GABA-related functional connectivity in the language network

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Recent models of dyslexia suggest that phonological processing difficulties are related to tuning of auditory cortex in the phonemic/low-gamma frequency range. Theoretical neural models and recent imaging studies indicate that the characteristics of local gamma oscillations are partially determined by excitation-inhibition balance, related to levels of GABA and glutamate metabolites. Since low frequency fluctuations in BOLD signal are coupled to power fluctuations in gamma band local field potentials, functional connectivity measures from resting fMRI may reflect oscillatory tuning characteristics seed regions. We investigate the relation between GABA and phonological processing using

Preliminary whole-brain seed-to-voxel connectivity analyses in 44 children suggest that GABA, quantified using magnetic resonance spectroscopy in bilateral occipital cortex, modulates bilateral connectivity between primary auditory cortex and between right primary auditory cortex and regions of prefrontal cortex. Additionally, functional connectivity predicts composite measures of phonological processing. These results suggest that GABAergic mechanisms influence early auditory processing and provide support for oscillatory models of phonological processing.