

Apathy is associated with large-scale white matter network disruption in small vessel disease

Jonathan Tay, BSc, Anil M. Tuladhar, MD, PhD, Matthew J. Hollocks, PhD, et al.

Cite as: *Neurology*® 2019;92:e1157-e1167. doi:10.1212/WNL.0000000000007095

Correspondence

Dr. Tay
jt629@medschl.cam.ac.uk

Study objective and summary result

This study tested the hypothesis that white matter (WM) network disruption underlies the pathogenesis of apathy in patients with cerebral small vessel disease (SVD) and found that apathy is associated with WM network disconnection in patients with SVD.

What is known and what this paper adds

Apathy is prevalent in patients with SVD, and MRI studies have shown that apathy is associated with reduced WM microstructural integrity. This study provides evidence that apathy in SVD is a disconnection syndrome and can be localized to specific networks.

Participants and setting

This study analyzed data from 331 patients with SVD (58.6% female; 98% Caucasian; mean age, 68.9 ± 8.3 years) who participated in the Radboud University Nijmegen Diffusion Tensor and Magnetic Resonance Cohort (RUN DMC) study, a prospective cohort study that recruited dementia-free individuals with WM hyperintensities (WMH) or lacunar infarcts. The baseline assessment was conducted in 2006, with a follow-up in 2011, which was the data analyzed.

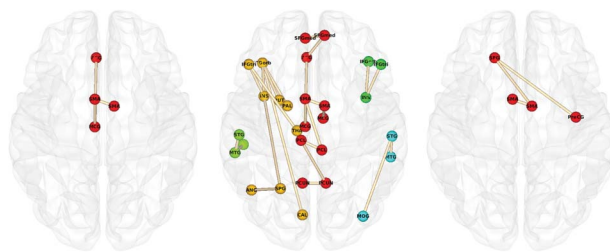
Design, size, and duration

The Apathy Evaluation Scale was used to assess apathy severity. MRI scans were examined to assess SVD markers (i.e., WMH and lacunar infarcts), and diffusion tensor tractography was used to reconstruct WM pathways. Path analysis was used to determine whether network integrity mediated the relationship between apathy and SVD markers. Network markers were then compared between patient groups.

Primary outcome measures

The primary outcome was the relevance of network integrity to the relationship between apathy and SVD markers.

Figure Topological clusters related to apathy



Main results and the role of chance

Path analysis showed that network disruption mediated the relationship between apathy and SVD markers. Compared to patients without apathy, those with apathy had worse outcomes for network density and global efficiency ($p < 0.001$). This could be localized to specific WM networks.

Bias, confounding, and other reasons for caution

Diffusion tractography algorithms cannot easily determine the specific effects of pathologies on WM fibers.

Generalizability to other populations

The racial homogeneity of the RUN DMC study's participants may limit the interracial generalizability of this study's results.

Study funding/potential competing interests

This study was funded by the Stroke Association. Some authors report being a member of the Dutch Heart Foundation and receiving funding from various foundations and the UK and Dutch governments. Go to Neurology.org/N for full disclosures.

A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The authors of the full-length article and the journal editors edited and approved the final version.

Neurology[®]

Apathy is associated with large-scale white matter network disruption in small vessel disease

Jonathan Tay, Anil M. Tuladhar, Matthew J. Hollocks, et al.

Neurology 2019;92:e1157-e1167 Published Online before print February 8, 2019

DOI 10.1212/WNL.0000000000007095

This information is current as of February 8, 2019

Updated Information & Services	including high resolution figures, can be found at: http://n.neurology.org/content/92/11/e1157.full
References	This article cites 48 articles, 9 of which you can access for free at: http://n.neurology.org/content/92/11/e1157.full#ref-list-1
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.neurology.org/about/about_the_journal#permissions
Reprints	Information about ordering reprints can be found online: http://n.neurology.org/subscribers/advertise

Neurology® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright © 2019 The Author(s). Published by Wolters Kluwer Health, Inc. on behalf of the American Academy of Neurology. All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.

