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## Functional Connectivity and Activity of White Matter in Somatosensory Pathways under Tactile Stimulations

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### ABSTRACT

Functional MRI has proven to be effective in detecting neural activity in brain cortices on the basis of blood oxygenation level dependent (BOLD) contrast, but has relatively poor sensitivity for detecting neural activity in white matter. To demonstrate that BOLD signals in white matter are detectable and contain information on neural activity, we stimulated the somatosensory system and examined distributions of BOLD signals in related white matter pathways. The temporal correlation profiles and frequency contents of BOLD signals were compared between stimulation and resting conditions, and between relevant white matter fibers and background regions, as well as between left and right side stimulations. Quantitative analyses show that, overall, MR signals from white matter fiber bundles in the somatosensory system exhibited significantly greater temporal correlations with the primary sensory cortex and greater signal power during tactile stimulations than in a resting state, and were stronger than corresponding

<sup>1</sup> These authors contribute equally to this work.

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