DOI: 10.1002/alz.045577

BIOMARKERS

POSTER PRESENTATIONS

Alzheimer's & Dementia®
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION

Neuroimaging / New imaging methods

Increased white matter MRI T1 hypointensity volume in young-onset Alzheimer's disease patients is not accounted for by age or cardiovascular risk factors

Ryn Flaherty[1] | Rania Ezzo[1] | Jessica A. Collins[1] | Samantha Krivensky[1] | Ryan Eckbo[2] | Prashanthi Vemuri[3] | Bret J. Borowski[3] | Leonardo Iaccarino[4] | Renaud La Joie[5] | Orit H. Lesman-Segev[4] | Viktoriya Bourakova[4] | Ani Eloyan[6] | Paul S. Aisen[7] | Anne Fagan[8] | Tatiana M. Foroud[9] | Constantine Gatsonis[10] | Clifford R. Jack Jr.[3] | Joel H. Kramer[11] | Robert A. Koeppe[12] | Andrew J. Saykin[9] | Arthur W. Toga[13] | Gregory S Day[14] | Neill R. Graff-Radford[15] | Lawrence S. Honig[16] | David T. Jones[3] | Joseph C. Masdeu[17] | Mario F. Mendez[18] | Chiadi U. Onyike[19] | Emily J. Rogalski[20] | Stephen P. Salloway[21] | David A. Wolk[22] | Thomas S. Wingo[23] | Maria C. Carrillo[24] | Liana G. Apostolova[9] | Gil D. Rabinovici[5] | Brad C. Dickerson[1]

[1] Massachusetts General Hospital, Boston, MA, USA

[2] Massachusetts General Hospital, Charlestown, MA, USA

[3] Mayo Clinic, Rochester, MN, USA

[4] University of California, San Francisco, San Francisco, CA, USA

[5] Memory and Aging Center, UCSF Weill Institute for NeurosciencesUniversity of California, San Francisco, San Francisco, CA, USA

[6] Brown University, Providence, RI, USA

[7] Alzheimer's Therapeutic Research InstituteUniversity of Southern California, San Diego, CA, USA

[8] Washington University, St Louis, MO, USA

[9] Indiana University School of Medicine, Indianapolis, IN, USA

[10] Department of Biostatistics, Brown University, Providence, RI, USA

[11] UMemory and Aging Center, UCSF Weill Institute for NeurosciencesUniversity of California, San Francisco, San Francisco, CA, USA

[12] University of Michigan, Ann Arbor, MI, USA

[13] Laboratory of Neuro Imaging, Stevens Neuroimaging and Informatics InstituteKeck School of Medicine, University of Southern California, Los Angeles, CA, USA

[14] Mayo Clinic Florida, Jacksonville, FL, USA

[15] Mayo Clinic, Jacksonville, FL, USA

[16] Columbia University Medical Center, New York, NY, USA

[17] Houston Methodist Neurological Institute, Houston, TX, USA

[18] David Geffen School of Medicine at UCLA, Los Angeles, CA, USA

[19] Johns Hopkins University, Baltimore, MD, USA

[20] Northwestern University, Chicago, IL, USA

[21] Alpert Medical School of Brown University, Providence, RI, USA

[22] University of Pennsylvania, Philadelphia, PA, USA

[23] Emory Goizueta Alzheimer's Disease Research Center, Atlanta, GA, USA

[24] Alzheimer's Association, Chicago, IL, USA

Correspondence
Ryn Flaherty, Massachusetts General Hospital, Boston, MA, USA.
Email: rflaherty3@mgh.harvard.edu

Abstract

Background: White matter (WM) hypointensity volume in T1 MRI correlates strongly with T2 hyperintensities and both are typically associated with advancing age and vascular brain injury (VBI). Recent research has suggested that Alzheimer's Disease (AD) neuropathologic changes (ADNC) also increases WM hypointensity volume. Sporadic early onset AD (EOAD) patients provide a unique model to examine the relationship between ADNC biomarkers and WM hypointensity volume in the absence of advanced age, cardiovascular injury, or autosomal dominant genetic mutations.

Method: Included in the analysis were sporadic EOAD patients (n = 75) and cognitively normal controls (n = 39) from the Longitudinal Alzheimer's Disease Study (LEADS) for whom full demographic and health information were available. WM hypointensity volume in T1 MRI was segmented by Freesurfer and corrected for total white matter volume. Multiple-factor ANOVA models with logarithmic transformations were used to determine the effects of age, cohort, and presence of cardiovascular conditions on WM hypointensity volume. Further multiple-factor ANOVA models assessed whether the addition of covariates improved the model fit.

Result: In a reproduction of prior research, WM hypointensity volume was correlated with age for controls ($p < 0.05$), but not for EOAD patients. We additionally found an effect of cohort, such that EOAD patients had a higher mean WM hypointensity volume than controls when accounting for age ($p < 0.05$). No difference in the presence or number of cardiovascular conditions was found between groups. Additionally, no correlation was found between WM hypointensity volume and the presence or number of cardiovascular conditions. Including cardiovascular condition as a covariate failed to improve the model fit, even when accounting for interaction effects.

Conclusion: These results support the hypothesis that patients with ADNC have higher WM hypointensity volume beyond what would be expected based on aging or cardiovascular risk factors. Further research is needed to assess the co-localization of WM hypointensities with cortical degradation, amyloid pathology, and tau pathology.