

A nighttime photograph of the Birmingham, Alabama skyline, featuring numerous illuminated skyscrapers and city lights against a dark blue sky. The city lights create a vibrant, glowing effect across the urban landscape.

Evelyn F. McKnight

Brain Research Foundation
Sixth Inter-Institutional Meeting

The
McKnight
Brain Research
Foundation®

*Preserving Memory,
Enhancing Life*

The University of Alabama at Birmingham

Birmingham, Alabama

April 24 - 26, 2013

The Evelyn F. McKnight Brain Institute at the
University of Alabama at Birmingham welcomes:

The McKnight Brain Research Foundation Board of Trustees

The Evelyn F. McKnight Brain Institute at the University of Arizona

Evelyn F. and William L. McKnight Brain Institute at the University of Florida

Evelyn F. McKnight Center for Age-Related Memory Loss at the University of Miami



The University of Alabama at Birmingham within the Birmingham skyline

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The McKnight Brain Research Foundation
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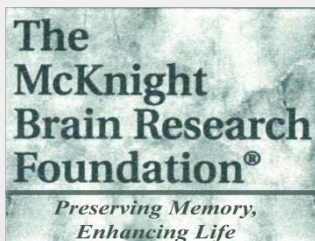


Evelyn F. McKnight

Mission Statement

The McKnight Brain Research Foundation strives to:

- Lead in generating interest and support of scientific research in the understanding and alleviation of age-related memory loss
- Inspire commitment and shared vision in the understanding and alleviation of age-related memory loss
- Partner with research scientists, institutions, and organizations to promote research to understand and alleviate age-related memory loss
- Promote collaboration and communication among research scientists, institutions, and organizations engaged in research in age-related memory loss
- Nurture scientists dedicated to the exploration and innovative research in the understanding and alleviation of age-related memory loss
- Recognize and reward achievement in discoveries leading to the understanding and alleviation of age-related memory loss



**2013 McKnight Inter-Institutional Meeting
Renaissance Birmingham Ross Bridge
Birmingham, Alabama
April 24 - 26, 2013**

Wednesday, April 24, 2013

5:30 - 6:30 p.m. Cocktail Reception: Main Terrace

6:30 - 8:00 p.m. Dinner: Salon ABCD

Welcome

John Hablitz, Ph.D., Professor
Associate Director, Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

J. Lee Dockery, M.D.
Trustee, McKnight Brain Research Foundation

Thursday, April 25, 2013

7:30 - 8:30 a.m. Breakfast: Foyer Salon ABCD

8:30 - 8:45 a.m. Welcome

J. David Sweatt, Ph.D., Professor
Evelyn F. McKnight Endowed Chair
Director, Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

J. Lee Dockery, M.D.
Trustee, McKnight Brain Research Foundation

SESSION I An Epigenetic Hypothesis of Cognitive Aging

Salon ABCD MODERATOR - John Hablitz, Ph.D.

8:45 - 8:50 a.m. **Introduction**

J. David Sweatt, Ph.D., Professor
Evelyn F. McKnight Endowed Chair
Director, Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

8:50 - 9:30 a.m. **Epigenomics of Memory Persistence: Deciphering of
Memory-forming Circuits at the Single-cell Level**

Leonid Moroz, Ph.D., Professor
Department of Neuroscience
Evelyn F. and William L. McKnight Brain Institute
University of Florida

9:30 - 10:10 a.m. **Next Generation Cognitive Aging Genomics: Birds, Bees, and Dendritic Trees**

Matt Huentelman, Ph.D., Associate Professor
Neurogenomics Division, The Translation Genomics Research Institute
Faculty Affiliate, Evelyn F. McKnight Brain Institute
University of Arizona

10:10 - 10:30 a.m. Break

10:30 - 11:10 a.m. **Epigenetic Plasticity in the Mouse Brain**
Juan Young, Ph.D., Assistant Professor
Dr. John T. Macdonald Foundation Department of Human Genetics
Div Director, Div of Epigenetics in the Center for Human Molecular Genetics
John P. Hussman Institute for Human Genomics
Evelyn F. McKnight Brain Institute
University of Miami Health System

11:10 - 11:50 a.m. **Epigenetic Mechanisms in Memory and Aging**
J. David Sweatt, Ph.D., Professor
Evelyn F. McKnight Endowed Chair
Director, Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

12:00 - 1:00 p.m. Lunch: Salon E

SESSION II **Epigenetics, Aging, and Neural Function Part 1**
Salon ABCD MODERATOR - Tom Foster, Ph.D.

1:00 - 1:15 p.m. **Dopamine Signaling in Aging Cortex**
John Hablitz, Ph.D., Professor
Vice Chair, Department of Neurobiology
Associate Director, Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

1:15 - 1:30 p.m. **Methylation and Demethylation in Memory Formation and Aging**
Farah Lubin, Ph.D., Assistant Professor
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

1:30 - 1:45 p.m. **Problems and Solutions in Epigenetic Studies of the Brain**
Paul Coleman, Ph.D., Senior Scientist
Director of J.L. Roberts Center for Alzheimer's Research
Affiliate, Evelyn F. McKnight Brain Institute
University of Arizona

1:45 - 2:00 p.m. **Effects of the Age-regulating Protein Klotho on Brain Function**
Gwen King, Ph.D., Assistant Professor
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

2:00 - 2:15 p.m. Break

SESSION III **Epigenetics, Aging and Neural Function Part 2**
Salon ABCD MODERATOR - Carol Barnes, Ph.D.

2:15 - 2:30 p.m. **Do My Old Genes Still Fit: A View from the University of Florida**
Tom Foster, Ph.D., Professor
Evelyn F. McKnight Chair for Research on Cognitive Aging and Memory
Evelyn F. and William L. McKnight Brain Institute
University of Florida

2:30 - 2:45 p.m. **Epigenetics: A Potential Mechanism for Regulating Astrocyte Function**
Michelle Olsen, Ph.D., Assistant Professor
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

2:45 - 3:00 p.m. **Hippocampal Synaptic Plasticity and Behavior are Modulation by O-GlcNAcylation**
Lori McMahan, Ph.D., Professor
Director, Center for Neuroscience
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

3:00 - 3:15 p.m. **Genome Wide Association Study of Cognition in a Diverse Sample**
Ashley Beecham, M.S. Senior Research Analyst
Evelyn F. McKnight Brain Institute
University of Miami Miller School of Medicine

3:15 - 3:30 p.m. **Genetics of White Matter Hyperintensity Volume**
Susan Blanton, Ph.D., Associate Professor
Associate Director of Communications and Compliance
Executive Director, HIHG
Evelyn F. McKnight Brain Institute
University of Miami Miller School of Medicine


- 4:15 p.m. Busses depart for Barbers Motorsports
- 5:30 p.m. Reception and Museum Tour: Barbers Motorsports Museum
- 6:30 p.m. Dinner: Barbers Motorsports Museum
- 7:00 p.m. J. David Sweatt, Ph.D., Professor
Evelyn F. McKnight Endowed Chair
Director, Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
- Ray L. Watts, M.D.
President
University of Alabama at Birmingham
- 8:00 p.m. Buses depart for Ross Bridge

Friday, April 26, 2013

- 7:30 - 9:00 a.m. Breakfast Buffet: Foyer Salon ABCD
- Board of Directors Breakfast with MBI Directors
Breakfast Buffet: Foyer Salon ABCD
Meeting: Helena Room

SESSION IV Updates on Cognitive Test Battery and MRI Standardization Projects Salon ABCD MODERATOR - Lee Ryan, Ph.D.

- 9:00 - 9:20 a.m. **Clinical Approaches to the Shifting Boundaries of Cognitive Aging**
David Geldmacher, M.D., Professor
Charles and Patsy Collat Endowed Scholar
Department of Neurology
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
- 9:20 - 9:40 a.m. **Behavioral Assessment Battery Follow-up**
Lee Ryan, Ph.D., Associate Professor
Associate Head, Department of Psychology
Neurosciences Interdisciplinary Program
Evelyn F. McKnight Brain Institute
University of Arizona
- 9:40 - 9:50 a.m. **Introduction**
Clinton B. Wright, M.D., M.S.
Scientific Director, Evelyn F. McKnight Brain Institute
Associate Professor, Department of Neurology
University of Miami Miller School of Medicine

- 
- 9:50 - 10:05 a.m. **Opportunities & Challenges: Multi-site MRI Studies of Cognitive Aging**
Gene Alexander, Ph.D., Professor
Director, Brain Imaging Behavior and Aging Lab
Department of Psychology
University of Arizona
- 10:05 - 10:20 a.m. **MRI Standardization across McKnight Brain Institutes: Update and Initial Findings**
Noam Alperin, Ph.D., Professor
Radiology and Biomedical Engineering
Physiologic Imaging and Modeling Lab
Advance Image Processing Lab
University of Miami Miller School of Medicine
- 10:20 - 10:35 a.m. **Where Do We Go From Here? Answering the Need for Studies of Healthy Aging**
Ronald Cohen, Ph.D., Professor
Director, Cognitive Aging and Memory Clinical Translational Research
Department of Aging and Geriatric Research and Institute on Aging
University of Florida
- 10:35 - 11:30 a.m. **Summary and Discussion**
Clinton B. Wright, M.D., M.S. and Presenters
- 11:30 a.m. Meeting adjourns
- 11:45 a.m. Shuttle service to airport begins

UAB EVELYN F. MCKNIGHT
BRAIN INSTITUTE
DEPARTMENT OF NEUROBIOLOGY

Tara M. DeSilva, Ph.D.

Assistant Professor
Physical Medicine & Rehabilitation
Evelyn F. McKnight Brain Institute

Cristin Gavin, Ph.D.

Postdoctoral Fellow
Department of Neurobiology

David S. Geldmacher, M.D., F.A.C.P.

Professor
Charles and Patsy Collat Endowed Scholar
Department of Neurology
Evelyn F. McKnight Brain Institute

Alecia K. Gross, Ph.D.

Associate Professor
Department of Vision Sciences
Evelyn F. McKnight Brain Institute

John J. Hablitz, Ph.D.

Professor
Vice Chair, Department of Neurobiology
Associate Director, Evelyn F. McKnight Brain
Institute

Andrew J. Kennedy, Ph.D.

Postdoctoral Fellow
Department of Neurobiology

Mark Kilgore, Ph.D. - 2013

Recently Graduated Graduate Student
Department of Neurobiology

Gwendalyn King, Ph.D.

Assistant Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

David C. Knight, Ph.D.

Assistant Professor
Department of Psychology
Evelyn F. McKnight Brain Institute

Robin Lester, Ph.D.

Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Farah D. Lubin, Ph.D.

Assistant Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Lori L. McMahon, Ph.D.

Professor
Director, Comprehensive Neuroscience Ctr
Cell, Developmental and Integrative Bio
Evelyn F. McKnight Brain Institute

Rodolphe Nenert, Ph.D.

Postdoctoral Fellow
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Michelle Olsen, Ph.D.

Assistant Professor
Cell, Developmental and Integrative Bio
Evelyn F. McKnight Brain Institute

Linda Overstreet-Wadiche, Ph.D.

Assistant Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Vladimir Parpura, M.D., Ph.D., M.A.E.

Associate Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Lucas Pozzo-Miller, Ph.D.

Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Elizabeth J. Rahn, Ph.D.
Postdoctoral Research Fellow
Evelyn F. McKnight Brain Institute
Department of Neurobiology

Erik Roberson, M.D., Ph.D.
Associate Professor
Department of Neurology and Neurobiology
Virginia B. Spencer Professor of Neuro
Evelyn F. McKnight Brain Institute

Lesley Anne Ross, Ph.D.
Assistant Professor
Department of Psychology
Roybal Center for Translational Research
on Aging and Mobility

David G. Standaert M.D., Ph.D.
John N. Whitaker Professor and Chair
Department of Neurology
Evelyn F. McKnight Brain Institute

J. David Sweatt, Ph.D.
Professor
Evelyn F. McKnight Endowed Chair
Department of Neurobiology
Director, Evelyn F. McKnight Brain Institute

Anne Theibert, Ph.D.
Associate Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Kristina M. Visscher, Ph.D.
Assistant Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Jacques Wadiche, Ph.D.
Assistant Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Sidney Williams, M.S.
Graduate Trainee
Department of Neurobiology

Scott Wilson, Ph.D.
Associate Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute

Iva Zovkic, Ph.D.
Postdoctoral Fellow
Department of Neurobiology

Tara M. DeSilva, Ph.D.

Assistant Professor
Physical Medicine & Rehabilitation
Evelyn F. McKnight Brain Institute
The University of Alabama at Birmingham
SRC 547
1717 6th Avenue South
Birmingham, AL 35294
desilvat@uab.edu
Telephone: (205) 996-6896
Fax: (205) 975-9754



While oligodendrocytes (OLs) have the ability to proliferate in inflammatory white matter diseases such as cerebral palsy and multiple sclerosis, they fail to myelinate axons suggesting a disruption in maturation or inability to make functional contacts with axons. Also, there is a substantial decrease in myelin in the aging brain suggesting that with age the brain has a reduced capacity to remyelinate. Therefore, a better understanding of the signaling mechanisms responsible for myelination would allow us to design therapeutic approaches to promote brain repair. The selection of axons to be myelinated, formation of the nodes of ranvier, and regulation of myelin thickness are known to involve axon-glia signaling. One of the emerging molecules in axon-glia signaling is glutamate. Glutamate, as an essential neurotransmitter, exerts its role by activating glutamate receptors on neurons, and is precisely regulated by glutamate transporters. These same constituents of glutamatergic signaling are developmentally regulated throughout the OL lineage. In fact, vesicular release of glutamate from axons induces glutamate receptor mediated currents in postsynaptic OL progenitor cells, underscoring the importance of studying glutamate as a signaling molecule during myelination. Our lab has shown that stimulation of glutamate receptors leads to activation of specific intracellular signaling cascades that enhance myelination and that inflammatory mediators perturb these signaling pathways and disrupt myelination. Our lab uses primary cultured cells in an *in vitro* model of myelination as well as transgenic animals to understand the role of glutamatergic axon-glia signaling during myelination and how inflammation and the process of aging dysregulate these pathways.

Cristin Gavin, Ph.D.

Postdoctoral Fellow
Neurobiology
1825 University Blvd, Shelby 1070
E-mail: cfgavin@uab.edu
Telephone: (205) 996-6745



Pitt-Hopkins Syndrome (PTHS) is a neurodevelopmental disorder, the underlying genetic basis of which is mutation/deletion of the TCF4 gene and resultant disruption of normal TCF4 transcription factor function. The mutated gene product is present throughout development but is also present in the fully developed adult CNS. At present, it is unclear if Pitt-Hopkins Syndrome is caused exclusively by disruption of TCF4 function during development, or whether loss of TCF4 in the mature CNS might also contribute to neurobehavioral and cognitive dysfunction in PTHS patients. My studies aim to investigate the physiological basis of cognitive dysfunction associated with PTHS, focusing on mechanistic studies to understand the role of the TCF4 transcription factor in central nervous system function.

David S. Geldmacher, M.D., F.A.C.P.

Professor
Charles and Patsy Collat Endowed Scholar
Department of Neurology
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
Chauncey Sparks Center
1720 7th Avenue South
Birmingham, AL 35294
E-mail: dgeldmacher@uab.edu
Telephone: (205) 996-3679



David S. Geldmacher, MD, FACP is the Charles and Patsy Collat Endowed Scholar in Neuroscience He is a Professor of Neurology and Director of the Division of Memory Disorders and Behavioral Neurology at the University of Alabama School of Medicine. Prior to joining UAB in 2011, he held a Harrison Distinguished Teaching appointment as an Associate Professor of Neurology at the University of Virginia.

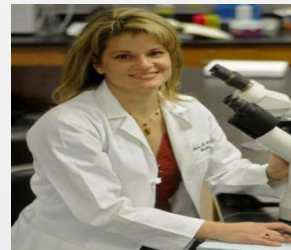
His research has centered on drug development for dementia, including investigator-initiated clinical trials funded by the NIH and pharmaceutical manufacturers. His other research interests include complex visual processing in aging and neurological conditions. Dr. Geldmacher is the author of *Contemporary Diagnosis and Management of Alzheimer's Dementia*, and has published over 100 research articles, chapters, abstracts and reviews. His major clinical interests are in the diagnosis and management of dementia, evaluation of behavioral neurologic syndromes, and rational drug treatments of disorders resulting from brain dysfunction.

He is a Fellow of the American College of Physicians and a member of the American Academy of Neurology, the American Neurological Association, and the International Society to Advance Alzheimer's Research and Treatment.

Dr. Geldmacher graduated *magna cum laude* from the University of Rochester with his B.A. in Biology and Psychology. He obtained his M.D (with Certificate in Academic Research) from the State University of New York - Health Science Center at Syracuse. He trained in Neurology at Case Western Reserve University and completed a postdoctoral fellowship in Behavioral Neurology at the University of Florida.

Alecia K. Gross, Ph.D.

Associate Professor
Department of Vision Sciences
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
Shelby 906
1825 University Boulevard
Birmingham, AL 35294
E-mail: agross@uab.edu
Telephone: (205) 975-8396
Fax: (205) 975-7394



Dr. Gross' interest is in G protein-coupled receptor (GPCR) trafficking and signaling in neurons. One of the most fundamental problems in molecular neuroscience and cell biology is the proper assembly of signal-transducing membranes including the transport and sorting of protein components. A major cause of neurodegenerative and other inherited disorders is the improper localization of receptors and other signaling or transport proteins. The Gross Lab uses the dim-light photoreceptor protein rhodopsin as a model GPCR to better understand this process in the neural retina, and has been investigating the molecular interactions of proteins that interact with rhodopsin during folding, transport and those involved in the biogenesis of disk membranes in the outer segments of rods. In addition, using transgenic *X. laevis* and knock-in mice expressing mutants and fusion proteins of rhodopsin, they are studying both the molecular mechanisms of retinal degeneration as well as *in vivo* imaging of rhodopsin trafficking in live animals.

John J. Hablitz, Ph.D.

Professor
Vice Chair, Department of Neurobiology
Associate Director, Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
Shelby 1014
1825 University Boulevard
Birmingham, AL 35294-2182
Email: jhablitz@uab.edu
Telephone: (205) 934-0742
Fax: (205) 934-6571



Dr. Hablitz's research is centered on understanding control of activity in local cortical circuits. He is using studies on synaptic transmission to further understand basic biophysical properties of mammalian central neurons, as well as to explore the pathophysiology of experimental epilepsy. Whole-cell voltage-clamp recordings from visually identified neurons are used in *in vitro* brain slice preparations. The goal of these studies is to determine the types of synaptic interactions present among pyramidal cells and interneurons in neocortex and how these patterns change over the lifespan. A particular goal is to understand how hyperpolarization-activated non-specific cation (HCN) channels control neocortical excitability. HCN channels and I_h , the membrane current generated by their activation, have been implicated in a variety of processes including memory, behavior and neurological diseases. HCN channels regulate dendritic integration and affect excitability of individual neurons in prefrontal cortex. Alterations in these processes are potentially important in aging since dendritic integration is altered in spatial learning-impaired aged rats. Additional studies involve the use of imaging techniques to directly visualize activity in presynaptic nerve terminals. These studies examine modulation of neurotransmitter release in normal neocortex and animal models of neurological disease. New studies are underway

examining changes in dopamine (DA) receptor modulation of transmitter release at inhibitory nerve terminals in prefrontal cortex during aging. The hypothesis being examined is that DA modulation of responses to gamma frequency stimulation is altered in aging brain. The question whether DA modulation of GABA release in response to natural stimulation patterns is more efficacious and altered in aged animals also will be studied.

Andrew J. Kennedy, Ph.D.

Postdoctoral Fellow

Department of Neurobiology

University of Alabama-Birmingham

1825 University Boulevard, Shelby 1074

Birmingham, AL 35294

E-mail: ajkennedy@uab.edu

Telephone: (205) 996-6067



Dr. Kennedy's research interests are the molecular mechanisms that facilitate learning and memory, and he is a postdoctoral fellow in the laboratory of Dr. J. David Sweatt at the University of Alabama, Birmingham. Currently, Andrew studies the basic neurobiology underlying Pitt-Hopkins Syndrome, an ultra rare intellectual disorder on the autism spectrum with a phenotype resembling Angelman Syndrome, but that is currently understood in only the most cursory way. Pitt-Hopkins Syndrome is caused by the haploinsufficiency of transcription factor 4, and understanding its role in genetic and epigenetic regulation may be useful for potential therapeutic intervention as well as determining the role transcription factor 4 performs in learning and memory more broadly.

Mark Kilgore, Ph.D. - 2013

Recently Graduated Graduate Student

Evelyn F. McKnight Brain Institute

Department of Neurobiology

The University of Alabama at Birmingham

1825 University Blvd

Birmingham, AL 35294

E-mail: kilgoma@uab.edu

Telephone: (334) 444-0699



Histone deacetylase (HDAC) inhibitors have shown promise in being able to ameliorate cognitive deficits in mouse models of Alzheimer's disease. Investigating the mechanism(s) through which HDAC inhibitors work is important to understand how memory impairments occur under chronic amyloid burden, as well as to understand what role epigenetic mechanisms play in regulating long-term memory formation.

Gwendalyn King, Ph.D.

Assistant Professor
Evelyn F. McKnight Brain Institute
Department of Neurobiology
The University of Alabama at Birmingham
1825 University Blvd
Shelby Building 913
Birmingham, AL 35294
E-mail: gdking@uab.edu
Telephone: (205) 996-0247
Fax: (205) 934-6571



Our lab is broadly interested in understanding proteins involved in brain aging. Only 4% of genes are age-regulated in brain. Among them is the age-regulating protein klotho that is downregulated across species at times when age-related disorders are prone to develop. We are focused on understanding the role of klotho in brain. Klotho protein shortens mouse lifespan when knocked out, and extends lifespan when overexpressed. It is expressed in only a few organs, including brain, but affects organ function throughout the body through functions as both a transmembrane protein regulating ion homeostasis and as a shed protein regulating numerous signaling pathways critical to healthy aging. Although the brains of knockout mice bear the protein hallmarks of premature aging and are cognitively impaired, very little is known about the function of klotho in brain. We are seeking to determine whether klotho's effects are cell autonomous or the result of circulating klotho produced by choroid plexus. Data from our lab implicates a role for klotho in the basic synaptic function of the brain and in adult neurogenesis.

David C. Knight, Ph.D.

Assistant Professor
Department of Psychology
Evelyn F. McKnight Brain Institute
The University of Alabama at Birmingham
Civitan International Research Center 235H
1720 2nd Avenue South
E-mail: knightdc@uab.edu
Telephone: (205) 996-6344
Fax: (205) 975-6320



Dr. Knight's research is focused on better understanding the neural substrates of human learning, memory, and emotion using functional magnetic resonance imaging (fMRI). His research employs a Pavlovian fear conditioning paradigm during fMRI to explore changes in human brain activity that occur during this type of associative learning. Findings from these studies are consistent with laboratory animal research in that they indicate the thalamus, amygdala, hippocampus, and prefrontal cortex are important components of the neural circuitry that supports learning and memory of conditional fear in humans. Dr. Knight has been developing methodologies designed to expand the use of autonomic and behavioral measures that are recorded simultaneously with fMRI. The use of such data to extract additional information from functional images may provide more detailed insights into the neural circuitry that mediates certain cognitive processes. Dr. Knight's laboratory is also interested in the role of awareness in the expression of fear-related behaviors, the neural circuitry mediating aware and unaware fear memory processes, and brain regions that process properties of fearful stimuli compared to regions that produce behavioral and autonomic fear responses.

Robin Lester, Ph.D.

Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
Shelby Multidisciplinary Biomedical Research Building
Room 1006
1825 University Blvd.
Birmingham, AL 35294-2182
Email: rlester@nrc.uab.edu
Telephone: (205) 934-4483
Fax: (205) 934-6571



Dr. Lester's lab has been researching the role of CNS nicotinic acetylcholine receptors (nAChRs) in tobacco addiction and central synaptic transmission. nAChRs are ligand-gated ion channels composed of five individual protein subunits that cause neuronal excitation when bound and activated by synaptically released neurotransmitter, acetylcholine, or exogenous drugs like nicotine. In respect to drug addiction, they have been studying how exposure of these receptors to nicotine *in vivo* leads to persistent changes in hippocampal neuronal network activity following long-term withdrawal of the drug. In addition they have uncovered a unconventional form of diffuse synaptic signaling through nAChRs in the brain implying that this transmitter system may participate in volume transmission. Molecular biological studies have characterized at least ten receptor subunits that can be assembled together in numerous combinations giving rise to a wide variety of nAChRs with distinct functional roles. It is because of this diversity that nAChRs have been implicated in a range of CNS behaviors from pain sensation to learning and memory, and multiple pathological states such as aging, epilepsy and schizophrenia.

Farah D. Lubin, Ph.D.

Assistant Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
1825 University Boulevard, SHEL 1175
Birmingham, AL 35294
E-mail: flubin@uab.edu
Website: www.lubinlab.com
Office: (205) 996-6084
Lab: (205) 996-2242



As an Assistant Professor at UAB, Dr. Lubin is focused on studying learning, memory and its disorders. She is investigating the Molecular and Cellular basis for transcriptional regulation of genes in neurons that integrate and encode information in the brain and to find treatments for memory impairments. Currently, the goal of the lab is to gain insights into epigenetic mechanisms and the signaling cascades that mediate the interaction of transcription factors to chromatin and determine how they participate in the regulation of gene expression during memory encoding, allocation, storage and recall in hopes of unraveling the causes of cognitive deficits and to develop treatment options. Dr. Lubin's research program focuses on neurons and synapses in the hippocampus, an area of the brain that plays an important role in learning and memory. She and others have observed that neurons have "highjacked" epigenetic processes such as DNA methylation and posttranslational histone modifications to coordinate gene transcription changes in the hippocampus, thus revealing an unexpected role for chromatin structure

regulation in mature, non-dividing neurons during memory formation. Furthermore, our chromatin biology studies revealed that DNA methylation and histone methylation work in concert to regulate gene transcription during memory consolidation. The results obtained from my research program will provide fundamental information concerning chromatin biology in mature neurons with clear relevance in learning and memory deficits associated with aging, epilepsy, schizophrenia, and depression.

Lori L. McMahon, Ph.D.

Professor

Director, Comprehensive Neuroscience Center

Evelyn F. McKnight Brain Institute

Cell, Developmental and Integrative Biology

University of Alabama at Birmingham

McCallum 964

1918 University Boulevard

Birmingham, Alabama 35294-0005

Email: mcmahon@uab.edu

Telephone: (205) 934-3523



My lab is currently investigating the role of estradiol in modulating hippocampal dependent learning and memory and synaptic plasticity over the lifespan. A recent focus of the lab is in investigating the deficits in hippocampal function following prolonged periods of estrogen deprivation in aging and in defining the critical window in which estrogen replacement must begin to benefit hippocampal dependent learning and memory and synaptic plasticity. Ovariectomized female rats treated with estradiol at various intervals following ovariectomy are used as a model system. Experiments involve hippocampal dependent learning and memory assays combined with spine density analysis and electrophysiological measurements of AMPA and NMDA currents and LTP in acute brain slices. We recently reported that prolonged ovarian estrogen deprivation rather than chronological age more strongly dictates whether estrogen replacement will be beneficial in maintaining hippocampal function throughout the lifespan. We find that if estrogen replacement is capable of increasing NR2B current, then it also increases the LTP magnitude and novel object recognition. However, if following prolonged ovarian hormone deprivation, estrogen replacement does not stimulate an increase in NR2B current, then neither the LTP magnitude or performance in NOR is increased. These results help to define the estrogen-dependent mechanisms required for maintaining hippocampal function in aging and will inform the use of estrogen replacement to alleviate hormone-dependent memory loss in aging.

Rodolphe Nenert, Ph.D.

Postdoctoral Fellow

Department of Neurobiology

Evelyn F. McKnight Brain Institute

University of Alabama at Birmingham

CIRC 111

1719 6th Avenue South

Birmingham, AL 35294

E-mail: rodolphe@uab.edu

Telephone: (205) 934-0423

Fax: (205) 975-5097



Dr. Nenert is interested in characterizing what brain mechanisms underlie the human ability to flexibly process inputs from the environment. We often process the same information in different ways at different times. For example, sometimes we may hear a phone number on a commercial from the radio

and try to remember it, while at another time, the same string of numbers may be irrelevant, and we may ignore it. Dr. Nenert uses a variety of tools to better characterize how human brain activity before a stimulus is presented may impact the ways in which that stimulus is processed, and how this activity may change with age and with training. Behavioral measurements (psychophysics and eye movements), measurement of electrical activity in the human brain using EEG, and measurement of neural activity through fMRI allow insight into this question.

Dr Nenert received his PhD in Neuropsychology from University of Toulouse, France, where, with Professor Jean-Francois Demonet, he studied how techniques of fMRI and EEG can help us understand neural activity of children suffering from dyslexia and how different types of remediation can help them compensate their troubles. Dr Nenert has been occupying a postdoctoral fellow position under the supervision of Dr Kristina Visscher at the University of Alabama at Birmingham since 2010.

Michelle Olsen, Ph.D.

Assistant Professor

Evelyn F. McKnight Brain Institute

Cell, Developmental and Integrative Biology

MCLM 958

1720 2nd Avenue South

Birmingham, AL 35294

E-mail: molsen@uab.edu

Telephone: (205) 975-2715



The focus of my research is to enhance our understanding of the role of astrocytes in brain and spinal cord function. Astrocytes are the most numerous cells in the central nervous system yet the role of astrocytes in neurodevelopmental disorders and injury, particularly pediatric injury, is highly understudied. My work focuses on two essential functions of astrocytes; buffering of extracellular K^+ and glutamate. These functions are thought to be largely mediated by two astrocytic proteins, Kir4.1, an inwardly rectifying potassium channel and excitatory amino acid transporter, GLT-1. These two proteins function to dampen neuronal excitability. Following injury, persistent alterations in the biophysical properties of astrocytes hinder their ability to perform these basic altruistic functions. The resulting dysregulation of extracellular K^+ and glutamate are associated with increased neuronal excitability and changes in synaptic physiology and plasticity in the adult. In the developing central nervous system, loss of these functions may profoundly impact neuronal development. Surprisingly, little is known regarding the regulation of either protein in the normal developing brain, following injury or during abnormal development.

Our current research projects span from understanding how Kir4.1 and GLT-1 transcription and translation are being regulated during normal development, to how each is maintained in the adult brain and understanding changes in this regulation in pathological conditions. We are particularly interested in how reduced extracellular K^+ and glutamate regulation in the immature brain impacts neuronal development. To do this work requires a multitude of techniques. To study protein expression we employ functional assays such as electrophysiology and glutamate uptake assays, in addition to protein biochemistry. Confocal and wide field fluorescent microscopy is used to visualize and localize protein in brain slices and in cultured cells. Quantitative PCR is used to examine transcript levels and we are currently implementing epigenetic techniques to investigate mechanisms of transcriptional regulation. To perform these experiments we utilize tissue derived from several animal models, primary astrocyte and neuron cultures and human autopsy and surgical resection tissue.

Linda Overstreet-Wadiche, Ph.D.
Assistant Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
Shelby 1003
1825 University Boulevard
Birmingham, AL 35294-2182
Email: lwadiche@nrc.uab.edu
Telephone: (205) 996-6414
Fax: (205) 934-6571



The research in the laboratory of Dr. Linda Overstreet-Wadiche is focused on understanding the role of adult generated neurons in a region of the brain that is associated with learning and memory. Most neurons are generated during embryogenesis, but in the hippocampus newborn neurons are continuously produced throughout adulthood and growing evidence suggests that they participate in hippocampal-dependent cognitive and emotive functions. The proliferation, survival and integration of newborn neurons are regulated by many factors including aging and environmental enrichment, allowing adult neurogenesis to provide a link between experience and structural plasticity of the brain. Dr. Overstreet-Wadiche's lab uses transgenic mouse models and electrophysiological techniques to explore how experience-dependent factors control adult neurogenesis and how newborn neurons in turn participate in hippocampal network activity.

Vladimir Parpura, M.D., Ph.D., M.A.E.
Associate Professor
Evelyn F. McKnight Brain Institute
Department of Neurobiology
1719 6th Avenue South, CIRC 429
University of Alabama
Birmingham, AL 35294-0021
E-mail: vlad@uab.edu
Telephone: (205) 996-7369
Fax: (205) 975-6320



Parpura's current research includes: i) studying the modulation of calcium-dependent glutamate release from astrocytes in health and disease; ii) visualization of vesicular/receptor trafficking; iii) examination of the nature and energetics of interactions between exocytotic proteins using single molecule detection approaches; iv) development of scaffolds and dispersible materials, most notably modified carbon nanotubes, which can be used in repair after brain injury and v) bio-mimetic micro-robotics. He has been interfacing neuroscience with nanoscience/nanotechnology, synthetic biology and biomedical engineering.

Lucas Pozzo-Miller, Ph.D.

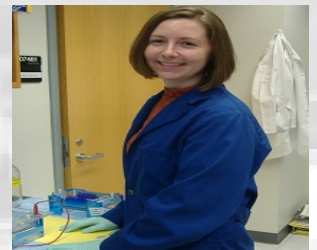
Professor
Evelyn F. McKnight Brain Institute
Department of Neurobiology
The University of Alabama at Birmingham
Shelby 1002
1825 University Blvd.
Birmingham, AL 35294-2182
E-mail: lucaspm@uab.edu
Telephone: (205) 975-4659
Fax: (205) 934-6571



The long-term research interest of the Pozzo-Miller lab is to characterize the functional role of structurally defined neuronal compartments such as dendritic spines, dendrites and presynaptic terminals, and how they participate in synaptic development, function and plasticity as they relate to learning & memory and neurodevelopmental disorders. We specifically focus on the actions of neurotrophins in the hippocampus. Neurotrophins such as brain-derived neurotrophic factor (BDNF) are secretory proteins that regulate neuronal survival and differentiation, as well as synapse development, function and plasticity. Neurotrophic factors are strong candidates to provide the molecular signaling pathways mediating complex interactions leading to appropriate dendritic maturation and synapse development. We are currently investigating the “BDNF hypothesis” of Rett syndrome, a neurodevelopmental disorder of genetic origin associated with autism and mental retardation. Rett syndrome is associated with mutations in *MECP2*, a methylated DNA-binding transcriptional regulator of several genes, including *BDNF*. Tools: acute and cultured brain slices, neuronal cell cultures, transgenic mice, post-mortem brain samples, cDNA plasmids, sh/siRNA. Techniques: intracellular patch-clamp whole-cell recordings simultaneously with intracellular Ca^{2+} imaging, voltage-dye imaging, synaptic vesicle recycling, immunocytochemistry, electron microscopy, confocal microscopy, multiphoton excitation microscopy, DiOlistic cell labeling, quantitative analyses of neuronal and synaptic morphology, particle-mediated gene transfer.

Elizabeth J. Rahn, Ph.D.

Postdoctoral Research Fellow
Evelyn F. McKnight Brain Institute
Department of Neurobiology
University of Alabama at Birmingham
1825 University Blvd.
SHEL 1070C
Birmingham, AL 35294
E-mail: rahneli@uab.edu
Telephone: (205) 934-6433
Fax: (205) 934-6571



Dr. Rahn’s research focuses on epigenetic modifications associated with murine models of induced inflammatory or neuropathic pain. Specifically, she is interested in alterations of DNA methylation observed in pronociceptive genes (e.g., BDNF) following administration of chemotherapeutic treatment or inflammation-inducing agents. Overall her work seeks to understand epigenetic alterations at the level of the spinal dorsal horn associated with the maintenance and induction of chronic pain states.

Erik Roberson, M.D., Ph.D.

Associate Professor
Department of Neurology and Neurobiology
Virginia B. Spencer Professor of Neuroscience
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
1825 University Blvd., SHEL 1171
Birmingham, AL 35294
E-mail: eroberson@uab.edu
Telephone: (205) 996-9486
Fax: (205) 996-9436



Dr. Roberson received his A.B. with highest honors from Princeton University. He then earned his M.D. and Ph.D in neuroscience at Baylor College of Medicine in Houston where he studied molecular mechanisms of learning and memory using a combination of electrophysiology and biochemistry. He completed a residency in neurology at the University of California San Francisco, where he also served as Chief Resident in Neurology. After residency, he completed a clinical fellowship in behavioral neurology with Dr. Bruce Miller at UCSF and resumed basic research in the laboratory of Dr. Lennart Mucke at the Gladstone Institute of Neurological Disease, initiating his current studies of neurodegenerative disease using mouse models. He was appointed as Assistant Professor of Neurology at UCSF in 2005. In 2008, he moved to UAB to establish his independent research laboratory. Dr. Roberson also cares for patients with memory disorders and dementia at the Kirklin Clinic.

The Roberson lab studies the neurobiology of two common neurodegenerative disorders, Alzheimer's disease (AD) and frontotemporal dementia (FTD), with a focus on understanding the underlying cellular and molecular mechanisms that will lead to better treatments. Lab members use modern neuroscience approaches to study animal models of these conditions. One area of interest is pursuing the discovery that tau reduction makes the brain resistant to AD-related neuronal dysfunction and seizures, to determine how the protective effects of tau reduction might be harnessed as a treatment for these conditions. Other members of the lab work on determining how mutations in tau and progranulin cause the social and behavioral dysfunction seen in FTD.

Lesley Anne Ross, Ph.D.

Assistant Professor
Department of Psychology
Roybal Center for Translational Research on Aging and Mobility
University of Alabama at Birmingham
HMB 112
924 19th Street South
Birmingham, AL 35294-1170
E-mail: LesleyRoss@uab.edu
Telephone: (205) 975-9424
Fax: (205) 975-2295



Dr. Ross' research goal is to improve the everyday functioning of older adults. She approaches this goal through two tracks of research. First, she is interested in the investigation of the cognitive, health and lifestyle contributing factors to trajectories of change in everyday functioning. Next, she translates modifiable cognitive, health and lifestyle factors from the first track of research into evidence-based interventions that may maintain everyday functioning. She is currently leading several studies investigating the driving mobility and safety of older drivers, as well as the neural changes and

improvements in everyday abilities after cognitive and exercise interventions. Dr. Ross' research utilizes behavioral data, genetics, neuroimaging, new technologies (such as cameras to collect naturalistic driving data), and new intervention approaches (such as use of video games to improve cognition).

Dr. Ross received graduate training under the guidance of University Professor Karlene Ball while researching factors that enable safe and sustainable mobility for older adults. Upon completion of her PhD in Psychology in 2007, Dr. Ross was awarded a competitive postdoctoral fellowship that allowed her to diversify her research expertise through moving to Australia to work under Professor Kaarin Anstey at the Australian National University. This experience developed Dr. Ross' epidemiological skills, while identifying factors to promote increased years of disability-free life and mobility. She has been an Assistant Professor of Psychology at UAB since 2009 and is currently the Vice Chair of the Transportations Research Board of the National Academies' Committee of Safe Mobility for Older Persons. Dr. Ross also currently serves on several graduate and undergraduate committees which allow her to continue working in research while giving back to the University through service to students.

David G. Standaert M.D., Ph.D.

John N. Whitaker Professor and Chair
Department of Neurology
Evelyn F. McKnight Brain Institute
1719 6th Ave., South, Birmingham, AL 35294
E-mail: dstandaert@uab.edu
Telephone: (205) 996-2094
Fax: (205) 996-6580



Dr. Standaert graduated from Harvard College in 1982. He received his M.D. and Ph.D. degrees from Washington University in St. Louis. He completed a one-year internship in Medicine followed by a three-year Neurology residency at the University of Pennsylvania. He was appointed a Howard Hughes Medical Institute Physician Research Fellow, and completed a three-year research and clinical fellowship in Neurology (Movement Disorders) at Harvard Medical School and Massachusetts General Hospital in 1995. He subsequently joined the faculty at MGH where he served as Director of the MGH/MIT Udall Center of Excellence in PD Research as well as a Chair of the MGH Institutional Review Board (IRB). Dr. Standaert joined the University of Alabama at Birmingham faculty in July of 2006 and is the John N. Whitaker Professor and Chair of the Department of Neurology. He serves as Director of the Division of Movement Disorders, the Director of the APDA Advanced Center for Parkinson Research at UAB, and is the Director of the Center for Neurodegeneration and Experimental Therapeutics.

He sees patients in a weekly clinic and oversees many clinical trials for new treatments of Parkinson's disease. He is a member of the Scientific Advisory Boards of the Michael J. Fox Foundation for Parkinson Research, the American Parkinson Disease Association, and the Bachmann-Strauss Dystonia & Parkinson Foundation.

Dr. Standaert's laboratory works on understanding both the root causes of Parkinson's disease as well as the origin of the disabling symptoms that appear after long term treatment of the disease. Recently, his group has focused on approaches to reducing the toxicity of synuclein in animal models of Parkinson disease, and the role of neuroinflammatory reactions in disease progression.

J. David Sweatt, Ph.D.

Professor

Evelyn F. McKnight Chair, Dept. of Neurobiology

Director, Evelyn F. McKnight Brain Institute

University of Alabama at Birmingham

1825 University Boulevard

Birmingham, AL 35294

E-mail: dsweatt@uab.edu

Telephone: (205) 975-5196

Fax: (205) 975-5097



Dr. Sweatt's research program focuses on molecular mechanisms underlying learning and memory. Dr. Sweatt uses knockout and transgenic mice to investigate signal transduction mechanisms in the hippocampus, a brain region known to be critical for higher-order memory formation in animals and humans. His laboratory also uses a large number of genetically engineered mouse models for human learning and memory disorders in order to investigate the molecular and cellular basis of human memory dysfunction. His laboratory has discovered a number of new roles and mechanisms of gene regulation in memory formation, focusing on studies of transcription factors, regulators of chromatin structure, and other epigenetic mechanisms such as chemical modification of DNA. Overall his work seeks to understand the role of regulation of gene expression in synaptic plasticity and long-term memory formation and storage. His laboratory also is interested in using what they have learned about the molecular basis of hippocampal synaptic plasticity and memory formation to generate insights into human pathological conditions associated with aging-related memory dysfunction.

Anne Theibert, Ph.D.

Associate Professor

Evelyn F. McKnight Brain Institute

Department of Neurobiology

University of Alabama at Birmingham

1825 University Boulevard

Birmingham, Alabama 35294-2182

Email: theibert@uab.edu

Telephone: (205) 934-7278



Many diseases are linked to dysregulation of second messenger signaling cascades. One important second messenger system is the phosphoinositide (PI) system, in which inositol lipids function as second messengers and cofactors for many cellular activities stimulated by growth and trophic factors, hormones, cytokines, and neurotransmitters. Dr. Theibert's research focuses on investigating the intracellular targets for several of the PI second messengers in the nervous system. They are particularly interested in the function of PtdInsP3 in neurons and glia, since they have demonstrated that this lipid is required for cells to extend processes, termed neurites, in response to trophic factors and extracellular matrix. Neurites eventually form mature axons and dendrites. Using biochemical and molecular techniques, they have isolated and cloned several novel phosphoinositide receptors from brain. One of these receptors is involved in regulating vesicle trafficking and the actin cytoskeleton, two activities which are involved in neurite outgrowth and new synapse formation. Studies are underway to determine the role of these receptors in neuronal development and synapse formation, and the molecular mechanisms which regulate receptor expression, targeting to intracellular compartments, and modulation of activity. Several potential homologues of these receptors are present in the genetically tractable organism, *Saccharomyces cerevisiae*, which allows us to use yeast genetics to complement the biochemical and molecular approaches in dissecting the function of these phosphoinositide receptors.

Kristina M. Visscher, Ph.D.

Assistant Professor
Evelyn F. McKnight Brain Institute
Department of Neurobiology
University of Alabama at Birmingham
CIRC 111
1719 6th Avenue South
Birmingham, AL 35294
E-mail: kmv@uab.edu
Telephone: (205) 934-0267
Fax: (205) 975-5097



Dr. Visscher is interested in characterizing what brain mechanisms underlie the human ability to flexibly process inputs from the environment. We often process the same information in different ways at different times. For example, sometimes we may hear a string of numbers (e.g. a phone number on a commercial from the radio) and try to remember it, while at another time, the same string of numbers may be irrelevant, and we may ignore it. Dr. Visscher uses a variety of tools to better characterize how human brain activity before a stimulus is presented may impact the ways in which that stimulus is processed. Behavioral measurements (psychophysics and eye movements), measurement of electrical activity in the human brain using EEG, and measurement of neural activity through fMRI allow insight into this question.

Dr. Visscher started at the University of Alabama at Birmingham in April 2009, after a postdoctoral fellowship at Harvard University, where she worked with Randy Buckner and studied how connectivity among brain areas (as measured with functional MRI) change with experience. She used psychophysical and EEG techniques to examine how brain activity before a stimulus influences whether a stimulus will interfere with items in working memory during a previous postdoctoral fellowship at Brandeis University working with Robert Sekuler. She received her Ph.D. in Neuroscience from Washington University in St. Louis in 2004, where, with Steve Petersen, she studied how techniques of fMRI can be used to examine different timecourses of neural activity.

Jacques Wadiche, Ph.D.

Assistant Professor
Evelyn F. McKnight Brain Institute
Department of Neurobiology
1825 University Blvd SHELBY 1005
E-mail: jwadiche@uab.edu
Telephone: (205) 996-6413
Fax: (205) 934-6571



Our brain is organized as interconnected groups of neurons with repeating elements, known as circuits, that underlie information processing. The maintenance of neural activity within circuits that endows us with behaviors and thoughts relies on the specialized synaptic junctions between nerve cells. Fundamental knowledge of circuits and synapses is essential for understanding how the nervous system works under normal and abnormal conditions. We use the rodent cerebellar cortex as a model system for probing the function of neural circuits and synapses. The cerebellum is ideal for studying circuits and synapses because its anatomy is among the best characterized in the nervous system, and cerebellar processing is involved in many simple motor behaviors as well as higher brain functions.

Sidney Williams, M.S.

Graduate Trainee
Department of Neurobiology
1825 University Blvd.
1031 Shelby Bldg
Birmingham, AL 35294
E-mail: sbwill@uab.edu
Telephone: (770) 656-4067



Focal cortical dysplasia is a congenital disorder where neurons fail to migrate properly, often associated with drug-resistant epilepsy. Hyperpolarization-activated non-specific cation (HCN) channels modulate intrinsic and network excitability and are down-regulated in cortical dysplasia. How HCN channels modulate intrinsic firing and synchronization of GABAergic interneurons, the main source of inhibition in the neocortex, is unknown. These channels are important in regulating network activity through modulation of synaptic integration, spike timing, and synchronization of network activity. We hypothesize that loss of HCN channels and the HCN-mediated current I_h produces intrinsic alterations in GABAergic interneurons, leading to hyperexcitability in cortical dysplasia. Whole-cell patch clamp recordings of fast-spiking basket cells, Martinotti cells, and neurogliaform cells are used to determine effects of I_h inhibition on interneuron excitability and synchronization. These studies will elucidate the role of HCN channels in regulating excitability of GABAergic interneurons and alterations in cortical dysplasia.

Scott Wilson, Ph.D.

Associate Professor
Department of Neurobiology
Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham
1825 University Boulevard
Birmingham, AL 35294-2182
Email: livvy01@uab.edu
Telephone: (205) 975-5573
Fax: (205) 934-6571



The focus of Scott Wilson's research is to investigate how regulated protein turnover by the ubiquitin proteasome system controls nervous system development and function. By using a combination of genetics, biochemistry, electrophysiology and behavioral analyses, the Wilson laboratory has investigated ubiquitin-signaling events that are required for synapse maturation, the induction of synaptic plasticity and learning and memory. Results from these studies demonstrate the importance of localized ubiquitin recycling and regulated protein turnover for the proper development and function of synaptic connections. Our studies also suggest that targeting proteasome associated factors may be a viable approach to enhance the clearance of aggregated prone proteins associated with chronic neurological diseases

Iva Zovkic, Ph.D.

Postdoctoral Fellow

Evelyn F. McKnight Brain Institute

Department of Neurobiology

Shelby 1070

1825 University Blvd

Birmingham, AL 35233-1913

E-mail: izovkic@nrc.uab.edu

Telephone: (205) 975-3083

Fax: (205) 934-6571



Dr. Zovkic is interested in understanding the molecular mechanisms that support the transition of transient environmental stimuli into long lasting memories. Epigenetic mechanisms, which regulate gene expression through modifications of DNA and chromatin, are particularly amenable to self-perpetuation required for maintaining memories over prolonged periods of time. In addition to the widely investigated role of cytosine methylation and post-translational modifications of histones, chromatin can be modified through the exchange of canonical histones with their variant counterparts. Particular interests are in the role of histone variant H2A.Z and its interplay with DNA methylation and histone post-translational modifications in memory formation. Findings point to histone variant exchange as an important regulator of gene expression and present an additional level of epigenetic regulation that allows for the complexity and the specificity required to support memory formation.



Evelyn F. McKnight Brain Institute

The University of Arizona

Gene E. Alexander, Ph.D.

Professor and Director, Brain Imaging
Behavior & Aging Lab
Department of Psychology and
Evelyn F. McKnight Brain Institute
Department of Psychology

Elsa Baena

Graduate Student
Cognition and Neuroimaging Laboratory
Department of Psychology
Evelyn F. McKnight Brain Institute

Carol A. Barnes, Ph.D.

Regents' Professor, Psychology, Neurology and
Neuroscience
Evelyn F. McKnight Chair for Learning and
Memory in Aging
Director, Evelyn F. McKnight Brain Institute
Director, ARL Division of Neural Systems,
Memory & Aging
Associate Director, BIO5

Andrew Busch, B.S.

Ph.D. Student, Physiological Science
ARL Division of Neural Systems, Memory and Ag
Evelyn F. McKnight Brain Institute

Joe Cardoza, B.S.

Graduate Student
Cognition and Neuroimaging Lab
Cognitive and Neural Systems Program Psych

Monica K. Chawla, Ph.D.

Assistant Research Scientist
ARL Evelyn F. McKnight Brain Institute
Division of Neural Systems, Memory and Aging

Paul D. Coleman, Ph.D.

Senior Scientist and Director of J.L. Roberts
Center for Alzheimer's Research
Affiliate, Evelyn F. McKnight Brain Institute
Banner Sun Health Research Institute

Stephen L. Cowen, Ph.D.

Assistant Professor
Department of Psychology
Evelyn F. McKnight Brain Institute

James R Engall, Ph.D.

Postdoctoral Research Associate
ARL Division of Neural Systems, Mem and Ag
Evelyn F. McKnight Brain Institute

Megan C. Fitzhugh, B.S.

Graduate Associate
Physiological Sciences
Brain Imaging, Behavior and Aging Laboratory
Evelyn F. McKnight Brain Institute

Elizabeth L. Glisky, Ph.D.

Professor and Head
Department of Psychology
Evelyn F. McKnight Brain Institute

Kari Haws, B.A.

Graduate Associate
Psychology Department
Brain Imaging Behavior and Aging Lab
Evelyn F. McKnight Brain Institute

Mathew J. Huentelman, Ph.D.

Associate Professor
Co-Director, Center for Rare Childhood Dis

Adam W. Lester
Graduate Research Assistant
ARL Division of Neural Systems, Mem and Ag
Evelyn F. McKnight Brain Institute

Michael A. Miller, B.S.
Graduate Associate
Department of Neuroscience
Evelyn F. McKnight Brain Institute

Lauren Nguyen, B.A.
Graduate Associate
Psychology Department
Brain Imaging Behavior and Aging Lab
Evelyn F. McKnight Brain Institute

Brooke Reid, B.A.
Graduate Student
Brain Imaging, Behavior and Aging Laboratory
Department of Psychology

Lee Ryan, Ph.D.
Associate Professor, Psychology and Neurology
Associate Head, Department of Psychology
Evelyn F. McKnight Brain Institute

Rachel Samson, Ph.D.
Postdoctoral Research Associate
ARL Division of Neural Systems, Memory and Ag
Evelyn F. McKnight Brain Institute

Ariana Stickel, B.A.
Graduate Student
Cognition and Neuroimaging Laboratory

Alexander Thome, Ph.D.
Assistant Research Scientist
ARL Division of Neural Systems, Memory and Ag
Evelyn F. McKnight Brain Institute

John Totenhagen, Ph.D.
Postdoctoral Research Associate
Psychology Department
Brain Imaging, Behavior, and Aging Laboratory
Evelyn F. McKnight Brain Institute

Janelle Wohltmann, M.A.
Graduate Student
Aging and Cognition Laboratory
Department of Psychology

Gene E. Alexander, Ph.D.

Professor
Director, Brain Imaging Behavior & Aging Lab
Department of Psychology and
Evelyn F. McKnight Brain Institute
Department of Psychology
University of Arizona
1503 E. University
Tucson, AZ 85721
Email: gene.alexander@arizona.edu
Telephone: (520) 626-1704
Fax: (520) 621-9306



Dr. Alexander's research interests focus on the study of brain-behavior relationships in the context of healthy aging and age-related, neurodegenerative disease to help elucidate the mechanisms of human cognitive aging. He uses neuroimaging techniques, including structural and functional magnetic resonance imaging (MRI) and positron emission tomography (PET), in combination with measures of cognition and behavior to address research questions on the effects of healthy aging and Alzheimer's disease on the brain. A major focus of his research program includes the use of multivariate network analysis techniques with neuroimaging methods and measures of neuropsychological function, health status, and genetic risk to advance understanding on how these multiple factors interact to influence cognitive function as we age. Dr. Alexander's research also includes the application of these techniques to non-human animal models of aging and age-related disease. He is Professor in the Clinical and Cognition & Neural Systems Programs and directs the Brain Imaging, Behavior & Aging Lab in the Department of Psychology and in the Evelyn F. McKnight Brain Institute.

Elsa Baena

Graduate Student
Cognition and Neuroimaging Laboratory
Department of Psychology
Evelyn F. McKnight Brain Institute
P.O. Box 210068
University of Arizona
Tucson AZ 85721-0068
Email: ebaena@email.arizona.edu
Phone: (520) 621-8792
Fax: (520) 621-7628



Elsa Baena is Fifth year graduate student in the Clinical Neuropsychology Program. She graduated with honors in Psychology and a certificate in Life-Span Development and Gerontology in 2006 from the University of Akron. After graduation she was part of Duke University's Post-baccalaureate Research Education Program (PREP) where her research focused in investigating basic episodic memory processes by comparing age groups. Currently, she studies age-related changes in memory processes and how those changes relate to brain function by using neuropsychological testing, behavioral and neuroimaging techniques such as functional magnetic resonance imaging (fMRI).

Carol A. Barnes, Ph.D.

Regents' Professor, Psychology, Neurology and Neuroscience
Evelyn F. McKnight Chair for Learning and Memory in Aging
Director, Evelyn F. McKnight Brain Institute
Director, ARL Division of Neural Systems, Memory & Aging
Associate Director, BIO5
P.O. Box 245115
Life Sciences North Building, room 362
University of Arizona
Tucson, AZ 85724-5115
Email: carol@nsma.arizona.edu
Telephone: (520) 626-2312
Fax: (520) 626-2618



The central goal of Dr. Barnes' research and teaching program is the question of how the brain changes during the aging process and the functional consequences of these changes on information processing and memory in the elderly. Her research program involves studies of behavior and neurophysiology in young and old laboratory animals. This work provides a basis for understanding the basic mechanisms of normal aging in the brain and sets a background against which it is possible to assess the effects of pathological changes such as Alzheimer's disease. Some current work also includes an assessment of therapeutic agents that may be promising in the alleviation or delay of neural and cognitive changes that occur with age. Dr. Barnes is a Regents' Professor at the University of Arizona, Director of the Evelyn F. McKnight Brain Institute at the University of Arizona and recipient of the Evelyn F. McKnight Endowed Chair for Learning and Memory in Aging. The objective of the Evelyn F. McKnight Brain Institute is to uncover the neurobiological changes in the brain that cause memory changes as we age, and to unravel which changes are due to normal aging and which are due to disease states.

Andrew Busch, B.S.

Ph.D. Student, Physiological Science
ARL Division of Neural Systems, Memory and Aging
Evelyn F. McKnight Brain Institute
Life Science North Building, Room 384
University of Arizona
Tucson, AZ 85724
Email: akbusch@email.arizona.edu
Telephone: (480) 313-4003
Fax: (520) 626-2618



Mr. Busch attended UC San Diego and Arizona State where he received a B.S. in biology. His current research interests pertain to the mechanisms by which spatial decisions are informed by hippocampal representations of space, and how these might change with age. Specifically he is recording activity from large ensembles of neurons in the CA3 region of young and old rats, while they perform a multiple T-based decision task. At certain points in the maze, place cells have been shown to transiently represent positions forward of the animal, corresponding to alternate spatial decisions. This work may reveal the effect aging has on this relatively recently discovered computational phenomenon, and whether it contributes to an aged rat's spatial impairments.

Joe Cardoza, B.S.

Graduate Student
Cognition and Neuroimaging Lab
Cognitive and Neural Systems Program
Office 217G
Psychology
University of Arizona
Tucson, AZ 85724
Email: cardozaj@email.arizona.edu
Telephone: (520) 250-4374



My current research interests lie in the areas of perirhinal cortex, object discrimination and aging. Previous research has found older rats to be significantly different to younger rats in their ability to discriminate similar looking objects. In our experiment, we predict that older adults will have decreased performance in an ambiguous object discrimination task and will show differences in fMRI activation in the perirhinal cortex. Activation and volume analysis will be used to compare both groups. With this project, we hope to learn more about the differences between younger and older adults and the role that the perirhinal cortex plays in aging.

Monica K. Chawla, Ph.D.

Assistant Research Scientist
ARL Evelyn F. McKnight Brain Institute
Division of Neural Systems, Memory and Aging
P.O. Box 245115
Life Sciences North Building, room 345
University of Arizona
Tucson, AZ 85724
Email: mchawla@nsma.arizona.edu
Telephone: (520) 626-6792
Fax: (520) 626-2618



The primary goal of Dr. Chawla's research is the question of how the brain changes during the normal aging process and the functional consequences of these changes on information processing and memory in the elderly. Her research involves behavioral studies of immediate-early genes and neural plasticity mechanisms using spatial and temporal compartmental analysis in young and old laboratory animals. This work provides a basis for understanding the basic mechanisms of normal aging in the brain and sets a background against which it is possible to assess the effects of pathological changes such as Alzheimer's disease. Dr. Chawla is an Assistant Research Scientist and heads the molecular research team in Dr. Carol Barnes laboratory at the University of Arizona, Evelyn F. McKnight Brain Institute and the ARL Division of Neural Systems Memory and Aging at the University of Arizona.

Paul D. Coleman, Ph.D.

Senior Scientist and Director of J.L. Roberts
Center for Alzheimer's Research
Affiliate, Evelyn F. McKnight Brain Institute
Banner Sun Health Research Institute
10515 West Santa Fe Drive
Sun City, AZ 85351
Email: Paul_Coleman@urmc.rochester.edu
Telephone: (623) 876-6638



Ever since Dr. Coleman's initial publication that indicated continuing neuronal plasticity in the aging human brain and loss of this plasticity in Alzheimer's disease (Science, 1979) his work has focused on differentiating changes in the brain in Alzheimer's disease from changes related to normal, non-demented ageing. His initial studies in this area were based on quantitative Golgi studies of dendritic extent in human and rodent brains. Feeling a need to be able to competently expand into studies using molecular biology, he spent much of two summers at Cold Spring Harbor Laboratories learning molecular biology and molecular biology methods. One of these summers resulted in the first publication (with Jim Eberwine in PNAS) of a method of profiling gene expression in single identified neurons. Most recently, Dr. Coleman's work has expanded into the realm of epigenetics. This work is successfully demonstrating that reduced transport of epigenetic molecules from the cytoplasm into the cell nucleus is a key event in the Alzheimer's brain. This inability of epigenetic molecules to translocate to the nucleus, where they should be, has consequences for chromatin structure and consequently, the massive changes in gene expression seen in the AD brain. In addition, the aberrant cytoplasmic localization of epigenetic molecules leads to interactions with transport mechanisms in axons and dendrites, to interactions with mitochondria and to other interactions leading to the pathophysiology of Alzheimer's disease.

Stephen L. Cowen, Ph.D.

Assistant Professor
Department of Psychology
Evelyn F. McKnight Brain Institute
P.O. Box 245115
Life Sciences North Building, room 347
The University of Arizona
Tucson, AZ 85724
Email: scowen@email.arizona.edu
Telephone: (520) 626-2615
Fax: (520) 626-2618

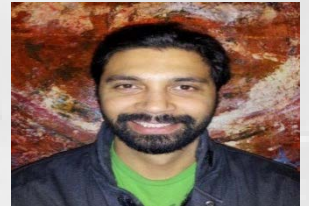


My research interests revolve around the question of how the activities of ensembles of neurons drive our capacity to decide, remember, and navigate. In particular, I am interested in the role of the prefrontal cortex in cost-benefit decision making and in the role of the hippocampus in navigation and memory consolidation. I investigate these topics through the use of large-scale extracellular recording methods acquired from rodents as the animals perform a variety of decision-making and navigational behaviors. The results of my research point towards a surprising connection between physical movement and working memory-associated neural activity in the medial prefrontal cortex, an observation that has since motivated me to develop novel tools for behavioral control, analysis, and inertial measurement. Research into decision making in our laboratory has also revealed that neurons in the anterior cingulate cortex, a region involved in effort-guided decision making and action selection, integrate information about actions,

physical effort, and reward in the service of maintaining action sequences during goal-directed behaviors. Our work in spatial navigation has investigated how the hippocampal navigational system can switch the relative strength of visual and vestibular inputs based on goal location. Our ultimate goal is to connect our work in these two areas by recording from both regions simultaneously in order to determine how contextual and spatial information from the hippocampus becomes integrated with executive processes operating in the prefrontal cortex.

James R Engall, Ph.D.

Postdoctoral Research Associate
ARL Division of Neural Systems, Memory and Aging
Evelyn F. McKnight Brain Institute
California National Primate Research Center
Route 98 and Hutchison Drive
Davis, CA
Email: jrengle@ucdavis.edu
Telephone: (530) 754-5943
Fax: (530) 754-5942



The goal of James Engall's post-doctoral research is to elucidate how age-related changes in the lower level sensory processing impacts higher cognitive functions in the aged. In July 2011, James completed his dissertation entitled, "The recalibrating brain: How the auditory system of the Rhesus Macaque monkey copes with age-related hearing loss." His thesis focused on how age-related changes in cochlear structure and function propagated to higher levels of the auditory pathway. James's research focuses on establishing a link between Prebycusis and Presbyopia to changes in the neural substrates of cognition in young and aged Rhesus Macaques at the California National Primate Research Center at UC Davis. Currently, James has been using a combined approach that correlates behavioral assessments, gross electrophysiological recordings of sensory function and neuroimaging techniques (i.e., positron emission tomography and magnetic resonance imaging).

Megan C. Fitzhugh, B.S.

Graduate Associate
Physiological Sciences
Brain Imaging, Behavior and Aging Laboratory
Evelyn F. McKnight Brain Institute
1503 E. University Blvd, RM 317
University of Arizona
Tucson, AZ 85721
E-mail: fitzhugh@email.arizona.edu
Telephone: (520) 626-6570



Megan Fitzhugh's research interests focus on investigating the effects of healthy and pathological aging on brain structure and function in humans and animal models. Her techniques for exploring these effects include voxel-based analyses of magnetic resonance imaging and positron emission tomography, combined with multivariate statistical methods, and measures of cognitive performance. Currently, she is studying the effects of blood pressure on brain structure and behavior using a novel, transgenic rat model of inductive hypertension

Elizabeth L. Glisky, Ph.D.

Professor and Head
Department of Psychology
Evelyn F. McKnight Brain Institute
University of Arizona
P.O. Box 210068
1503 E. University Blvd.
Tucson, AZ 85721
Email: glisky@email.arizona.edu
Telephone: (520) 621-9289
Fax: (520) 621-9306



Betty Glisky's research interests include changes in memory and executive function that occur as a result of normal aging or age-related neurological conditions such as MCI or Alzheimer's disease. Recent collaborative work has focused on tracking longitudinal changes in cognitive function in a cohort of normally-aging older adults, and relating those changes to measures of brain integrity, genetic predisposition, and other health variables. The goals of this research are to understand the variability in the normal aging process, to identify early indicators of what might be abnormal aging, and to design and implement interventions that might be instrumental in enabling older adults to maintain optimal memory function into the oldest years. Dr. Glisky's work has been supported by the National Institute on Aging, the Arizona Biomedical Research Council, the Arizona Alzheimer's Consortium, and the Evelyn F. McKnight Brain Institute.

Kari Haws, B.A.

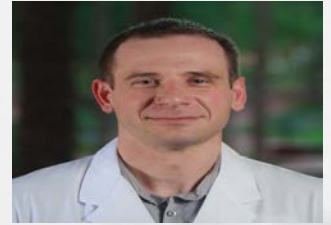
Graduate Associate
Psychology Department
Brain Imaging Behavior and Aging Laboratory
Evelyn F. McKnight Brain Institute
1503 E. University Blvd, RM 317
University of Arizona
Tucson, AZ 85721
Email: khaws@email.arizona.edu
Telephone: (415) 706-7003



Kari Haws's research focuses on investigating the differences between pathological and non-pathological aging. Her approach to investigating this problem primarily has involved multivariate statistical methods paired with voxel-based morphometry processing of structural MRI's correlated with behavioral measures of cognitive performance. In particular, she is seeking to understand the effects of blood pressure variability on brain structures and cognition in healthy aging. Ms. Haws received a B.A. in Psychology at the University of California, Berkeley.

Matthew J. Huentelman, Ph.D.

Associate Professor, Neurogenomics Division
Co-Director, Center for Rare Childhood Disorders
The Translational Genomics Research Institute
445 N Fifth Street
Phoenix, AZ 85004
Email: mhuentelman@tgen.org
Telephone: (602) 343-8730
FAX: (602) 343-8844



Dr. Huentelman's research interests center around the investigation of the “-omics” (genomics, transcriptomics, epigenomics, and proteomics) of neurological traits and disease. His laboratory's overarching goal is to leverage findings in these disciplines to better understand, diagnose, and treat diseases of the nervous system. His laboratory focuses on the study of cognition, successful aging, Alzheimer's disease, and rare neurological diseases of unknown cause. He also has a strong program in comparative genomics where the focus is on understanding the genetic basis of neurological disease in purebred cats and dogs and in the use of insect animal models to better understand cognitive aging.

He and his laboratory team have participated in several successful genetic association studies for diseases and traits such as autism, episodic memory, Alzheimer's disease, progressive supranuclear palsy, amyotrophic lateral sclerosis, schizophrenia, age-related hearing impairment, and otosclerosis. Their work in this research has led to the identification of several genes associated with individualized altered predisposition to disease as well as the elucidation of multiple novel pharmaceutical targets.

It is clear that the next phase of genomics will revolve around the rapidly emerging field of whole genome sequencing. His team has extensive expertise in the area of next generation sequencing, a technique under use in his laboratory since early 2006. His team currently uses the approach to sequence candidate genes, entire genomes and exomes, and large association peaks to identify functional variants. Additionally he has longstanding expertise in next generation RNA sequencing to identify differentially expressed transcripts as well as determine splice isoform differences. Lastly, his team also utilizes next generation sequencing to investigate the epigenome using methylation specific sequencing.

Adam W. Lester

Graduate Research Assistant
ARL Division of Neural Systems, Memory and Aging
Evelyn F. McKnight Brain Institute
P.O. Box 245115
Life Sciences North Building, Room 384
University of Arizona
Tucson, AZ 85724
Email: lester@email.arizona.edu
Telephone: (520) 626-2612
FAX: (520) 626-2618



The central goal of Adam Lester's dissertation research is the question of how age-associated changes in neural network processing may contribute to impairments in spatial processing in the elderly. It's been found that certain cells in cortical areas surrounding the hippocampus show increased firing rates when rats are in a specific location in an environment, and that these locations make up a regularly tessellating grid of equilateral triangles. It's believed that these cells are involved in integrating information from multiple sensory modalities to determine location, and that this information is passed onto the hippocampus for further processing. Given known impairments in connectivity between hippocampus and its surrounding cortical structures with age, Adam is exploring how these impairments may contribute to changes in local and interregional processing between the hippocampus and surrounding cortical structures during spatial navigation in aged rats.

Michael A. Miller, B.S.

Graduate Associate
Department of Neuroscience
Evelyn F. McKnight Brain Institute
P.O. Box 245115
Life Sciences North Building, Room 344
The University of Arizona
Tucson, AZ 85724
Email: mmiller1@email.arizona.edu
Telephone: (520) 247-2183



Michael Miller's research focuses on investigating the relationships among cortical and subcortical brain regions in effort based decision making. Through electrophysiological techniques, Michael examines the potential connectivity and interaction between prefrontal cortical regions, insula and the basal ganglia during the performance of multiple choice maze tasks which vary in effort and reward. The specific focus is to elucidate the role of the orbitofrontal cortex and insula in guiding behavior during effort tasks. Michael received BAs from Trinity University and BSs from the University of Arizona.

Lauren Nguyen, B.A.

Graduate Associate
Psychology Department
Brain Imaging Behavior and Aging Laboratory
Evelyn F. McKnight Brain Institute
1503 E. University Blvd, RM 317
University of Arizona
Tucson, AZ 85721
Email: languyen@email.arizona.edu



Lauren Nguyen's research focuses on investigating the differences between pathological and non-pathological aging. She is investigating the effects of self-report of memory complaints and blood pressure variability on brain structures and cognition in healthy aging. To understand these effects, she will utilize multivariate statistical methods paired with voxel-based morphometry processing of structural MRIs correlated with behavioral measures of cognitive performance. Lauren received a B.A. in Psychology at the University of California, Davis.

Brooke Reid, B.A.

Graduate Student
Brain Imaging, Behavior and Aging Laboratory
Department of Psychology
University of Arizona
1503 E. University Blvd, RM 317
University of Arizona
Tucson, AZ 85721
Email: breid@email.arizona.edu
Telephone: (406) 853-1603



I am a first year graduate student in the Cognition and Neural Systems Program at the University of Arizona. I am interested in how long-term sleep quality might modulate changes in cognition and brain structure in the context of both healthy aging and age-related neurodegenerative disease. The goal of my current proposed research is to determine whether self-reported measures of sleep are associated with differences in behavioral measures of cognitive functioning in healthy older adults, specifically in the domains of memory, executive function, complex attention, and processing speed. Additionally, I will be using structural MRI's to investigate whether reduced or disrupted sleep is associated with differences in gray matter volume.

I graduated with a B.A. in Psychology from the University of Notre Dame, where I was a research assistant in the Sleep, Stress and Memory Lab.

Lee Ryan, Ph.D.

Associate Professor, Psychology and Neurology
Associate Head, Department of Psychology
Evelyn F. McKnight Brain Institute
University of Arizona
P.O. Box 210068
University of Arizona
Tucson, AZ 85721-0068
Email: ryant@email.arizona.edu
Telephone(s): (520) 621-7443; (520) 621-7443
Website: <http://cnl.web.arizona.edu>



Dr. Lee Ryan received her Ph.D. in Cognitive and Clinical Psychology at the University of British Columbia in 1992 and completed a postdoctoral fellowship at the University of California, San Diego. Dr. Ryan is an Associate Professor in the departments of Psychology, Neurology, and the Neurosciences Interdisciplinary Graduate Program. She is the Associate Head and the Director of Graduate Studies for the Department of Psychology. Dr. Ryan has engaged in studies of memory and the neural basis of memory since 1996, publishing over 60 scholarly articles utilizing various neuroimaging methods including functional MRI, ASL perfusion, voxel-based morphometry, and diffusion tensor imaging. She is currently a member of the Evelyn F. McKnight Brain Institute at the University of Arizona.

Dr. Ryan's research on the neural basis of memory has focused on understanding the hippocampal processes mediating autobiographical and semantic memory, how memory changes across the adult lifespan, and how those changes relate to brain structure and function. Recent studies using morphometric analyses and diffusion imaging have investigated factors that influence individual differences in age-related cognitive function, including genetic markers, obesity, hypertension, and anti-inflammatory drug use. As a clinical neuropsychologist, Dr. Ryan has worked with individuals and families who are coping with chronic and progressive diseases that affect cognitive functioning, including multiple sclerosis, Parkinson's disease, and Alzheimer's disease. Dr. Ryan teaches undergraduate and graduate courses in memory, neuropsychology, neuroanatomy, and cognitive neuroscience. She has been very active in mentoring programs at the University of Arizona that encourage women and minority students to become involved in research and pursue a career in science.

Rachel Samson, Ph.D.

Postdoctoral Research Associate
ARL Division of Neural Systems, Memory and Aging
Evelyn F. McKnight Brain Institute
University of Arizona
P.O. Box 245115
Life Sciences North Building, Room 384
Tucson, AZ 85724
Email: rasamson@nsma.arizona.edu
Telephone: (520) 626-2312
Fax: (520) 626-2618



Dr. Samson's project addresses the effects of normal aging on goal-directed behaviour and decision making. Using appetitive instrumental tasks, she investigates how young and aged rats adapt their behavior to changes in reward value and task contingencies. She is also interested in understanding the role of the amygdala in decision making under uncertainty and how aging affects the network activity of this region. Results from her project will provide insight into the mechanisms of age-related changes in amygdala function. Dr. Samson was trained as an *in vitro* electrophysiologist, and is currently a Postdoctoral Associate at the Evelyn F. McKnight Brain Institute at the University of Arizona.

Ariana Stickel, B.A.

Graduate Student
Cognition and Neuroimaging Laboratory
1503 E. University Blvd, RM 217J
Department of Psychology
University of Arizona
Tucson, AZ 85721
Email: astickel@email.arizona.edu
Telephone: (619) 540-9714



Ariana Stickel's present research investigates the relationship between body fat and brain structure. Of particular interest are observing changes in white matter that may result from increased adiposity in older adults. Tract-based spatial statistics and voxel-based morphometry processing methods are being combined to research this. Further, these relationships will be studied to see how they may affect cognition in older adults using both behavioral and functional magnetic resonance imaging. Also important to these investigations are interactions of genes (e.g., the fat mass and obesity gene) and other physiological measurements (e.g., hypertension).

Alexander Thome, Ph.D.

Assistant Research Scientist
ARL Division of Neural Systems, Memory and Aging
Evelyn F. McKnight Brain Institute
P.O. Box 245115
Life Science North Building, Room 384
University of Arizona
Tucson, AZ, 85724
Email: thome.alex@gmail.com
Telephone: (520) 626-2312
Fax: (520) 626-2618



Dr. Thome's research focuses on studying populations of neurons in the temporal lobe of awake and freely behaving primates using molecular imaging techniques as well as multiple single unit recordings. He is using freely navigating primates in real and virtual environments in combination with molecular imaging techniques. In particular, he is seeking to understand whether ensembles of neurons in navigation related structures show patterns of activation similar to those seen in rodents. In addition, the project aims to understand whether there exist differences in patterns of ensemble activity between real and virtual environments. This work will clarify basic questions regarding primate temporal lobe function and provide insight into the extensibility of findings in rodents to higher primates. A second set of experiments, using data from young and old primates, is aimed at understanding the functional role of oscillations in the primate temporal lobe and whether these change with age. Mr. Thome received an interdisciplinary B.A in Cognitive Science at the University of Arizona, and his Ph.D. in the Graduate Interdisciplinary Program in Neuroscience in March 2012.

John Totenhagen, Ph.D.

Postdoctoral Research Associate
Psychology Department
Brain Imaging, Behavior, and Aging Laboratory
Evelyn F. McKnight Brain Institute
1503 E. University Blvd, Room 317
University of Arizona
Tucson, AZ 85721
Email: jtotenha@email.arizona.edu
Telephone: (520) 444-2998



John Totenhagen's research interests include the use of modern non-invasive imaging technologies to study human development and disease in both clinical and pre-clinical settings. He currently works in Dr. Gene Alexander's Brain Imaging, Behavior, and Aging Laboratory on a variety of projects using MRI to quantify and track changes in brain structure and function associated with aging, injury, and disease, relating those changes to neuropsychological assessments of cognition. Current studies include investigations of brain morphometry changes in aging and hypertensive rats, and of cortical thickness, gray matter density, white matter integrity, and functional connectivity in aging adults and young endurance athletes. John's has a B.S. in Electrical and Computer Engineering and completed a Ph.D. in Biomedical Engineering at the University of Arizona in 2012, focusing on MRI and MRS studies of neurodegenerative diseases.

Janelle Wohltmann, M.A.

Graduate Student
Aging and Cognition Laboratory
Department of Psychology
University of Arizona
Evelyn F. McKnight Brain Institute
1503 E University Blvd.
P.O. Box 210068
Psychology Bldg. Rm. 312
Tucson AZ 85721
Email: jjw@email.arizona.edu
Telephone: (520) 621-5721
Fax: (520) 621-9306



Janelle Wohltmann is pursuing a Ph.D. in clinical psychology with a specialization in neuropsychology. Her research interests include memory, aging, and neuropsychological rehabilitation of age-related cognitive impairments. She is currently examining the effects of online social networking on social and cognitive variables in socially isolated older adults.



**Evelyn F. & William L.
McKnight Brain Institute**
UNIVERSITY of FLORIDA

Stephen Anton, Ph.D.

Assistant Professor & Interim Division Chief
Aging and Geriatric Research

Tetsuo Ashizawa, M.D., FAAN

Executive Director
Evelyn F. and William L. McKnight Brain Ins
Melvin Greer Professor
Chair, Department of Neurology

Cristina Bañuelos, B. S.

Doctoral Candidate
Bizon Laboratory
Department of Neuroscience

Linda Bean, B. S.

Doctoral Candidate
Interdisciplinary Program in Biomedical Sci
Department of Neuroscience
Evelyn F. and William L. McKnight Brain

B. Sofia Beas, B.S.

Ph.D. Graduate Student
Department of Neuroscience

Jennifer Bizon, Ph.D.

Associate Professor
Evelyn F. and William L. McKnight Brain Ins
Department of Neuroscience

Ronald Cohen, Ph.D.

Program Director & Professor
Ins for Aging, Dept of Aging & Geriatric Res

Vonetta Dotson, Ph.D.

Assistant Professor
Department of Clinical & Health Psychology
Department of Neuroscience

Natalie C. Ebner, Ph.D.

Assistant Professor
Department of Psychology

Thomas C. Foster, Ph.D.

Professor and Evelyn F. McKnight Chair
For Research on Cognitive Aging and Mem

Michael Guidi, B.A.

Doctoral Candidate
Department of Neuroscience
Evelyn F. and William L. McKnight Brain Ins

Ashok Kumar, Ph.D.

Assistant Professor
Department of Neuroscience
Evelyn F. and William L. McKnight Brain Ins

Leonid L. Moroz, Ph.D.

Professor of Neuroscience, Genetics, Biology &
Chemistry
Evelyn F. and William L. McKnight Brain Ins

Lucia Notterpek, Ph.D.

Chair and Professor
Department of Neuroscience
Evelyn F. and William L. McKnight Brain Ins

Brandi K. Ormerod, Ph.D.

Neuroscience
Assistant Professor
J. Crayton Pruitt Family Department of
Biomedical Engineering
Evelyn F. and William L. McKnight Brain Ins

Talia Seider

Graduate Student
Clinical & Health Psychology
Evelyn F. and William L. McKnight Brain Ins

Rachel Speisman

NSF Graduate Research Fellow
J. Crayton Pruitt Family
Department of Biomedical Engineering
Evelyn F. and William L. McKnight Brain Ins

Adam J. Woods, Ph.D.

Assistant Professor
Aging & Geriatric Research
Evelyn F. and William L. McKnight Brain Ins

Stephen Anton, Ph.D.

Assistant Professor &
Interim Division Chief
Aging and Geriatric Research
2199 E. Mowry Road
E-mail: santon@ufl.edu
Telephone: (352) 273-7514
Fax: (352) 273-5920



Dr. Anton's specific research interests are in the role that lifestyle factors have in influencing obesity, cardiovascular disease, and metabolic disease conditions.

He completed his doctoral degree in Clinical and Health Psychology at the University of Florida (UF), receiving training in health promotion and the delivery of lifestyle interventions designed to modify eating and exercise behaviors. During his post-doctoral fellowship at the Pennington Biomedical Research Center, he served as a critical member of the NIA funded study, *Comprehensive Assessment of Long-term Effects of Reducing Energy Intake* (CALERIE; PI, Eric Ravussin), and the NHLBI funded study, *Preventing Overweight Using Novel Dietary Strategies* (POUNDS LOST; PI: George Bray). Following completion of his post-doctoral fellowship in June 2007, he accepted a joint Assistant Professor position within the Department of Aging and Geriatric Research and Department of Clinical and Health Psychology at the University of Florida. Since joining, he has successfully obtained and conducted multiple grants examining the effects that lifestyle interventions have on biological and functional outcomes relevant to obesity, cardiovascular disease, and metabolic disease conditions related to aging. In addition to his research on the effects of lifestyle interventions on biological and functional outcomes, Dr. Anton has been actively involved in a line of research evaluating the potential that natural compounds and/or nutritional formulations (i.e., nutraceuticals) may have in preventing and treating metabolic conditions associated with aging. In 2009, Dr. Anton was awarded a K-23 Mentored Patient-Oriented Research Career Development Award from the *National Center for Complementary and Alternative Medicine (NCCAM)* to test the role that botanical compounds may have in affecting food intake, body weight, and oxidative stress levels. Dr. Anton also served as the Principal Investigator of a study funded by the University of Florida's *McKnight Brain Institute* (Dual PI: Anton S; Manini, T) examining the effects of the natural compound resveratrol on cognitive and physical function in older adults. The findings of this study were recently presented at the Gerontological Society of America conference and at the 2nd International Scientific Conference on Resveratrol and Health.

Tetsuo Ashizawa, M.D., FAAN

Executive Director
Evelyn F. and William L. McKnight Brain Institute
Melvin Greer Professor
Chairman
Department of Neurology
University of Florida
1149 South Newell Drive
L3-100, P.O. Box 100236
Gainesville, FL 32611
Telephone: (352) 273-8500
Fax: (352) 273-5575
Email: Tetsuo.Ashizawa@neurology.ufl.edu



Dr. Tetsuo Ashizawa is the Executive Director of the Evelyn F. and William L. McKnight Brain Institute and Professor and Chairman of the Department of Neurology at the University of Florida, Gainesville, Florida. Dr. Ashizawa also holds the Melvin Greer Professor of Neurology. Dr. Ashizawa received his medical degree from the Keio University School of Medicine in Tokyo in 1973. He completed his neurology residency training and subsequent clinical and basic science fellowships at Baylor College of Medicine. In 1981 he joined the faculty at Baylor, where he climbed to the academic rank of tenured Professor 1997. In 2002 Dr. Ashizawa was recruited to the University of Texas Medical Branch (UTMB) in Galveston, Texas to chair the Neurology Department, and then moved to Gainesville, Florida in April 2009 as Chair of the Department of Neurology at UF. He has published over 200 papers including 160 original contributions in peer-reviewed scientific and clinical journals. Dr. Ashizawa's basic science research projects have primarily been focusing on neurogenetic disorders caused by expanded short tandem repeats, including myotonic dystrophy, Friedreich's ataxia and autosomal dominant spinocerebellar ataxias. His current research is to investigate the pathogenic mechanism of spinocerebellar ataxia type 10 (SCA10). Dr. Ashizawa is also the principal investigator of a nationwide consortium for clinical research on SCA1, SCA2, SCA3 and SCA6. This consortium has been one of the Rare Disease Clinical Research Consortia (RDCRC) organized and funded by the National Institute of Health (NIH). This consortium will establish the infrastructure and database to prepare for future clinical trials of new therapies for SCAs.

Cristina Bañuelos, B. S.
Graduate Assistant
Bizon Laboratory
Department of Neuroscience
University of Florida, College of Medicine
Email: cbanuelos@ufl.edu
Telephone: (956) 545-8147



Cristina Bañuelos is a Doctoral Candidate in the lab of Dr. Jennifer Bizon. She received a BS in Biology from Cornell University and a MS in Biology from the University of Texas at Brownsville. Her Master's thesis explored the effects temporal lobe epilepsy on medial septal neuronal populations in a rodent model. In the fall of 2008, she joined the laboratory of Dr. Jennifer Bizon when she entered the Behavioral and Cellular Neuroscience Ph.D. program at Texas A&M University. Cristina transferred into the Interdisciplinary Program in Biomedical Sciences at the University of Florida College of Medicine with the Bizon laboratory in the fall of 2010. Currently, her dissertation experiments focus on age-related changes in GABAergic systems and how these changes relate to cognitive decline.

Linda Bean, B. S.
Doctoral Candidate
Interdisciplinary Program (IDP) in Biomedical Sciences
Department of Neuroscience
Evelyn F. and William L. McKnight Brain Institute
University of Florida
100 South Newell Drive
L2-132, P.O. Box 100236
Gainesville, FL 32611
Telephone (352) 392-6863
Email: labean1@ufl.edu



Linda Bean is a PhD. Graduate Student of the Interdisciplinary Program (IDP) in Biomedical Sciences with a Concentration in Neuroscience in the William L. McKnight Brain Institute at the University of Florida, Gainesville, Florida. Linda graduated Summa Cum Laude with a bachelor degree in biological sciences from Eastern Illinois University in Charleston, Illinois in 2008, where she also worked as a graduate teaching assistant. Linda is the recipient of the 2010 Alumni Graduate Program Award and the Grinter Fellowship Award at the University of Florida. The goal of her research interest is to unravel the mechanisms by which estrogens are known to provide protection from memory deficits seen with aging. Her specific attention is directed toward the interaction of estrogen receptors with cellular functions and how these interactions effect behavior in middle aged and aged female rats.

B. Sofia Beas, B.S.

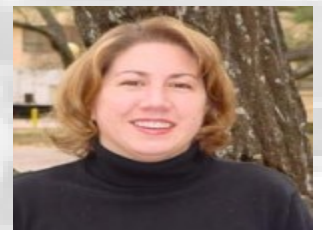
PhD Graduate Student
Evelyn F. and William L. McKnight Brain Ins
Department of Neuroscience
University of Florida- College of Medicine
100 South Newell Drive
L3-100, P.O. Box 100236
Gainesville, FL 32611
Telephone (352) 219-7438
Email: sofiabeas@ufl.edu



Sofia Beas is a fourth year Ph.D. graduate student in the department of Neuroscience at the Evelyn F. and William L. McKnight Brain Institute at the University of Florida, Gainesville, Florida. Sofia received her Bachelor of Science degree from the University of Texas at El Paso in 2004. As an undergraduate, she was awarded with the Minority Access to Research Career (MARC) Fellowship in the fall of 2007, a competitive NIH-funded program that promotes minorities in pursuing biomedical research careers. She also participated in The Leadership Alliance Summer Research Early Identification program at Brown University in the summer of 2008. In addition, during the summer of 2009, she was awarded a Summer Research Fellowship by the National Institute on Drug Abuse (NIDA) for underrepresented students. In the fall of 2009, Sofia was admitted to the Neuroscience Ph.D. program under the mentorship of Dr. Jennifer Bizon, who is a very successful scientist in the field of aging and memory, and who, in collaboration with Dr. Barry Setlow, has an expanding research program in the behavioral, pharmacological, and neural mechanisms of decision-making. In 2011, she was awarded with the National Science Foundation (NSF) Graduate Research Fellowship. Sofia's research topic involves looking at the neural mechanism of age-related alterations in prefrontal cortex and investigating how these mediate changes in executive functioning. Specifically, she is interested in looking at the changes in the dopaminergic system and other relevant neurotransmitter systems.

Jennifer Bizon, Ph.D.

Associate Professor
Department of Neuroscience
University of Florida
P.O. Box 100244
Gainesville, FL 32601
E-mail: Jennifer.bizon@mbi.ufl.edu
Telephone: (352) 294-5149



Dr. Jennifer Bizon is an Associate Professor in the Department of Neuroscience, University of Florida, College of Medicine. She received her Bachelor of Science with highest honors in Psychology from the University of North Carolina at Chapel Hill and her Ph.D. in Neurobiology and Behavior from University of California, Irvine (1998). She then received postdoctoral training at Johns Hopkins University (1998-2003) where she investigated neuroendocrine and neuromodulatory systems in aging and their impact on plasticity mechanisms and cognition. She established her own laboratory at Texas A&M University prior to joining the Department of Neuroscience at University of Florida in 2010 where she is continuing to pursue research questions related to the behavioral and neurobiological basis of age-related cognitive decline.

A major focus and critical foundation of her research has been the development of reliable and novel rodent behavioral models of age-related cognitive decline that are sensitive to early changes, that provide indices of function across distinct neural systems compromised in normal aging, and that are well-suited for mechanistic and intervention studies. Her approach involves taking advantage of individual differences that are evident in animal populations as they age in order to identify and target the most relevant cognitive and neural mechanisms that underlie both impaired and successful cognitive aging. Specifically, Dr. Bizon's laboratory is pursuing questions regarding how the aging process alters corticolimbic inhibitory and neuromodulatory circuits, and how such alterations contribute to decline of medial temporal lobe and prefrontal cortical-dependent cognition. Dr. Bizon currently mentors two Ph.D. students and serves as the co-Director for the Neuroscience graduate program.

Ronald Cohen, Ph.D.

Program Director & Professor
Institute for Aging, Dept of Aging & Geriatric Res
University of Florida
P.O. Box 100107
Gainesville, FL 32610-0107
E-mail: roncohen@ufl.edu
Telephone: (352) 265-7227
Fax: (352) 265-7228



Dr. Ron Cohen is the Director for the Center on Cognitive Aging at the University of Florida and Professor within the College of Medicine. He received a BSc with honors from Tulane University in 1976 and a PhD in psychology from Louisiana State University in 1982. Following an internship in Clinical Psychology from the Neuropsychiatric Institute at UCLA Medical School with a Medical Psychology Specialization in Neuropsychology and Behavioral Medicine (American Psychological Association Accredited), he completed a postdoctoral fellowship in Neuropsychology at the University of Florida in 1983. He was then awarded Diplomate status by the American Board of Clinical Neuropsychology in 1995. Dr. Cohen's research interests include clinical and experimental neuropsychology; cognitive and clinical neuroscience; neuropsychology of attention; attention and memory; anterior cingulate cortex, short-duration timing; reward systems and their influence on attention and other cognitive functions; neuroimaging; age-associated cognitive and brain dysfunction, neurodegenerative disorders (e.g., Alzheimer's disease, vascular dementia, MCI); HIV-associated neurocognitive dysfunction, and cardiovascular-associated brain dysfunction.

Dr. Cohen is principal and co-investigator on multiple R01 grants from NIH over the past 15 years. In addition, he has chaired several NIH study sections, including the recent review group on MCI, and he has been a standing member of a NIH study section (BMIO) for the past seven years. He is a reviewer for both medical and neuropsychology/ neuroscience journals, and he has served on several editorial boards of multiple scientific journals over the past two decades, including: *Brain Imaging and Behavior*, *Journal of the International Neuropsychological Society*, and the *Clinical Neuropsychologist*. He is also the primary section editor for *Stroke* on neuropsychological studies.

Vonetta Dotson, Ph.D.

Assistant Professor
Department of Clinical & Health Psychology
College of Public Health and Health Professions
Department of Neuroscience
College of Medicine
Email: vonetta@pnhp.ufl.edu
Telephone: (352) 273-6041



Dr. Dotson is an Assistant Professor in the Department of Clinical and Health Psychology (CHP) with a joint appointment in the Department of Neuroscience at the University of Florida. She is also a Claude D. Pepper scholar. She received her Ph.D. from CHP in 2006 with a specialization in neuropsychology and a certificate in gerontology. She completed her postdoctoral training in the Laboratory of Personality and Cognition in the National Institute on Aging Intramural Research Program under the mentorship of Drs. Susan Resnick and Alan Zonderman. Her research program focuses on studying the underlying neurobiology of late-life depression and its relationship to cognitive changes and functional deficits in the elderly. Currently, work in her lab is aimed at 1) using cognitive and neuroimaging methods to examine the depressive spectrum hypothesis, 2) investigating whether particular symptom dimensions of depression (e.g., somatic vs. affective symptoms) have distinct cognitive and neural correlates in normal aging and Parkinson's disease, 3) examining whether aerobic exercise improves memory functioning and alters memory-related brain functioning in depressed older adults; and 4) examining whether genetic markers impact the effect of exercise on depression in the elderly.

Natalie C. Ebner, Ph.D.

Assistant Professor
Department of Psychology
University of Florida
P.O. Box 112250
Gainesville, FL 32611
Telephone: (203) 691-0371
Email: natalie.ebner@ufl.edu
Website: <http://www.psych.ufl.edu/~ebner/>



Dr. Ebner is Assistant Professor in the Department of Psychology at University of Florida since Fall 2011. She received her Ph.D. in 2005 in Psychology with a particular focus on lifespan development and human aging from the Free University of Berlin in Germany. She completed post-doctoral fellowships at the Max Planck Institute for Human Development in Berlin, Germany, and at Yale University, where she also worked as Associate Research Scientist before joining the faculty at University of Florida.

Dr. Ebner's research background is in cognitive, social, and affective changes across the lifespan. Her research focuses on age-related changes in attention and memory in processing socio-emotional information. She uses a multi-methods approach that combines convergent measures, including self-report, cognitive-behavioral, eye tracking, and functional neuroimaging techniques, with the aim to integrate introspective, behavioral, and neuropsychological data. Her work is published in leading peer-reviewed journals in the fields of aging, emotion, and cognition.

Thomas C. Foster, Ph.D.

Professor and Evelyn F. McKnight Chair
for Research on Cognitive Aging and Memory
P.O. Box 100244
McKnight Brain Institute, Room L1-120
Department of Neuroscience
University of Florida
Gainesville, FL 32610-0244
Email: foster1@ufl.edu
Telephone: (352) 294-0033
Fax: (352) 392-8347



Dr. Thomas Foster is the Evelyn F. McKnight Chair for Research on Cognitive Aging and Memory and Professor of Neuroscience at the University of Florida. Dr Foster's research program utilizes a combination of behavioral characterization with biochemical, molecular, and electrophysiological techniques to obtain a vertically integrated perspective on neural aging, from the molecular to the cognitive level. The two main goals of the lab are to identifying mechanisms for age-related memory impairment and to test treatments to alleviate memory deficits. Electrophysiological recording, gene arrays, and enzyme activity assays are employed to identify biological markers of memory decline and examine the mechanisms for age-related changes in synaptic plasticity and signaling cascades that are thought to mediate memory consolidation. This work has provided evidence for a model linking age-related memory decline with altered Ca^{2+} homeostasis and increased oxidative stress associated with aging. A second area of research is directed at examining the therapeutic window for beneficial effects of hormone replacement on memory function. Estrogen has effects on the hippocampus that are diametrically opposite to changes observed in aged memory impaired animals; however, estrogen responsiveness declines with advanced age and the duration of hormone deprivation. Finally, Dr. Foster's lab employs behavioral treatments and gene therapy in an attempt to rejuvenate the brain and preserve cognitive function. He has been continuously funded through NIH as a principle investigator since 1992 and his work includes over 100 publications on memory mechanisms and the aging brain. He is currently the principle investigator on two grants from the National Institute of Aging, which includes a MERIT award.

Michael Guidi, B.A.

Doctoral Candidate
Department of Neuroscience
Evelyn F. and William L. McKnight Brain Institute
College of Medicine
University of Florida
100 South Newell Drive
Gainesville, FL 32611
Telephone: (352) 392-6863
Fax: (352) 294-0033
Email: mguidi@ufl.edu



Michael Guidi is a fourth-year pre-doctoral candidate working in the laboratory of Dr. Thomas Foster. He received his Bachelor's degree in psychology from Florida Atlantic University in 2007. While at Florida Atlantic University, in addition to completing his psychology coursework and graduating *summa cum laude*, he also completed the requirements to graduate with Honors designation in psychology. This included the completion of an Honors Thesis on research performed using *In vivo* pharmacological manipulations of small conductance Ca^{2+} -activated K^{+} channels to assess learning and memory behavior in the novel object recognition task. After entering the Interdisciplinary Program in Biomedical Sciences at the University of Florida in 2009, Michael joined the Foster lab in conducting research on age-related cognitive decline. His research focuses on the effects of aging on prefrontal cortex-dependent executive functions and the elucidation of the role of the NMDA receptor in senescent prefrontal cortex physiology. In 2011, Michael was a recipient of the Neurobiology of Aging Training Grant, Pre-doctoral Fellowship, through the Department of Physiology.

Ashok Kumar, Ph.D.

Assistant Professor
Department of Neuroscience
Evelyn F. and William L. McKnight Brain Institute
University of Florida
Newel Drive
Gainesville, FL 32610
Telephone: (352) 392-4085
Email: kash@mbi.ufl.edu; calciummemory@yahoo.com



The central focus of my research program is directed towards understanding how the dysregulation of Ca^{2+} homeostasis during senescence affects synaptic function and cell excitability as well as its influence on age-related memory loss. Aging is associated with a shift in synaptic plasticity favoring long-term depression (LTD) over long-term potentiation (LTP) and we have shown that the magnitude of the Ca^{2+} -dependent, K^+ -mediated afterhyperpolarization (AHP) plays a critical role in setting the threshold for induction of synaptic plasticity. Our results demonstrate that Ca^{2+} release from intracellular Ca^{2+} stores and voltage-gated Ca^{2+} channels contributes to the enhanced AHP and regulates the threshold for synaptic plasticity induction. There is a shift in susceptibility to induction of long-term depression during aging. However, the asymptotic level of synaptic modification (LTP/LTD) does not change with age. Rather, induction impairments are observed using weak stimulation parameters.

In addition, Dr. Kumar is interested in investigating the impact of environmental enrichment, exercise, and transcranial magnetic stimulation on biological markers of brain aging and their beneficial influence on cognitive performance during senescence. The AHP, which is enhanced during aging, regulates the induction of LTP, in part by limiting NMDA receptor activation and cell excitability. Our recently published results suggest that environmental enrichment and exercise have beneficial influence on hippocampal senescent physiology. Dr. Kumar also studies the effects of estrogen on hippocampal function across the lifespan, and our results indicate that estrogen rapidly increases neuronal excitability, decreases AHP, and augments the strength of synaptic transmission. Finally, my research will determine the complex interaction of cholinergic transmission on hippocampal synaptic function during senescence and delineate the mechanisms that contribute to age-related memory loss. The overall goal of my research is in the pursuit of fundamental knowledge of mechanisms underlying alterations in hippocampal function during senescence, as well as the application of that knowledge to promote healthy and successful aging, while reducing the encumbrances of cognitive aging and age-related neurodegenerative diseases.

Dr. Kumar earned his Bachelors and Masters of Sciences and Ph.D. from the University of Lucknow/Central Drug Research Institute, Lucknow.

Leonid L. Moroz, Ph.D.

Professor of Neuroscience, Genetics, Biology & Che
McKnight Brain Institute & Dept of Neuroscience
Gainesville, FL 32610-0244 and
Whitney Lab for Marine Biosciences
St. Augustine, FL 32080
University of Florida
Email: moroz@whitney.ufl.edu
Telephone(s): (904) 461-4006; (396) 986-9083
Fax: (904) 461-4052



His Dr. Moroz's interdisciplinary research utilizes a combination of molecular, physiological, computational and comparative approaches to decipher (i) genomic bases of neuronal identity and plasticity in memory circuits, and (ii) the origins neurological impairments during age-related memory loss.

The long-term objective of Dr. Moroz' program is to understand fundamental aspects of (a) mechanisms of integrative activity of genome in neurons as they learn and remember, focusing on individually identified neurons in memory-forming circuits and mechanisms of long-term memory persistence; and (b) the origins and evolution of nervous systems using comparative approaches. To achieve these objectives he develops new tools and methods of single-cell epigenomics to monitor expression and activity of nearly all genes in any single neuron of a given circuit – an approach that has enabled innovative experimental approaches to long-standing questions in neuroscience and the cellular bases of behavior. In doing so he brings to bear, when necessary, concepts or techniques from other disciplines, such as microanalytical chemistry and single-cell metabolic or proteomic profiling, or phylogenomics.

Recently, Dr. Moroz performed the first genome-wide DNA methylation profiling at the single-cell level and demonstrated that fascilatory transmitters induce active and rapid DNA demethylation via formation of 5-hydroxymethylcytosine (the 6th base in DNA), suggesting a critical role for massive genomic-wide demethylation in neuroplasticity. He also provided evidence for linking age-related memory decline with neuron-specific chromatin remodeling, signifying the role of epigenetic mechanisms in differential aging of neuronal subpopulations.

Dr. Moroz is consistently at the forefront of both genomics and neuroscience, as evidenced by his publications in the prominent journals (*Nature*, *PNAS*, *Cell*, *Neuron*) as well as media coverage of his research. The evolutionary approach, that he promotes, is less developed in modern neuroscience. However, it is crucial to understand how complex networks and brains are formed or to answer “why” questions (e.g. why different subsets of signal molecules were selected in distinct neuronal circuits, or why different neurons “come together” to form a given memory-forming circuit).

Lucia Notterpek, Ph.D.

Chair and Professor
Department of Neuroscience
Evelyn F. and William L. McKnight Brain Ins
1149 Newell Drive, L1-100
P.O. Box 100244
Gainesville, FL 32610
Telephone (352) 294-5373
Email: Notterpek@ufl.edu

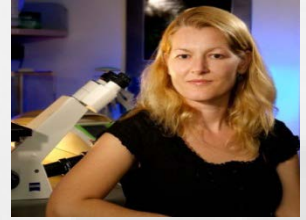


Dr. Lucia Notterpek is Professor and Chair of the Department of Neuroscience at the McKnight Brain Institute of the University of Florida, Gainesville, Florida. Dr. Notterpek received a B.A. in Anatomy-Physiology from the University of California at Berkeley. She obtained her Ph.D. in Neuroscience at the University of California at Los Angeles in 1994, working with Dr. Leonard H. Rome. Her postdoctoral training was under the guidance of Dr. Eric Shooter at Stanford University. She is recipient of the 2004 Jordi Folch-Pi Memorial Award, from the American Society of Neurochemistry, to a young scientist for research excellence. She has authored and co-authored over fifty peer-reviewed publications. She is actively involved in the educational and research missions of the College of Medicine at the University of Florida. Her research efforts have been supported by the NIH, the National Muscular Dystrophy Association and the National Multiple Sclerosis Society.

Dr. Notterpek investigates how the loss of glial insulation around axons, called myelin, contributes to the pathogenesis of hereditary and age-related neural disorders. Diseases that are specifically linked with defects in myelin include peripheral neuropathies, such as Charcot-Marie-Tooth diseases and multiple sclerosis. Recent studies also suggest an involvement of myelin damage in the underlying and painful symptoms of trigeminal neuralgia. Current research is focused on understanding the subcellular changes within neural cells that underlie the progressive nature of these disorders and normal aging-associated myelin degeneration. A major effort of our lab focuses on approaches to maintain healthy myelin and/or restore it in disease paradigms. The laboratory is equipped with models and reagents, including small molecule therapeutics and genetic models to attain these goals. Other areas of active investigation include the optimization of lipid nanoparticles as delivery vehicles for neural disorders.

Brandi K. Ormerod, Ph.D.

Neuroscience
Assistant Professor
J. Crayton Pruitt Family Department of
Biomedical Engineering
College of Engineering
E-mail: bormerod@bme.ufl.edu
Telephone: (352) 273-8125



Dr. Ormerod obtained a B.Sc. (honors) in Psychology from Queen's University (Kingston, Ontario) where she studied the role of cholinergic systems in recent memory in Dr. Rick Beninger's lab, and a PhD in Neuroscience from the University of British Columbia (Vancouver, BC) where she studied the hormonal regulation and functional role of adult hippocampal neurogenesis in Dr. Liisa Galea's lab. Dr. Ormerod then completed a postdoctoral fellowship with Dr. Theo Palmer at Stanford University in which she studied how neuroinflammation impacts stem cell behavior (both in vivo and in vitro) and hippocampus-dependent behavior in rodents and generated several human and non-human primate neural progenitor cell lines. Dr. Ormerod's laboratory at the University of Florida currently asks whether age-related cognitive decline is impacted by age-related changes in hippocampal neurogenesis, whether there are stress- or neuroinflammation-related markers of age-related cognitive decline that can be measured in blood serum or in brain tissue, what factors set up a neurogenic versus non-neurogenic niche (with emphasis on vascular and ECM proteins) and whether transplantable cells impact neural activity in healthy primary cultures or following experimental stroke. The Ormerod laboratory uses a combination of immunohistochemistry and light/confocal microscopy to measure hippocampal neurogenesis, Bioplex multiplex sandwich fluorokine technology to examine biomarkers (such as stress and neuroinflammation), microelectrode array technology to examine how transplanted cells affect neural activity and behavioral testing (typically water maze) is employed in many of our experiments.

Talia Seider

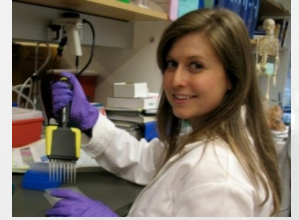
Graduate Student
Clinical & Health Psychology
University of Florida
P.O. Box 100165
Gainesville, FL 32610-0165
E-mail: tseider@ufl.edu
Telephone: (352) 273-6617



Talia Seider is a first year graduate student in the Department of Clinical and Health Psychology at the University of Florida working under the mentorship of Dr. Ronald Cohen. She received her BA in Psychology from the University of California, Berkeley. Following her undergraduate training, she worked in the Memory and Aging Center at University of California, San Francisco under the supervision of Dr. Joel Kramer coordinating a study on the effects of vascular risk factors on brain structure and function. As a graduate student, Talia is interested in studying neuropsychology, cognitive aging, and neuroimaging. Her current work focuses on cognitive and structural brain changes associated with aging and HIV.

Rachel Speisman

NSF Graduate Research Fellow
J. Crayton Pruitt Family Department of
Biomedical Engineering
1275 Center Dr., JG-56 Biomedical Sciences
Gainesville, FL 32601
E-mail: swizzle9@ufl.edu
Telephone: (352) 222-0231
Fax: (352) 273-9221



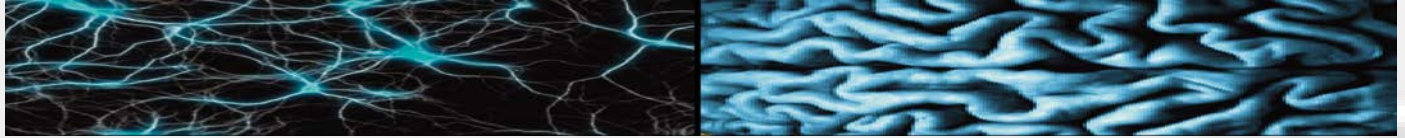
I am currently a National Science Foundation Graduate Research Fellow in the J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida. My doctoral research focuses on developing a biomarker assay to predict/diagnose age-related cognitive decline. Specifically, I am examining how central and circulating immunomodulators (cytokines, chemokines, stress hormones, etc.) are modified with age and how intervention, such as non-steroidal anti-inflammatory drugs or aerobic exercise, can protect the aging brain from neuroinflammation. Furthermore, I am relating these neuro-immunomodulators with basal levels of hippocampal neurogenesis and learning and memory on the spatial water maze.

Adam J. Woods, Ph.D.

Assistant Professor
Department of Aging & Geriatric Research
2004 Mowry Road
Gainesville, FL 32611
E-mail: woodsaj@gmail.com
Telephone: (215) 573-7010
Fax: (215) 573-7136



My active research program investigates the role of brain arousal systems and attentional processing in conscious perception and cognition. Many patient populations (e.g., stroke, dementia, etc.) suffer from underlying deficits in arousal. Recent research also suggests that decline in arousal systems contribute to attention-related deficits in normal cognitive aging. My research hypothesizes that treatment of underlying deficits in arousal can ameliorate related symptoms of normal cognitive aging and neurological disorders through stimulation of attentional processing. For example, hypo-arousal is known to play a role in spatial neglect, a post-stroke disorder in which patients fail to attend to one side of space. Using an ERP arousal biomarker to detect arousal deficits and a simple sensory arousal stimulation method I was able to temporarily ameliorate symptoms of spatial neglect. Pharmacological manipulations of arousal have proven much longer in duration. My research uses these and other cognitive neuroscience methods (fMRI, tDCS, etc.) to investigate and combat aspects of normal cognitive decline related to arousal and attention.



EVELYN F. McKNIGHT BRAIN INSTITUTE

THE UNIVERSITY OF MIAMI LEONARD M. MILLER SCHOOL OF MEDICINE

Noam Alperin, Ph.D.

Professor of Radiology and Biomedical Eng
Physiologic Imaging and Modeling Lab
Advance Image Processing Lab
Evelyn F. McKnight Brain Institute

Ahmet Murat Bagci, Ph.D.

Senior Research Associate
Department of Radiology
Evelyn F. McKnight Brain Institute

Ashley Beecham, M.S.

Senior Research Analyst
Evelyn F. McKnight Brain Institute

Miguel Melo Bicchi, M.D.

Research Assistant (Volunteer)
McKnight Brain Institute

Susan Halloran Blanton, Ph.D.

Executive Director, Hussman Institute for
Human Genomics
Associate Professor of Human Genetics and
Neurology
Dr. John T. Macdonald Department of
Human Genetics
Evelyn F. McKnight Brain Institute

Charles Harlan Cohan, B.S.

Graduate Student
Department of Neurology
Evelyn F. McKnight Brain Institute

Kunjan Dave, Ph.D.

Assistant Research Professor
Department of Neurology

Chuanhui Dong, Ph.D.

Research Assistant Professor
Evelyn F. McKnight Institute
Department of Neurology

Hannah Gardener, ScD

Assistant Scientist
Department of Neurology

Bonnie E. Levin, PhD.

Bernard and Alexandria Schoninger Professor of
Neurology
Director, Division of Neuropsychology

M. Carolina Mendoza-Puccini, I.M.G., C.C.R.C.

Clinical Research Coordinator
Evelyn F. McKnight Brain Institute

Nooshin Nabizadeh, M.S.

Graduate Assistant

Fatta B. Nahab, M.D.


Assistant Clinical Professor of Neurology
Director of Research, Division of Movement Disorders
Clinical Investigator, Miami Institute of Human Gen
Evelyn F. McKnight Brain Institute

Jacob T. Neumann, Ph.D.

Postdoctoral Associate
Department of Neurology
Evelyn F. McKnight Brain Institute

Miguel A. Perez-Pinzon, Ph.D., F.A.H.A.

Vice-Chair for Basic Science
Director, Cerebral Vascular Research Lab
Evelyn F. McKnight Brain Institute



Alberto Ramos, M.D., M.S.P.H.
Assistant Professor of Clinical Neurology
Co-Director of the Sleep Disorders program
Evelyn F. McKnight Brain Institute

Ralph L. Sacco, M.D., M.S., F.A.H.A., F.A.A.N.
Professor of Neurology, Epidemiology and Public
Health
Chairman, Department of Neurology
Exe Dir, Evelyn F. McKnight Brain Institute

Clinton B. Wright, M.D., M.S.
Scientific Director
Evelyn F. McKnight Brain Institute
Associate Professor

Juan Young, Ph.D.
Assistant Professor
Dr. John T. Macdonald Foundation Department of
Human Genetics

Noam Alperin, Ph.D.

Professor of Radiology and Biomedical
Engineering
Physiologic Imaging and Modeling Lab
Advance Image Processing Lab
University of Miami Miller School of Medicine
Professional Art Center
1150 NW 14th Street, Suite 713
Miami, FL 33136
Email: Nalperin@med.miami.edu
Telephone: (305) 243-8098



Noam Alperin came to the University of Miami in May 2009 from the University of Illinois at Chicago. He obtained his Graduate Degree from the University of Chicago's Medical Physics program. Dr. Alperin's work is supported by the National Institute of Health. Dr. Alperin's research focuses on the interplay between blood and CSF flow dynamics using flow sensitive MRI techniques. A primary aim of the research is to provide noninvasively, important physiologic parameters among which are cerebral blood perfusion and intracranial pressure. These parameters play an important role in a wide range of neurological problems, including hydrocephalous and stroke. Since joining the University of Miami, Dr. Alperin's Advance Image Processing laboratory is working closely with the Evelyn F. McKnight Center for Age Related Memory Loss, using different MRI modalities to characterize and quantify morphologic and physiologic changes in the brain associated with aging as well as the coupling between age related brain tissue volume loss and cerebral blood flow decrease.

Ahmet Murat Bagci, Ph.D.

Senior Research Associate, Department of Radiology
University of Miami Miller School of Medicine
1150 NW 14th Street, Suite 713
Miami, FL 33136
Email: ABagci@med.miami.edu
Telephone: (305) 243-6559
Fax: (305) 243-3405



Dr. Bagci received his graduate degree from the Electrical and Computer Engineering Department at the University of Illinois at Chicago in 2008. He joined the Department of Radiology at the University of Miami in May 2009. Dr. Bagci's area of research is signal and image processing, and development of algorithms and methods for segmentation of medical images. He is a member of the Advanced Image Processing Laboratory, jointly supported by Department of Radiology and Evelyn F. McKnight Brain Institute. His current research focuses on investigating morphological and cerebral blood perfusion changes in brain due to aging using MRI.

Ashley H. Beecham, M.S.

Senior Research Analyst
Human Genomics
University of Miami Miller School of Medicine
P.O. Box 19132 (M-860)
Biomedical Research Building, Room 353
Miami, FL 33101
Telephone: (305) 243-1231
Email: abeecham@med.miami.edu



Ms. Beecham is a Senior Research Analyst for John P. Hussman Institute for Human Genomics and Evelyn F. McKnight Brain Institute. Ms. Beecham's research focus is on statistical genetics and methods for analyzing complex diseases such as stroke, multiple sclerosis, and vascular cognitive impairment. In particular, she has focused on genetic factors influencing both cognitive function and white matter lesions.

Miguel Melo Bicchi, M.D.

Research Assistant (Volunteer)
McKnight Brain Institute
University of Miami, Miller School of Medicine
Telephone: (786) 449-7678
Email: melobicchi@gmail.com



Dr. Melo Bicchi received his degree in Medicine at Universidad Iberoamericana School of Medicine in Santo Domingo, Dominican Republic. Since his graduation he dedicated his time to work as a Chemistry Laboratory Professor and Health Promotion. Afterwards he moved to the United States to participate in clinical clerkships at the University of Miami Jackson Memorial Hospital and pursue his medical career and interests in the field of neurological research. During his rotations he met Dr. Clinton Wright who invited him to collaborate with his research team in different projects such as Brain Mapping and Segmentation on brain MRI images and the creation of a Cognitive Disorders Database. He will begin his Neurology Residency Training in July 2013 at the University of Medicine and Dentistry of New Jersey.

Susan Halloran Blanton, Ph.D.

Executive Director, Hussman Institute for Human Genomics
Associate Professor of Human Genetics and Neurology
Dr. John T. Macdonald Department of Human Genetics
Evelyn F. McKnight Brain Institute
P.O. Box 019132 (M-860)
Biomedical Research Building, Room 406
University of Miami Miller School of Medicine
Miami, FL 33101
Email: SBlanton@med.miami.edu
Telephone: (305) 243-2321
Fax: (305) 243-2523



Dr. Blanton received her PhD in Human Genetics from Virginia Commonwealth University/Medical College of Virginia. She obtained post-doctoral training in Biostatistics (University of Pittsburgh) and Population Oncology (Fox Chase Cancer Center). Her primary research has focused on the mapping of genes for Mendelian and complex diseases; she has been instrumental in studies identifying over twenty genes/loci for Mendelian disorders. Stroke and the underlying genetics of its risk factors, deafness, retinal diseases, skeletal dysplasias, cleft lip/palate, and clubfoot are among the diseases which she currently studies. She collaborates with Drs. Sacco, Wright and Rundek to identify genetic factors influencing white matter and cognition and their relation to ageing. She has also been involved in developing and implementing genetic education materials for Federal and appellate level judges and science writers in an ELSI sponsored project. Her current research also involves developing methods for integrating genetics into the private practice setting. Dr. Blanton is the Executive Director of the Hussman Institute for Human Genomics as well as the Associate Director of Communications and Compliance. She is an Associate Professor in the Dr. John T. Macdonald Foundation Department of Human Genetics.

Charles Harlan Cohan, B.S.

Graduate Student
Department of Neurology
University of Miami Miller School of Medicine
1420 NW 9th Ave, Room 203
Miami, FL 33136
Email: ccohan@med.miami.edu
Telephone: (305) 243-4732



Mr. Cohan received his B.S. from the University of Michigan. Currently, Mr. Cohan is pursuing his Ph.D. at the University Of Miami Miller School Of Medicine. As a graduate student he joined the lab of Dr. Perez-Pinzon at the University of Miami. Under the guidance of Dr. Perez-Pinzon and Dr. Clinton Wright he is currently investigating cognitive decline after aging and cardiac arrest. The focus of his research is on the synaptic changes that take place in both cardiac arrest and aging and to examine what molecular mechanisms govern these changes. Additionally, he has a strong interest in designing translatable treatments that can prevent cognitive decline.

Kunjan Dave, PhD.

Assistant Research Professor
Department of Neurology
University of Miami Miller School of Medicine
P.O. Box 016960
Miami, FL 33101
Email: kdave@med.miami.edu
Telephone: (305) 243-3590
Fax: (305) 243-6955



Presently, Dr. Kunjan R. Dave is a Research Assistant Professor of Neurology, University of Miami Miller School of Medicine. Dr. Dave received his Ph.D. in Biochemistry in 2000 from the M. S. University of Baroda, India. During his PhD training he worked on several research projects including secondary complications of diabetes, Alzheimer's disease and drug toxicity among others. From 1999 to 2000 Dr. Dave served at the Zandu Pharmaceutical Works, Mumbai, India, as a Biochemist, where he participated in a drug development program.

Dr. Dave then joined the Department of Neurology, University of Miami as a post-doctoral fellow with Dr. Miguel A. Perez-Pinzon. Dr. Dave has performed research essential for the understanding cerebral ischemia pathophysiology and Amyotrophic Lateral Sclerosis. The goal of Dr. Dave's research is to study potential signaling pathways responsible for neuronal death in neurodegenerative diseases, especially cerebral ischemia. Investigation of intracellular signaling pathways may lead to the development of novel therapies for patients with neurodegenerative diseases and stroke.

Chuanhui Dong, Ph.D.

Research Assistant Professor
Evelyn F. McKnight Brain Institute
Department of Neurology
Clinical Research Building, Rm 1346
University of Miami Miller School of Medicine
Miami, FL 33136
Email: CDong@med.miami.edu
Telephone: (305) 243-9274
Fax: (305) 243-7519



Dr. Dong is a Biostatistician and Research Assistant Professor in the Department of Neurology at the University of Miami. Dr. Dong received his PhD in Molecular Epidemiology from Shanghai Medical University and had his post-doctoral training in Genetic Epidemiology at Karolinska Institute and Statistical Genetics at University of Pennsylvania. His research has focused on the investigation of independent and interactive effects of environmental, behavioral, metabolic and genetic factors on the risk of complex diseases such as obesity, depression, cerebrovascular diseases, and cognitive disorders. Since he joined the Department of Neurology, Dr. Dong has collaborated with Drs. Sacco, Wright, Rundek and Blanton to identify the environmental and genetic determinants of subclinical brain lesions and cognition decline.

Hannah Gardener, ScD

Assistant Scientist
Department of Neurology
University of Miami Miller School of Medicine
1120 NW 14th St
Miami, FL 33136
E-mail: hgardener@med.miami.edu
Telephone: (305) 243-9283
Fax: (305) 243-7081



Hannah Gardener, ScD, Assistant Scientist in the Department of Neurology at the University of Miami, is an epidemiologist with a particular interest in neuroepidemiology and the epidemiology of aging. She received her doctorate in Epidemiology in 2007 from the Harvard School of Public Health. She has been conducting research on risk factors for clinical and subclinical vascular outcomes in the Northern Manhattan Study for six years. She is particularly interested in dietary behavior and other modifiable vascular risk factors in relation to vascular events, carotid disease, and age-related changes in brain structure and function.

Bonnie E. Levin, PhD.

Bernard and Alexandria Schoninger Professor of Neurology
Director, Division of Neuropsychology
University of Miami Miller School of Medicine
1120 NW 14th Street, CRB-1337, Miami, FL 33136
Email: blevin@med.miami.edu
Telephone: (305) 243-7529
Fax: (305) 243-7081



Dr. Bonnie Levin is the Alexandria and Bernard Schoninger Professor of Neurology and Director of the Division of Neuropsychology in the Department of Neurology at the University of Miami, Miller School of Medicine. She received her BS from Georgetown University and her Ph.D. from Temple University. She completed an internship at the Boston Children's Hospital where she was a clinical fellow in Psychiatry at Harvard Medical School and an externship at the Boston VA Hospital.

Dr. Levin is a neuropsychologist whose research examines neurocognitive and affective changes associated with neurodegenerative disease and the normative aging process. Her work examines the role of cardiometabolic risk factors in cognitive decline. Another focus has been the inter-relationship between behavioral and motor symptoms in Parkinson's disease and the neural circuitry underlying memory and age related cognitive change. Her current work is aimed to advance our understanding of frontal striatal circuit function in cognition and to generate data that will improve our knowledge of key clinical parameters associated with differential rates of cognitive decline. Current projects include: examining which components of the metabolic syndrome predict cognition, identifying imaging and clinical correlates of white matter changes associated with the aging process and linking structural and metabolic markers underlying different symptom profiles in neurodegenerative disease.

M. Carolina Mendoza-Puccini, IMG, CCRC
Clinical Research Coordinator
Evelyn F. McKnight Brain Institute
University of Miami Miller School of Medicine
1120 NW 14th Street, Suite 1361-4
Miami, FL 33136
E-mail: mmendozapuccini@med.miami.edu
Telephone: (305) 243-0184
Fax: (305) 243-7081



Carolina is an International Medical Graduate from Colombia; she is the clinical research coordinator for the McKnight Registry and Repository at the University of Miami Miller School of Medicine. Prior to working at the McKnight Brain Institute she worked coordinating clinical trials in hepatitis C, B and liver pre-transplant. Her main interest is in memory loss and aging and plans to pursue her residency in this field. She is responsible for study enrollment, coordination of all the study-related procedures, protocol adherence, and compliance with local and federal regulations. The registry and repository enrolls patients who come to the Memory Disorders Center with a memory complaint. The Registry collects clinical information including demographics, laboratory, imaging, screening memory tests and formal neuropsychological tests. The research procedures include a transcranial doppler (TCD), blood collection for future genetics studies and CSF biomarkers. With this study, we hope to understand the demographics and risk factors for dementia and its subtypes that may lead to improvements in patient care.

Nooshin Nabizadeh, M.S.
Graduate Assistant
Clinical Research Building, Room 1374
University of Miami Miller School of Medicine
Miami, FL 33136
Email: nzadeh@med.miami.edu
Telephone: (305) 243-1809
Fax: (305) 243-7081



Nooshin Nabizadeh received her Bachelor and Master degrees in Electrical Engineering at Isfahan University of Technology (IUT) and Sharud University of Technology (SUT), Iran. Upon completion of her Master's degree, she moved to the United States, where she started her PhD training in Virginia Commonwealth University at Richmond, Virginia. She transferred to the University of Miami to continue her education. Currently, she is working at the McKnight Brain Institute with Dr. Clinton Wright and his team on the brain mapping and segmentation project on brain MRI images. This project consists of measuring cortical and sub-cortical brain volumes using Free Surfer software to evaluate effect of aging on total brain volume, total cranial volume, cortical thickness, occipital, parietal, temporal and frontal lobes on population based data. She is also working on automatically detection of infarct lesion on MRI brain images.

Fatta B. Nahab, M.D.

Assistant Clinical Professor of Neurology
Director of Research, Division of Movement Disorders
Clinical Investigator, Miami Institute of Human Genomics
University of Miami Miller School of Medicine
1120 NW 14th Street, Suite 1347 (C215)
Miami, FL 33136
Email: fnahab@med.miami.edu
Telephone: (305) 243-4749
Fax: (305) 243-7081



Dr. Nahab is a board-certified neurologist with fellowship training in the neurological movement disorders and functional neuroimaging. He is the director of the Laboratory for Functional Imaging of Neurodegenerative Disorders. The FIND lab is focused on the use of neuroimaging to understand the mechanisms of neurodegeneration and normal aging. Current projects include the study of Essential Tremor, Parkinson disease, and gait dysfunction and the role of cognitive impairment in aged individuals.

Jacob T. Neumann, Ph.D.

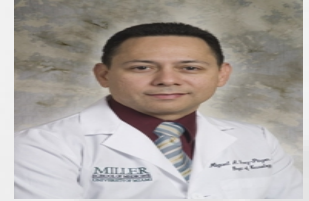
Postdoctoral Associate
Department of Neurology
Miller School of Medicine
University of Miami
1420 NW 9th Ave
Miami, FL 33130
Email: JNeumann@med.miami.edu
Telephone: (305) 243-4732



Dr. Neumann received his Ph.D. in Pharmacology from Southern Illinois University School of Medicine and is currently being trained by Dr. Miguel Perez-Pinzon at the University of Miami Miller School of Medicine. His research is focused on the electrophysiological synaptic changes that occur in the hippocampus after cerebral ischemia or cardiac arrest. He is interested in potential therapies to prevent the neurological decline from these insults. Dr. Neumann is collaborating with the McKnight Brain Research Foundation researching the relationship between age-related memory loss and cardiac arrest.

Miguel A. Perez-Pinzon, Ph.D., FAHA

Vice-Chair for Basic Science
Director, Cerebral Vascular Research Laboratories
Professor of Neurology & Neuroscience
Department of Neurology, D4-5
University of Miami Miller School of Medicine
P.O. Box 016960
Miami, FL 33101
Email: mperez18@med.miami.edu
Fax: (305) 243-6955



Dr. Perez-Pinzon primary appointment is in the Department of Neurology, where he serves as Vice-Chair for Basic Science. Dr. Perez-Pinzon directs the Cerebral Vascular Disease Research Laboratories. Dr. Perez-Pinzon is also a Professor of Neurology and the Neuroscience Program (member of this Program Steering Committee). His main research expertise is in the area of cerebral ischemia/metabolism, specifically on the area of ischemic preconditioning in which he has been working since 1995. In 1997, he obtained his first NIH grant on ischemic preconditioning which remains funded. He has expanded his research interest into the field of cardiac arrest and its effects on synaptic dysfunction and cognitive decline. These studies are funded by another NIH RO1 that is funded until 2015 and the cognitive decline is supported by the McKnight Institute. Two additional areas in which he has focused his research are on signaling pathways that lead to mitochondrial dysfunction following cerebral ischemia, these studies are currently funded by another NIH RO1 which is under review consideration for renewal.

Alberto Ramos, M.D., MSPH

Assistant Professor of Clinical Neurology
Co-Director of the Sleep Disorders program
University of Miami Miller School of Medicine
1120 NW 14th Street, Suite 1350 (C215)
Miami, FL 33136
Email: aramos@med.miami.edu
Telephone: (305) 243-8393
Fax: (305) 243-7081



Dr. Alberto Ramos is Assistant Professor of Clinical Neurology and Co-Director of the Sleep Disorders program at the University of Miami, Miller School of Medicine.

Dr. Ramos' research focus is on sleep and cerebrovascular disease. Dr. Ramos was the recipient of a Research Supplement in Health Related Research - an NIH/NINDS funded supplement grant to the ongoing Northern Manhattan Study, to study the relationship between sleep and risk factors for stroke.

Dr. Ramos is the site Principal Investigator for the Sleep Patterns as a Risk Factor for Disease in the Hispanic Community Health Study – Field Center at the University of Miami. An NHLBI funded, ancillary study to the Hispanic Community Health Study to evaluate sleep patterns and cardiovascular risk in Hispanics. He is a member of the American Academy of Sleep Medicine and the Sleep Research Society.

Ralph L. Sacco, M.D., M.S., F.A.H.A., F.A.A.N.

Professor of Neurology, Epidemiology and Public Health
Chairman, Department of Neurology

Executive Director

Evelyn F. McKnight Brain Institute

University of Miami Miller School of Medicine

1120 NW 14th Street, CRB-1352, Miami, FL 33136

Email: rsacco@med.miami.edu

Telephone: (305) 243-7519

Fax: (305) 243-7081



Ralph L. Sacco, MD, MS, is the Chairman of Neurology, Olemberg Family Chair in Neurological Disorders, Miller Professor of Neurology, Public Health and Epidemiology, Human Genetics, and Neurosurgery, and Executive Director of the Evelyn McKnight Brain Institute at the Miller School of Medicine, University of Miami. He is Chief of the Neurology Service at Jackson Memorial Hospital. He was the former Professor of Neurology and Director of the Stroke and Critical Care Division at the Neurological Institute of Columbia University College of Physicians and Surgeons, the Mailman School of Public Health, and the Sergievsky Center.

Dr. Sacco graduated from Cornell University with distinction, received his medical degree cum laude from Boston University School of Medicine in Massachusetts, and a master's degree in epidemiology from Columbia University, School of Public Health. Dr. Sacco completed a residency in neurology at Presbyterian Hospital of the City of New York. He completed his postdoctoral training in stroke and Epidemiology at Columbia under a NINDS-funded neuroepidemiology training grant.

Dr. Sacco's clinical research activities began in 1980 when he participated in the Framingham Heart Study. Since 1990, he has been the Principal Investigator of the Northern Manhattan Study an NIH-funded community-based, epidemiologic study designed to determine stroke incidence, risk factors, and prognosis in an elderly, multi-ethnic, urban population living in northern Manhattan in New York City. This study now includes a separate NINDS-funded project, the Northern Manhattan Family Study, to evaluate potential genetic determinants of stroke risk factors. He is the PI of the NINDS U54 Stroke Prevention and Intervention Research Program to support the Florida Puerto Rico Stroke Registry and reduce stroke disparities.

Dr. Sacco was also the founding principal investigator of the NY Columbia Collaborative Specialized Program in Translational Research in Acute Stroke. He is also co-investigator of six other NINDS grants. He has been involved in the design and conduct of multiple randomized trials including the co-principal investigator of the Warfarin Aspirin Recurrent Stroke Study, the principal investigator of the Glycine Antagonist in Neuroprotection Trial, and the co-chair of the international PROfESS Study (Prevention Regimen for Effectively avoiding Second Strokes). He serves on the Data Safety and Monitoring Boards of a number of NIH and pharmaceutical-sponsored clinical trials. In addition, Dr. Sacco is the Senior Consulting Editor for *Stroke*, and on the editorial boards of *Cerebrovascular Diseases*, *Neuroepidemiology*, and *Nature Clinical Practice Neurology*. He has published extensively in the areas of stroke prevention, treatment, risk factors and stroke recurrence, with more than 700 original articles, case reports, book chapters, abstracts and communications to his credit. He has been a principal author on numerous evidence-based guidelines from the AHA and ACCP.

Clinton B. Wright, MD, MS

Scientific Director
Evelyn F. McKnight Brain Institute
Associate Professor
University of Miami Miller School of Medicine
Department of Neurology
Clinical Research Building
1120 NW 14th Street, Suite 1349
Miami, FL 33136
Email: CWright@med.miami.edu
Telephone: (305) 243-1664
Fax: (305) 243-7081



Dr. Wright is Associate Professor of Neurology, Epidemiology & Public Health, and Neuroscience and Scientific Director for the McKnight Brain Institute. He is Chief of the Division of Cognitive Disorders in the Department of Neurology and Co-Director of the University of Miami Memory Disorders Center. Dr. Wright's research focus is on the effects of vascular risk factors on brain structure and function, with an emphasis on subclinical damage such as covert infarcts, white matter lesions, and brain atrophy. His research also focuses on vascular cognitive impairment with an emphasis on early cognitive changes and the interaction between aging, vascular damage, and Alzheimer disease.

Juan Young, Ph.D.

Assistant Professor
Dr. John T. Macdonald Foundation
Department of Human Genetics
University of Miami Miller School of Medicine
Biomedical Research Building
1501 NW 10th Ave, Suite 524
Miami, FL 33136
Email: jyoung3@med.miami.edu
Telephone: (305) 243-1027
Fax: (305) 243-2703



Juan Young, Ph.D., is an Assistant Professor in the Center for Molecular Genomics at the HHG. Dr. Young is a neurobiologist interested in identifying epigenetic signatures of human genetic diseases and in establishing animal models of neurological diseases.