Purpose:
To investigate brain structural changes in patients with glaucoma.

Methods:
High resolution 3D T1-weighted MP-RAGE MRI images were collected in 15 glaucoma patients (5 female, 10 male, 67+/−11 yrs), and 15 age- and gender-matched controls (66+/−11 yrs). The images were first analyzed using an automatic voxel-based morphometry technique which combines a fully automated spatial normalization approach, dubbed HAMMER [1], in conjunction with a tissue mass preserving framework called RAVENS [2]. Four consecutive steps were carried out: removal of non-brain voxels, tissue segmentation, spatial normalization to a standardized template, and generation of a mass-preserving tissue density map (i.e. RAVENS map) for each tissue type (GM, WM, ventricles). Measurements of volumes of individual brain structures: From the RAVENS maps of each individual subject’s brain, the HAMMER technique generated measurement of the sizes of 110 brain structures. These 93 structures were labeled in the template brain. Group comparison to identify structures that are different between groups in comparison: Analysis of Covariance with age as a co-variant was carried out to identify structures that are significantly different between the two groups in comparison.

Results:
Table 1 listed structures that showed significant difference in volume. Interestingly, these structures are bigger in the glaucoma group than in the control group. In a companion study, a correlation analysis was carried out between the imaging results and clinical assessments for the interpretation and understanding of the findings (Program #5624).

Conclusions:
This study has reinforced the value of MRI as a robust tool to identify structural changes in the brain of glaucoma patients.

References: