Right Arcuate Fasciculus Abnormality in Chronic Fatigue Syndrome.


Abstract

Purpose To identify whether patients with chronic fatigue syndrome (CFS chronic fatigue syndrome) have differences in gross brain structure, microscopic structure, or brain perfusion that may explain their symptoms. Materials and Methods Fifteen patients with CFS chronic fatigue syndrome were identified by means of retrospective review with an institutional review board-approved waiver of consent and waiver of authorization. Fourteen age- and sex-matched control subjects provided informed consent in accordance with the institutional review board and HIPAA. All subjects underwent 3.0-T volumetric T1-weighted magnetic resonance (MR) imaging, with two diffusion-tensor imaging (DTI diffusion-tensor imaging) acquisitions and arterial spin labeling (ASL arterial spin labeling). Open source software was used to segment supratentorial gray and white matter and cerebrospinal fluid to compare gray and white matter volumes and cortical thickness. DTI diffusion-tensor imaging data were processed with automated fiber quantification, which was used to compare piecewise fractional anisotropy (FA fractional anisotropy) along 20 tracks. For the volumetric analysis, a regression was performed to account for differences in age, handedness, and total intracranial volume, and for the DTI diffusion-tensor imaging, FA fractional anisotropy was compared piecewise along tracks by using an unpaired t test. The open source software segmentation was used to compare cerebral blood flow as measured with ASL arterial spin labeling. Results In the CFS chronic fatigue syndrome population, FA fractional anisotropy was increased in the right arcuate fasciculus (P = .0015), and in right-handers, FA fractional anisotropy was also increased in the right inferior longitudinal fasciculus (ILF inferior longitudinal fasciculus) (P = .0008). In patients with CFS chronic fatigue syndrome, right anterior arcuate FA fractional anisotropy increased with disease severity (r = 0.649, P = .026). Bilateral white matter volumes were reduced in CFS chronic fatigue syndrome (mean ± standard deviation, 467 581 mm³ ± 47 610 for patients vs 504 864 mm³ ± 68 126 for control subjects, P = .0026), and cortical thickness increased in both right arcuate end points, the middle temporal (T = 4.25) and precentral (T = 6.47) gyri, and one right ILF inferior longitudinal fasciculus end point, the occipital lobe (T = 5.36). ASL arterial spin labeling showed no significant differences. Conclusion Bilateral white matter atrophy is present in CFS chronic fatigue syndrome. No differences in perfusion were noted. Right hemispheric increased FA fractional anisotropy may reflect degeneration of crossing fibers or strengthening of short-range fibers. Right anterior arcuate FA fractional anisotropy may serve as a biomarker for CFS chronic fatigue syndrome. © RSNA, 2014 Online supplemental material is available for this article.

PMID: 25353054 [PubMed - as supplied by publisher]