

AbstractID: 8231 Title: Improved BOLD signal detectability of short breath holding duration at 3T: a comparison with 1.5T

### **Introduction**

Hypercapnia stresses such as breath holding (BH) have been showed to result in vasodilatation. Karstrup compared cerebrovascular reactivity between CO<sub>2</sub> inhalation and BH, and found good correlation in BOLD intensity changes. This suggested possibility of using a simple BH task to evaluate abnormal vasomotor functions in clinical. A previous study has focused on the detectability of BOLD signal changes during short BH durations at 1.5 T and found a 10-s BH could be detected but a 20-s is suggested for clinical applications. As the 3T scanners recently became more available, we re-evaluated this issue and aimed to find optimal BH duration for clinical use at 3 T.

### **Methods**

A T2\* gradient-echo EPI sequence was used for BOLD measurements at a 3T scanner. Imaging parameters were TR/TE/flip angle= 3000ms/35ms/90°. Five BH duration, from 5 to 30 s, were experimented. To quantitatively examine BOLD responses, a convolution model was used to fit the time curves. Maximum signal change, FWHM and onset time (defined as the time to the first half maximum) were determined from the fitted curve and compared with the previously published results for 1.5 T. To explore the number of voxels with significant BOLD signal changes ( $p < 0.05$ , corrected), a correlation analysis was applied.

### **Results**

Our result shows the fractional activation volume increases with the BH duration and reaches the plateau at 15-s which is earlier than the data for 1.5T.

### **Conclusion**

Our results suggested the BOLD imaging at 3T was more sensitive for detecting BH induced cerebrovascular reactivity than at 1.5 T. The BH duration of 15 s or above is recommended for clinical use at 3 T, which is an improvement from 20-s BH at 1.5 T.