REPEATABILITY OF MOTOR EVOKED POTENTIALS WITH NAVIGATED AND NON-NAVIGATED MOTOR CORTICAL TRANSCRANIAL MAGNETIC STIMULATION

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Motor evoked potential (MEP), the response to motor cortical transcranial magnetic stimulation (TMS), varies considerably from trial to trial (Kamen, 2004). Placement and orientation of the stimulating coil affect MEP to a great extent (Brasil-Neto et al., 1992), which has led to the development of TMS navigational systems (Neggers et al., 2004). The purpose of this study was to examine if navigation of the motor cortical TMS has an effect on the trial to trial or day to day variability seen in MEP. Seven healthy males (mean age: 26±2, height: 180±5 cm and mass: 78±15 kg) volunteered as subjects for the study. Five TMS stimuli were applied (Magstim2002, Magstim, Whitland, Wales) to the passive biceps brachii (BB) muscle from the motor cortex using a stereotactic navigational system (navigated TMS) and without the navigational system (non-navigated). A custom made helmet was used for the fixation of the coil the position of which was constantly observed during the non-navigated TMS. Motor threshold was determined independently for both stimulation situations and the stimulation intensity was set to correspond to motor threshold multiplied by 1.4. The protocol was repeated twice one week apart.

20 ms RMS value around the highest positive MEP response peak from BB was analyzed. The repeatability was assessed by calculating the coefficient of variation (CV). The stimulation intensities and MEP responses were compared using paired samples one-tailed T-test. Although, the stimulation intensity was higher in non-navigated TMS (75±13 % of the stimulator output vs. 67±13 %, P < 0.05), no difference was observed between the MEP RMS values between navigated 0.3±0.12 mV and non-navigated 0.28±0.29 mV stimuli in the first measurement session. The trial to trial CV in RMS values was 0.37 in the first measurement session and 0.35 in the second session for navigated TMS and 0.36 and 0.32 for non-navigated TMS, respectively. The day to day CV was 0.15 for both the navigated and non-navigated TMS. As already suggested by Kamen (2004) the relatively high trial to trial and day to day variation observed in the present study implicate that several stimuli should be averaged in MEP determination. The use of navigational system facilitates finding the stimulation hotspot for a given muscle and thus makes TMS more comfortable on the subject by lowering the required stimulation intensity. On the other hand the MEP reproducibility seemed to be similar in navigated and non-navigated motor cortical transcranial magnetic stimulation.


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