



# Hugo Botha

ASSISTANT PROFESSOR

Department of Neurology, Mayo Clinic

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## Research Interests

Neurodegenerative disease, Neuroimaging, Machine learning, Bayesian statistics

## Education

### University of Stellenbosch

BACHELOR OF MEDICINE BACHELOR OF SURGERY (MBChB)

Cape Town, WC, SA

01/2006-12/2011

### Mayo Clinic

NEUROLOGY RESIDENCY, DEPARTMENT OF NEUROLOGY

Rochester, MN, USA

07/2012-06/2016

### Mayo Clinic

BEHAVIORAL NEUROLOGY FELLOWSHIP, DEPARTMENT OF NEUROLOGY

Rochester, MN, USA

07/2016-06/2017

### Mayo Clinic

CLINICIAN INVESTIGATOR PROGRAM, DEPARTMENT OF RADIOLOGY

Rochester, MN, USA

07/2017-06/2019

## Awards

### Rector's Award for Excellent Achievement: Academics

2011

UNIVERSITY OF STELLENBOSCH

- Awarded for outstanding achievement in either academics, sport or culture

### Graduated with Honors

2011

UNIVERSITY OF STELLENBOSCH

### Faculty of Health Sciences Medal for Best Graduating Student

2011

UNIVERSITY OF STELLENBOSCH

- Awarded to the best undergraduate student from the graduating classes in health and allied health sciences

### Mayo Brother's Fellowship Award

2016

MAYO CLINIC

- Based on the qualities associated with the founders, including outstanding clinical performance, humanitarianism, and scholarly activity

### Department of Neurology Research Award

2016

MAYO CLINIC

- Recognition of outstanding basic or clinical research during residency or fellowship

## Professional Memberships and Activities

### SOCIETY MEMBERSHIP

#### American Academy of Neurology

MEMBER

2013-present

#### International Society to Advance Alzheimer's Research and Treatment

MEMBER

2017-present

#### Organization for Human Brain Mapping

MEMBER

2017-present

#### International Society for Frontotemporal Dementias

MEMBER

2020-present

## PROFESSIONAL SERVICE

### Conferences

#### COURSE MONITOR

- American Academy of Neurology Annual Meeting (2016)

#### ABSTRACT REVIEWER

- Alzheimer's Association International Conference (2018, 2019, 2020)

### Journals

#### AD HOC REVIEWER

- Alzheimer's Research & Therapy
- Brain
- Human Brain Mapping
- JAMA Psychiatry
- Journal of Alzheimer's Disease
- Journal of the Neurological Sciences
- Mayo Clinic Proceedings
- Medical Image Analysis
- Nature: Scientific Reports
- Neurobiology of Aging
- NeuroImage: Clinical
- Neurology
- Neuropsychologia
- Parkinsonism and Related disorders

## Teaching

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### INTERNAL LECTURES

#### Neurology Residency Program

##### BASIC SUMMER LECTURE SERIES

- Bedside Cognitive Assessment (2018,2019,2020)

##### NEUROANATOMY COURSE

- Cortex I: Cytoarchitecture and Organization (2019, 2020)
- Cortex II: Lobes and Functions (2019, 2020)

### INTERNAL CONFERENCES

#### Neurology Department

##### GRAND ROUNDS

- Neurology Clinicopathologic Conference - A young man with progressive language difficulty (2015)

##### SUBSPECIALTY CONFERENCE

- Left Speechless: Dealing with the word salad of progressive aphasia and apraxia of speech (2015)
- The left hand of neurology: sinistrality, hemispheric specialization and neurodegenerative disease (2017)

### LAY PUBLIC FOCUSED TALKS

#### ADRC Patient-Caregiver Seminars

##### POSTERIOR CORTICAL ATROPHY EDUCATION SEMINAR

- Making a Diagnosis

##### CBD AND PSP EDUCATION SEMINAR

- Journey to the Diagnosis (2017)

##### FRONTOTEMPORAL DEMENTIA AND PRIMARY PROGRESSIVE APHASIA EDUCATION SEMINAR

- FTD/PPA: Making a Diagnosis (2017)
- FTD/PPA: Pathology and Pathophysiology (2017)

### Invited Talks

#### CHESLEY CENTER ON AGING 2017 DEMENTIA CARE CONFERENCE

- Latest Findings and Trends in Research (2017)

## Institutional/Departmental Activities

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### ACTIVE

<b>Neurology Research Committee</b> VOTING MEMBER	2019 - Current
<b>Neurology Artificial Intelligence Program</b> DEPUTY DIRECTOR	2020 - Current
<b>Behavioral Neurology Fellowship</b> DEPUTY DIRECTOR	2020 - Current
<b>Machine Learning/Deep Learning Journal Club</b> SECTION CHAIR (NEUROLOGY)	2020 - Current

### PRIOR

<b>Mayo Internal Medicine Residents Council</b> PRELIM-YEAR REPRESENTATIVE	2012 - 2013
<b>Neurology Residency Recruitment Committee</b> VOTING MEMBER	2014 - 2016

## Mentoring

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<b>Johhny Dang (Medical student)</b> PROJECT: DELAYS IN THE DIAGNOSIS OF PPAOS • Abstract submitted to AAN 2021 • Manuscript in preparation	2019 - Current
<b>Zeynep Secking (Intern)</b> PROJECT: NEUROLOGIC CAUSES FOR DELUSIONAL INFESTATION • Manuscript in preparation	2020 - Current
<b>Ryan Coburn (Neurology Resident)</b> PROJECT: FDG-PET TO PREDICT DECLINE IN ATYPICAL ALZHEIMER'S DISEASE • Data collection in progress	2020 - Current

## Research funding

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### ACTIVE

<b>The neurobiology of two distinct types of progressive apraxia of speech (Co-I)</b> NATIONAL INSTITUTE ON DEAFNESS AND OTHER COMMUNICATION DISORDERS	2017-2022 R01 DC 14942
<b>Longitudinal multi-modality imaging in progressive apraxia of speech (Co-I)</b> NATIONAL INSTITUTE ON DEAFNESS AND OTHER COMMUNICATION DISORDERS	2018-2023 R01 DC 12519
<b>ARTFL LEFFTDS Longitudinal Frontotemporal Lobar Degeneration (ALLFTD) (Co-I)</b> NATIONAL INSTITUTE ON AGING	2019-2024 U19 AG 63911
<b>Independent brain metabolic patterns in Progressive Supranuclear Palsy (Co-I)</b> NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE	2020-2022 R03 NS 114365

## Selected Presentations

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Botha, H. (2014). *Diffusion tensor imaging in primary progressive aphasia and apraxia of speech* [Poster]. International Frontotemporal Dementia Conference, Vancouver, BC, Canada.

Botha, H. (2015). *Category Specific Imaging Correlates in Neurodegenerative Anomia* [Poster]. American Neurologic Association Annual Meeting, Philadelphia, PA, USA.

Botha, H. (2016). *Language network dysfunction in primary progressive apraxia of speech* [Poster]. Fifth Biennial Conference on Resting-State and Brain Connectivity, Vienna, Austria.

Botha, H. (2018). *FDG-PET in tau-negative amnesic dementia resembles that of autopsy proven hippocampal sclerosis* [Platform]. Human Amyloid Imaging, Miami, FL, USA.

Botha, H. (2018). *Variability in pDMN Connectivity and Relative Hubness in Amyloid-Negative Cognitively Normal Individuals Predicts Amyloid and Tau Deposition Patterns in Typical Alzheimer's Disease* [Poster]. Alzheimer's Association International Conference, Chicago, IL, USA.

Variability, H. (2018). *A novel FDG-PET based marker of TDP-43 and hippocampal sclerosis pathology* [Platform]. 24th Mayo-KI Annual Scientific Research Meeting, Rochester, MN, USA.

Botha, H. (2019). *Brain States and Tau PET Patterns Interact across the Aging-Alzheimer's Continuum* [Poster]. Alzheimer's Association International Conference, Los Angeles, CA, USA.

Botha, H. (2019). *Data-driven characterization of cross-sectional and longitudinal molecular imaging in aging and Alzheimer's disease* [Platform]. Human Amyloid Imaging, Miami, FL, USA.

Botha, H. (2019). *Linking Brain States to Molecular Pathology across the Aging-Alzheimer's Continuum* [Blitz-poster]. ADC Annual Conference, St Louis, MO, USA.

Botha, H. (2020). *Disrupted brain dynamics across the Alzheimer's disease spectrum is related to tau accumulation* [Platform]. Alzheimer's Association International Conference, Virtual, originally planned for Amsterdam, NL.

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Botha, H. (2014). *Diffusion tensor imaging in primary progressive aphasia and apraxia of speech* [Poster]. International Frontotemporal Dementia Conference, Vancouver, BC, Canada.

Botha, H. (2015). *Category Specific Imaging Correlates in Neurodegenerative Anomia* [Poster]. American Neurologic Association Annual Meeting, Philadelphia, PA, USA.

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Botha, H. (2018). *FDG-PET in tau-negative amnesic dementia resembles that of autopsy proven hippocampal sclerosis* [Platform]. Human Amyloid Imaging, Miami, FL, USA.

Botha, H. (2018). *Variability in pDMN Connectivity and Relative Hubness in Amyloid-Negative Cognitively Normal Individuals Predicts Amyloid and Tau Deposition Patterns in Typical Alzheimer's Disease* [Poster]. Alzheimer's Association International Conference, Chicago, IL, USA.

Variability, H. (2018). *A novel FDG-PET based marker of TDP-43 and hippocampal sclerosis pathology* [Platform]. 24th Mayo-KI Annual Scientific Research Meeting, Rochester, MN, USA.

Botha, H. (2019). *Brain States and Tau PET Patterns Interact across the Aging-Alzheimer's Continuum* [Poster]. Alzheimer's Association International Conference, Los Angeles, CA, USA.

Botha, H. (2019). *Data-driven characterization of cross-sectional and longitudinal molecular imaging in aging and Alzheimer's disease* [Platform]. Human Amyloid Imaging, Miami, FL, USA.

Botha, H. (2019). *Linking Brain States to Molecular Pathology across the Aging-Alzheimer's Continuum* [Blitz-poster]. ADC Annual Conference, St Louis, MO, USA.

Botha, H. (2020). *Disrupted brain dynamics across the Alzheimer's disease spectrum is related to tau accumulation* [Platform]. Alzheimer's Association International Conference, Virtual, originally planned for Amsterdam, NL.

## Publications

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Botha, H., Schalkwyk, G. van, Bezuidenhout, J., & Schalkwyk, S. van. (2011). Discourse of final-year medical students during clinical case presentations. *African Journal of Health Professions Education*, 3(1), 3–6. <https://www.ajol.info/index.php/ajhpe/article/view/69937>

Botha, H., Ackerman, C., Candy, S., Carr, J. A., Griffith-Richards, S., & Bateman, K. J. (2012). Reliability and Diagnostic Performance of CT Imaging Criteria in the Diagnosis of Tuberculous Meningitis. *PLOS ONE*, 7(6), e38982. <https://doi.org/10.1371/journal.pone.0038982>

Schalkwyk, G. van, Botha, H., & Seedat, S. (2012). Comparison of 2 Dementia Screeners, the Test Your Memory Test and the Mini-Mental State Examination, in a Primary Care Setting. *Journal of Geriatric Psychiatry and Neurology*, 25(2), 85–88. <https://doi.org/10.1177/0891988712447895>

Botha, H., & Carr, J. (2012). Attention and visual dysfunction in Parkinson's disease. *Parkinsonism & Related Disorders*, 18(6), 742–747. <https://doi.org/10.1016/j.parkreldis.2012.03.004>

Botha, H., Whitwell, J. L., Madhavan, A., Senjem, M. L., Lowe, V., & Josephs, K. A. (2014). The pimple sign of progressive supranuclear palsy syndrome. *Parkinsonism & Related Disorders*, 20(2), 180–185. <https://doi.org/10.1016/j.parkreldis.2013.10.023>

- Zalewski, N., Botha, H., Whitwell, J. L., Lowe, V., Dickson, D. W., & Josephs, K. A. (2014). FDG-PET in pathologically confirmed spontaneous 4R-tauopathy variants. *Journal of Neurology*, 261(4), 710–716. <https://doi.org/10.1007/s00415-014-7256-4>
- Botha, H., Duffy, J. R., Strand, E. A., Machulda, M. M., Whitwell, J. L., & Josephs, K. A. (2014). Nonverbal oral apraxia in primary progressive aphasia and apraxia of speech. *Neurology*, 82(19), 1729–1735. <https://doi.org/10.1212/WNL.0000000000000412>
- Martinez-Thompson, J. M., Botha, H., & Katz, B. S. (2014). Clinical Reasoning: A woman with subacute progressive confusion and gait instability. *Neurology*, 83(5), e62–e67. <https://doi.org/10.1212/WNL.0000000000000648>
- Botha, H., Moore, S. A., & Rabinstein, A. A. (2014). Teaching NeuroImages: Massive cerebral edema after CT myelography: An optical illusion. *Neurology*, 83(18), e170–e170. <https://doi.org/10.1212/WNL.0000000000000946>
- Botha, H., Duffy, J. R., Whitwell, J. L., Strand, E. A., Machulda, M. M., Schwarz, C. G., Reid, R. I., Spychalla, A. J., Senjem, M. L., Jones, D. T., Lowe, V., Jack, C. R., & Josephs, K. A. (2015). Classification and clinicoradiologic features of primary progressive aphasia (PPA) and apraxia of speech. *Cortex*, 69, 220–236. <https://doi.org/10.1016/j.cortex.2015.05.013>
- Botha, H., Boeve, B. F., Jones, L. K., Parisi, J. E., & Klaas, J. P. (2016). A Young Man With Progressive Language Difficulty and Early-Onset Dementia. *JAMA Neurology*, 73(5), 595–599. <https://doi.org/10.1001/jamaneuro.2016.0246>
- Yost, M. D., Chou, C. Z., Botha, H., Block, M. S., & Liwuluck, T. (2017). Facial diplegia after pembrolizumab treatment. *Muscle & Nerve*, 56(3), E20–E21. <https://doi.org/10.1002/mus.25663>
- Cohen, A., Kenney-Jung, D., Botha, H., & Tillema, J.-M. (2017). NeuroDebian Virtual Machine Deployment Facilitates Trainee-Driven Bedside Neuroimaging Research. *Journal of Child Neurology*, 32(1), 29–34. <https://doi.org/10.1177/0883073816668113>
- Botha, H., Finch, N. A., Gavriloiva, R. H., Machulda, M. M., Fields, J. A., Lowe, V. J., Petersen, R. C., Jack, C. R., Dheel, C. M., Gearhart, D. J., Knopman, D. S., Rademakers, R., & Boeve, B. F. (2017). Novel GRN mutation presenting as an aphasic dementia and evolving into corticobasal syndrome. *Neurology Genetics*, 3(6), e201. <https://doi.org/10.1212/NXG.0000000000000201>
- Jones, D. T., Graff-Radford, J., Lowe, V. J., Wiste, H. J., Gunter, J. L., Senjem, M. L., Botha, H., Kantarci, K., Boeve, B. F., Knopman, D. S., Petersen, R. C., & Jack, C. R. (2017). Tau, amyloid, and cascading network failure across the Alzheimer's disease spectrum. *Cortex*, 97, 143–159. <https://doi.org/10.1016/j.cortex.2017.09.018>
- Josephs, K. A., Martin, P. R., Botha, H., Schwarz, C. G., Duffy, J. R., Clark, H. M., Machulda, M. M., Graff-Radford, J., Weigand, S. D., Senjem, M. L., Utianski, R. L., Drubach, D. A., Boeve, B. F., Jones, D. T., Knopman, D. S., Petersen, R. C., Jack, C. R., Lowe, V. J., & Whitwell, J. L. (2018). [18F]AV-1451 tau-PET and primary progressive aphasia. *Annals of Neurology*, 83(3), 599–611. <https://doi.org/10.1002/ana.25183>
- Utianski, R. L., Whitwell, J. L., Schwarz, C. G., Duffy, J. R., Botha, H., Clark, H. M., Machulda, M. M., Senjem, M. L., Knopman, D. S., Petersen, R. C., Jack, C. R., Lowe, V. J., & Josephs, K. A. (2018). Tau uptake in agrammatic primary progressive aphasia with and without apraxia of speech. *European Journal of Neurology*, 25(11), 1352–1357. <https://doi.org/10.1111/ene.13733>
- Botha, H., Utianski, R. L., Whitwell, J. L., Duffy, J. R., Clark, H. M., Strand, E. A., Machulda, M. M., Tosakulwong, N., Knopman, D. S., Petersen, R. C., Jack, C. R., Josephs, K. A., & Jones, D. T. (2018). Disrupted functional connectivity in primary progressive apraxia of speech. *NeuroImage: Clinical*, 18, 617–629. <https://doi.org/10.1016/j.nicl.2018.02.036>
- Townley, R. A., Botha, H., Graff-Radford, J., Boeve, B. F., Petersen, R. C., Senjem, M. L., Knopman, D. S., Lowe, V., Jack, C. R., & Jones, D. T. (2018). 18F-FDG PET-CT pattern in idiopathic normal pressure hydrocephalus. *NeuroImage: Clinical*, 18, 897–902. <https://doi.org/10.1016/j.nicl.2018.02.031>
- Botha, H., Mantyh, W. G., Graff-Radford, J., Machulda, M. M., Przybelski, S. A., Wiste, H. J., Senjem, M. L., Parisi, J. E., Petersen, R. C., Murray, M. E., Boeve, B. F., Lowe, V. J., Knopman, D. S., Jack, C. R., & Jones, D. T. (2018). Tau-negative amnesic dementia masquerading as Alzheimer disease dementia. *Neurology*, 90(11), e940–e946. <https://doi.org/10.1212/WNL.0000000000005124>
- Tetzloff, K. A., Duffy, J. R., Strand, E. A., Machulda, M. M., Boland, S. M., Utianski, R. L., Botha, H., Senjem, M. L., Schwarz, C. G., Josephs, K. A., & Whitwell, J. L. (2018). Clinical and imaging progression over 10 years in a patient with primary progressive apraxia of speech and autopsy-confirmed corticobasal degeneration. *Neurocase*, 24(2), 111–120. <https://doi.org/10.1080/13554794.2018.1477963>
- Botha, H., Mantyh, W. G., Murray, M. E., Knopman, D. S., Przybelski, S. A., Wiste, H. J., Graff-Radford, J., Josephs, K. A., Schwarz, C. G., Kremers, W. K., Boeve, B. F., Petersen, R. C., Machulda, M. M., Parisi, J. E., Dickson, D. W., Lowe, V., Jack, C. R., & Jones, D. T. (2018). FDG-PET in tau-negative amnesic dementia resembles that of autopsy-proven hippocampal sclerosis. *Brain*, 141(4), 1201–1217. <https://doi.org/10.1093/brain/awy049>
- Botha, H., Duffy, J. R., Whitwell, J. L., Strand, E. A., Machulda, M. M., Spychalla, A. J., Tosakulwong, N., Senjem, M. L., Knopman, D. S., Petersen, R. C., Jack, C. R., Lowe, V. J., & Josephs, K. A. (2018). Non-right handed primary progressive apraxia of speech. *Journal of the Neurological Sciences*, 390, 246–254. <https://doi.org/10.1016/j.jns.2018.05.007>
- Utianski, R. L., Duffy, J. R., Clark, H. M., Strand, E. A., Botha, H., Schwarz, C. G., Machulda, M. M., Senjem, M. L., Spychalla, A. J., Jack, C. R., Petersen, R. C., Lowe, V. J., Whitwell, J. L., & Josephs, K. A. (2018). Prosodic and phonetic subtypes of primary progressive apraxia of speech. *Brain and Language*, 184, 54–65. <https://doi.org/10.1016/j.bandl.2018.06.004>
- Jones, D. T., Townley, R. A., Graff-Radford, J., Botha, H., Knopman, D. S., Petersen, R. C., Jack, C. R., Lowe, V. J., & Boeve, B. F. (2018). Amyloid- and tau-PET imaging in a familial prion kindred. *Neurology Genetics*, 4(6), e290. <https://doi.org/10.1212/NXG.0000000000000290>
- Utianski, R. L., Botha, H., Duffy, J. R., Clark, H. M., Martin, P. R., Butts, A. M., Machulda, M. M., Whitwell, J. L., & Josephs, K. A. (2018). Rapid rate on quasi-speech tasks in the semantic variant of primary progressive aphasia: A non-motor phenomenon? *The Journal of the Acoustical Society of America*, 144(6), 3364–3370. <https://doi.org/10.1121/1.5082210>

- Ali, F., Botha, H., Whitwell, J. L., & Josephs, K. A. (2019). Utility of the Movement Disorders Society Criteria for Progressive Supranuclear Palsy in Clinical Practice. *Movement Disorders Clinical Practice*, 6(6), 436–439. <https://doi.org/10.1002/mdc3.12807>
- Ali, F., Martin, P. R., Botha, H., Ahlskog, J. E., Bower, J. H., Masumoto, J. Y., Maraganore, D., Hassan, A., Eggers, S., Boeve, B. F., Knopman, D. S., Drubach, D., Petersen, R. C., Dunkley, E. D., Gerpen, J. van, Uitti, R., Whitwell, J. L., Dickson, D. W., & Josephs, K. A. (2019). Sensitivity and Specificity of Diagnostic Criteria for Progressive Supranuclear Palsy. *Movement Disorders*, 34(8), 1144–1153. <https://doi.org/10.1002/mds.27619>
- Whitwell, J. L., Stevens, C. A., Duffy, J. R., Clark, H. M., Machulda, M. M., Strand, E. A., Martin, P. R., Utianski, R. L., Botha, H., Spychalla, A. J., Senjem, M. L., Schwarz, C. G., Jack, C. R., Ali, F., Hassan, A., & Josephs, K. A. (2019). An Evaluation of the Progressive Supranuclear Palsy Speech/Language Variant. *Movement Disorders Clinical Practice*, 6(6), 452–461. <https://doi.org/10.1002/mdc3.12796>
- Whitwell, J. L., Tosakulwong, N., Schwarz, C. G., Botha, H., Senjem, M. L., Spychalla, A. J., Ahlskog, J. E., Knopman, D. S., Petersen, R. C., Jack, C. R., Lowe, V. J., & Josephs, K. A. (2019). MRI Outperforms [18F]AV-1451 PET as a Longitudinal Biomarker in Progressive Supranuclear Palsy. *Movement Disorders*, 34(1), 105–113. <https://doi.org/10.1002/mds.27546>
- Graff-Radford, J., Botha, H., Rabinstein, A. A., Gunter, J. L., Przybelski, S. A., Lesnick, T., Huston, J., Flemming, K. D., Preboske, G. M., Senjem, M. L., Brown, R. D., Mielke, M. M., Roberts, R. O., Lowe, V. J., Knopman, D. S., Petersen, R. C., Kremers, W., Vemuri, P., Jack, C. R., & Kantarci, K. (2019). Cerebral microbleeds: Prevalence and relationship to amyloid burden. *Neurology*, 92(3), e253–e262. <https://doi.org/10.1212/WNL.0000000000006780>
- Botha, H., & Josephs, K. A. (2019). Primary Progressive Aphasias and Apraxia of Speech: *CONTINUUM: Lifelong Learning in Neurology*, 25(1), 101–127. <https://doi.org/10.1212/CDN.0000000000000699>
- Whitwell, J. L., Martin, P. R., Duffy, J. R., Clark, H. M., Machulda, M. M., Schwarz, C. G., Weigand, S. D., Sintini, I., Senjem, M. L., Ertekin-Taner, N., Botha, H., Utianski, R. L., Graff-Radford, J., Jones, D. T., Boeve, B. F., Knopman, D. S., Petersen, R. C., Jack, C. R., Lowe, V. J., & Josephs, K. A. (2019). The influence of  $\beta$ -amyloid on [ $^{18}$ F]AV-1451 in semantic variant of primary progressive aphasia. *Neurology*, 92(7), e710–e722. <https://doi.org/10.1212/WNL.0000000000006913>
- Tetzloff, K. A., Duffy, J. R., Clark, H. M., Utianski, R. L., Strand, E. A., Machulda, M. M., Botha, H., Martin, P. R., Schwarz, C. G., Senjem, M. L., Reid, R. I., Gunter, J. L., Spychalla, A. J., Knopman, D. S., Petersen, R. C., Jack, C. R., Lowe, V. J., Josephs, K. A., & Whitwell, J. L. (2019). Progressive agrammatic aphasia without apraxia of speech as a distinct syndrome. *Brain*, 142(8), 2466–2482. <https://doi.org/10.1093/brain/awz157>
- Townley, R. A., Syrjanen, J. A., Botha, H., Kremers, W. K., Aakre, J. A., Fields, J. A., Machulda, M. M., Graff-Radford, J., Savica, R., Jones, D. T., Knopman, D. S., Petersen, R. C., & Boeve, B. F. (2019). Comparison of the Short Test of Mental Status and the Montreal Cognitive Assessment Across the Cognitive Spectrum. *Mayo Clinic Proceedings*, 94(8), 1516–1523. <https://doi.org/10.1016/j.mayocp.2019.01.043>
- Sintini, I., Schwarz, C. G., Senjem, M. L., Reid, R. I., Botha, H., Ali, F., Ahlskog, J. E., Jack, C. R., Lowe, V. J., Josephs, K. A., & Whitwell, J. L. (2019). Multimodal neuroimaging relationships in progressive supranuclear palsy. *Parkinsonism & Related Disorders*, 66, 56–61. <https://doi.org/10.1016/j.parkreldis.2019.07.001>
- Jack, C. R., Wiste, H. J., Botha, H., Weigand, S. D., Therneau, T. M., Knopman, D. S., Graff-Radford, J., Jones, D. T., Ferman, T. J., Boeve, B. F., Kantarci, K., Lowe, V. J., Vemuri, P., Mielke, M. M., Fields, J. A., Machulda, M. M., Schwarz, C. G., Senjem, M. L., Gunter, J. L., & Petersen, R. C. (2019). The bivariate distribution of amyloid- $\beta$  and tau: Relationship with established neurocognitive clinical syndromes. *Brain*, 142(10), 3230–3242. <https://doi.org/10.1093/brain/awz268>
- Utianski, R. L., Botha, H., Martin, P. R., Schwarz, C. G., Duffy, J. R., Clark, H. M., Machulda, M. M., Butts, A. M., Lowe, V. J., Jack, C. R., Senjem, M. L., Spychalla, A. J., Whitwell, J. L., & Josephs, K. A. (2019). Clinical and neuroimaging characteristics of clinically unclassifiable primary progressive aphasia. *Brain and Language*, 197, 104676. <https://doi.org/10.1016/j.bandl.2019.104676>
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