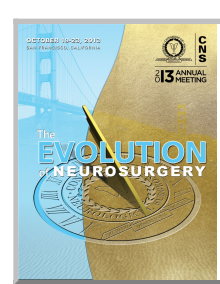


# The Value of Navigated Transcranial Magnetic Stimulation in Patients Undergoing Glioma Surgery Near Speech- Areas

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## Introduction

The resection of lesions in the vicinity of eloquent brain areas constitutes a great challenge in neurosurgery. Preoperative identification of the motor cortex and speech areas can be performed by functional magnetic resonance imaging (fMRI) and nTMS. Intraoperative motor evoked potentials via direct cortical stimulation give real-time information about the motor function.

The areas for speech function are more heterogeneous, and intraoperative monitoring needs an awake patient. To avoid awake-craniotomy, preoperative identification of speech sites is even more important.

## Methods

All patients with gliomas near anatomic speech areas and a planned operative resection were included in our study prospectively. The study is approved by the local ethics commission. In most cases nTMS was performed a day prior to surgery. After acquiring the nTMS data, they were transferred to our Brainlab® workstation for surgical navigation. Each surgeon studied the data and planned the operative approach as well as a possible complete versus incomplete tumor resection.

From August 2012 to March 2013, we included 14 patients in our study. Speech disorder was the leading symptom in 6 patients. One reported of seizure-like symptoms, during which he wasn't able to talk. Surgery was performed in general anesthesia in all patients.

## Results

Speech disorder was unchanged in five of these seven patients, improved in one and one was symptom-free postoperatively. A new speech deficit occurred in 1 patient resected from a left fronto-parasagittal anaplastic oligoastrocytoma (WHO III) with a postoperative left temporal bleeding caused by a ruptured bridging vein. The symptoms improved by neurolinguistic therapy and were hardly detectable on discharge. The other seven patients were without speech deficit. Ten tumors [3 glioblastomas(WHO IV), 3 anaplastic astrocytomas (WHO III), 3 anaplastic oligoastrocytomas (WHO III) and 1 oligoastrocytoma (WHO II)] could be resected completely. Four patients with glioblastome had residual tumor. Two of those were with tumor growth into the Wernicke's areas and into the basal ganglia respectively.

## Conclusions

For surgical resection of brain lesions near speech- areas, preoperative cortical mapping via nTMS is a noninvasive, safe and reliable alternative to awake- craniotomy. Results of our study are comparable to the most recent literature with awake craniotomy(1)

## Learning Objectives

Avoiding postoperative motor or sensory speech disorder by performing preoperative speech mapping via navigated transcranial magnetic stimulation (nTMS), making awake- craniotomy unnecessary.

## References

1. Wilden JA et al., Neurosurg focus 34 (2):E5, 2013