

J. Riley McCarten, MD.



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Research Interests:

My research is clinical and focuses on the early recognition of cognitive impairment in older adults, particularly identifying early features of Alzheimer's disease (AD). Together with our collaborators at the University of Minnesota's Center for Magnetic Resonance Research, we have identified *in vivo* neurochemical biomarkers in the brain sensitive to aging and AD. Our hope is that not only will these studies lead to better early diagnosis AD, but that they will provide insights into the pathophysiology of AD and potentially to treatment response.

An emerging research area of interest is the use of transcranial magnetic stimulation (TMS), and specifically direct current stimulation (tDCS), a non-invasive, generally well-tolerated and inexpensive form of TMS. We will investigate its use in treating cognition in mild cognitive impairment (MCI) that is prodromal to AD, and also in treating the behavioral and psychological symptoms of dementia (BPSD) in later stages of AD. If the treatment response is positive, we will attempt to add an assessment of subjects' magnetoencephalography (MEG) before and after treatment. Our former work with the Brain Sciences Center at the Minneapolis VAMC reveals that MEG, and specifically the Synchronous Neural Interaction Test based on MEG, is very sensitive to changes in AD. Improvement in AD symptoms induced by TMS may be expected to alter the MEG pattern revealed by SNIT, potentially providing a biomarker for this treatment.

My clinical and academic interests are in the diagnosis and management of Alzheimer's disease and related dementias. We are fortunate to have multiple physicians and other healthcare providers specializing in dementia in the GRECC Clinical Program. We are deliberate in our approach to assessment and diagnosis, including a rigorous consensus diagnosis process, and are proud to serve as a

principle site for several programs in teaching fellows, residents and students how to evaluate, diagnose, share the diagnosis and guide the management of dementing illnesses.

Research Support:

Current Grant Support:

Title: Linking connectomics to biochemical trajectories of aging: How the human brain ages differentially in key regions of the default mode network [DMN]

Source: NIH 1R01AG055591-01A1; Terpstra, Melissa, P.I.

Amount: \$3.543 million, 9/15/2017 – 4/30/2022

Role: Co-Investigator; 1.56 calendar months effort (13%) years 1-5 and salary support

Description: This study is integrated into the larger Human Connectome Project on Aging (HCPA), a multisite endeavor to discover how brain connections (the “connectome”) change from ages 35 – 89. By using magnetic resonance spectroscopy (MRS) to measure human neurochemistry *in vivo* and focusing on key default mode network (DMN) components—the posterior cingulate cortex and frontal cortex—we will determine the relationship between functional connections and structural (neurochemical) parameters across the age span and pilot the extent to which deviations from this healthy normative age-course can be detected in AD.

Selected Past Grant Support:

Title: Treatment of Clinical Alzheimer’s-type Dementia (CATD) and Diagnosis of CATD and Mild Cognitive Impairment (MCI)

Source: Agency for Healthcare Research & Quality (AHRQ); Fink, Howard, P.I.

Amount: \$513,357; 3/11/18-5/7/19

Role: Co-Investigator 10%

Description: This was a systematic review on interventions for treating CATD and for diagnosing CATD and MCI. Dr. McCarten was responsible for reviewing selected studies, drafting sections and editing this comprehensive review.

Title: Noninvasive Antioxidant Quantification in the Human Brain under Oxidative Stress

Source: NIH 4R01AG039396-05; Terpstra, Melissa, P.I.

Amount: \$1.857 million, 9/1/2012 – 8/31/2018

Role: Co-Investigator; 9% effort years 2-5 and salary support

Description: This study assessed *in vivo* the antioxidants ascorbate (Asc) and glutathione (GSH) using a high field 7T MRI to optimize the magnetic resonance spectroscopy (MRS) signal and to develop analogous methods on a clinical 3T scanner. Results may provide an early biomarker for AD.

Title: Probing the Intracellular Environment in Normal Aging Using Magnetic Resonance

Source: NIH R21; Marjanska, Malgorzata, PI

Amount: \$418,000; 10/1/2015 – 4/30/2018

Role: Co-Investigator; 8% effort with salary support

Description: This study assessed in vivo changes in 15 neurochemicals in young vs. healthy elderly adults using high field 7T magnetic resonance spectroscopy (MRS) and targeting areas of the brain most and least affected in Alzheimer's disease. The aim is to create a profile that will define healthy brain aging.

Title: Interventions for Preventing Cognitive Decline and Alzheimer's Disease – systematic review phase

Source: Agency for Healthcare Research & Quality (AHRQ); Kane, Robert, P.I.

Amount: \$1,000,000; 2/5/16-2/9/17

Role: Co-Investigator 10%

Description: This was a systematic review on interventions for preventing cognitive decline. Dr. McCarten was responsible for sections of this comprehensive review.

Recent Publications:

1. **McCarten JR.** The Case for Screening for Cognitive Impairment in Older Adults. *J Am Geriatr Soc* 61:1203-1205; Response to Malaz Boustani. *J Am Geriatr Soc* 61(7):1203-1205, 2013. PMID: 23782453
2. **McCarten JR.** Clinical Evaluation of Early Cognitive Symptoms. *Clin Geriatr Med* 29:791-807, 2013. PMID: 24094297
3. Dysken MW, Sano M, Peters JJ, Asthana S, Vertrees JE, Pallaki M, Llorente M, Love S, Schellenberg GD, **McCarten JR**, Malphurs J, Prieto S, Chen P, Loreck DJ, Trapp, G, Bakshi RS, Mintzer JE, Heidebrink JL, Vidal-Cardona A, Arroyo LM, Cruz AR, Zachariah S, Kowall NW, Chopra MP, Craft S, Thielke S, Turve CL, Woodman C, Monnell KA, Gordon K, Tomaska J, Segal Y, Peduzzi PN, Guarino PD. Vitamin E and Memantine in Alzheimer's Disease: The TEAM-AD VA Cooperative Study. *JAMA* 311(1):33-44, 2014. PMID: 24381967
4. **McCarten JR**, Borson S. Should family physicians routinely screen patients for cognitive impairment? YES: Screening is the first step toward improving care. *American Family Physician* 89(11):861-62, 2014. PMID: 25077388
5. Fink HA, Hemmy LS, MacDonald R, Carlyle MH, Olson CM, Dysken MW, **McCarten JR**, Kane RL, Rutks IR, Ouellette J, Wilt TJ. Cognitive Outcomes After Cardiovascular Procedures in Older Adults: A Systematic Review [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US) November 17, 2014. PMID: 25905147.
6. Santacruz KS, Rottunda SJ, Meints JP, Bearer EL, Bigio EH, **McCarten JR.** A Case of Globular Glial Tauopathy Presenting Clinically as Alzheimer Disease. *Alzheimer Dis Assoc Disord.* 29(1):82-84, 2015. PMID: 23751368
7. Jor'dan AJ, **McCarten JR**, Rottunda S, Stoffregen TA, Manor B, Wade MG. Dementia alters standing and postural adaptation during a visual search task in older adult men. *Neuroscience Letters* 593:101-106, 2015. PMID: 25770830
8. Fink HA, Hemmy LS, MacDonald R, Carlyle MH, Olson CM, Dysken MW, **McCarten JR**, Kane RL, Garcia, SA, Rutks IR, Ouellette J, Wilt TJ. Intermediate and long-term cognitive outcomes after

cardiovascular procedures in older adults: a systematic review. *Annals of Internal Medicine* 163(2):107-17, 2015. PMID: 26192563

9. Michaud TL, Kane RL, **McCarten JR**, Gaugler JE, Nyman JA, Kuntz KM. Risk stratification using cerebrospinal fluid biomarkers in patients with mild cognitive impairment: An exploratory analysis. *Journal of Alzheimer's Disease* 47(3):729-40, 2015. PMID: 26401707
10. Rosenbloom M, Borson S, Barclay T, Hanson LR, Werner A, Stuck L, **McCarten J**. Routine cognitive screening in a neurology practice: Effects on physician behavior. *Neurol Clin Pract* 6:16-21, 2016. PMID: 26918200
11. Marjańska M, **McCarten JR**, Hodges J, Hemmy LS, Grant A, Deelchand DK, Terpstra M. Region-specific aging of the human brain as evidenced by neurochemical profiles measured noninvasively in the posterior cingulate cortex and the occipital lobe using 1H magnetic resonance spectroscopy at 7 T. *Neuroscience* 354:168-177, 2017. PMID: 28476320
12. Kane RL, Butler M, Fink HA, Brasure M, Davila H, Desai P, Jutkowitz E, McCreedy E, Nelson VA, **McCarten JR**, Calvert C, Ratner E, Hemmy LS, Barclay T. Interventions to prevent age-related cognitive decline, mild cognitive impairment, and clinical Alzheimer's-type dementia. Agency for Healthcare Research and Quality (AHRQ) Report No. 17-EHC008-EF, 2017. PMID: 28759193
13. Michaud TL, Kane RL, **McCarten JR**, Gaugler JE, Nyman JA, Kuntz KM. Using Cerebrospinal Fluid Biomarker Testing to Target Treatment to Patients with Mild Cognitive Impairment: A Cost-Effectiveness Analysis. *Parmacocon Open* 2(3):309-323, 2018. doi: 10.1007/s41669-017-0054-z, 2017. PMID: 29623628
14. Fink HA, Jutkowitz E, **McCarten JR**, Hemmy LS, Butler M, Davila H, Ratner E, Calvert C, Barclay T, Brasure M, Nelson VA, Kane RL. Pharmacological interventions to prevent cognitive decline, mild cognitive impairment, and clinical Alzheimer's-type dementia: a systematic review. *Ann Intern Med* 168(1):39-51, 2018. PMID: 29255847.
15. Butler M, McCreedy E, Nelson VA, Desai P, Ratner E, Fink HA, Hemmy L, **McCarten JR**, Barclay TR, Brasure M, Davila H, Kane RL. Does cognitive training prevent cognitive decline: a systematic review. *Ann Intern Med* 168(1):63-68, 2018. PMID: 29255842.
16. Butler M, Nelson VA, Davila H, Ratner E, Fink HA, Hemmy L, **McCarten JR**, Barclay TR, Brasure M, Kane RL. Over-the-counter supplement interventions to prevent cognitive decline, mild cognitive impairment, and clinical Alzheimer's-type dementia: a systematic review. *Ann Intern Med* 168(1):52-62, 2018. PMID: 29255909.
17. Brasure M, Desai P, Davila H, Nelson VA, Calvert C, Jutkowitz E, Butler M, Fink HA, Ratner E, Hemmy L, **McCarten JR**, Barclay TR, Kane RL. Physical activity interventions in preventing cognitive decline and Alzheimer's type dementia: a systematic review. *Ann Intern Med* 168(1):30-38, 2018. PMID: 29255839.
18. Marjańska M, Deelchand DK, Hodges JS, **McCarten JR**, Hemmy LS, Grant A, Terpstra M. Altered macromolecular pattern and content in the aging human brain. *MR Biomed* 31(2):2018 e3865, 2018. PMID: 29266515

19. Burns T, Lawler K, Lawler D, **McCarten JR**, Kuskowski M. Predictive Value of the Cognitive Performance Test (CPT) for Staging Function and Fitness to Drive in People With Neurocognitive Disorders. *Am J Occup Ther* 72(4): 7204205040p1-7204205040p9, 2018. PMID: 29953838
20. Marjańska M, **McCarten JR**, Hodges JS, Hemmy LS, Terpstra M. Distinctive Neurochemistry in Alzheimer Dementia via 7 T In Vivo Magnetic Resonance Spectroscopy. *J Alzheimers Dis.* 68(2):559-569, 2019. PMID: 30775983

Education:

BS Psychology – Georgetown University, Washington, D.C., 1976

M.D. – University of Minnesota Medical School, Minneapolis, MN 1980

Postdoctoral Fellow – Sleep Disorders Medicine, Minnesota Regional Sleep Disorder Center, Hennepin County Medical Center, Minneapolis, MN 1984-1985

Postdoctoral Fellow – Clinical and Research Fellow in Alzheimer’s Disease, Department of Neurology, Harvard Medical School at the Massachusetts General Hospital, Boston, MA 1985-1987

Postdoctoral Fellow – Research Scientist, Department of Psychology, Massachusetts Institute of Technology, Boston, MA 1985-1987

Licensure:

Licensed by Minnesota Board of Medical Examiners 1983

Board Certified in Neurology by American Board of Psychiatry and Neurology 1991

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