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Titel des Beitrags: Cortical regions involved in semantic processing investigated by repetitive navigated transcranial magnetic stimulation and object naming.

Abstract:
Knowledge about the cortical representation of semantic processing is mainly derived from functional magnetic resonance imaging (fMRI) or direct cortical stimulation (DCS) studies. Because DCS is regarded as the gold standard in terms of language mapping but can only be used during awake surgery due to its invasive character, repetitive navigated transcranial magnetic stimulation (rTMS)--a non-invasive modality that uses a similar technique as DCS--seems highly feasible for use in the investigation of semantic processing in the healthy human brain. A total number of 100 (50 left-hemispheric and 50 right-hemispheric) rTMS-based language mappings were performed in 50 purely right-handed, healthy volunteers during an object-naming task. All rTMS-induced semantic naming errors were then counted and evaluated systematically. Furthermore, since the distribution of stimulations within both hemispheres varied between individuals and cortical regions stimulated, all elicited errors were standardized and subsequently related to their cortical sites by projecting the mapping results into the cortical parcellation system (CPS). Overall, the most left-hemispheric semantic errors were observed after targeting the rTMS to
the posterior middle frontal gyrus (pMFG; standardized error rate: 7.3?), anterior supramarginal gyrus (aSMG; 5.6?), and ventral postcentral gyrus (vPoG; 5.0?). In contrast to that, the highest right-hemispheric error rates occurred after stimulation of the posterior superior temporal gyrus (pSTG; 12.4?), middle superior temporal gyrus (mSTG; 6.2?), and anterior supramarginal gyrus (aSMG; 6.2?). Although error rates were low, the rTMS-based approach of investigating semantic processing during object naming shows convincing results compared to the current literature. Therefore, rTMS seems a valuable, safe, and reliable tool for the investigation of semantic processing within the healthy human brain.

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