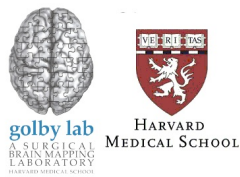




FMRI can Effectively Localize Expressive Language Cortex in Patients with Low-grade and High-grade Glioma

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Introduction

Previous studies have raised questions about tumor-induced alternations in neurovascular coupling and possible reduction of blood oxygenation level dependent (BOLD) signal in patients with brain tumors thus interfering with the validity of fMRI in these patients. This study aims to investigate the use of fMRI for presurgical mapping of language cortex and compare BOLD signal change in patients with high-grade and low-grade glioma.

Methods

A total of 12 patients with pathologic diagnosis of glioma in the left hemisphere who underwent presurgical language mapping were included. Based on pathology, patients were divided into high-grade and low-grade (6 in each group). All patients performed two block-designed language tasks (antonym generation and sentence completion). Activation maps and mean percent signal change in the left inferior frontal gyrus (region of interest; ROI) were calculated for both groups. Mann Whitney U test was used to compare signal change and age between the two study groups. Finally, multivariate analysis of covariance (MANCOVA) was used to control for age when determining effects of tumor grade on signal change in both tasks.

Results

Both language tasks resulted in significant activations in selected ROI in all patients (100%; both groups). Average signal changes in the LGG and HGG groups were not statistically different for sentence completion (1.27 ± 0.71 vs. 1.85 ± 0.72 respectively, $p > 0.05$). For antonym generation, mean signal change was statistically different between HGG and LGG groups (0.77 ± 0.44 and 1.87 ± 0.67 respectively, $p = 0.009$). Age was also statistically different between the groups (57.8 ± 5.0 years in HGG vs. 34.0 ± 12.6 in LGG, $p = 0.01$). Considering age as a covariate in MANCOVA, results showed that signal change was not statistically different between LGG and HGG for either task ($p > 0.05$ for both).

Learning Objectives

- By the conclusion of this session, participants should be able to:
- 1) Describe the importance of fMRI in presurgical brain mapping;
 - 2) Discuss, in small groups, why there are concerns regarding validity of fMRI in patients with high-grade glioma;
 - 3) Explain possible impacts of normal aging in a reduce fMRI signal.

Conclusions

FMRI successfully localized language areas in a small group of glioma patients regardless of tumor grade. Further study in a larger group of patients harboring glioma is warranted.