A comparison of language mapping by preoperative navigated transcranial magnetic stimulation and direct cortical stimulation during awake surgery.

Navigated transcranial magnetic stimulation (nTMS) is increasingly used in presurgical brain mapping. Preoperative nTMS results correlate well with direct cortical stimulation (DCS) data in the identification of the primary motor cortex. Repetitive nTMS can also be used for mapping of speech-sensitive cortical areas. The current cohort study compares the safety and effectiveness of preoperative nTMS with DCS mapping during awake surgery for the identification of language areas in patients with left-sided cerebral lesions. Twenty patients with tumors in or close to left-sided language eloquent regions were examined by repetitive nTMS before surgery. During awake surgery, language-eloquent cortex was identified by DCS. nTMS results were compared for accuracy and reliability with regard to DCS by projecting both results into the cortical parcellation system. Presurgical nTMS maps showed an overall sensitivity of 90.2%, specificity of 23.8%, positive predictive value of 35.6%, and negative predictive value of 83.9% compared with DCS. For the anatomic Broca’s area, the corresponding values were a sensitivity of 100%, specificity of
13.0%, positive predictive value of 56.5%, and negative predictive value of 100%, respectively. Good overall correlation between repetitive nTMS and DCS was observed, particularly with regard to negatively mapped regions. Noninvasive inhibition mapping with nTMS is evolving as a valuable tool for preoperative mapping of language areas. Yet its low specificity in posterior language areas in the current study necessitates further research to refine the methodology.