

____ Beau Ances
Department of Neurology
Title: Effects of HIV on Aging Using 11C-labeled Pittsburgh Compound-B (11C-PIB)
To characterize A β plaque deposition within HIV infected subjects, seronegative controls with normal low cerebral spinal fluid (CSF) A β and DAT patients.

____ Dave Balota/Jan Duchek
Department of Psychology
Title: Attention, Aging, and Alzheimer's disease
Description: Research addresses issues related to visual word recognition, semantic memory, priming on implicit memory tests, and attention systems that modulate performance within each of these domains. Investigate these phenomena within young adults, older adults, and individuals with dementia of the Alzheimer's type. Are examining how breakdowns in an attentional control system may account for age-related changes in cognitive performance and be a potential early marker for Alzheimer's disease.

____ Jianxin Bao
Department of Otolaryngology
Title: Develop stem cell therapy for age-related hearing loss
Brief description: Presbycusis is one of the most widespread conditions associated with aging, affecting more than half of people over the age of seventy. The degeneration or absence of hair cells in the cochlea contributes heavily to this loss of hearing. Unfortunately, presbycusis cannot be reversed naturally due to the inability of hair cells to regenerate. We hypothesize that adult omental stem cells are a potential candidate for replacing these hair cells. Our recent studies have shown that with modifications by VOT-E36 protein transfer and Math1 over-expression, omental stem cells had a 12.5% success rate in responding to mechanical vibrations following co-culturing with primary spiral ganglion neurons (SGNs). The same cell line receiving other treatments lacked responses. Furthermore, 30% of adult omental stem cells dyed with phalloidin showed strong staining, a characteristic of hair bundles under similar circumstances. Our experiments henceforth will have two major goals. First we will continue observing the effects of modifications on omental stem cells into hair cells, particularly in terms of the mechanotransduction machinery. We anticipate verifying if this machinery is induced in hair bundle-like structures. Our second aim is to examine the interactions of omental stem cells with SGNs. This will include whether modified omental stem cells will form synaptic connections and activate SGNs. We will be able to gather important information on the intrinsic and extrinsic modifications of omental stem cells regardless of the results.

____ Dennis Barbour
Department of Biomedical Engineering
(Best for a student with a quantitative background and with several years of college coursework participated.)
Title: Directed neural circuit formation in adults
Description: The brain loses much of its plasticity as it ages. Neuroengineering techniques may be able to induce directed plasticity to induce recovery of brain function. Such techniques could be useful in cases of focal brain damage from stroke or trauma. We are testing a technique of directed neural circuit formation using electrical stimulation in adult animal models.

____ Randy Bateman
Department of Neurology
Title: Behavior effects on soluble amyloid-beta levels in humans
Description: This study will determine if there is an association between activity (sleep, wake, food consumption, reading, etc.), and the production of amyloid-beta levels in human cerebrospinal fluid in participants over 36 to 48 hours of study. The student will engage in grading behavioral activity, coordinating data analyses, forming hypotheses and testing. There will also be an opportunity to learn wet bench techniques of measuring amyloid-beta levels.

_____Todd S. Braver*

Department of Psychology

Title: Motivation effects on cognitive control in older adults.

Description: In our previous work we have found strong enhancements of performance in younger adults performing difficult cognitive tasks when motivational incentives are provided. Importantly, we observed qualitative differences related to the type of reinforcer used -- monetary bonuses, or preferred liquids. Moreover, these behavioral effects were mirrored by increased activation in brain regions that support cognitive control processes, such as the prefrontal cortex. The current project will test whether the same or different effects occur in older adults. If the same results are obtained, it will have important implications for cognitive rehabilitation strategies in older adults.

_____Julie Bugg

Department of Psychology/Division of Cell Biology and Physiology

Title: Aging, Cognitive Control, and Prospective Memory

Description: Cognitive control refers to the goal-oriented coordination of cognitive resources such as attention and working memory. This project is aimed at characterizing age-related impairments in cognitive control, as well as age-related maintenance of cognitive control function. We will investigate older adults' cognitive control abilities using a range of paradigms including the Stroop and prospective memory tasks.

_____Christopher R. Carpenter

Department of Emergency Medicine

Title: A Multifactorial Emergency Department Falls Prevention Intervention

Description: High-risk fallers will be identified by research associate screening of emergency department patients with validated clinical instruments. In a randomized controlled trial, high-risk individuals will be offered Physical Therapy home-safety evaluation and additional fall prevention strategies or standard of care therapy.

_____Maurizio Corbetta

Department of Neurology

Title: Brain Imaging Studies of Cognitive Recovery in Stroke

Description: We are conducting longitudinal studies of cognitive recovery in stroke victims using behavioral assessments and state-of-the-art brain imaging coupled with connectivity analysis of brain networks.

_____James Galvin

Department of Neurology

Title: Psychosocial Determinants of Aging-In-Place

Description: Our goal is to examine psychosocial factors that determine Aging-in-Place; that is the ability to remain in an independent living situation. The LONG TERM GOALS are to: 1) determine whether Aging-in-Place is in the best interest of the older adult and 2) design appropriate interventions to delay transition out of the home.

_____Raphael Kopan

Department of Developmental Biology & Department of Medicine (Division of Dermatology)

Title: "gamma-secretase-mediated cleavages of amyloid precursor protein and Notch"

Description: Soluble Abeta peptides and Abeta oligomers are toxic to neurons and are believed to be the trigger of Alzheimer's disease (AD). Abeta is sequentially cleaved from amyloid precursor protein (APP) by beta and gamma-secretase. Not only does gamma-secretase activity controls the total Abeta level, but it also determines the ratio of Abeta42/Abeta40, which is more relevant for the pathogenesis of AD. Thus, gamma-secretase is a promising drug target for AD. However, in addition to APP, gamma-secretase also cleaves growing number of other important type-I transmembrane proteins including Notch receptors that play an essential role in embryonic development as well as in tissue maintenance in adulthood. In fact, intestinal toxicity hampers use of gamma-secretase inhibitors in the clinic. We are using biochemical and genetic approaches (mutagenesis, SiRNA knockdown, Knockout, luciferase complementation and reconstitution of gamma-secretase activity in yeast system)

and in different model systems (cultured cells, yeast and mouse) to understand the molecular mechanism underlying gamma-secretase-mediated cleavages of APP and Notch. One of our goals is to find small chemicals that selectively inhibit Abeta generation with minimum effect on Notch signaling pathway.

_____John J. Lehman

Department of Internal Medicine/Cardiovascular Division

Title: Modulation of Aging and Calorie Restriction Benefits by the Mitochondrial Regulator PGC-1alpha.

Description: This project will explore in mice and humans how the control of mitochondrial function and energy delivery by the transcriptional regulator PGC-1alpha impacts the rate of aging and the anti-aging effects of calorie restriction.

_____Mark McDaniel*

Department of Psychology

Description: Cognitive training and exercise interventions for cognitive health in older adults.

_____Kevin K. Ohlemiller

Department of Otolaryngology

Title: The impact of cochlear stria marginal cell density on the age trajectory of the endocochlear potential (EP).

Description: We have discovered that a mouse strain showing a slightly reduced stria marginal cell density early in life (BALB/cJ) tends toward stria presbycusis later in life. To examine cause and effect relationships, and to establish the number of genes involved, we are testing ~200 mice from 13 recombinant mouse strains formed from BALB/c and C57BL/6. Presently we are determining how the EP varies across these strains. After this stage, we plan to section sample cochleas from each strain and correlate EP with marginal cell density across the 13 strains. The project involves learning how to section plastic-embedded mouse cochleas and performing cochlear cell counts by light microscopy. Against a background of no known stria presbycusis genes, we hope to identify the first naturally-occurring candidate gene for screening in humans.

_____Paul Shaw

Department of Anatomy & Neurobiology

Description: Identify and describe molecular pathways that are relevant for our understanding of mammalian sleep and sleep homeostasis and to determine if these pathways impact motivated waking behaviors.

_____Barbara 'Joy' Snider

Department of Neurology

Title: Accuracy of a single diagnostic encounter in the diagnosis of very mild Alzheimer's Disease.

Description: A clinical pathological study that would involve looking at clinical and pathological data from the clinical and pathological cores of the Alzheimer's Disease Research Center. Observation of how clinical assessments are done and reviewing Alzheimer's disease pathology and what the diagnostic criteria are for the pathological diagnosis.

_____Mitch Sommers

Department of Psychology

Description: Conducts research on age-related changes in speech perception and auditory processing.

_____Susan Stark

Department of Occupational Therapy

Title: Aging in place: How the environment influences older adults with chronic conditions

Description: This study will examine how removing environmental barriers present in the home of older adults with chronic conditions can enhance their daily activity performance, community participation and fall rates. The student will engage in clinical assessment in the community,

interviewing older adults, working with interdisciplinary teams, collecting and entering data, and conducting preliminary data analyses. Students will be exposed to clinical measures and will have an opportunity to engage with older adults in their homes and in community settings.

_____ Dennis T. Villareal

Department of Internal Medicine/Division of Geriatrics and Nutritional Science

Title: Weight Loss and Exercise in Frail Obese Elderly Subjects

Brief description: This is a randomized controlled trial of the independent and combined effects of weight loss and exercise on physical function, body composition, muscle and bone metabolism, glucose tolerance, and quality of life in frail obese elderly men and women.

_____ Consuelo Hopkins Wilkins

Department of Internal Medicine/Division of Geriatrics and Nutritional Science

Title: Risk Factors for Frailty in Community-Dwelling Older Adults

Description: Students will be able to examine risk factors associated with frailty including depressive symptoms, bone density, and impaired mobility. Students will have hands-on experience in performing assessments and will also have an opportunity to develop their own research questions.

_____ Kevin E. Yarasheski

Department of Internal Medicine/Endocrinology/Metabolism/Lipid Research

Title: Human Atherosclerotic Plaque Inflammation Imaged Using FDG-PET/CT

Description: We are evaluating a novel radiologic imaging technique for detecting and quantifying carotid plaque size in HIV+ people with pre-diabetes.