

AbstractID: 5025 Title: Asymmetric Spin Echo in fMRI at 3T: a Quantitative Evaluation of BOLD response and Signal Drop Off

Purpose: To quantitatively evaluate the fMRI BOLD response of the asymmetric spin echo (ASE) EPI acquisition and signal drop offs at 3T. Applications in the frontal cortical and orbital frontal cortical (OFC) areas from finger tapping and olfactory stimulation were investigated.

Method and Materials: ASE EPI was developed and tested on a 3.0T scanner. Phantom was used for quantitative distortion measurement by the GRE-, SE-, and ASE-EPI sequences. For olfactory testing, subjects were presented with 12s of olfactory stimuli interspersed by 28s of air with a total scan time of 7 minutes. Subjects were trained to inhale and exhale following a prompts on the screen. Eight subjects were studied for finger tapping and six subjects for olfactory. The BOLD intensity and correlation were measured in the frontal cortical area for finger tapping, and in the orbital frontal area for olfactory stimulation studies.

Results: The signal drop off is relatively small when the echo shift is 5 msec and 10 msec compare to SE-EPI, but is significantly better compared to GRE-EPI. The optimal BOLD response from olfactory test was detected by ASE with 35 msec TE, and 10 msec echo shift. Almost no BOLD effect detected from SE at TE of 35 ms and with ASE at TE of 35 ms and 5 ms echo shift. Echo shift of 15 msec had strong artifacts. GRE-EPI was not useable for the olfactory study because almost all the signal dropped off in the OFC area.

Conclusions: ASE-EPI offers reasonable BOLD response without significant reduction in the slice coverage like SE-EPI. It can detect BOLD response where the signal is small and susceptibility is strong. GRE-EPI is preferred when the BOLD response is located in the less susceptible areas. ASE-EPI with 10 msec echo shift appears to be optimal for olfactory study at 3T.