Cortical plasticity of language function in glioma patients as measured by nrTMS

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Introduction
Cortical plasticity has been shown in glioma patients by direct cortical stimulation (DCS) during awake craniotomy. However, this invasive option for repeated mapping is only available after decision for a second surgery. Navigated repetitive transcranial magnetic stimulation (nrTMS) has shown a high correlation to the results of DCS during awake craniotomy for language-negative regions. The present study aims to examine the cortical plasticity of language-negative regions in glioma patients.

Methods
We included 14 patients with left-sided perisylvian gliomas, who underwent preoperative nrTMS language mapping twice. The mean time between mappings was 17 ± 12 months. In order to perform analysis, we defined a tumor area (T) and an area without tumor (WOT).

Results
We detected changes of cortical language function in all patients. In 8 of 14 patients (57.1\%) we found more language-negative regions within the T area during the second nrTMS mapping (26 vs. 11 during first mapping). Three patients (21.4\%) showed no change of language-negative cortical regions. In 3 patients (21.4\%) nrTMS detected less language-negative regions within the T area during the second mapping (22 vs. 34 during the first mapping).

Conclusion
Present results show that nrTMS might be able to show cortical plasticity of language-negative regions in glioma patients. However, the reliability of our results has to be confirmed in a larger cohort and by DCS during awake craniotomy.