

QUANTIFY MULTI-TENSOR FOR IMPROVED CNS INJURY DIAGNOSIS USING DIFFUSION BASIS SPECTRUM IMAGING (DBSI)

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Background: Diffusion tensor imaging (DTI) has demonstrated sensitivity to detect pathologies in CNS white matter disorders. However, the capability of DTI to detect CNS white matter pathologies is confounded by the coexisting structural (crossing fibers) and pathological (inflammation associated cell infiltration and vasogenic edema, axonal injury, demyelination, and tissue loss) complications.

Technology Description: Washington University researchers have developed diffusion basis spectrum imaging (DBSI), a novel method to quantify diffusion parameters of each fiber tract to reflect the underlying structural and pathological complexity of CNS tissues using commonly implemented diffusion data acquisition schemes retaining its applicability in clinical settings. Preliminary data in mouse models of CNS diseases/injury demonstrated that DBSI is capable of separating different underlying pathologies and estimating the extent of cell infiltration, vasogenic edema, axonal injury, demyelination, and tissue loss. This approach also generates realistic “noninvasive histology” maps of various CNS white matter pathologies directly related to the actual immunohistochemistry staining that is only available after tissue excision and fixation.

Benefits:

- Able to estimate tissue loss and accurately measure the severity of the injury
- Detects neuroinflammation without exogenous agents
- Accurately resolves crossing fibers as well as reflects the actual pathologies
- Individualize patient care to increase effectiveness of therapies