

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
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NAME Jonathan H. Burdette	POSITION TITLE Professor, Neuroradiology		
eRA COMMONS USER NAME jburdett			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Duke University, Durham, North Carolina	B.S.E.	1985-89	Biomedical Engineering
Univ, of Tennessee College of Medicine, Memphis	MD	1989-93	Medicine
University of Michigan Hospital, Ann Arbor		1993-97	Radiology Resident
Wake Forest University School of Medicine		1997-99	Neuroradiology Fellow

A. PERSONAL STATEMENT

I have considerable experience using physiological brain imaging techniques, evaluating brain imaging tools as an end-user, and collaborating with researchers with different scientific backgrounds. I am a board-certified neuroradiologist and have been the PI or Co-Investigator on several NIH-funded studies in which the brain imaging techniques proposed here have been the primary methods of evaluating the brain. I will be the leader of the end-user team on this project. I have served as an end-user for several methodological development projects. For example, I am senior author and end-user evaluator on a project that created a tool that allowed atlas-based interrogations of fMRI data sets. This software package called WFU PickAtlas is freely available at <http://fmri.wfubmc.edu/software/pickatlas>, and this tool has had a considerable impact on the field of neuroscience imaging as evidenced by its over 2,200 citations to date. In addition, I was on the end-user team for the biological parametric mapping project which created a statistical toolbox for multimodality brain image analysis. Also, I was senior author on a manuscript describing an end-user project to automatically process brain fMRI data and send the processed images to the PACS system. In addition, reproducibility evaluation will be part of the end-user portion of this project, and I have published a recent exploration of graph metric reproducibility in complex brain networks. Finally, as the key members of the end-user team, Dr. Dagenbach and I will analyze the networks derived from the new causation entropy approach and traditional correlation approach to determine which technique produces networks that are more highly associated with cognitive performance. Dr. Dagenbach and I have collaborated on similar projects, such as our published manuscript showing changes in global and regional modularity associated with increasing working memory load.

- a. Maldjian JA, Laurienti PJ, Kraft RA, **Burdette JH**. An automated method for neuroanatomic and cytoarchitectonic atlas-based interrogation of fMRI data sets. *Neuroimage*. 2003; 19(3):1233-39.
- b. Maldjian JA, Baer AH, Kraft RA, Laurienti PJ, **Burdette JH**. Fully automated processing of fMRI data in SPM: from MRI scanner to PACS. *Neuroinformatics*. 2009; 7(1):57-72.
- c. Telesford QK, **Burdette JH**, Laurienti PJ. An exploration of graph metric reproducibility in complex brain networks. *Front in Neurosci*. 2013; 7.
- d. Stanley ML, Dagenbach D, Lyday RG, **Burdette JH**, Laurienti PJ. Changes in global and regional modularity associated with increasing working memory load. *Front. Hum. Neurosci*. 8:954. doi:10.3389/fnhum.2014.00954

B. POSITIONS AND HONORS

Positions and Employment

1998-1999	Instructor, Neuroradiology, Wake Forest University School of Medicine, Winston-Salem, NC
1999-2004	Assistant Professor of Neuroradiology, Wake Forest University School of Medicine
2003-Present	Associate, Department of Biomedical Engineering, Wake Forest University School of Medicine
2004-2010	Associate Professor of Neuroradiology, Wake Forest University School of Medicine

2010-Present Professor of Neuroradiology, Wake Forest University School of Medicine
2010-Present Clinical Director of the Translational Science Center, Wake Forest University
2013-Present Vice-Chairman of Research for the Department of Radiology, Wake Forest School of Medicine

Other Experience and Professional Memberships

2001 NIH Review Panels: NCI Development of Novel Technologies for In Vivo Imaging: PAR 01-101 and 102
2003 NIH Review Panels: NCCAM Basic and pre-clinical R21 applications
2002-2004 RSNA Grant Review Committee

Honors and Awards

1985-1989 Angier B. Duke Memorial Scholar--Full tuition 4 years undergraduate at Duke University
1987-1989 Richard Miles Thompson Engineering Scholar--Academic Engineering Scholarship (\$2000/year)
1989 Summa cum laude, Phi Beta Kappa, and Tau Beta Pi Engineering Honor Society--Duke University
1989-1993 Doggett Merit Scholar--Full tuition medical school
1993 Alpha Omega Alpha (AOA)--Medical School
1995 University of Michigan Outstanding Scientific Radiology Resident Research Paper
2000 Berlex Outstanding General Neuroradiology Paper—Am Society of Neuroradiology Meeting
2002 -2004 General Electric-Association of University Radiologists Research Fellowship (GERRAF)
2004 New Investigator in Clinical Sciences Research Award at Wake Forest Univ Sch of Medicine
2005-Present "Best Doctors in America" List
2006 Walter M. Whitehouse Memorial Lecturer at the University of Michigan, Dept. of Radiology

C. CONTRIBUTION TO SCIENCE

1. Advanced MRI/PET techniques applied to clinical medicine. I have an ongoing research program evaluating advanced imaging techniques and their application to clinical medicine. Following my initial work as a radiology resident at the University of Michigan in PET imaging where I performed the first ROC analysis of the visual interpretation of PET images in Alzheimers disease, I switched my research focus to advanced MRI brain imaging techniques as a neuroradiologist. I published some of the first papers on the clinical application of diffusion imaging in stroke, including the time course of diffusion signal abnormalities in acute infarctions and quantifying the time course of T2 shine-through phenomena on DW images. I also co-wrote a highly successful MRI physics textbook that was published in English and Japanese.
 - a. **Burdette JH**, Minoshima S, Vander Borght T, Tran DD, Kuhl DE. Alzheimer disease: improved visual interpretation of PET images by using three-dimensional stereotaxic surface projections. *Radiology* 1996; 198:837-43.
 - b. **Burdette JH**, Ricci PE, Petitti N, Elster AD. Cerebral infarction: time course of signal intensity changes on diffusion-weighted MR images. *Am J Roentgen* 1998; 171:791-95.
 - c. **Burdette JH**, Elster AD, Ricci PE. Acute cerebral infarction: quantification of spin-density and T2 "shine-through" phenomena on diffusion-weighted MR images in acute cerebral infarctions. *Radiology* 1999; 212:333-39.
 - d. Elster AD, **Burdette JH**. *Questions and Answers in Magnetic Resonance Imaging*, 2nd Ed. Mosby, A Harcourt Health Sciences Company, St. Louis. 2001.
2. The Neuroscience of Music: I have had a long term research focus on the effects of music on the brain. My initial research in this area focussed on the behavioral effects and brain imaging findings of multisensory auditory-visual interactions. Our music/brain research then switched to using network science to study musical experiences. We published the first network science investigation of the brain, where we studied the complexity of musical experiences in the brain. Then, our work applying network science to elucidate the effects of music preference on functional brain connectivity was published in *Nature Scientific Reports*, was the cover story of *Nature.com* for 48 hours, has had over 30,000 page views, has been tweeted 153 times in 28 countries, and has been published by 21 news outlets. I have been an invited keynote speaker at several international Clinical Neuromusicology conferences and Neuroscience of Music symposia.

- a. Wilkins RW, Hodges DA, Laurienti PJ, Steen M, **Burdette JH**. Network science and the effects of music preference on functional brain connectivity: from Beethoven to Eminem. *Nature Sci Rep*. 2014 Aug 28;4:6130. doi: 10.1038/srep06130. PMID: PMC4205834
 - b. Hodges DA, Hairston WD, **Burdette JH**. Aspects of multisensory perception: the integration of visual and auditory information in musical experiences. *Ann NY Acad Sci*. 2005; 1060:175-85.
 - c. Wilkins RW, Hodges DA, Laurienti PJ, Steen MR, **Burdette JH**. Network Science: A New Method for Investigating the Complexity of Musical Experiences in the Brain. *Leonardo Transactions* 2012; 45(3):282-283.
 - d. Toole JF, Flowers DL, **Burdette JH**, Absher J. A Pianist's Recovery from Stroke. *Archives of Neurology* 2007; 64(8): 1184-88.
3. Lifestyle Interventions and Healthy Aging: I have been a neuroimaging collaborator with psychologists, health and exercise scientists, nutritionists, and imaging neuroscientists as part of an ongoing research program studying the elderly population and the effects of certain lifestyle interventions on the aging brain. I have considerable experience evaluating cognitive and brain changes in older adults. I wrote the first paper linking physical activity to changes in brain networks. I have been and am currently the imaging supervisor on several NIH projects, such as projects from our own laboratory (Brain Fitness (B-Fit) clinical trial, the POEM (Parameter Of Elderly Multisensory success) study, and the ACE (Aging, Cognition and Exercise) study), as well as large multi-center NIH studies (the ARIC (Atherosclerosis Risk in Communities) Study, the ARIC Neurocognitive Study, and the Cooperative Lifestyle Intervention Program (CLIP) study). In addition, I have ongoing interest in the effects on brain networks on food cravings and how weight loss and mindfulness-based interventions affect these brain networks in the elderly.
- a. **Burdette JH**, Laurienti PJ, Espeland MA, Morgan A, Telesford Q, Vechlekar CD, Hayasaka S, Jennings JM, Katula JA, Kraft RA, Rejeski WJ. Using network science to evaluate exercise-associated brain changes in older adults. *Front Aging Neurosci*. 2010; 2:23. PMID: PMC2893375
 - b. Rejeski WJ, **Burdette JH**, Burns M, Morgan AR, Hayasaka S, Norris J, Williamson D, Laurienti PJ. Power of Food Moderates Food Craving, Perceived Control, and Brain Networks Following a Short-Term Post-Absorptive State in Older Adults. *Appetite* 2012; 58(3):806-813. PMID: PMC3340490
 - c. Paolini BM, Laurienti PJ, Simpson SL, **Burdette JH**, Lyday RG, Rejeski WJ. Global Integration of the Hot-State Brain Network of Appetite Predicts Short Term Weight Loss in Older Adult. *Front. Aging Neurosci*. 2015; doi.org/10.3389/fnagi.2015.00070 PMID: PMC4423432
 - d. Voss MW, Wong CN, Baniqued PL, **Burdette JH**, Erickson KI, Prakash RS, McAuley E, Laureinti PJ, Kramer AF. Aging Brain from a Network Science Perspective: Something to Be Positive About? *PLoS One* 2013; 8(11): e78345. doi: 10.1371/journal.pone.0078345. PMID: PMC3819386
4. Arterial Spin Labeling (ASL) Brain MR Perfusion: Clinical and Basic Science Applications: I have had a long-term research interest in ASL perfusion imaging in the brain. Before ASL became readily available on clinical MR scanners, we developed an ASL perfusion protocol and performed ASL studies as part of our research and as part of routine clinical brain MR imaging. Wake Forest School of Medicine was the first place to routinely perform ASL imaging clinically. As such, we pioneered the understanding of how to interpret ASL studies in the neuroradiology clinic and have many publications detailing the ASL patterns expected to be seen in several clinical diagnoses. I have also been a collaborator using ASL to study the effects of caffeine on the human brain. Our work studying caffeine has contributed to the understanding of the neural and vascular consequences of acute caffeine ingestion and caffeine withdrawal. Our laboratory became the world authority on caffeine's effects on the brain; for example, our work was the only neuroimaging featured in the January 2005 *National Geographic* cover story on caffeine. More recently I was co-senior author on a project combining my interests in the aging brain and ASL MR perfusion. In this project, we studied the acute effects of a high nitrate diet on brain perfusion, showing increased perfusion in key association areas of the brain following the acute ingestion of beetroot juice in the elderly.
- a. Presley TD, Morgan AR, Bechtold E, Clodfelter W, Dove RW, Jennings JM, Kraft RA, S. King SB, Laurienti PJ, Rejeski WJ, **Burdette JH**, Kim-Shapiro DB, Miller GD. Acute effect of a high nitrate diet on brain perfusion in older adults. *Nitric Oxide* 2011; 24(1):34-42. PMID: PMC3018552
 - b. Pollock JM, Tan H, Whitlow CT, **Burdette JH**, Maldjian JA. Arterial Spin Labeled MR Perfusion Imaging: Clinical Applications. *Magn Reson Imaging Clin N Am*. 2009; 17(2):315-38.

- c. Field AS, Laurienti PJ, **Burdette JH**, Moody DM. Dietary caffeine consumption and withdrawal: confounding variables in quantitative cerebral perfusion studies? *Radiology* 2003; 227:129-35
- d. Laurienti PJ, Field AS, **Burdette JH**, Maldjian JA, Yen Y-F, Moody DM. Relationship between Caffeine-Induced Changes in Resting Cerebral Perfusion and Blood Oxygenation Level-Dependent Signal. *AJNR Am J Neuroradiol* 2003; 24:1607-11.

The complete publication list can be found at:

<https://scholar.google.com/citations?user=YQtMSMAAAAJ&hl=en&oi=ao>

D. RESEARCH SUPPORT

Ongoing:

5 R18HL076441-08 Rejeski (PI)

03/01/2012 - 12/31/2016

NHLBI

Cooperative Lifestyle Intervention Programs (CLIP II)

This study will provide the first large scale randomized controlled clinical trial to evaluate the effects of diet-induced weight loss (WL) on mobility in obese, older adults with coronary heart disease or metabolic syndrome as compared to WL combined with physical activity.

Role: Co Investigator

3 R01 ES008739-17S1 Arcury (PI)

03/01/2013 - 02/28/2016

NIEHS

CBPR on Pesticide Exposure & Neurological Outcomes for Latinos: PACE4

This supplemental funding will be used to obtain magnetic resonance brain imaging for the parent study examining the effects of agricultural pesticides in migrant and seasonal Latino farmworkers.

Role: Co Investigator

5 P01 AA021099-03 Weiner (PI)

09/01/2013 - 08/31/2017

Project PI (Laurienti)

NIAAA

Translational Studies On Early-Life Stress And Vulnerability To Alcohol Addiction

This project will use network science to investigate the effects of life stressors and aging compounded with moderate alcohol use.

Role: Co Investigator

Recently Completed:

R01 NS039426 Coghill (PI)

12/01/1999 - 03/31/2014

NINDS

Supraspinal Processing of Sensory Aspects of Pain

This study is designed to use behavioral and functional MRI measures to examine brain regions involved in perceptual and anticipatory aspects of pain processing.

Role: Co Investigator

U01 HL096814 Wagenknecht (PI)

07/07/2010 - 04/30/2014

NHLBI / NINDS

ARIC Neurocognitive Study (ARIC-NCS)

This is an observational study relating dementia, MCI and cerebral changes observable on MRI to midlife vascular risk factors with the goal of suggesting dementia prevention strategies where none currently exist.

Role: Co Investigator

Translational Science Center Burdette (PI)

07/01/2012 - 06/30/2014

Wake Forest University

Brain Network Analysis in the Cooperative Lifestyle Intervention Program

This ancillary award provides funding for pre and post intervention MRI scanning for a subpopulation of the CLIP II parent grant.

Role: PI

The Hershey Company Laurienti/Burdette (Co-PIs)

09/01/2013 - 08/31/2014

Effects of a Cocoa Shot on the Human Brain

The Hershey Company is interested in investigating the effects of various chocolate beverages on brain physiology and cognitive function. (NCT01924481)

Role: Co-PI

R01 HL089115 Kincaid (PI)

02/15/2008 - 11/30/2014

NHLBI

Improving Neurologic Outcomes in Diabetics Undergoing Cardiac Surgery

This study examines the effects of strict control of blood glucose levels in the peri-operative period on patients undergoing cardiothoracic surgery. MRI examinations will be performed to rule out post-operative acute infarctions.

Role: Co Investigator

The Hershey Company Laurienti/Burdette (Co-PIs)

03/01/2014 – 02/28/2015

Effects of a Cocoa Shot on the Human Brain II

The Hershey Company is interested in investigating the effects of various chocolate beverages on brain physiology and cognitive function. (NCT02080845)

Role: Co-PI