

TITLE: Diffusion-Tensor Imaging and Executive Function in Subcortical Ischemic Vascular Disease and Mild Cognitive Impairment

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ABSTRACT:

Objective: To examine white matter microstructural integrity using diffusion-tensor imaging (DTI) and to determine its association with executive cognitive function in non-demented patients with subcortical vascular disease (SIVD), mild cognitive impairment, and normal controls (NC). DTI provides measures of white matter microstructural integrity that can detect changes in normal appearing white matter on T2-weighted MRI.

Participants and Methods: Participants included 9 subjects with SIVD, 9 subjects with MCI, and 8 NC. Four subjects in the SIVD group had CADASIL (cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy), a genetic form of SIVD. All participants had DTI and completed a battery of cognitive tests.

Results: The SIVD group was younger than the MCI group ($p=.003$). Region-of-interest analysis revealed significant DTI changes in NAWM in the SIVD group had relative to the MCI and NC. The MCI and NC groups did not differ significantly on DTI parameters. Exploratory correlation analyses revealed an inverse association between psychomotor processing speed and DTI in NAWM ($r=-.418$, $p=.034$).

Conclusions: This may be the first report using DTI to measure white matter health in patients with SIVD vs. MCI. Compared to normal controls, patients with SIVD have subtle changes in the microstructural integrity of NAWM, however this effect is not seen in patients with MCI. There appears to be an association between the integrity of NAWM and psychomotor processing speed. The results are limited by the small sample size and region-of-interest placement. We are continuing to recruit subjects and explore alternative approaches to analyzing DTI data.
