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Titel des Beitrags: The impact of repetitive navigated transcranial magnetic stimulation coil positioning and stimulation parameters on human language function.

Abstract: Repetitive navigated transcranial magnetic stimulation (rTMS) in combination with object naming is able to elicit naming errors by stimulating language-related brain regions. However, stimulation results mainly depend on coil positioning and stimulation parameters, which have not been investigated since the implementation of neuronavigation to transcranial magnetic stimulation. Therefore, the following three parameters were systematically examined in the present study: coil angulation, stimulation frequency, and stimulation intensity. Five healthy, right-handed subjects underwent rTMS language mapping of Broca’s as well as Wernicke’s areas of the left hemisphere. During mapping sessions, coil angulation was changed clockwise in 45° steps, and the stimulation frequency and intensity were varied within a considerably wide range. For angulation, the anterior-posterior (ap) coil orientation was used as reference position. An angulation of 90° to ap coil orientation led to the highest rate of naming errors within Broca’s area, whereas an inhomogeneous distribution of angulations was observed during stimulation of Wernicke’s area. Therefore, ap coil orientation, which is regarded as standard in rTMS language mapping, could not be approved as the optimal position. With regard to stimulation parameters, 20
Hz and 120% of the resting motor threshold (RMT) were defined as optimal. Coil angulation, stimulation frequency, and stimulation intensity have significant impacts on language impairment during rTMS mapping. The variation of only one of these parameters already leads to a clearer disruption of language performance. Therefore, individually adapted stimulation protocols have to be determined prior to language mapping in order to improve mapping results.