interview. After the interview, the patient continues to MEG-preparation and assessment. MEG assessments were performed as explained in Figure 1.

MEG data were filtered using MaxFilter, to remove DBS artefacts. The data was processed using the Fieldtrip toolbox. After preprocessing steps to eliminate artefacts, the data was averaged and data in orthogonal gradiometer pairs were combined. Grand averages were computed across subjects within conditions. Gradiometer pairs showing maximum amplitude and it’s latency in sensorimotor areas were searched (See Figure 2). Repeated-measures ANOVA with a Tukey post-hoc test was performed to determine significant differences in both amplitude and latency.

Results

MaxFilter successfully suppressed the DBS artefacts enabling visualization of SEF responses. The early SEF responses namely N20 and N30 were clearly localized in central areas as shown in Figures 2 and 3. The mid-latency evoked fields were also clearly visible in the same region. The SEF amplitudes and latencies did not significantly differ with DBS therapy or medication.

Discussion

The evoked fields preserve the phase-locked content in the response and these did not show any significant variation with therapy. The lack of differences in N20 is in congruence with previous studies (3,4). The mid-latency and late responses also do not seem affected. It is probable induced oscillatory activity, that is non-phase locked to the stimulus might contain more useful information. The study of induced activity might be useful to ascertain problems in early sensory cortical processing in PD patients(5).

References