Diffusion Tensor Imaging Shows Subclinical Atherosclerosis is Associated with Brain Structure on in Obese Subjects.

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Purpose: Obesity and atherosclerosis in the common carotid artery are associated with greater risk of ischemic stroke. We aimed to analyze the relation between carotid intima-media thickness (c-IMT) and structural metrics from diffusion tensor imaging (DTI) in obese subjects.

Methods and materials: Twenty-two obese (body mass index ≥ 30kg/m) and 20 age-and-sex matched control subjects underwent DTI coded in 15 directions. We determined fractional anisotropy (FA) and radial, axial, and mean diffusivity in volumes of interest in 8 brain regions. We determined c-IMT by ultrasonography and values > 0.80mm were considered increased. A plaque was defined as a focal thickening ≥ 1.2 mm. Atherosclerosis was considered present when c-IMT > 0.8 mm and/or plaques were present. We recorded blood pressure, waist circumference, HOMA index of insulin resistance, and lipid profile.

Results: c-IMT was greater in obese subjects ($p<0.001$). The c-IMT correlated with FA in the lenticular nucleus ($r= 0.440$, $p= 0.004$) and in the frontal white matter ($r=0.354$, $p=0.021$) as well as with axial diffusivity in subcortical white matter ($r = -0.454$, $p=0.003$). Axial diffusivity in subcortical white matter was higher in obese subjects ($p= 0.002$). After controlling for age, sex, and waist circumference, c-IMT predicted FA in the lenticular nucleus. The best predictor of axial diffusivity in subcortical white matter was waist circumference.

Conclusion: Obesity and subclinical atherosclerosis are associated with structural changes in the lenticular nucleus and subcortical white matter. Our preliminary results point to a potential role for DTI in monitoring obesity-related structural changes in the brain.