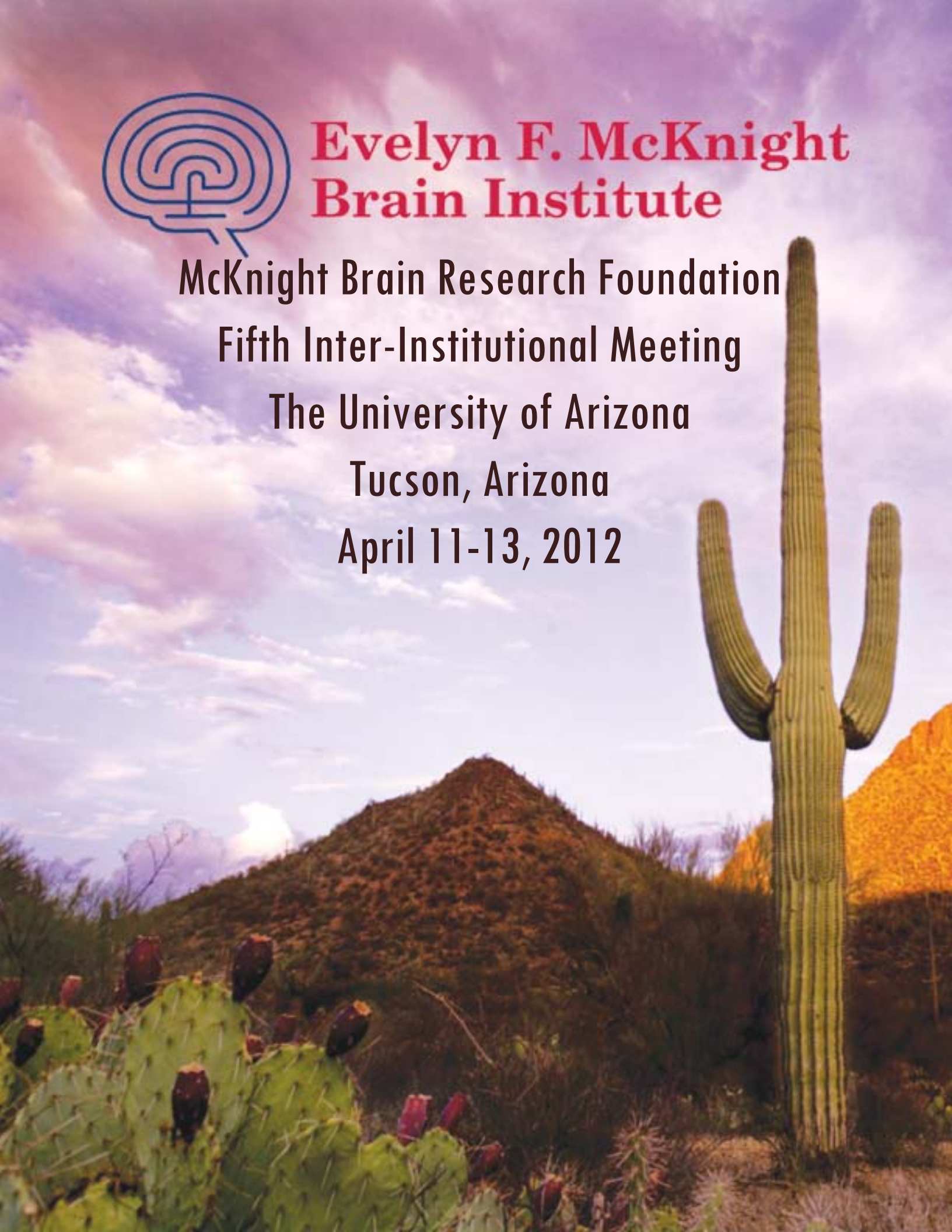
Evelyn F. McKnight
Brain Institute
McKnight Brain Research Foundation
Fifth Inter-Institutional Meeting
The University of Arizona
Tucson, Arizona
April 11-13, 2012

Fifth McKnight Inter-Institutional Meeting
Loews Ventana Canyon Resort
7000 N. Resort Drive
Tucson, AZ

Wednesday, April 11, 2012

5:30pm-7:30pm **Welcome Reception and Buffet Dinner** (Upper Terrace)

6:00pm Welcome by:
Carol A. Barnes, Ph.D., Director, UA Evelyn F. McKnight Brain Institute
Leslie P. Tolbert, Ph.D., Senior Vice President for Research
Joaquin Ruiz, Ph.D., Dean, College of Science
Fernando D. Martinez, M.D., Director, BIO5 Institute

7:30pm Waterfall walk for those interested

Thursday, April 12, 2012

7:30am – 8:30am Breakfast (Salon C)

8:30am – 8:45am **Welcome** (Catalina Ballroom)

8:30am Carol A. Barnes, Ph.D.
Director, Evelyn F. McKnight Brain Institute; Evelyn F. McKnight Chair for Learning and Memory in Aging, University of Arizona

8:35am Jonathan Rothschild
Mayor, City of Tucson

8:40am J. Lee Dockery, M.D.
Trustee, McKnight Brain Research Foundation

8:45am **Introduction to the Cognitive Test Battery Project**
Carol A. Barnes, Ph.D.
Director, Evelyn F. McKnight Brain Institute; Evelyn F. McKnight Chair for Learning and Memory in Aging, University of Arizona

8:50am – 9:00am **Challenges and Opportunities in Characterizing Cognitive Aging Across Species**
Erik Roberson, M.D., Ph.D.
Assistant Professor, Department of Neurology, Evelyn F. McKnight Brain Institute, University of Alabama at Birmingham

9:00am – 9:10am Discussion

9:10am – 9:25am	**Characterizing Healthy Samples for Studies of Human Cognitive Aging** Bonnie E. Levin, Ph.D. Professor of Neurology and Psychology; Director, Division of Neuropsychology, Evelyn F. McKnight Brain Institute, University of Miami Miller School of Medicine Clinton B. Wright, M.D., M.S. Scientific Director, Evelyn F. McKnight Brain Institute Department of Neurology, University of Miami Miller School of Medicine
9:25am – 9:35am	Discussion
9:35am – 9:45am	**Characterizing Cognitive Aging of Associative Memory** James R. Engle, Ph.D. Postdoctoral Research Associate, Evelyn F. McKnight Brain Institute, University of Arizona
9:45am – 9:55am	Discussion
9:55am – 10:15am	**Characterizing Cognitive Aging of Recognition Memory** Sara N. Burke, Ph.D. Postdoctoral Research Associate, Evelyn F. McKnight Brain Institute, University of Arizona Lee Ryan, Ph.D. Associate Professor of Psychology, Neurology and Evelyn F. McKnight Brain Institute; Associate Head of Psychology, University of Arizona
10:15am – 10:25am	Discussion
10:25am – 10:45am	Break
10:45am – 10:55am	**Characterizing Cognitive Aging of Spatial and Contextual Memory** Thomas C. Foster, Ph.D. Professor and McKnight Chair for Research on Aging and Memory, Department of Neuroscience, Evelyn F. and William L. McKnight Brain Institute
10:55am – 11:05am	Discussion
11:05am – 11:25am	**Characterizing Cognitive Aging of Working Memory and Executive Function** Jennifer L. Bizon, Ph.D. Associate Professor, Department of Neuroscience and Evelyn F. and William L. McKnight Brain Institute Elizabeth L. Glisky, Ph.D. Professor, Department of Psychology and Evelyn F. McKnight Brain Institute; Head, Department of Psychology, University of Arizona
11:25am – 11:35am	Discussion

11:35am – 11:45am **Characterizing Cognitive Aging in Humans with Links to Animal Models**
Gene E. Alexander, Ph.D.
Professor, Department of Psychology and Evelyn F. McKnight Brain Institute, University of Arizona

Dawn Bowers, Ph.D.
Director, Cognitive Neuroscience Laboratory; Professor and Division Head, Clinical and Health Psychology, Evelyn F. and William L. McKnight Brain Institute

11:45am – 11:55am Discussion

11:55am – 1:10pm Lunch (Flying V)

1:10pm – 1:15pm **Several New Approaches to Understanding Cognitive Aging from Affiliate Investigators of the University of Arizona Evelyn F. McKnight Brain Institute**
Carol A. Barnes, Ph.D.
Director, Evelyn F. McKnight Brain Institute; Evelyn F. McKnight Chair for Learning and Memory in Aging, University of Arizona

1:15pm – 1:25pm **Aging Increases the Time Needed for Context to Affect Perceptual Organization**
Mary A. Peterson, Ph.D.
Professor, Department of Psychology and Evelyn F. McKnight Brain Institute; Director, Program in Cognitive Sciences, University of Arizona

1:25pm – 1:35pm **Online Social Networking – When I am 64? or 74! or 84**!
Matthias R. Mehl, Ph.D.
Associate Professor, Department of Psychology and Evelyn F. McKnight Brain Institute, University of Arizona

1:35pm – 1:45pm **Sleep, Action and Videotape - What Flies Can Tell Us About Mechanism Of Behavioral Senescence**
Giovanni Bosco, Ph.D.
Associate Professor, Molecular and Cellular Biology
University of Arizona

1:45pm – 1:55pm **Decoding the Successful Aging Blueprint: Molecular Sequencing Approaches to Better Understand Aging and Age-Related Disease**
Matt Huentelman, Ph.D.
Associate Professor, Neurogenomics Division, The Translational Genomics Research Institute; Faculty Affiliate, Evelyn F. McKnight Brain Institute, University of Arizona

1:55pm – 2:05pm **Therapeutic Strategies for Cognition in Normal Aging and Alzheimer's Disease**
Eric Reiman, M.D.
Executive Director, Banner Alzheimer's Institute; CEO, Banner Research; Director, Arizona Alzheimer's Consortium; Faculty Affiliate, Evelyn F. McKnight Brain Institute, University of Arizona

2:05pm – 2:15pm	**General Discussion**
2:15pm – 2:45pm	Break
2:45pm	Load buses and depart for Desert Museum
3:45pm	Arrive Desert Museum
4:00pm – 5:00pm	Desert Museum Self Tour
5:00pm – 6:00pm	Hosted Reception at the Desert Museum (Baldwin Building Patio)
6:00 – 7:30pm	Dinner at the Desert Museum (Baldwin Building)
~ 7:30pm	Buses return to Loews Ventana Canyon Resort

Friday, April 13, 2012

7:30am – 8:30am	Breakfast (Salon C)
8:30am – 11:00am	**General Discussion and Data Exchange among McKnight Affiliated Faculty and Trainees: What are the Most Promising Avenues Going Forward?** (Catalina Ballroom)
8:30am	**Discussion of Human Tests Most Sensitive to Early Cognitive Decline** Leader: Lee Ryan, Ph.D.
9:10am	**Discussion of Non-Human Animal Tests Most Sensitive to Early Cognitive Decline** Leader: Jennifer L. Bizon, Ph.D.
9:50am	**Discussion of Biomarkers Most Sensitive for Early Detection of Cognitive Decline** Leader: Farah D. Lubin, Ph.D.
10:30am	**Summary of Discussion and Consensus for Going Forward**
11:00am	Pick up box lunches for departure to airport for those who need to leave – continued discussions for those who can stay longer

Evelyn F. McKnight Brain Institute Meeting Participants
University of Alabama at Birmingham

Michael Brenner, Ph.D.
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Evelyn F. McKnight Brain Institute
University of Alabama at Birmingham

Tara M. DeSilva, Ph.D.
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Physical Medicine & Rehabilitation
Evelyn F. McKnight Brain Institute

Lynn Dobrunz, Ph.D.
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Evelyn F. McKnight Brain Institute

Alecia K. Gross, Ph.D.
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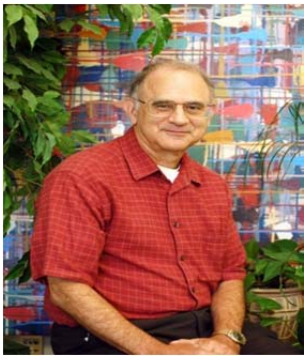

Dr. Brenner's laboratory studies the molecular biology of astrocytes, the most common cell type in the central nervous system (CNS). Astrocytes are responsible for many of the homeostatic controls in the CNS, such as maintaining the blood-brain barrier and proper neurotransmitter levels. Astrocyte serve as precursors for neurons and oligodendrocytes during development, and also serve as stem cells for the production of these cell types in the adult. CNS injury stimulates astrocytes to undergo a reactive response, which contributes to healing but can also lead to further damage. The work focuses on the transcriptional regulation of a gene encoding an intermediate filament protein specific to astrocytes, glial fibrillary acidic protein (GFAP), and on the biological role of this protein. The GFAP gene is of interest because it is turned on as astrocytes mature, and its activity increases dramatically during the reactive response. Thus, study of GFAP transcription will yield insights into mechanisms governing development, reaction to injury, and cell specificity, ultimately allowing these processes to be manipulated.
Dr. Brenner's laboratory has also discovered that heterozygous coding mutations in the GFAP gene are responsible for Alexander disease, a rare but fatal neurological disorder. Interestingly, although this establishes that the primary genetic defect in this disease is in astrocytes, the infantile form of Alexander disease is marked by massive myelination defects, and the later onset forms by neuronal dysfunction. Thus the study of this disorder not only has direct clinical implications, but also will reveal critical interactions between astrocytes and oligodendrocytes and between astrocytes and neurons that occur throughout the life span.

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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-glial signaling. One of the emerging molecules in

axon-glial 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-glial signaling during myelination and how inflammation and the process of aging dysregulate these pathways.

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Dr. Dobrunz's research program uses electrophysiological approaches to study synaptic transmission and dynamics at synapses in the hippocampus. Using hippocampal brain slices from rodents, the lab studies short-term plasticity and the cellular and molecular mechanisms underlying the activity dependent modulation of neurotransmitter release. Projects in the lab include the study of dynamic alterations in the balance of inhibition and excitation in an animal model of interneuron dysfunction, and alterations in synaptic plasticity in an animal model of neurodegeneration. The lab also studies the changes that occur in synaptic plasticity during normal postnatal development and during normal aging.

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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.

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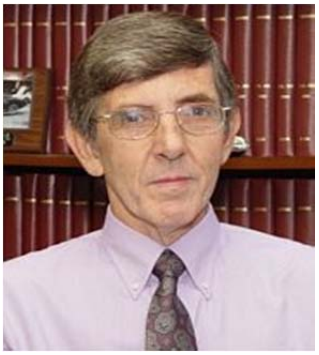

Dr. Hablitz's research is centered on understanding control of activity in local cortical circuits. He is using studies on synaptic transmission to further understand basic biophysical properties of mammalian central neurons, as well as to explore the pathophysiology of experimental epilepsy. Whole-cell 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-specification (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.

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Dr. King received her BS from Purdue University and her M.S. and Ph.D. degrees from the University of Michigan. She did postdoctoral fellowships at Cedars-Sinai Medical Center/UCLA characterizing the immunological mechanisms of tumor regression upon adenoviral expression of TK and Flt3L proteins in rodent models of glioma. She did a second postdoctoral fellowship at Boston University School of Medicine where she identified novel

small molecules to elevate Klotho transcription and examined the role of epigenetic modification in the age-downregulation of Klotho protein. She is now an Assistant Professor at the University of Alabama at Birmingham where her lab is characterizing the role of Klotho in the brain and eye. Klotho knockout animals display a prominent ageing like phenotype and rapidly die from the confluence of syndromes induced by the absence of the protein. Klotho is made mostly in brain and kidney as a transmembrane protein where it functions as a coreceptor. Likewise, it is shed from the membrane and functions as a humoral factor. Although Klotho is generated in the kidney and the brain, the majority of studies have focused on its role in kidney. As Klotho has roles in memory retention, axonal transport, and calcium/phosphate/ Vitamin D homeostasis, understanding its involvement in the brain could impact our understanding of age-related changes that occur in the brain.

David C. Knight, **Ph.D.**
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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, cingulate, and sensory 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.

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Dr. Lubin's research is primarily directed towards identifying molecular mechanisms that serve to regulate gene expression changes necessary for learning and memory. Currently, Dr. Lubin's lab is focused on characterizing the role of epigenetic mechanisms, such as histone methylation, DNA methylation, and signaling cascades that mediate the interaction of the nuclear factor-kappa B (NF-κB) transcription factors to chromatin and determine how they participate in the regulation of gene expression as they relate to learning and memory and memory deficits associated with epilepsy. Her 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 is investigating the epigenetic regulation of brain derived neurotrophic factor (BDNF) and early growth response-1 (EGR1/Zif268) transcripts during memory formation. This has led to the discovery that gene regulation of *BDNF* and *Zif268* transcripts are dynamically regulated by DNA methylation and specific histone modifications in hippocampus during memory consolidation. Current work also includes an assessment of histone deacetylase inhibitors and demethylating agents (histone and DNA) that may be promising in the mitigation or disruption of cognitive disorders.

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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.

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Vladimir Parpura, M.D., Ph.D. holds both a medical degree, awarded from the University of Zagreb in Croatia in 1989, and a doctorate, received in Neuroscience and Zoology from Iowa State University in 1993. He has held faculty appointments at the Department of Zoology and Genetics, Iowa State University and the Department of Cell Biology and Neuroscience, University of California Riverside. He is presently an Associate Professor in the Department of Neurobiology, University of Alabama Birmingham. His 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.

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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.

J. David Sweatt, Ph.D.
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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.

Kristina M. Visscher, Ph.D.
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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 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, 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. Visscher 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. 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 postdoctoral fellowship at Brandeis University working with Robert Sekuler. She did a postdoctoral fellowship at Harvard University with Randy Buckner studying how connectivity among brain areas (as measured with functional MRI) change with experience. Dr. Visscher started at the University of Alabama at Birmingham in April 2009.

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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.

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Dr. Ahern is Medical Director of the Behavioral Neuroscience and Alzheimer's Clinic at the University of Arizona. He is board-certified in Neurology and Behavioral Neurology & Neuropsychiatry. He is a member of the American Academy of Neurology and the American Neurological Association. His clinical & research interests include: Behavioral Neurology; Dementia; Alzheimer's Disease; Intracarotid Amobarbital (Wada) Test; Paraneoplastic Syndromes; Cerebral Lateralization for Emotional Processes; Quantitative EEG; and Psychophysiology. He directs the University of Arizona site of the Arizona Alzheimer's Disease Core Center. He has participated in a number of clinical research studies, including those involved in the development of *Aricept* and *Reminyl/Razadyne*, which are now considered standard of care in the clinical treatment of Alzheimer's Disease. Dr. Ahern's participation in the Evelyn F. McKnight Brain Institute centers on the interface between normal age-related changes in cognition and alterations in cognition that signify the onset of more ominous entities, e.g., Mild Cognitive Impairment (MCI), Alzheimer's Disease, and other dementing illnesses.

Gene E. Alexander, Ph.D.
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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.

Dev Ashish
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Dev is studying effects of mindfulness on existential concerns. His research interests include aging and Terror Management Theory, and he integrates these interests with his main interest, contemplative neuroscience. He intends to study the effects of compassion and mindfulness meditations on emotion and attention regulation to promote healthy aging. Other interests include contemplative pedagogy and mindfulness based psychosocial interventions.

Carol A. Barnes, Ph.D.
Regents' Professor, Psychology and Neurology
Evelyn F. McKnight Chair for Learning and Memory in Aging
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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.

Molly L. Bisbee
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Molly's main research interests are in memory and normal cognitive aging. She is currently working on her Master's thesis which investigates the role of the medial temporal lobes in age-related changes in associative memory. She has also done research on the effect of APOE genotype on source memory in older adults. In future research, Molly hopes to discover more about the causes and characteristics of memory changes in healthy older adults.

Giovanni Bosco, Ph.D.
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My lab's current research program is focused on several areas that are all related by a common theme: Molecular mechanisms of 3D spatial organization of the genome and how this affects gene expression. Although my primary interest is in elucidating basic molecular mechanisms by using model systems (Drosophila) we also work with human primary cells and cancer cell lines. All the questions being addressed in my lab are relevant to understanding human disease.

Sara N. Burke, Ph.D.
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The central goal of Sara Burke's postdoctoral research is the question of how age-associated changes in attention may contribute to memory impairments in the elderly. Specifically, Sara is examining how distractions and interruptions impact working memory in a colony of young and aged Bonnet Macaques. In April 2009, Sara completed her dissertation entitled, "A perceptual-mnemonic role for the perirhinal cortex in age-associated cognitive decline". Her thesis work

involved examining how functional changes in the aged perirhinal cortex contribute to the impairments in stimulus recognition that have been observed in aged animals.

Christine M. Burns
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Christine studies the effects metabolic syndrome or its components may have on brain metabolism, cognition and risk for the development of Alzheimer's disease. Her current research utilizes P.E.T. neuroimaging techniques and neuropsychological testing to investigate the relationship between cardiometabolic risk factors and risk for the development of Alzheimer's disease in healthy older adults. Other interests include pharmaceutical, lifestyle and psychosocial based interventions that may alter the development of metabolic risk indicators in mid-life.

Andrew Busch
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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
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I work in the cognition and neuroimaging lab at the University of Arizona. My current project involves studying the performance difference between younger and older adults in an ambiguous object discrimination task. We will be using behavioral measures and fMRI to look at the differences between these two groups. We will focus on differences in the visual streams and the perirhinal cortex. Past animal research has found that lesions to the perirhinal cortex cause decreased performance in object matching and novel-repeat identifications tasks. We hypothesize older adults will have decreased performance in the ambiguous object discrimination task and will also 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.
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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.

Marina Cholanian
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Marina studies a subpopulation of hypothalamic neurons that play a role in neuroendocrine control of reproduction. These neurons express Neurokinin B (NKB) peptide and, as a result of withdrawal of ovarian steroids, undergo dramatic change during menopause. Her current research utilizes whole-cell patch clamp recordings in hypothalamic brain slices from Tac2-EGFP transgenic mice. Marina's project involves the examination of electrophysiological and morphological properties of single arcuate NKB neurons and the effects of ovariectomy and estrogen replacement upon these properties.

Paul D. Coleman, Ph.D.
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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.

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The goal of James Engle'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. Currently, 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.

Megan C. Fitzhugh
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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. In the future, she plans to study the effects of blood pressure on brain structure and behavior.

Elizabeth L. Glisky, Ph.D.
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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.

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Matt's main research interests are in memory, memory disorders associated with aging and brain damage, and memory rehabilitation. Principal aims of Matt's current research include characterizing the mechanisms of encoding strategies and discovering novel methods for enhancing memory in memory-impaired patients. Matts Master's thesis investigated the mnemonic utility of a novel cognitive strategy referred to as the self-imagination technique, i.e., the imagination of an event from a personal perspective. Matt's dissertation investigated the mechanisms of self-imagining as well as potential applications of the self-imagination technique. In future research, Matt hopes to develop memory rehabilitation programs that provide long-lasting benefits for individuals with memory deficits.

Kari Haws
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Kari Haws 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.
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The primary objective of Dr. Huentelman's research is to identify and characterize the molecular changes that are associated with the process of aging and of diseases with a significant aging component. He has a specific focus on cognitive aging, Alzheimer's disease, and age-related sensory disorders like presbycusis. His approaches include the use of next generation sequencing technologies to examine an individual's entire genetic sequence and to accurately quantitate RNA expression levels within targeted cell types of various brain regions. The ultimate goal of Dr. Huentelman's research is to develop improved diagnostic tests for age-related disease and propose better cellular targets to attack with small molecule therapeutics. Current research areas focus specifically on the development of novel cognitive enhancing agents based on genetic findings in healthy aged humans, in the genomic analysis of individuals that present with very rare phentoypes in Alzheimer's disease, and in the genetic dissection of risk factors in the most common APOE genotype carriers – the E3 homozygotes with Alzheimer's disease. Dr. Huentelman joined TGen in July of 2004 after completing his doctoral work at the University of Florida's Department of Physiology and Functional Genomics at the McKnight Brain Institute where he investigated the application of gene therapy in the study of hypertension. His undergraduate degree is from Ohio University's Department of Chemistry and Biochemistry at Clippinger Laboratories. Dr. Huentelman's career includes visiting researcher stints in Moscow, Russia at the MV Lomonosov Moscow State University "Biology Faculty" and in the United Kingdom at the University of Bristol's Department of Physiology. He has published over 75 peer-reviewed manuscripts in the scientific literature and his research is supported in part by the National Institutes of Health, the Arizona Community Foundation, the Institute for Mental Health Research, and Science Foundation Arizona.

Alfred W. Kaszniak, Ph.D.
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Dr. Kaszniak received his Ph.D. in clinical and developmental psychology from the University of Illinois in 1976, and completed an internship in clinical neuropsychology at Rush-Presbyterian-St. Luke's Medical Center in Chicago. He is currently Director of the Arizona Alzheimer's Disease Center Education Core, an affiliate faculty member of the Evelyn F. McKnight Brain

Institute, and a Professor in the Departments of Psychology, Neurology, and Psychiatry at the University of Arizona. His publications (7 books and over 155 journal articles and scholarly book chapters) focus primarily on neuropsychological aspects of aging and age-related disorders of the central nervous system, particularly Alzheimer's and Parkinson's diseases. Dr. Kaszniak has served on the editorial boards of several journals in neuropsychology and gerontological psychology, has been an advisor to several national institutes and agencies concerned with aging and Alzheimer's disease, and is a Past-President of the Section on Clinical Geropsychology (Division of Clinical Psychology) of the American Psychological Association.

Kevin Kawa
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Kevin Kawa's research interests lie in investigating factors that affect cognition during the aging process. In particular, he is interested in genetic factors that may be associated with cognitive functioning in older adults. Under the advisement of Lee Ryan, Ph.D., and in collaboration with Matthew Huentelman, Ph.D., he is examining the roles of KIBRA and COMT on episodic memory ability and frontal functioning, respectively. In addition, diffusion tensor imaging will be used to determine whether KIBRA and COMT genotypes are associated with the underlying structural integrity of white matter pathways in the brain. By examining structural as well as cognitive changes, the influence of an individual's genetic profile can be better characterized.

Adam W. Lester
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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.

Peter Lipa, Ph.D
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Peter Lipa studied physics in Austria (PhD 1991) and completed his habilitation to private docent in high energy physics at the University of Vienna in 1997. During his physics career Peter was a member of the UA1-collaboration at CERN and received a 3-year APART fellowship from the Austrian Academy of Sciences to conduct postdoctoral research at the University of Arizona. In 1999 Peter joined the ARL-NSMA laboratory at the University of Arizona as a staff scientist and has since then conducted research in neurophysiology. His current research interests focus on the understanding of learning and memory and their role in decision making, navigation and sleep as well as their subtle changes due to the normal aging process.

James P. Lister, Ph.D.
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Dr. Lister received his doctoral training at Boston University researching the effects of prenatal protein malnutrition on the neuroanatomy of the adult rat hippocampal formation. After studying structure throughout graduate school, he came to NSMA to learn more about function, and is involved in efforts for automating whole brain imaging as well as projects that use the expression of immediate early genes (such as Arc and Homer) to map behavior-induced neural circuits. Current progress on automated brain imaging has focused on work with collaborators at Rensselaer Polytechnic Institute to automate montaging of high resolution confocal images encompassing entire cortical regions. He is also involved in using 3D catFISH to analyze encoding in the hippocampus and cerebral cortex in young and old animals to assess age-related impairments in the ability of these structures to represent information. 3D catFISH is a technique that combines fluorescent *in situ* hybridization with high resolution confocal microscopy of immediate-early gene expression to evaluate the exact neural circuits activated by behavior. Behaviorally relevant neuronal activity is known to induce the expression of certain

immediate early genes, such as Arc. The localization of *Arc* mRNA within cellular compartments (nucleus vs. cytoplasm) is consistently time-dependent, allowing the researcher to probe multiple time points within the same animal. Current projects examine the effects of exercise on Arc expression and age-related differences in Arc expression in the hippocampus and entorhinal cortices during behavior.

Lalitha Madhavan, M.D., Ph.D.
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Dr. Madhavan's research centers on stem cells and their potential to help understand and treat neurological disorders. A current focus in the lab is to study stem cells in the context of aging and neurodegenerative disorders such as Parkinson's and Alzheimer's diseases. One of the important discoveries in aging research is that the adult brain remains plastic and adaptive to some extent as it ages. The aim of ongoing work is to use stem cells to investigate (a) the brains own intrinsic capacity for plasticity and regeneration as it ages, and (b) how harnessing this plasticity might help maintain healthy brain function and prevent the onset of age-related degeneration. The research involves cell culture, animal model and molecular approaches to address the question. Dr. Madhavan has received an MD from Baroda Medical College (Vadodara, India) and a PhD from Iowa State University. She subsequently completed a postdoctoral fellowship at the University of Cincinnati, after which she moved to the University of Arizona where she is currently an Assistant Professor in the Department of Neurology.

Andrew P. Maurer, Ph.D.
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As a graduate student, Drew focused on short time-scale neuronal dynamics in CA1 of the hippocampus during linear track running. He has made a number of important discoveries in his dissertation, and his most recent work has provided the first direct evidence that, as an animal's velocity increases, there is 'sequence compression' of hippocampal cell firing within an individual cell's preferred firing location, suggesting the importance of temporal as well as spatial information in the activity of hippocampal ensembles. Dr. Maurer has recently joined the Barnes laboratory, where the focus of his research will be to investigate the neuronal activity

within the primate medial temporal lobe in naturalistic conditions such as random foraging and sleep. This goal will be accomplished through the development of multi-unit, telemetric recording technology.

Matthias R. Mehl, Ph.D.
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Professor Mehl is a social/personality and health psychologist. He joined the faculty of the Psychology Department in 2004 where he is now a tenured Associate Professor. He is also an Adjunct Associate Professor in the Department of Communication, an Associate Investigator at the Arizona Cancer Center, and an Affiliate Faculty at the Evelyn F. McKnight Brain Institute. Over the last decade, Dr. Mehl has developed the Electronically Activated Recorder (or EAR) as a novel methodology for the unobtrusive naturalistic observation of daily life. He has repeatedly written about and given workshops on novel real-world assessment methods and, most recently, edited the Handbook of Research Methods for Studying Daily Life (2012; Guilford Press). His research has been published in various high-impact journals including Science, Psychological Science, Annual Review of Psychology, Psychological Assessment, Journal of Personality and Social Psychology, and Health Psychology and has been funded by the National Institute of Health (NCI, NICHD, NCCAM), the American Cancer Society, and the John Templeton Foundation. Dr. Mehl is the current Vice President of the Society for Ambulatory Assessment and serves on the board of the Association of Research in Personality. In 2011, the Association for Psychological Science identified him as a 'Rising Star'.

Erica Minopoli
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Erica Minopoli is the Research Technician for the Brain Imaging, Behavior and Aging (BIBA) Lab at the University of Arizona. The Brain Imaging, Behavior and Aging Lab studies brain-behavior relationships in the context of aging using 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 cognitive aging and age-related, neurodegenerative disease. Erica is currently assisting with

BIBA's Brain Aging and Memory Study. The goal of this research is to determine how aging affects cognitive abilities and whether differences among people in their health status and genetic risk for cognitive impairment affect structural changes in the brain associated with aging and age-related cognitive decline.

Suzanne A. Moseley
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Suzanne's main research interests are in memory disorders associated with aging and brain injury, factors that play into older adults' memory performance, and memory rehabilitation. Currently her work is focused around stereotypes of aging held by both young and older adults, namely that competence declines and memory worsens with increasing age. Suzanne hopes to explore how stereotype threat influences older adults' memory performance and how deactivating this stereotype may have important implications for memory rehabilitation programs.

Mary A. Peterson, Ph.D.
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Dr. Peterson investigates how we perceive the world visually. Specifically, she uses cognitive neuroscience techniques (e.g., ERPs, fMRI, and behavioral methods) to investigate:

- the competitive processes producing the perception of shape, and how they are affected by context
- the relationship between perception and memory
- the processes used to learn new objects and to recognize familiar ones
- how attention affects perception
- the illusory perception of color in synesthesia
- how brain damage and aging affect the perception of and memory for objects and faces

Dr. Peterson is a Fellow of the American Association for the Advancement of Science; of the American Psychological Association; and of the Association for Psychological Science. She is also an elected member of the Society of Experimental Psychologists.

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Kojo works extensively with the Bonnet macaques for the Barnes lab. He oversees the day to day activities involving the bonnets including health monitoring, C/T scans, MRI's, physical examinations, and any other procedures the animals are subjected to. He handles the training of the animals to perform behavioral tasks and also assists with setting up behavior experiments. Making sure that the proper equipment is ready and available and that testing procedures are followed accurately. Each behavior experiment is set up to test different aspects of the aging brain and the way the brain changes over time. He also collects the data from such experiments for further analysis. The bonnet colony consists of 13 animals, 7 adult, and 6 aged animals, some as old as 30, so knowing each animal is key. He also prepares and trains undergrads that come to the lab to work with the bonnets.

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Broadly, Angelina's research is in the area of emotional memory and aging with a particular emphasis on the positivity bias found in older adults. Her current research focuses on identifying potential mechanisms through which this positivity bias is maintained, specifically in autobiographical memory (e.g., perspective use). Future plans include combining neuroimaging and psychophysiological methods with cognitive procedures to examine emotional memory in aging and examining emotional memory in amnestic mild cognitive impairment and Alzheimer's disease. Angelina received her B.Sc. in Psychology at the University of Toronto.

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Dr. Reiman's research interests include brain imaging, genomics, the unusually early detection and tracking of Alzheimer's disease (AD), and the rigorous and rapid evaluation of promising Alzheimer's disease-slowing and prevention therapies. He and his colleagues have been using imaging techniques to detect and track brain changes in cognitively normal people with two copies, one copy and no copies of the apolipoprotein E (APOE) ε4 allele, the major AD susceptibility gene, evaluate genetic and non-genetic risk factors for the disorder, and provide a springboard for genomic, transcriptomic, neuropathological and basic neuroscientific studies of AD. He and his colleagues have shown how imaging techniques could be used in at-risk people to evaluate promising Alzheimer's prevention therapies without having to study many healthy volunteers or wait many years to determine if they go on to develop symptoms. More recently, they reported the first genome-wide association studies of Alzheimer's disease and normal human memory.

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Dr. Lee Ryan received a Ph.D. in Cognitive and Clinical Psychology at the University of British Columbia in 1992. She is currently a faculty member of the Evelyn F. McKnight Brain Institute at the University of Arizona as well as the Director of the Cognition and Neuroimaging Laboratories, making magnetic resonance imaging (MRI) technology available to cognitive neuroscience researchers on campus. Her research focuses on the neural basis of memory and understanding how age-related changes in brain function affect memory in older adults. She has a special interest in memory disorders such as Alzheimer's Disease, and is currently conducting research using various MRI methods as a tool for detecting subtle markers of change in brains of individuals with risk for Alzheimer's disease prior to the onset of memory impairments. As an associate professor in the Cognition and Neural Systems program and the Clinical Neuropsychology program at the University of Arizona's Department of Psychology, Dr. Ryan teaches undergraduate classes in human memory and graduate level courses such as Human Brain Behavior Relationships, Cognitive Neuroscience, and Principles of Neuroanatomy. As a

clinical psychologist, Dr. Ryan works 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.

Rachel Samson, Ph.D.
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Dr. Samson's project addresses the effects of normal aging on reward processing and goal-directed behavior. Using appetitive instrumental tasks, she investigates how young and aged rats adapt their behavior to changes in reward value and task contingencies. She is interested in understanding how the network activity of the amygdala and prefrontal cortex mediate incentive learning and how their neurophysiological properties are different in young and aged rats. Results from her project will provide insight into the mechanisms of age-related changes in goal-directed behaviors. Dr. Samson was trained as an *in vitro* electrophysiologist, and is currently a Post-Doctoral Associate at the Evelyn F. McKnight Brain Institute at the University of Arizona.

Alexander Thome, Ph.D.
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Mr. 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.
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John Totenhagen has recently begun work in the Brain Imaging Behavior and Aging Laboratory on a variety of projects using MRI to quantify and track changes in the brain associated with aging and disease. John recently completed a Ph.D. in Biomedical Engineering at the University of Arizona, focusing on magnetic resonance imaging and spectroscopy studies of mouse models of neurodegenerative diseases.

Ted P. Trouard, Ph.D.
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The focus of research in Dr. Trouard's laboratory is on the development and application of novel Magnetic Resonance Imaging (MRI) technologies for a number of biomedical applications. Projects aimed at advanced clinical imaging involve diffusion-weighted MRI and functional MRI and are being carried out on 1.5T and 3T human MRI scanners at the University Medical Center (UMC). Projects involving cell cultures and imaging of animal models are being carried out at the Biological Magnetic Resonance (BMR) facility within the Arizona Research Laboratories (ARL).

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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. and William L. McKnight Brain Institute Meeting Participants - The University of Florida

Tetsuo Ashizawa, M.D., FAAN
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Melvin Greer Professor
Chairman, Department of Neurology

Cristina Bañuelos
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Russell M. Bauer, Ph.D., ABPP
Professor
University of Florida
Department of Clinical & Health Psychology

Linda Bean
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Leonid L. Moroz, Ph.D.
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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 180 papers in leading scientific and clinical journals and books. 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 is 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 SCA.

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Cristina Bañuelos 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 entered the Behavioral and Cellular Neuroscience Ph.D. program at Texas A&M University in Dr. Jennifer Bizon's aging research laboratory. Her first year project examined the spatial learning abilities of rats in a model of human third trimester binge ethanol exposure. She was also involved in a study in which systemic injections of a GABAB antagonist was shown to reverse

age related learning deficits in aged Fisher 344 rats. 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 septohippocampal projection systems.

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Russell M. Bauer, Ph.D. is Professor and former Chair of the Department of Clinical & Health Psychology at the University of Florida Health Science Center, Gainesville, FL, USA. He received his Ph.D. from Pennsylvania State University in 1979. He currently is Co-Director of the Evaluation and Tracking Program at UF's Clinical & Translational Science Institute. He is a Fellow and Past President-of the American Psychological Association's Division of Clinical Neuropsychology (Division 40), and is a Diplomate in Clinical Neuropsychology of the American Board of Professional Psychology. He is immediate Past President of the International Neuropsychological Society (2012). He chaired the Perception and Cognition Review Group, then renamed BBBP-4, of NIH's Center for Scientific Review from 1999-2002. The Florida Psychological Association awarded him its Outstanding Psychological Research Award in 1992.
He directed the Doctoral Program in Clinical Psychology at the University of Florida from 2000-2007 and the University's APA-accredited Internship in Clinical Psychology from 1995-1999. He received a 2003-2004 Dissertation Advising/Mentoring Award from the University of Florida. He has authored over 85 articles and chapters and has received extramural support from the National Institute of Alcohol Abuse and Alcoholism, the National Institutes of Communicative Disorders and Stroke, the Health Resources and Services Administration, and the National Institutes of Mental Health. He currently has a funded project in collaboration with the UF CTSI to establish a community-based concussion/traumatic brain injury research network among Florida health practitioners caring for youth in organized recreational sports and school sponsored athletics programs. Other current research projects examine differential diagnosis and preclinical detection of dementia, neurobehavioral aspects of epilepsy and epilepsy surgery, hippocampal contributions to spatial memory, and structure-function relationships in cognitive aging.

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Linda Bean is a Ph.D. Graduate student of the Interdisciplinary Program in Biomedical Sciences with a concentration in Neuroscience 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. She is seeking her doctorate in the laboratory of Dr. Thomas Foster at the McKnight Brain Institute, University of Florida. The focus of her research interest is to unravel the mechanisms of how estrogens are involved in providing protection from memory deficits seen with aging. Her specific attention will be directed toward the interaction of estrogen receptors with cellular functions and how these interactions affect behavior in female rats. She is currently working on viral delivery of estrogen receptor genes into the hippocampus to improve spatial memory in aged rat.

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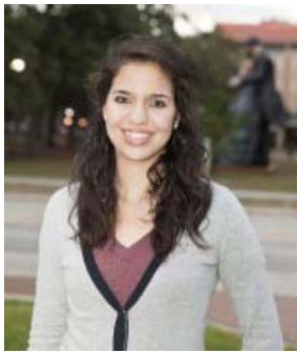

Sofia Beas is a third year Ph.D. graduate student in the department of Neuroscience at the Evelyn F. and William L. McKnight Brain Institute at the University of Florida, Gainesville, Florida. Sofia received her Bachelor of Science degree from the University of Texas at El Paso in 2004. As an undergraduate, 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.

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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 Biological Sciences from University of California, Irvine (1998). She then received postdoctoral training at Johns Hopkins University (1998-2003) where she investigated neuroendocrine and neuromodulatory systems and how age-related changes in these systems impact plasticity mechanisms and hippocampal-dependent cognition. She established her own laboratory in 2004 as an Assistant Professor at Texas A&M University where she remained until joining the Department of Neuroscience at University of Florida in 2010. Research in her laboratory is broadly focused on understanding the behavioral and neurobiological basis of age-related cognitive decline, with a particular interest in memory and executive function. Her laboratory employs a number of novel assessments for rodents which are sensitive to individual differences in decline of function associated with normal aging. These individual differences can be used to help identify and target behavioral and neural mechanisms that underlie both impaired and successful cognitive outcomes at advanced ages. Findings from her laboratory indicate that GABAergic circuitry becomes dysregulated in aging and that these changes are tightly coupled to loss of memory. One line of her current research is focused on further elucidating age-related alterations in this inhibitory circuitry and investigating whether corticolimbic GABAergic circuits could be targeted to improve memory and executive functioning at advanced ages. Other lines of research are investigating the contributions of dopaminergic and other modulatory neurotransmitter systems to age-related alterations in executive function, including cognitive flexibility, working memory and decision making. Dr. Bizon currently mentors three Ph.D. students in her laboratory, and serves as the co-Director for the Neuroscience graduate program.

Dawn Bowers, Ph.D.
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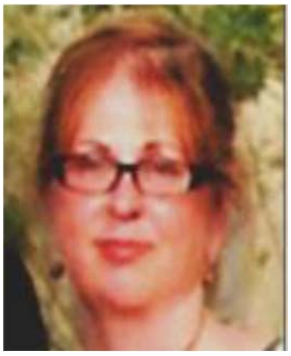

Dawn Bowers is a Professor and clinical/research neuropsychologist in the Departments of Clinical & Health Psychology and Neurology at the University of Florida. She is a UF Research Foundation Professor, the Director of the Cognitive Neuroscience Laboratory at the McKnight Brain Institute, the area head of the Neuropsychology division, coordinator of the UF clinical neuropsychology post-doctoral program, and director of the neuropsychology arm of the INFORM database for the UF Center for Movement Disorders and Neurorestoration. Dr. Bowers received her Ph.D. from the University of Florida, interned at Boston University/ Boston Veterans Administration Hospital (with an externship at the Framingham Heart Project), and completed a post-doctoral fellowship in behavioral neurology/neuropsychology at the University of Florida. She has received continuous research funding by NIH and other foundations since 1981. She provides peer review for NIH and VAMC research panels, has served on various journal editorial boards, and is a member of the governing board of the International Neuropsychology Society. She has over 150 peer-reviewed research articles, over 250 peer-reviewed research presentations, 1 co-authored book, and 1 clinical test. Her research has spanned laterality, attention and memory, and neurocognitive and affective changes associated with neurologic disease and aging, using a variety of “tools” (TMS, ERP, psychophysiology, computational modeling, etc.). Current research focuses on emotional and cognitive changes associated with Parkinson disease and aging, predictors of decline and wellbeing, and novel treatment approaches for apathy and executive dysfunction. She recently completed two funded clinical trials with Parkinson disease, one for treatment of apathy and another for treatment of masked faces in Parkinson disease. She and Dr. Michael Marsiske head up the MBRF funded Vital study examining trajectory of aerobic and activity predosing on cognitive training in community dwelling older adults from the Gainesville Village Retirement Center. Dr. Bowers is strongly committed to research mentoring and has served as primary mentor for 7 predoctoral and post-doctoral NIH NRSA recipients and one K23-awardee. She has keen interests in multidisciplinary research and professional training of future leaders in cognitive neuroscience/neuropsychology.

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Ronald Cohen, PhD, is a professor of psychiatry and human behavior at The Warren Alpert Medical School of Brown University and director of neuropsychology at The Miriam Hospital. Cohen is an active researcher in clinical and cognitive neuroscience with over 150 publications. He has authored the book *Neuropsychology of Attention*, which is currently going into press as a second edition. He served as co-editor on the book *Vascular Dementia: Cerebrovascular Mechanisms and Clinical Management*, and has two edited books in press, *Neuropsychology and Cardiovascular Disease* and *Brain Imaging in Behavioral Medicine and Clinical Neuroscience*. Cohen's research interests focus on achieving greater understanding of the relationship between brain disturbances and behavior and cognitive function. Specific areas of investigation include studies of the link between cardiovascular disease and the development of cerebrovascular disturbances, and neuropsychological dysfunction in the context of aging. His research has a similar focus with respect to the neuropsychology of HIV infection on the brain. He also is actively involved in neuroscience research studies of CVD risk factors, including obesity, metabolic syndrome, exercise, smoking and other substance abuse, with all of this work focusing on the brain functions underlying these conditions. Cohen is on the editorial board of three primary journals in the field of neuropsychology as well as the journal Brain Imaging and Behavior and is a permanent member of the behavioral medicine study section of the NIH. Cohen is actively involved in the training of predoctoral interns and postdoctoral fellows within the Centers.

Vonetta Dotson, Ph.D.
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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 C. 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, 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.

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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 aging from the Free University of Berlin in Germany. She completed postdoctoral 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 lifespan development and cognitive and socio-emotional aging. Her research focuses on age-related changes in attention and memory biases in processing socio-emotional information. She uses a multi-methods approach that combines convergent measures, including self-report, behavior observation, 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.

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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 90 publications on memory mechanisms and the aging brain. He is currently the principle investigator on three grants from the National Institute of Aging, which includes a MERIT award.

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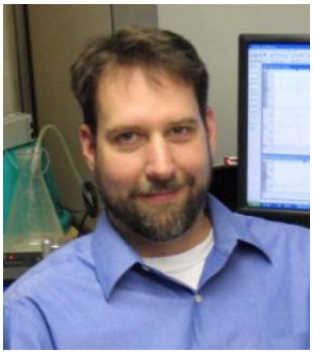

Dr. Frazier earned a Bachelor's degree in Neuroscience in 1991 at Oberlin College, and a Ph.D. in Neuroscience in 1997 at the University of Colorado Health Sciences Center. An early interest in age related memory dysfunction led him to the study of cholinergic systems in the mammalian hippocampus. His graduate work, supervised by Dr. Thomas V. Dunwiddie, used primarily electrophysiological techniques to study nicotinic acetylcholine receptors expressed in area CA1 of the hippocampus. During his post-doctoral years, Dr. Frazier studied cholinergic systems in the hilar region of the dentate gyrus, and also spent some time studying the detailed biophysics of channel gating in specific voltage gated potassium and calcium channels. Dr. Frazier joined the faculty in the College of Pharmacy at the University of Florida in 2003. Currently, his lab uses electrophysiological and optical techniques to study the effects of endocannabinoid mediated signaling and ambient GABA in the dentate gyrus, to study subcellular mechanisms through which calcium activated potassium channels may modulate plasticity in aging, and to reveal synaptic mechanisms in the hypothalamus that modulate energy metabolism and hypertension. Overall, this work is motivated by a broad interest in cellular and synaptic mechanisms that contribute to regulation of cortical excitability, and by a desire to expose specific mechanistic problems associated with aging, drug abuse, or disease.

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Michael Guidi is a third-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, which 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. Michael is also a recipient of the Neurobiology of Aging Training Grant, Pre-doctoral Fellowship, though the Department of Physiology.

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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 after hyperpolarization (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.

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Karienn Montgomery graduated with a BS in Biochemistry (2006) from Texas A&M University. She was accepted to the Behavioral and Cellular Neuroscience Ph.D. program at Texas A&M in Dr. Jennifer Bizon's aging research laboratory. Findings from her first year project indicated that prenatal exposure to methylmercury in mice, even at the lowest dose examined to date, can have long-lasting motor and cognitive consequences for adults. Based on this publication, Mrs. Montgomery was selected nationally for a Young Investigator's Award from the American Psychological Association. During her second year of graduate school, she was also involved in the characterization of aged Fisher 344 rats in behavioral tasks with the goal of developing a rodent model of mild cognitive impairment. During this time, she also collaborated with Dr. Barry Setlow's laboratory in a study focused on the long term deleterious effects of cocaine on learning and memory. More recently, Mrs. Montgomery has established a transfer learning task in mice which is analogous to a human clinical test that appears to be an early cognitive assessment for Alzheimer's Disease. This novel task is a promising tool for behavioral characterization of rodent models of neurodegenerative disease, and is well-suited for clinically relevant within-subject intervention studies. Data from this project was submitted for a NRSA fellowship, which Mrs. Montgomery was awarded in the Fall of 2010. Mrs. Montgomery transferred to the University of Florida College of Medicine with the Bizon laboratory in 2010, and plans to graduate in 2012.

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Dr. Leonid Moroz is Professor of Neuroscience of the Department of Neuroscience and The Whitney Laboratory for Marine Bioscience at the University of Florida. Dr. Moroz also holds the Professorship at Departments of Chemistry, Biology and Genomics at the Genetic Institute. Dr. Moroz received his degree from the Institute of Developmental Biology in Moscow in 1989. He completed his postdoctoral training and subsequent analytical chemistry and neuroscience fellowships at University of Leeds (UK) and University of Illinois. In 1998 he joined the faculty at University of Florida, where he climbed to the academic rank of tenured Professor 2006. He has published over 120 papers in leading scientific journals and books. Dr. Moroz' basic science research projects have primarily been focusing on cellular bases of behaviors and, during last few years, genomic bases of neuronal identity and plasticity where he pioneered the fields of single-cell microchemical analysis, single-neuron genomics and even genomics of individual cell compartments. His current research is to investigate epigenomic mechanisms of learning and memory including age-related memory loss. His laboratory is actively involved in development and implementation of innovative technologies to understand the logic of operation of genome in specific neurons of memory circuits as they learn, remember and age. Dr. Moroz is the principal investigator of several nationwide consortia for genome sequencing from more than dozen of model organisms. These consortia will establish the infrastructure and database to prepare for future basis and clinical research in biomedicine. He is also a recipient of numerous NIH and NSF awards.

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Dr. Lucia Notterpek is Chair and Professor of the Department of Neuroscience at the McKnight Brain Institute at 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

coauthored 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 underlying the 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 to identify approaches to restore myelin and neural function. The laboratory is equipped with models and reagents, including small molecule therapeutics and genetic modifications to attain these goals. Other areas of active investigation include the role of gene regulatory mechanisms in peripheral nerve development, and the effects of aging on neural function.

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Kelsey Thomas is a second year neuropsychology doctoral student in the Department of Clinical & Health Psychology at the University of Florida. Kelsey completed her undergraduate education at the University of California, San Diego, and graduated in 2008 with majors in biochemistry and psychology. Upon graduation, Kelsey worked at the San Diego VA as a study coordinator for a cognitive intervention and work outcomes study of Iraq/Afghanistan veterans returning with mild to moderate traumatic brain injury. She currently works in the Cognitive Aging Laboratory of Dr. Michael Marsiske and is a recipient of a T32 training fellowship through the National Institute on Aging. Kelsey is actively involved in various research projects including the VITAL study, a project examining the effects of aerobic exercise pre-dosing on cognitive training in older adults. She recently successfully defended her Master's thesis, which investigated whether verbal prompting was effective in improving performance on tasks of everyday cognition (e.g., paying bills, medication management) in both non-impaired and mild cognitively impaired (MCI) older adults. Kelsey is particularly interested researching cognitive interventions that can be easily implemented to reduce or delay the cognitive decline associated with both normal and pathological aging.

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Dr. Alperin received his PhD in Medical Physics from the University of Chicago, where he also obtained post doctoral training in MRI. Dr. Alperin joined the University of Miami in May 2009 from the University of Illinois at Chicago. His primary research focuses on cerebral hemodynamics and hydrodynamics. He uses MRI to measure the coupling between blood and CSF flow dynamics. This work, supported by NIH funding, has lead to the development of a noninvasive method for measurement of Intracranial Pressure. Shortly after arriving at UM, Dr. Alperin joined the Evelyn F. McKnight Center for Age Related Memory Loss imaging team focusing on development of MRI based algorithms for quantitation of age related changes in brain morphology and cerebral perfusion and the relationships between the two.

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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.

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Dr. Melo Bicchi received his degree in Medicine from Universidad Iberoamericana in Santo Domingo, Dominican Republic. Since his graduation he has dedicated his time to work as a Chemistry Laboratory Professor and Health Promotion while he prepared himself for the USMLE examinations. Upon completion of these activities, he moved to the United States to participate in clinical clerkships at the University of Miami Hospital and pursue his medical career and interests in the field of neurological research. He then met Dr. Clinton Wright whom invited Dr. Melo Bicchi to collaborate with him and his research team and work on Brain Mapping and Segmentation Project on Brain MRI images. The project consists in measuring cortical and sub-cortical brain volumes using FreeSurfer Software to evaluate the effect of aging on total brain volume, total cranial volume, the occipital, parietal and frontal lobes on population brain data.

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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 Associate Director of Communications and Compliance at the HIHG and Associate Professor of the Dr. John T. Macdonald Foundation Department of Human Genetics.

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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.

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Dr. Elizabeth Crocco received her MD from the University of Medicine and Dentistry, Robert Wood Johnson Medical School in Piscataway, New Jersey. She then completed her residency training in general psychiatry at The Mount Sinai Medical Center in New York. She specializes in geriatric psychiatry, and completed her fellowship at UM/Jackson Memorial Hospital. Dr. Crocco is currently the Chief of Geriatric Psychiatry in the Department of Psychiatry and Behavioral Sciences at the Miller School of Medicine. As the Co-P.I. of the UM Memory Disorder Clinic with Dr. Wright, she oversees the coordination of clinical services at the MDC and participates actively in the overall research efforts of the clinic. She also serves as the geriatric psychiatry training director at Jackson Memorial Hospital and facilitates the primary training and supervision of all geriatric psychiatry fellows, psychiatry residents, medical students and other physicians/health care professionals.

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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.

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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.

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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 over four years. Her current research focuses primarily on dietary behavior and how it relates to the risk of vascular events, carotid disease, and age-related changes in the brain.

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A graduate of the accelerated 6-year B.A. /M.D. program at the University of Missouri at Kansas City School of Medicine, Dr. Isaacson currently serves as Vice-Chair of Education and Director of the Neurology Residency Program in the Department of Neurology. He completed his residency in Neurology at Beth Israel Deaconess Medical Center/Harvard Medical School, and his medical internship at Mount Sinai Medical Center in Miami Beach, FL. Prior to joining the University of Miami, he served as Director of the Research Unit in Medical Education and Associate Medical Director of the Wien Center for Alzheimer's disease and Memory Disorders at Mount Sinai.

Dr. Isaacson's emphasis on education spans undergraduate (student) and graduate (resident) medical education, as well as patient, caregiver and community education/outreach. He has chaired the American Academy of Neurology (AAN) Undergraduate Education Subcommittee working group in dementia, responsible for making recommendations of what is taught to U.S. medical students. He received the AAN Education Research Grant for "Evaluating the effectiveness of *Continuum*: Dementia as a teaching tool for medical students" published in *Neurology* (January 2011). This was the first education research study to evaluate surrogate markers of patient outcomes via a patient case simulation of age-related memory loss. He has completed a study on "Evaluating the effectiveness of a Cognitive Aging curriculum for medical students, Internal Medicine and Neurology residents" and is working with Marytery Fajardo (UMMSM MS-4) on "Age-Related Memory Loss and Alzheimer's Disease Web-based

Educational Intervention in Patient Waiting Rooms," an educational intervention/assessment for patients and caregivers in English and Spanish. Funding from the McKnight Brain Institute and the National Institutes of Health Clinical Research LRP supported a multi-institution (Cornell, Harvard, UM, U. Pennsylvania, U. Rochester) education research protocol using the EMR and Health IT, to be presented as a Platform at the 2012 AAN Annual Meeting. He is the author of numerous publications, his research in neurology and medical education has been presented at scientific meetings nationally and internationally, and he was awarded the 2009 AAN A.B. Baker Teacher Recognition Award, a national award, for his contributions to improving neurologic education. He has lectured in a variety of settings in the community, such as the annual Brain Fair (co-sponsored by the McKnight Brain Institute) for elementary and junior-high school students (and their parents), and other outreach initiatives.

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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 for 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.

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Nooshin Nabizadeh received her Bachelor and Master's degree 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 FreeSurfer 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 MR brain images.

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Dr. Nahab completed his medical degree and residency training in Neurology at the Loma Linda University School of Medicine in southern California. He went on to complete a combined 4-year fellowship in Movement Disorders and Functional Neuroimaging under the direction of Dr. Mark Hallett in the Human Motor Control laboratory at the National Institute of Neurological Disorders and Stroke in Bethesda, Maryland. During his tenure at the National Institutes of Health, he also became Assistant Clinical Investigator and Director of the Botulinum Toxin Clinic. Dr. Nahab has conducted leading research into the mechanisms of voluntary movement and self-agency using functional MRI, as well as conducting Phase I/II clinical trials for the treatment of essential tremor. Dr. Nahab is the author of numerous peer-reviewed publications, book chapters, and scientific abstracts in both national and international venues. Dr. Nahab joined the University of Miami Department of Neurology in 2008 and established the Laboratory for Functional Imaging of Neurodegenerative Disorders. In addition to his NIH-funded research exploring the neural mechanisms of tremor, he is interested in the development of fMRI-based methods to track the progression of neurodegeneration, understanding the neural substrates of healthy cognitive aging, gait dysfunction, and the development of clinical functional neuroimaging protocols for patients with brain tumors and epilepsy.

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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.

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Dr. Perez-Pinzon directs the Cerebral Vascular Disease Research Center at the University of Miami since 2005, which was established approximately 45 years ago. I am Professor of Neurology and Neuroscience and I am Vice-Chairman of Basic Sciences in the Department of Neurology. My main research expertise is in the area of cerebral ischemia, which results from cardiac arrest or a stroke. My research focuses on the area synaptic, vascular and mitochondrial dysfunction that ensues following cerebral ischemia. Over the last 15 years, my laboratory has investigated the signaling pathways that lead to neuroprotection against ischemia following ischemic preconditioning (IPC). IPC is an innate protective mechanism whereby a sublethal ischemic insult protects against a subsequent lethal ischemic attack. Over the last 5 years we have defined that sirtuins are downstream pathways activated by IPC, which among other sites, promote synaptic and mitochondrial protection.

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Dr. Raval Ami serves as Research Assistant Professor in the Department of Neurology at the University of Miami Miller School of Medicine. She has had previous training in the physiology of reproduction, and coupled this knowledge with laboratory research on the pathophysiology of stroke. Her research focuses on (1) understanding the effects of estrogen on neuronal survival after an ischemic episode, and (2) the role of nicotine addiction in compromising the beneficial effects of estrogen on hippocampal neurons subjected to ischemia. The results to this point indicate that nicotine addiction renders females more susceptible to ischemic brain damage. The severity of ischemic brain damage is far greater in females simultaneously exposed to oral contraceptives than to nicotine only. Overall her study aims to identify the mechanism of deleterious effects of nicotine that are unique to the female brain. The knowledge acquired will guide the development of novel pharmacological strategies specific for women.

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Dr. Tatjana Rundek is a Professor of Neurology, Epidemiology and Public Health with tenure, Vice Chair of Clinical Research, and a Director of Clinical Translational Research Division in the Department of Neurology of the University of Miami Miller School of Medicine, Miami, FL, USA. She also holds a secondary faculty appointment at the Department of Neurology at Columbia University in the City of New York, NY, USA. Dr. Rundek is a stroke neurologist, clinical researcher and principal investigator of several large longitudinal NIH funded projects on genetic determinants of carotid atherosclerosis and stroke epidemiology. Dr. Rundek was the Fulbright Scholar and the recipient of the research awards from the Hazel K. Goddess and the Dr. Gilbert Baum Fund and the American Institute in Ultrasound in Medicine for best clinical application of medical ultrasound. Her current research work is directed toward the genetic and environmental determinants of stroke, atherosclerosis, and use of ultrasound for early detection, intervention and prevention of functional and structural changes of arterial wall in inflammation. Dr. Rundek serves on the editorial boards of several professional journals including Stroke, Neurology and Cerebrovascular Diseases. She has published over 150 scientific publications,

professional manuscripts, reviews, and book chapters. She is a member of the American Heart Association, American Academy of Neurology, and American Institute of Ultrasound in Medicine. She is currently the President of the Neurosonology Communities of Practice of the American Institute of Ultrasound in Medicine, the largest professional medical ultrasound organization in the US.

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

Dr. Sacco graduated from Cornell University with distinction, received his medical degree cum laude from Boston University School of Medicine in Massachusetts where he was elected to AOA, and completed 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 research activities began in 1980 when he participated in the Framingham Heart Study. Since 1990, he has been the founding Principal Investigator of the Northern Manhattan Study. He has published extensively in the areas of stroke prevention, treatment, risk factors, stroke recurrence, and genetics, with more than 330 original articles and 100 invited publications to his credit. He has been a leading author on numerous evidence-based guidelines from the AHA and other organizations. In addition, he is the senior consulting editor of *Stroke*, and serves on the editorial boards of *Cerebrovascular Disease, Neuroepidemiology*, and *Nature Clinical Practice Neurology*. He has helped train numerous fellows in stroke and epidemiology and was co-director of a T32 at Columbia entitled Neuroepidemiology Training Program.

He has received a number of awards including the Feinberg Award for Excellence in Clinical Stroke and the Chairman's Award from the American Heart Association, and the NINDS Javits Award in Neuroscience. He has lectured extensively including giving some key named lectures: Donald Baxter Lecture, HJM Barnett Lecture, Chaim Mayman Memorial Lecture, Daniel Gainey Lecture, Henry Russek Lecture, and the David Sherman Lecture. He is a member of the

American Association of Physicians, fellow of the Stroke and Epidemiology Councils of the American Heart Association, a Fellow of the American Academy of Neurology, and a member of the American Neurological Association. Dr. Sacco is the first neurologist to serve as the President (2010-11) of the American Heart Association, and is currently serving as immediate past President and on the Board of Directors.

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Clinton Wright, M.D., M.S., is Scientific Director of the Evelyn F. McKnight Brain Institute in the Miller School of Medicine at the University of Miami. He directs the Division of Cognitive Disorders and is a member of the Stroke division in the department of Neurology, co-directs the University of Miami Memory Disorders Center (MDC), and is an Associate Professor of Neurology (primary), Neuroscience, and Epidemiology & Public Health. He is Adjunct Associate Professor of Neurology at the College of Physicians & Surgeons of Columbia University.

Dr. Wright received his B.A in psychology with honors from George Washington University and his M.D. from the College of Physicians & Surgeons of Columbia University where he later trained in neurology at the Neurological Institute of New York. Following residency he remained at Columbia and did a vascular neurology fellowship and a Master's degree in Epidemiology from the Mailman School of Public Health under a T32 Neuroepidemiology Training Grant. He was appointed Assistant Professor of Neurology in 2003 where he was a member of the Stroke Division until he moved to Miami in 2008.

Dr. Wright's current studies focus on the effects of vascular risk factors, the role of chronic kidney disease, phosphorus and mineral metabolism, and vitamin D on brain morphology and cognitive function. He is also involved in studies to identify genes that are associated with greater risk of white matter damage and cognitive decline. Most of this work is population-based and involves the Northern Manhattan Study sample. He has also developed a clinical and biomarker registry as part of the MDC. As Scientific Director of the U.M. McKnight Brain Institute, Dr. Wright is focusing on clinical studies of cognitive and brain morphological correlates of aging and vascular damage using neuropsychology and structural MRI, animal models of brain ischemia and its effects on behavior, and the role of mitochondrial function in aging.