

AbstractID: 11115 Title: Varied vasomotor responses among brain territories in unilateral ICA stenosis patients studied using Breath-hold BOLD MRI

Introduction

Patients with significant internal carotid artery (ICA) stenosis increase the incidence of ischemic stroke and benefit from carotid interventions, such as carotid angioplasty with stenting (CAS). Hyperperfusion syndrome usually causes disastrous outcome if occurred after carotid interventions. In recent studies, impaired cerebral vasoreactivity (CVR) is considered as one of the predictors for hyperperfusion syndrome. Hypercapnia stresses such as breath holding result in vasodilatation in human subjects. Thus combining breath holding and BOLD MRI may be a useful method to characterize the impaired CVR in patients prone to hyperperfusion after CAS. Most recently, Leoni et. al. found different hemodynamic response among different brain territories in normal subjects during breath holding. The aim of this study was to evaluate the varied hemodynamic responses among different brain territories in unilateral ICA stenosis patients using the same MRI method.

Methods

Six patients with unilateral ICA stenosis participated in this study and were asked to hold their breath for 15 sec. Three cycles of the breath holding task were performed. A single-shot T2* gradient-echo EPI sequence was used for BOLD measurements at a 1.5T scanner. Twenty axial slices were acquired to cover the whole brain. Echo-planar images were spatially normalized to the MNI template and averaged BOLD signal time curves were drawn from six regions of interest, i.e. ACA, MCA and PCA on both sides. To show the extent of voxels with significant BOLD signal changes, a correlation analysis ($p < 0.05$, corrected) was applied using the averaged signal time curve from the whole brain tissue.

Results and conclusion

In summary, our results showed the impaired CVR in patients with ICA stenosis was territory dependent (Fig. 2). Detailed analysis of the hemodynamic responses measured from breath-holding BOLD MRI may help predict hyperperfusion syndrome after CAS.