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Frequency Mapping of Rat Spinal Cord at 7T[1] EVAN CHEN, ALEXANDER RAUSCHER, PIOTR KOZLOWSKI, ANDREW YUNG, University of British Columbia, UBC MRI RESEARCH CENTER TEAM, ICORD AT VGH TEAM — The spinal cord is an integral part of the nervous system responsible for sensory, motor, and reflex control crucial to all bodily function. Due to its non-invasive nature, MRI is well matched for characterizing and imaging of spinal cord, and is used extensively for clinical applications. Recent developments in magnetic resonance imaging (MRI) at high field (7T) using phase represents a new approach of characterizing spinal cord myelin. Theory suggests that microstructure differences in myelinated white matter (WM) and non-myelinated gray matter (GM) affect MR phase, measurable frequency shifts. Data from pilot experiments using a multi-gradient echo (MGE) sequence to image rat spinal cords placed parallel to main magnetic field B0 has shown frequency shifts between not only between WM and GM, but also between specific WM tracts of the dorsal column, including the fasciculus gracilis, fasciculus cuneatus, and corticospinal tract. Using MGE, frequency maps at multiple echo times (TE) between 4ms and 22ms show a non-linear relationship between WM frequency, contrary to what was previously expected. These results demonstrate the effectiveness of MGE in revealing new information about spinal cord tissue microstructure, and lays important groundwork for in-vivo and human studies.

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