


January 18, 2015

MEMORANDUM

TO: Trustees, The McKnight Brain Research Foundation
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FROM: C.A. Barnes, Ph.D. 
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Evelyn F. McKnight Chair for Learning and Memory in Aging
Director, Evelyn F. McKnight Brain Institute
Director, ARL Division of Neural Systems, Memory and Aging
Associate Director, BIO5

Please find enclosed six copies of the Annual Report for the University of Arizona Evelyn F. McKnight Brain Institute, which covers the financial reports for the period of July 1, 2013 through June 30, 2014 and scientific reports for the period of January 1, 2014 through December 31, 2014.



**Evelyn F. McKnight
Brain Institute**

Annual Report

**McKnight Brain Research Foundation
Sponsored Institutes and Research Programs**

Scientific Report Period: January 1, 2014 – December 31, 2014
Financial Report Period: July 1, 2013 – June 30, 2014
Institution: University of Arizona

Submitted January 19, 2015

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1. Summary of scientific achievements since last report

The Evelyn F. McKnight Brain Institute at the University of Arizona (EMBI) has made significant progress towards our goal of understanding how aging impacts the circuits responsible for age-related memory decline using sensitive cognitive tests and two primary neurobiological tools that have been developed in the Director's laboratory. The first method is state-of-the-art ensemble electrophysiological recording in behaving animals that can monitor changes in brain networks and cognitive decline in aged rodents and nonhuman primates, and can be combined with live imaging methodologies. The second is a molecular imaging technology (the catFISH method) that allows the examination of individual cells that participate in circuits critical for memory. Application of catFISH in conjunction with methods that can quantify transcriptional and epigenetic activity provides a powerful window into how memory circuits are modified by behavior and altered during aging.

A number of exciting papers using these methods were published during 2014; among these findings include the following:

We know that the perirhinal cortex (PRC) represents high-order sensory information and is involved in maintaining those representations in memory. These processes are required for recognition memory, which declines in normal aging. We were invited to write a review of the neural representation of 3-dimensional objects (Burke and Barnes, 2014), and also published a manuscript that was the first to describe the possible biological basis of the age-related deficit in recognition memory (Burke et al., 2104). When objects were placed on a track while young and old rats were running around it, subsets of neuron became active at discrete locations adjacent to the objects. The aged rats, however, had a lower proportion of neurons that were activated by objects. This weaker neural representation most likely contributes to the impairments in recognition memory with age.

We also published an in depth examination of cells in the rodent medial prefrontal cortex – an area thought to be important for guiding behavior according to an animal's expectations. We report that the activity of regular-firing, putative projection neurons in prefrontal cortex contains rich information about behavioral context and firing fields that cluster around reward sites. The activity of putative inhibitory and fast-spiking neurons, on the other hand, is most associated with movement and accompanying sensory stimulation. These data suggest a network that tracks an animal's behavioral situation while, at the same time, regulates excitation levels to emphasize high valued choices.

We have also begun to study how normal aging affects behavioral performance on a variety of associative learning tasks under Pavlovian conditions – which are known to engage the amygdala. The data suggest that acquisition of instrumental lever press behaviors is preserved in aged rats. In fact under some task conditions, aged rats can learn and adapt to changing requirements of instrumental tasks more quickly than do younger animals – suggesting more optimal strategy choices in the older animals under certain circumstances (Sampson et al., 2014). We also published an experiment, conducted using our young and aging bonnet macaques, which examined the structural integrity of brain regions known to be necessary for decisions based on expected outcomes – namely, the amygdala and orbitofrontal cortex. The older monkeys showed impairments in the ability to associate an object with a higher value

reward. Interestingly, greater orbitofrontal cortex volume in area 11/13, but not 14, was significantly correlated with an animal's ability to anticipate the reward outcome associated with an object, and a smaller basolateral amygdala was predictive of an animal's tendency to choose a higher value reward. The balance of information conveyed between these two structures may be disrupted during aging. This suggests that it will be interesting to examine the functional connectivity between the long-range projecting white matter tracts in the younger and older animals - we have collected the diffusion tensor scans from these animals, and will be able to test this idea directly upon their analysis.

2. Publications in peer reviewed journals

From Barnes

- Burke, S.N., Maurer, A.P., Nematollahi, S., Uprety, A., Wallace, J.L. and Barnes, C.A. (2014) Advanced age dissociates dual functions of the perirhinal cortex. *Journal of Neuroscience*, 34:467-480.
- Samson, R.D., Venkatesh, A., Patel, D.H., Lipa, P. and Barnes, C.A. (2014) Enhanced performance of aged rats in contingency degradation and instrumental extinction tasks. *Behavioral Neuroscience*, 128:122-133.
- Zelikowsky, M., Hersman, S., Chawla, M.K., Barnes, C.A., and Fanselow, M. S. (2014) Neuronal ensembles in amygdala, hippocampus and prefrontal cortex track differential components of contextual fear. *The Journal of Neuroscience*, 34:8462-8466.
- Burke, S.N., Thome, A., Plange, K., Engle, J.R., Trouard, T.P., Gothard, K.M., Barnes, C.A. (2014) Orbitofrontal cortex volume in area 11/13 predicts reward devaluation, but not reversal learning performance, in young and aged monkeys. *Journal of Neuroscience*, 34:9905-9916.
- Maurer, A.P., Lester, A.W., Burke, S.N., Ferng, J.J. and Barnes, C.A. (2014) Back to the future: Preserved hippocampal network activity during reverse ambulation. *Journal of Neuroscience*, 34:15022-15031.
- Insel, N. and Barnes, C.A. (2014) Differential activation of fast-spiking and regular-firing neuron populations during movement and reward in the dorsal medial frontal cortex. *Cerebral Cortex*, in press.
- Burke, S.N. and Barnes, C.A. (2014) The neural representation of 3-dimensional objects in rodent memory circuits. *Behavioral Brain Research*, in press.
- Samson, R.D., Venkatesh, A., Lester, A.W., Weinstein, A.T., Lipa, P. and Barnes, C.A. (2014) Age differences in strategy selection and risk preference during risk-based decision making. *Behavioral Neuroscience*, in press.

From Selected Affiliates

- Cholanian, M., Krajewski-Hall, S. J., Levine, R.B., McMullen, N. T. and Rance, N.E. (2014) Electrophysiology of Arcuate Neurokinin B Neurons in Female Tac2-EGFP Transgenic Mice. *Endocrinology*, 155:2555-2565.
- Hoscheidt, S.M., Labar, K.S., Ryan, L., Jacobs, W.J. and Nadel, L. (2014) Encoding negative events under stress: High subjective arousal is related to accurate emotional memory despite misinformation exposure. *Neurobiology of Learning and Memory*, 112:237-247.
- Lane, R., Ryan, L., Nadel, L. and Greenberg, L. (2014) Memory Reconsolidation, Emotional

- Arousal and the Process of Change in Psychotherapy: New Insights from Brain Science. Behavioral and Brain Sciences, 15:1-80. [Epub ahead of print]
- O'Connor, M.-F., Arizmendi, B. and Kaszniak, A.W. (2014) Virtually supportive: A Feasibility pilot study of an online support group for dementia caregivers in a 3D virtual environment. Journal of Aging Studies, 30:87-93.
- Raichlen, D. and Alexander, G.E. (2014) Exercise, APOE genotype, and the evolution of the human lifespan. Trends in Neurosciences, 37:247-255.
- Ryan, L. and Walther, K. (2014) White matter integrity in older females is altered by increased body fat. Obesity, 22:2039-2046.
- Yoshimaru E, Totenhagen J, Alexander GE and Trouard TP. (2014) Design, manufacture, and analysis of customized phantoms for enhanced quality control in small animal MRI systems. Magnetic Resonance in Medicine, 71:880-884.
- Back, A.L., Rushton, C.H., Kaszniak, A.W. and Halifax, J.S. (2015) Why are we doing this? Clinician helplessness in the face of suffering. Journal of Palliative Medicine, in press.
- Beach, T.G., Adler, C.H., Sue, S.I., Serrano, G., Shill, H.A., Walker, D.G., Lue, L.F., Roher, A.E., Dugger, B.N., Maarouf, C., Birdsill, A.C., Intorcchia, A., Saxon-Labelle, M., Pullen, J., Scroggins, A., Filon, J., Scott, S., Hoffman, B., Garcia, A., Caviness, J.N., Hentz, J.G., Driver-Dunckley, E., Jacobson, S.A., Davis, K.J., Belden, C.M., Long, K.E., Malek-Ahmadi, M., Powell, J.J., Gale, L.D., Nicholson, L.R., Caselli, R.J., Woodruff, B.K., Rapcsak, S.Z., Ahern, G.L., Shi, J., Burke, A.D., Reiman, E.M., Sabbagh, M.N. (2015) Arizona study of aging and neurodegenerative disorders and brain and body donation program. Neuropathology, in press.
- Jones, B., Pest, S. M., Vargas, I.M., Glisky, E. L. and Fellous, J-M. (2015). Contextual reminders fail to trigger memory reconsolidation in aged humans and rats. Neurobiology of Learning and Memory, accepted w/ minor revisions.

3. Publications (other)

From Barnes

- Barnes, C.A. Dr. Carol Barnes debunks myths about memory and the ageing brain, The Index Card, The Guardian, Tech Supplement to The Observer of London, June 21, 2014.
- Schimanski, L.A. and Barnes, C.A. (2014) Insights into age-related cognitive decline: Coupling neurophysiological and behavioral approaches. In: H.A. Bimonte-Nelson (Ed) The Maze Book: Your Guidebook to Theories, Practice, and Protocols for Testing Rodent Cognition. Springer: New York, in press.
- Siniard, A.L., Corneveaux, J.J., DeBoth, M., Chawla, M.K., Barnes, C.A. and Huentelman, M.J. (2014) RNA sequencing from laser capture microdissected brain tissue to study normal aging and Alzheimer's disease. In: Applied Neurogenomics. Springer: New York, in press.
- Article featuring Dr. Carol Barnes "Expert: Keep aging brains healthy, active" by Ellen Sussman, Special to the Green Valley News, January 6, 2014.
- Article featuring Dr. Carol Barnes in Honor of Women's History Month, "Esteemed UA Researchers, Scholars, UA News, March 23, 2014.
- Article featuring Dr. Carol Barnes "UA's Brainiac. Barnes unlocking secrets of normal aging" by Gabrielle Fimbres, Biz Tucson, April 1, 2014.

Article featuring Dr. Carol Barnes “UA researcher Barnes provides insights into aging, memory” by Tom Beal, Arizona Daily Star, August 25, 2014.

Article featuring Dr. Carol Barnes “Old-age myth: Alzheimer’s not inevitable with age, expert says” by Miranda Rivers, Cronkite News, September 19, 2014.

Barnes, C.A. (2014) Biography for APA Award for Distinguished Scientific Contributions, *American Psychologist* 69:730-732 (November 2014 issue).

From Selected Affiliates

Kaszniak, A.W. (2014) Preface to *Dialectical behavior therapy for wellness and recovery: Interventions and Activities for Diverse Client Needs* (pp. ix-xi) by Andrew Bein, New York: Wiley.

Kaszniak, A.W. (2014) *Contemplative pedagogy: Perspectives from cognitive and affective science*. In O. Gunnlaugson, E.W. Sarath, C. Scott & H. Bai, (Eds.), *Contemplative learning and inquiry across disciplines* (pp. 197-211). New York: State University of New York Press.

4. Presentations at scientific meetings

From Barnes

Barnes, C.A. Memory and the aging brain, Keynote Speaker, Cognitive Aging Symposium, Donders Institute, Nijmegen, The Netherlands, January 2014. (Invited)

Richards, A., Uprety, A.R., Alexander, G.E., Trouard, T.P., Mitchell, K.D. and Barnes, C.A. Cognitive and physiological changes that occur with gradual induction of hypertension in a Cyp1a1-Ren2 middle age transgenic rodent model. Twenty-fifth Annual Undergraduate Biology Research Program, January 2014. (Abstract)

Espinoza, A.I., Uprety, A.R., Lipa, P., Thome, A., Hindley, T.R. and Barnes, C.A. Frontal cortical gamma frequency slowing in aging: Can C6 rescue cortical synchrony and decision speed? Twenty-fifth Annual Undergraduate Biology Research Program, January 2014. (Abstract)

Barnes, C.A. Memory and the aging Brain. Cognitive Aging Symposium, Donders Institute, Nijmegen, The Netherlands, January 2014. (Invited)

Barnes, C.A. Are the functionally important changes in aging specific to white matter alterations? White Matter Meeting: Everything You Need and Want to Know about White Matter. Norwegian Institute of Science and Technology, Trondheim, Norway, February 2014. (Invited)

Barnes, C.A. Hippocampal state: contributes from motor and sensor inputs. Session entitled Neural signals for memory in the primate medial temporal lobe. Winter Conference on Neural Plasticity, Vieques Island, Caribbean, February 2014. (Invited)

Barnes, C.A. Impact on circuits for memory across species. 2014 Picower Institute Lecture, Picower Institute for Learning and Memory, MIT, Cambridge, MA, April 2014. (Invited)

Fakurnejad, S., Engle, J.R., Gray, D.T., Burke, S.N., Plange, K., Recanzone, G.H. and Barnes, C.A. Normal aging is associated with sensory impairments in non-human primates. Twenty-fifth Annual Undergraduate Research, Scholarship and Creative Activities Conference, University of California at Davis, Davis, CA. April 2014. (Abstract)

- Barnes, C.A. Ideas from animal models for effective human therapeutic targets. Scripps Spring Workshop on the Biology of Aging “Therapeutic Approaches for Extending Healthspan: The Next 10 Years”, Jupiter, FL, May 2014.
- Insel, N. and Barnes, C.A. Neuron population activity in the medial prefrontal cortex suggests superimposed codes for situation and situation value. Twenty-third Annual Computational Neuroscience Meeting. Quebec City, Canada. July 2014.
- Barnes, C.A. Cognitive Circuitry Session Discussion Leader. Gordon Research Conference on Neurobiology of Cognition, Newry, ME, July 2014.
- Barnes, C.A. Information processing and behavioral changes during aging. Gordon Research Conference on Neurobiology of Brain Disorders, Girona, Spain, July 2014.
- Siniard, A.L., Schrauwen, I., Corneveaux, J.J., Peden, J., Turk, M.N., De Both, M.D., Richholt, R.F., Mueller, M., Langbaum, J., Reiman, E., Caselli, R., Coleman, P., Barnes, C., Glisky, E., Ryan, L. and Huentelman, M.J. The influence of demographic and disease risk factors on paired associates learning in an internet recruited cohort of over 29,000 individuals. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2013. (Abstract)
- Samson, F.D., Lester, A.W., Lipa, P. and Barnes, C.A. Aging is associated with altered intrinsic neural dynamics in the basolateral complex of the amygdala. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2013. (Abstract)
- Uprety, A.R., Espinoza, A.I., Richards, A., Smith, A.C. and Barnes, C.A. Behavioral of normal aged rats mimics the pattern of task performance of rats with hippocampal lesions on a W-track continuous spatial alternation task. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2013. (Abstract)
- Wiegand, J.-P., Gray, D.T., Schimanski, L.A., Lipa, P., Barnes, C.A. and Cowen, S.L. Age-related changes in high-frequency local field activity in the rodent hippocampus during ripple and inter-ripple periods. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2013. (Abstract)
- Cowen, S.L., Wiegand, J.-P., Gray, D.T., Schimanski, L.A., Lipa, P. and Barnes, C.A. Age-associated changes in spike-timing of hippocampal principal cells and interneurons during ripple oscillations. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2013. (Abstract)
- Miller, M.A., Mehravar, S., Gray, D.T., Koshy, A.A., Cabral, C.M., Chawla, M.K., Kieu, K.Q., Barnes, C.A. and Cowen, S.L. Non-linear optical imaging: A powerful new technique for acquiring high-resolution brain images and possible application for identifying cell types and neuronal activity. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)
- Chawla, M.K., Gray, D.T., Comrie, A.E., Baggett, B.K., Utzinger, U. and Barnes, C.A. Novel method for behavior-driven molecular and structural investigation in rodent whole brain. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)
- Gray, D.T., Thome, A., Erickson, C.A., Lipa, P., Takamatsu, C.L. Comrie, A.E. and Barnes, C.A. Selective changes in inhibitory networks of the medial temporal lobe correlate with behavioral and electrophysiological deficits in aged rhesus macaques. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)

- Han, P., Permenter, M.R., Vogt, J.A, Engle, J.R., Barnes, C.A. and Shi, J. PACAP expression is downregulated in aged nonhuman primates. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)
- Corenblum, M.J., Ray, S., Long, M., Harder, B., Zhang, D.D., Barnes, C.A. and Madhavan, L. Nfe2l2 modulates neural stem cell function during aging. Stem Cell Energetics Symposium, Berkeley, CA, December 2014. (Abstract)

From Selected Affiliates

- Glisky, E. L. and Myhre, J.W. Cognitive benefits of online social networking in older adults. Southern Arizona Psychological Association, Tucson, AZ, February 2014. (Invited)
- Kaszniak, A.W. and Thompson, E. Zen Brain: Consciousness, complex systems, and transformation. Seminar/Retreat given at the Upaya Zen Center and Institute, Santa Fe, NM, February 2014.
- Myhre, J. W., Woolverton, C., Robbins, R., Polsinelli, A. and Glisky, E.L. Facebook for Seniors: The effects of online social networking on cognitive function in healthy older adults. International Neuropsychological Society, Seattle, WA, February 2014. (Abstract)
- Alexander, G. Studies of healthy and pathological aging, Alzheimer's Disease Consortium Retreat, Tucson, AZ, March 2014. (Invited)
- Ahern G.L. Diagnosis of Dementia, Evaluation, and Assessment, Pima County Medical Society, Tucson, AZ, April 2014. (Invited)
- Alexander, G. Brain Imaging Individual Differences in Cognitive Aging”, 2014 McKnight Inter-Institutional Meeting, Gainesville, FL, April 2014. (Invited)
- Glisky, E. L. Improving executive functions through real-world interventions: The role of social media. 2014 McKnight Inter-Institutional Meeting, Gainesville, FL, April 2014. (Invited)
- Alexander, G. Neuroimaging of the Aging Brain: Implications for Successful Aging and the Risk for Alzheimer’s Disease, Cognitive Science Colloquium, University of Arizona, Tucson, AZ, April 2014. (Invited)
- Burns, C.M., Kaszniak, A.W., Chen, K., Lee, W., Bandy, D.J., Caselli, R. and Reiman, E. Association between longitudinal increases in serum glucose and metabolic decline in Alzheimer's disease-related brain regions, 66th Annual Meeting of the American Academy of Neurology, Philadelphia, PA, April 2014. (Poster)
- Baena, E., Buckley, T., Myhre, J. W. and Ryan, L. Age related differences in hippocampal response to increasing difficulty in an associative memory retrieval task: An fMRI investigation of functional compensation in a face-name pairs task, Cognitive Aging Conference, Atlanta, GA, April 2014. (Poster)
- Cardoza, J., Arnold, W., Flores-Wallentin, J., Barense, M. and Ryan, L. An fMRI study comparing perirhinal cortex, temporal pole, and hippocampus activation during complex object discrimination, Cognitive Aging Conference, Atlanta, GA, April 2014. (Poster)
- Cooke, K.A., Kawa, K. Memel, M.B. and Ryan, L. Differential effects of context shifts on object recognition and source memory in older adults, Cognitive Aging Conference, Atlanta, GA, April 2014. (Poster)
- Moseley, S. A., Edwards, C. L. and Glisky, E. L. Ageist stereotypes about memory may not affect all older adults. Cognitive Aging Conference, Atlanta, GA, April 2014. (Poster)
- Polsinelli, A. J., Rentscher, K.E., Martinez, T., Sherman, N. C. and Glisky, E. L. Older adults’ autobiographical memories suggest importance of social interactions and third person

- perspective in maintenance of positive affect. Cognitive Aging Conference, Atlanta, GA, April 2014. (Poster)
- Schmit, M.B., Cooke, K.A. and Ryan, L. Familiarity and the context shift decrement in young and older adults, Cognitive Aging Conference, Atlanta, GA, April 2014. (Poster)
- Kaszniak, A.W. Meditation, aging, and the brain, Neuroscience and Mindfulness Conference, University of Bangor, North Wales, UK, April 2014. (Invited Keynote Address)
- Kaszniak, A.W. Conceptual and methodological issues in neuroscientific research on mindfulness, Neuroscience and Mindfulness Conference, University of Bangor, North Wales, UK, April 2014. (Invited Keynote Address)
- Kaszniak, A.W. Meditation Concurrent Session, Toward a Science of Consciousness 20th Anniversary Conference, Tucson, AZ, April 2014 (Chair and Discussant)
- Ahern G.L. Alzheimer's Disease: What Women Need to Know, 13th Annual Women's Health Symposium, University of Arizona Department of Psychiatry, Westin La Paloma, Tucson, AZ, May 2014. (Invited)
- Kaszniak, A.W. Empathy and compassion: The view from social neuroscience, Being with Dying Training Program, Upaya Zen Center and Institute, Santa Fe, NM, May 2014. (Invited)
- Kaszniak, A.W. Neuroscience of focused attention, executive function, perspective shifting, and mind wandering: Implications for clinicians. Being with Dying Training Program, Upaya Zen Center and Institute, Santa Fe, NM, May 2014. (Invited)
- Kaszniak, A.W. Stress and stress reduction: Biological evidence and practical implications. Being with Dying Training Program, Upaya Zen Center and Institute, Santa Fe, NM, May 2014. (Invited)
- Ahern G.L. Diagnosis of Dementia, Evaluation, and Assessment, Grand Rounds, Department of Medical Imaging. University of Arizona College of Medicine, Tucson, AZ, June 2014. (Invited)
- Arizmendi, B., O'Connor, M.-F. and Kaszniak, A.W. Virtually supportive: a feasibility pilot study of an online support group for dementia caregivers in a 3D virtual environment, 16th Annual Conference of the Arizona Alzheimer's Consortium, Mesa, AZ, June 2014. (Poster)
- Burns, C.M., Kaszniak, A.W., Chen, K., Lee, W., Bandy, D.J., Reschke, C., Caselli, R.J. and Reiman, E.M. An inverse relationship between longitudinal changes in fasting serum glucose and cerebral glucose metabolism in Alzheimer's disease related brain regions, 16th Annual Conference of the Arizona Alzheimer's Consortium, Mesa, AZ, June 2014. (Poster)
- Glisky, E. L. and Myhre, J. W. Facebook for seniors: Effects of online social networking in healthy older adults. 16th Annual Conference of the Arizona Alzheimer's Consortium, Mesa, AZ, June 2014. (Poster)
- Kawa, K., Stickel, A., Walther, K., Glisky, E. L., Hackett, N., Huentelman, M. J., and Ryan, L. (June, 2014). The effects of KIBRA, APOE, and hypertension status on measures of memory functioning in older adults. 16th Annual Conference of the Arizona Alzheimer's Consortium, Mesa, AZ, June 2014. (Poster)
- Schrauwen, I., Corneveaux, J., Siniard, A., Peden, J., Turk, M., De Both, M., Richholt, R., Mueller, M., Langbaum, J., Reiman, E. M., Caselli, R., J., Coleman, P., Barnes, C., Glisky, E., Ryan, L. and Huentelman, M. J. Web-based paired associates testing of over 25,000 individuals demonstrates significant main effects of age, gender, education, and Alzheimer's disease family history on performance. 16th Annual Conference of the Arizona Alzheimer's Consortium, Mesa, AZ, June 2014. (Poster)

- Siniard, A., Schrauwen, I., Corneveaux, J., Peden, J., Turk, M., De Both, M., Richholt, R., Mueller, M., Langbaum, J., Reiman, E. M., Caselli, R., J., Coleman, P., Barnes, C., Glisky, E., Ryan, L. and Huentelman, M. J. The influence of demographic and disease risk factors on paired associate learning in an internet recruited cohort of over 25,000 individuals. 16th Annual Conference of the Arizona Alzheimer's Consortium, Mesa, AZ, June 2014. (Poster)
- Kaszniak, A.W. Ageing, mindfulness, and the brain, Mindfulness Matters: Science and Application in an Emerging Society Conference, Stellenbosch University, Stellenbosch, South Africa, September 2014. (Invited Keynote)
- Kaszniak, A.W. Evaluating contemplative training programs with diverse populations. Mindfulness Matters: Science and Application in an Emerging Society Conference, Stellenbosch University, Stellenbosch, South Africa, September 2014. (Invited)
- Kaszniak, A.W. Closing Reflective Forum, Mindfulness Matters: Science and Application in an Emerging Society Conference, Stellenbosch University, Stellenbosch, South Africa, September 2014. (Invited Panelist)
- Kaszniak, A.W. Science and contemplative practice in a course on empathy and compassion, Symposium on Empathy, Contemplative Practice and Pedagogy, Humanities, and Sciences, University of Utah, Salt Lake City, UT, September 2014. (Invited)
- Kaszniak, A.W. Aging and meditation: evidence from cognitive, affective, and neuroscientific research, Second International Symposium for Contemplative Studies, Boston, MA, October/November 2014. (Invited)
- Alexander, G.E., Fitzhugh, M.C., Raichlen, D.A., Haws, K.A., Torre, G.A., Trouard, T.P., Hischaw, G.A. Individual differences in aerobic fitness influence the regional pattern of brain volume in healthy aging, Aging Brain and Cognition Session, Society for Neuroscience meeting, Washington, DC, November 2014. (Nanosymposium)
- Cardoza, J., Arnold, W., Flores-Wallentin, J., Barens, M. and Ryan, L. Age-related differences in object discrimination: the effects of familiarity on perirhinal cortex, hippocampus and temporal pole fMRI activation, 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)
- Cholanian, M., Krajewski-Hall, S.J, Levine, R.B., McMullen, N.T., Rance, N.E., 7 β -Estradiol reduces the dendritic spine density of KNDy neurons in the arcuate nucleus of ovariectomized Tac2-EGFP transgenic mice, 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)
- Huentelman, M.J., Schrauwen, I., Corneveaux, J., Siniard, A., Peden, J., Langbaum, J., Reiman, E., Caselli, R., Glisky, E., Ryan, L. MindCrowd: Web-based paired associates testing of 19,202 individuals demonstrate main effects of chronological age, gender, education, and Alzheimer's disease family history on performance. 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)
- Kawa, K., Cardoza, J., Stickel, A., Schmit, M., Lozano, M., Glisky, E.L. and Ryan, L. Comparing regional activations between older and younger adults on an fMRI task-switching and memory updating paradigm, 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)
- Memel, M. and Ryan, L. Age-related declines in a hippocampal-mediated visual associative memory task: integration or segmentation? 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)
- Rance, N.E. A role for KNDy neurons in the estrogen modulation of body temperature and the generation of hot flushes, 5th International Symposium on the Physiology and Pharmacology

of Temperature Regulation, Kruger National Park, South Africa, September 2014. (Invited Plenary Speaker)

Rance, N.E. Kisspeptin/Neurokinin B/Dynorphin (KNDy) Neurons in Cutaneous Vasodilation and the Estrogen Modulation of Body Temperature, The Science of Thermoregulation and Vasomotor Symptoms: New Targets for Research and Treatment, 2nd Utian Translational Symposium, Washington DC, October 2014. (Invited)

Rance, N.E. Symposium on Hot Flashes, The North American Menopause Society 2014 Annual Meeting, Washington DC, October 2014. (Invited Plenary Speaker)

Ryan, L. and Baena, E. fMRI correlates of successful encoding and retrieval in response to increasing difficulty during an episodic memory task, 2014 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2014. (Abstract)

Alexander, G.E. Neuroimaging of the Aging Brain: Implications for Successful Aging and the Risk for Alzheimer's Disease, Vanderbilt Memory & Alzheimer's Center Lecture Series, Vanderbilt University Medical Center, Nashville, TN, December 2014. (Invited)

5. Presentations at public (non-scientific) meetings or events

From Barnes

Barnes, C.A. The aging brain: Keeping neurons healthy and active, Pima Council on Aging Speaker Series, Canoa Hills Social Center, Green Valley, AZ, January 2014. (Invited)

Barnes, C.A. Interview on Arizona Illustrated by Georgia Davis, KUAT Channel 7, February 2014. (Invited)

Barnes, C.A. Memory and the Aging Brain. Arizona Now Campaign, La Jolla Country Club, La Jolla, CA, August 2014. (Keynote Speaker)

Barnes, C.A. Memory and the Aging Brain. Arizona Now Campaign, 21 Oceanfront Restaurant, Newport Beach, CA, August 2014. (Keynote Speaker)

Barnes, C.A., Alexander, G.E., Raichlin, D. KGUN Channel 9 News Segment on "Studying the Aging Brain: Methods to Prevent Memory Loss, October 17, 2014.

Goldberg, J., Miller, M., Ramos, K., Barnes, C.A. (Moderator: A. Hart). UA Visionaries Panel Discussion, The President's Club Luncheon, Arizona Biltmore, Phoenix, AZ, October 2014. (Invited Panelist)

From Selected Affiliates

Glisky, E.L. Memory changes with age: What to do about it? Nurses' Association of Green Valley. Green Valley, AZ, January 2014. (Invited)

Kaszniak, A.W. Age-associated cognitive impairment and Alzheimer's disease, Sunnyside High School, Tucson, AZ, January 2014. (Invited)

Dunne, J. and Kaszniak, A.W. Intention, expectation, and transformation, Upaya Zen Center and Institute, Santa Fe, NM, January 2014. (Invited)

Ahern G.L. Alzheimer's Disease: Current Treatments and Future Directions. Annual Conference on Successful Aging. University of Arizona Department of Psychology, Doubletree Hotel, Tucson, AZ, 2/21/2014. (Local)

Alexander, G.E. Understanding Symptoms, Causes and Risks for Alzheimer's Disease, Annual Conference on Successful Aging, Tucson, AZ, February 2014. (Invited)

Mehl, M.R. and Glisky, E.L. The importance of social engagement for successful aging. Annual Conference on Successful Aging, Tucson, AZ, February 2014. (Invited)

Alexander, G.E. Exercise: The surprising links between your brain and body, Pima Council on Aging Brain Health Lecture Series, Green Valley, AZ, February 2014.

Kasznik, A.W. Mindfulness, meditation, and aging: research and practice, Osher Lifelong Learning Institute, University of Arizona, Tucson, AZ, February 2014. (Invited)

Glisky, E.L. Memory changes with age: What to do about it? Pima Council on Aging Lecture Series, Green Valley, AZ, March 2014. (Invited)

Ryan, L. Eating your way to a healthy brain, Sun City Oro Valley, AZ, March 2014 (Invited)

Alexander, G.E. Exercise: The surprising links between your brain and body”, Catalina Methodist Church, Tucson, AZ, April 2014.

Ryan, L. Eating your way to healthy aging: enhancing cognitive functions through diet. Green Valley Pima County on Aging (PCOA) speaker series, Green Valley, AZ, April 2014. (Invited)

Ahern G.L. and Raach, K. Alzheimer’s May Be the 3rd Leading Cause of Death, Interview w/ Barbara Grijalva, KOLD-Channel 13 News, March 2014. (Invited)

Alexander, G.E. Understanding symptoms, causes and risks for Alzheimer’s disease”, Holocaust Survivors Friendly Visitors Program, Jewish Family Services, Tucson, AZ, May 2014.

Barnes, C.A., Alexander, G.E., Raichlin, D. KGUN Channel 9 News Segment on “Studying the Aging Brain: Methods to Prevent Memory Loss”, October 17, 2014.

Kasznik, A.W. Methodological and conceptual challenges in meditation research, The Behavioral Health Pavilion, University of Arizona College of Medicine South Campus. Tucson, AZ, October 2014. (Invited)

Kasznik, A.W. Incorporating multiple contemplative practices in a course on empathy and compassion, Contemplative Pedagogy Faculty Learning Community Workshop, University of Arizona, Tucson, AZ, October 2014. (Invited)

Kasznik, A.W. (2014, November). Conceptual and methodological issues in research on mindfulness and meditation, Arizona Meditation Research Interest Group (AMRIG), Tucson, AZ, November 2014. (Invited)

6. Awards (from McKnight affiliates)

Barnes, C.A. American Psychological Association Award for Distinguished Scientific Contributions, 2014.

Nadel, L. 2014 Sisley-Lejeune International Prize for Research on Intellectual Disabilities.

Sbarra, D. 2014 Herbert Weiner Early Career Award from the American Psychosomatic Society.

7. Faculty

With the award of the additional gift from the McKnight Brain Research Foundation to the Evelyn F. McKnight Brain Institute for a permanent endowment, the Director of this Institute proposed to change the administrative structure of the Institute in two ways: first, to appoint an

Associate Director, and second to create a Strategic Advisory Committee. Thus, in addition to the two levels of faculty participation in the Evelyn F. McKnight Brain Institute at the University of Arizona (the Scientific Advisory Committee, and Affiliate Faculty members), the following individuals have joined the Institute with new duties.

Dr. Lee Ryan has been appointed Associate Director. She was promoted to full Professor this past year; she is a licensed Clinical Psychologist and Cognitive Neuroscientist. Her research involves the study of memory loss in human aging using state of the art MRI and cognitive test battery methodologies. In addition, Lee is very active in community outreach activities and education of the public about normal aging.

Dr. Eric Reiman has been appointed as a member of the Strategic Advisory Board. Eric has outstanding administrative skills and many community and business leader contacts throughout the state of Arizona. Additionally, his experience in the International Prevention Initiative and in drug development and therapeutics will be invaluable as the Institute moves forward with treatment approaches.

Dr. Leslie Tolbert has been appointed as a member of the Strategic Advisory Board. Her administrative experience at the University as its previous Vice President for Research, her knowledge of the players in aging research and important community contacts across the state will be invaluable. Additionally, she has been supportive of the Tucson EMBI since the inception, and understands our goals perfectly.

Dr. Martha Brumfield has been appointed as a member of the Strategic Advisory Board. Martha also has administrative skills that are complementary to those of Eric and Leslie. She has direct experience with pharmaceutical companies (Pfizer) and is deeply involved in worldwide regulatory affairs and quality control for drug trials.

Additionally, the Arizona Health Sciences Center, and its new Senior Vice President for Health Sciences has made a priority the strengthening of our pool of physician scientists at the UA's medical school campus. As part of these efforts, he has recognized Neuroscience as a critical growth area, and Barnes was appointed co-chair with Tolbert and Vanderah to lead a committee to make recommendations on how to proceed. The committee suggested the creation of a "Center for Innovation in Brain Science". Dr. Garcia praised our report, and we have been given permission to recruit a Director to lead this new center. We have had an amazing pool of applicants – have had one interview this past week, and will have 3 more over the next two weeks. Each of these candidates has research interests in aging.

Complete Faculty List

Director

- Carol A. Barnes, Ph.D., Regents' Professor, Psychology and Neurology; Director, Evelyn F. McKnight Brain Institute; Evelyn F. McKnight Chair for Learning and Memory in Aging; Director, ARL Division of Neural Systems, Memory and Aging, Associate Director, BIO5 Institute, University of Arizona

Associate Director

- Lee Ryan, Ph.D., Professor, Psychology; Director, Cognition and Neuroimaging Labs, University of Arizona

Strategic Advisory Committee

- Martha A. Brumfield, Ph.D., President and Chief Executive Officer, Critical Path Institute; Research Professor, Pharmacology and Toxicology, University of Arizona
- Eric M. Reiman, M.D., Ph.D., Professor of Psychiatry; Associate Head for Research and Development (Phoenix Campus), University of Arizona; Director, Arizona Alzheimer's Disease Consortium; Executive Director, Banner Alzheimer's Institute; Clinical Director, Neurogenomics Program, Translational Genomics Research Institute (TGen)
- Leslie P. Tolbert, Ph.D., Regents' Professor, Departments of Neuroscience, and Cellular and Molecular Medicine, University of Arizona

Scientific Advisory Committee (Bios included in following pages)

- Geoffrey L. Ahern, M.D., Ph.D., Professor, Neurology, Psychology and Psychiatry; Medical Director, Behavioral Neuroscience and Alzheimer's Clinic, Bruce and Lorraine Cumming Endowed Chair in Alzheimer's Research, University of Arizona
- Gene E. Alexander, Ph.D., Professor of Psychology, University of Arizona
- Carol A. Barnes, Ph.D., Regents' Professor, Psychology and Neurology; Director, Evelyn F. McKnight Brain Institute; Evelyn F. McKnight Chair for Learning and Memory in Aging; Director, ARL Division of Neural Systems, Memory and Aging, Associate Director, BIO5 Institute, University of Arizona
- Elizabeth Glisky, Ph.D., Professor, Department of Psychology, University of Arizona
- Alfred W. Kaszniak, Ph.D., Head, Department of Psychology; Director, Coordinated Clinical Neuropsychology Program, University of Arizona
- Naomi E. Rance, M.D, Ph.D., Professor, Neurology, Cell Biology and Anatomy, and Pathology; Associate Head, Department of Pathology, University of Arizona
- Lee Ryan, Ph.D., Professor, Psychology; Director, Cognition and Neuroimaging Labs, University of Arizona

Additional Affiliate Faculty:

- Gene E. Alexander, Ph.D., Professor of Psychology, University of Arizona
- E. Fiona Bailey, Ph.D., Assistant Professor of Physiology, University of Arizona
- Heather Bimonte-Nelson, Ph.D., Associate Professor, Honors Disciplinary Faculty. Behavioral Neuroscience Program Director, Arizona State University
- Richard R. Bootzin, Ph.D., Professor of Psychology and Psychiatry; Director, Insomnia Clinic and Sleep Research Laboratory, University of Arizona
- Paul Coleman, Ph.D., UA Associate, Evelyn F. McKnight Brain Institute, University of Arizona; Co-Director and Senior Scientist, J. Roberts Center for Alzheimer's Research; Professor of Neurobiology and Anatomy, University of Rochester Medical Center
- Stephen Cowen, Ph.D. Assistant Professor, Department of Psychology, University of Arizona

- Ralph F. Fregosi, Ph.D., Professor of Physiology, University of Arizona
- Andrew J. Fuglevand, Ph.D., Associate Professor of Physiology, University of Arizona
- Katalin M. Gothard, M.D., Ph.D., Associate Professor of Physiology, University of Arizona
- Meredith Hay, Ph.D., Professor of Physiology, University of Arizona
- Matthew J. Huentelman, Ph.D., UA Associate, Evelyn F. McKnight Brain Institute, University of Arizona; Investigator, Neurobehavioral Research Unit, Translational Genomics Research Institute
- Anita Koshy, M.D., Assistant Professor of Neurology, University of Arizona
- Lalitha Madhavan, MBBS, Ph.D., Assistant Professor, Department of Neurology, University of Arizona
- Diano Marrone, Ph.D., UA Associate, Evelyn F. McKnight Brain Institute; Assistant Professor, Psychology, Wilfrid Laurier University
- Matthias R. Mehl, Ph.D., Associate Professor, Department of Psychology, University of Arizona
- Lynn Nadel, Ph.D., Regents' Professor of Psychology, University of Arizona
- Janko Nikolich-Zugich, M.D., Ph.D., Professor and Chairman, Department of Immunobiology; Co-Director, Arizona Center on Aging, University of Arizona
- Mary-Frances O'Conner, Ph.D., Assistant Professor of Psychology, University of Arizona
- Mary Peterson, Ph.D., Professor of Psychology, University of Arizona
- Steve Rapcsak, M.D., Professor of Neurology, Psychology, and Speech, Hearing and Language Pathology, University of Arizona; Chief, Neurology Section, VA Medical Center
- Linda L. Restifo, M.D., Ph.D., Professor, Neurology, Neuroscience, Cell Biology & Anatomy, and BIO5 Institute, University of Arizona
- David A. Sbarra, Ph.D., Associate Professor and Director of Clinical Training, Department of Psychology, University of Arizona
- Paige E. Scalf, Ph.D., Assistant Professor, Department of Psychology
- Anne C. Smith, Ph.D., Neurophysiology Researcher, EMBI, University of Arizona
- Ted P. Trouard, Ph.D., Associate Professor, Biomedical Engineering
- Pixuan 'Joe' Zhou, Ph.D., Adjunct Research Professor of Optical Sciences, University of Arizona

BIOGRAPHICAL SKETCH

NAME Carol A. Barnes, Ph.D.	POSITION TITLE Regents' Professor		
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
University of California, Riverside, CA	B.A. (Honors)	1971	Psychology
Carleton University, Ottawa, Ontario, Canada	M.A.	1972	Psychology
Carleton University, Ottawa, Ontario, Canada	Ph.D. (Cum laude)	1977	Psychology

Positions

1978	Research Associate , Dalhousie University, Dept. Psychology, Halifax, Canada
1979 - 1980	NRSA Postdoctoral Fellow , Institute of Neurophysiology, Oslo, Norway
1981	NATO Postdoctoral Fellow , Cerebral Functions Group, Univ College, London, England
1982 - 1985	Assistant Professor , Department of Psychology, University of Colorado, Boulder
1985 - 1989	Associate Professor , Department of Psychology, University of Colorado, Boulder
1989 - 1990	Professor , Department of Psychology, University of Colorado, Boulder
1990 - 1996	Professor , Departments of Psychology and Neurology, University of Arizona, Tucson
2006 -	Regents' Professor , Departments of Psychology and Neurology, University of Arizona, Tucson
2006 -	Director , Evelyn F. McKnight Brain Institute, University of Arizona, Tucson
2006 -	Evelyn F. McKnight Endowed Chair for Learning and Memory in Aging , University of Arizona, Tucson
2008 -	Director , ARL Division of Neural Systems, Memory and Aging, University of Arizona, Tucson
2009 -	Regents' Professor , Department of Neuroscience, University of Arizona, Tucson
2009 -	Associate Director , BIO5 Institute, University of Arizona, Tucson

Honors, Awards and Advisory Committees

1969	NSF Summer Research Fellowship
1971	Phi Beta Kappa
1972 – 1974	Ontario Graduate Fellowship
1979 – 1981	NRSA Individual Postdoctoral Fellowship
1981 – 1982	NATO Fellowship in Science
1984 – 1989	Research Career Development Award, N.I.H.
1987 – 1991	Neuroscience, Behavior and Sociology of Aging Committee A, N.I.A.
1989 – 1994	Research Scientist Development Award, Level II, N.I.M.H.
1991 – 1997	Medical and Scientific Advisory Board, Alzheimer's Association
1994 – 1999	Research Scientist Award, N.I.M.H.
1994 – 1997	National Advisory Council on Aging, N.I.H.
1995 – 1999	National Science Advisory Council, American Federation for Aging Research
1996 – 2000	Councilor, Society for Neuroscience
1997 – 2000	Medical and Scientific Advisory Council, Alzheimer's Association
1999 – 2004	Board of Scientific Counselors, N.I.M.H.
2000 – 2002	Secretary, Society for Neuroscience
2003 – 2006	President-Elect (2003-04), President (2004-05), Past-President (2005-06), Society for Neuroscience
2004 – 2014	MERIT Award, National Institute on Aging, NIH
2004	Elected Norwegian Royal Society of Sciences and Letters
2007	Elected Fellow, American Association for the Advancement of Science

- 2007 Elected Executive Committee, Dana Alliance for Brain Initiatives
- 2008 – 2011 Chair, Society for Neuroscience International Affairs Committee – US National Committee (Incoming Chair 2007-2008)
- 2008 APA Division 6 D.B. Marquis Behavioral Neuroscience Award for Behavioral Neuroscience
- 2010 Mika Salpeter Lifetime Achievement Award
- 2010 Elected, Galileo Fellow, College of Science, University of Arizona
- 2010 – 2014 Elected: Chair, Gruber Foundation Neuroscience Prize Advisory Board
- 2011 APA Division 6 D.B. Marquis Behavioral Neuroscience Award for Behavioral Neuroscience
- 2013 Ralph W. Gerard Prize in Neuroscience
- 2014 American Psychological Association Award for Distinguished Scientific Contributions

2014 Publications

- Burke, S.N., Maurer, A.P., Nematollahi, S., Uprety, A., Wallace, J.L. and Barnes, C.A. (2014) Advanced age dissociates dual functions of the perirhinal cortex. *Journal of Neuroscience*, 34:467-480.
- Samson, R.D., Venkatesh, A., Patel, D.H., Lipa, P. and Barnes, C.A. (2014) Enhanced performance of aged rats in contingency degradation and instrumental extinction tasks. *Behavioral Neuroscience*, 128:122-133.
- Zelikowsky, M., Hersman, S., Chawla, M.K., Barnes, C.A., and Fanselow, M. S. (2014) Neuronal ensembles in amygdala, hippocampus and prefrontal cortex track differential components of contextual fear. *The Journal of Neuroscience*, 34:8462-8466.
- Burke, S.N., Thome, A., Plange, K., Engle, J.R., Trouard, T.P., Gothard, K.M., Barnes, C.A. (2014) Orbitofrontal cortex volume in area 11/13 predicts reward devaluation, but not reversal learning performance, in young and aged monkeys. *Journal of Neuroscience*, 34:9905-9916.
- Maurer, A.P., Lester, A.W., Burke, S.N., Ferng, J.J. and Barnes, C.A. (2014) Back to the future: Preserved hippocampal network activity during reverse ambulation. *Journal of Neuroscience*, 34:15022-15031.
- Insel, N. and Barnes, C.A. (2014) Differential activation of fast-spiking and regular-firing neuron populations during movement and reward in the dorsal medial frontal cortex. *Cerebral Cortex*, in press.
- Burke, S.N. and Barnes, C.A. (2014) The neural representation of 3-dimensional objects in rodent memory circuits. *Behavioral Brain Research*, in press.
- Samson, R.D., Venkatesh, A., Lester, A.W., Weinstein, A.T., Lipa, P. and Barnes, C.A. (2014) Age differences in strategy selection and risk preference during risk-based decision making. *Behavioral Neuroscience*, in press.
- Schimanski, L.A. and Barnes, C.A. (2014) Insights into age-related cognitive decline: Coupling neurophysiological and behavioral approaches. In: H.A. Bimonte-Nelson (Ed) The Maze Book: Your Guidebook to Theories, Practice, and Protocols for Testing Rodent Cognition. Springer: New York, in press.
- Siniard, A.L., Corneveaux, J.J., DeBoth, M., Chawla, M.K., Barnes, C.A. and Huentelman, M.J. (2014) RNA sequencing from laser capture microdissected brain tissue to study normal aging and Alzheimer's disease. In: Applied Neurogenomics. Springer: New York, in press.

BIOGRAPHICAL SKETCH

NAME Geoffrey Lawrence Ahern, M.D., Ph.D.	POSITION TITLE Professor		
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
SUNY, Purchase College	B.A.	1976	Psychology
Yale University, New Haven	M.S.	1978	Psychology
Yale University, New Haven	Ph.D.	1981	Psychology
Yale University, New Haven	M.D.	1984	Medicine
Waterbury Hospital, Waterbury	Intern	1984-1985	Medicine
Boston University, Boston	Resident	1985-1988	Neurology
Beth Israel Hospital, Boston	Fellow	1988-1990	Behavioral Neurology

Positions

1977 - 1980	Lab Director , Human Psychophysiology Laboratory, Yale University, New Haven
1985 - 1988	Teaching Fellow , Department of Neurology, Boston Univ School of Medicine, Boston
1988 - 1990	Instructor , Department of Neurology, Harvard Medical School, Boston
1988 - 1990	Attending Neurologist , Beth Israel Hospital, Boston
1990 - 1996	Assistant Professor , Neurology and Psychology, University of Arizona, Tucson
1990 -	Attending Neurologist , University Medical Center, Tucson, Arizona
1990 - 1996	Medical Director , Behavioral Neurology Unit, University of Arizona, Tucson
1990 -	Director , Neurobehavioral Laboratory, University of Arizona, Tucson
1990 -	Member , Committee on Neuroscience, University of Arizona, Tucson, Arizona
1996 - 1999	Associate Professor , Neurology and Psychology, University of Arizona, Tucson
1996 -	Director , Behavioral Neuroscience & Alzheimer's Clinic, Univ of Arizona, Tucson
1999 - 2002	Associate Professor , Neurology, Psychology, Psychiatry, Univ of Arizona, Tucson
2002 -	Professor , Neurology, Psychology, and Psychiatry, University of Arizona, Tucson
2007-	Professor , Evelyn F. McKnight Brain Institute, University of Arizona, Tucson
2007-	Bruce and Lorraine Cumming Endowed Chair in Alzheimer's Research

Honors and Awards

1994-1995	Cited in S Naifeh & GW Smith(eds.), The Best Doctors in America, 2 nd Edition.
1996-1997	Cited in S Naifeh & GW Smith(eds.), The Best Doctors in America, Pacific Region.
1997	Elected, American Neurological Association
1998-1999	Cited in S Naifeh & GW Smith(eds.), The Best Doctors in America, 4th Edition.
2003	Cited in S Naifeh and GW Smith (eds.), The Best Doctors in America, 2003-2004
2005	Cited in S Naifeh and GW Smith (eds.), The Best Doctors in America, 2005-2006
2007	Cited in S Naifeh and GW Smith (eds.), The Best Doctors in America, 2007-2008
2007	Peer Review Circle of Honor Award, Journal of Clinical Psychiatry
2009-2010	Cited in S Naifeh and GW Smith (eds.), The Best Doctors in America
2013-2014	Cited in S Naifeh and GW Smith (eds.), The Best Doctors in America

2014 Publications

Beach, T.G., Adler, C.H., Sue, S.I., Serrano, G., Shill, H.A., Walker, D.G., Lue, L.F., Roher, A.E., Dugger, B.N., Maarouf, C., Birdsill, A.C., Intorcchia, A., Saxon-Labelle, M., Pullen, J., Scroggins, A., Filon, J., Scott, S., Hoffman, B., Garcia, A., Caviness, J.N., Hentz, J.G., Driver-Dunckley, E., Jacobson, S.A., Davis, K.J., Belden, C.M., Long, K.E., Malek-Ahmadi, M., Powell, J.J., Gale, L.D., Nicholson, L.R., Caselli, R.J., Woodruff, B.K., Rapcsak, S.Z., Ahern, G.L., Shi, J., Burke, A.D., Reiman, E.M., Sabbagh, M.N. (2015) Arizona study of aging and neurodegenerative disorders and brain and body donation program. Neuropathology, in press.

BIOGRAPHICAL SKETCH

NAME Gene E. Alexander, Ph.D.	POSITION TITLE Professor		
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Pomona College, Claremont, CA	B.A.	1983	Psychology
Loyola University of Chicago, Chicago, IL	M.A.	1987	Clinical
Loyola University of Chicago, Chicago, IL	Ph.D.	1992	Clinical

Positions

1988-1989	Clinical Psychology Intern , Dept. of Psychiatry & Behavioral Sciences, Univ. of Washington, Seattle, WA
1989-1992	Research Fellow , Dept. of Brain Imaging, NYSPI and Columbia University, NY, NY
1991-1993	Research Scientist I , Dept. of Brain Imaging, NYSPI and Columbia University, NY, NY
1993-1999	Staff Fellow to Sr. Staff Fellow , Lab. of Neurosciences, NIA, NIH, Bethesda, MD
1993-1999	Chief Neuropsychology Unit , Lab. of Neurosciences, NIA, NIH, Bethesda, MD
1999-2003	Research Associate Professor , Dept. of Psychology, Arizona State University, Tempe
1999- date	Director , MRI Morphology Core, Arizona Alzheimer's Disease Research Ctr, Phoenix
2001-2009	Director , Data Management Program/Core, NIA AZ Alzheimer's Disease Core Center
2001- date	Member , Executive Committee, NIA Arizona Alzheimer's Disease Core Center, AZ
2003-2007	Associate Professor to Professor , Psychology Dept., Arizona State University, Tempe
2007-date	Professor , Psychology & Evelyn F. McKnight Brain Institute, Univ of Arizona, Tucson
2007-date	Director , Brain Imaging, Behavior, & Aging Lab, Univ of Arizona, Tucson, AZ

Honors, Awards and Advisory Committees

1995- date	Ad Hoc Reviewer, 20 journals in Neuropsychology, Psychiatry, Neurology, & Neurosci.
1996-1999	Staff Recognition Awards (annual), Laboratory of Neurosciences, National Inst. on Aging
2000- date	Reviewer, Alzheimer's Association Research Grant Program
2003-2007	Member, Study Section, Clinical Neuroscience and Disease, IRG, CSR, NIH
2003	Member, SEP, Women's Health Initiative Memory Study, Review Branch, NHLBI, NIH
2004	Member, Special Emphasis Panel, Alzheimer's Disease Center Grant Review, NIA, NIH
2004-2009	External Advisor, Aging Brain: Vasculature, Ischemia & Behav. Prog Proj, UCSF/Davis
2005-2007	Member, Specialist Peer Review Comm, Psychology: Exp/Clin, Fulbright Scholar Prog
2006	Chair, Special Emphasis Panel, Clin Neurosci & Disease, ZRG1 BDCN-E, IRG, CSR, NIH
2008	Member, SEP, Prog Proj Review Group, Recovery from Illness, ZAG1 ZIJ-8 O1, NIA, NIH
2008	Member, Study Section, Brain Injury & Neurovasc. Path., ZRB 1 BDCN-L (07), CSR, NIH
2008	Member, Special Emphasis Panel, SPRINT Ctr Review, ZHL1 CCT-B C2 1, NHLBI, NIH
2008-date	Member, Neuroimaging Workgroup, International Conf. on Alzheimer's Disease/ISTAART
2009	Reviewer, Special Emphasis Panel, Challenge Grant Panel 10, ZRG1 BDA-A 58 R, CSR, NIH
2009	Member, SEP, P30 Faculty Recruitment in Biomedical Research Core Centers, NIA, NIH
2009	Member, SEP, RC2 Grand Opportunity Grants in Genetics, Epigenetics & Genomics, NIA
2009	Member, SEP, Program Project Review Group, Brain Dopamine, ZAG1 ZIJ-8 J3, NIA, NIH
2009	Member, SEP, Program Project Review Group, Neuroimaging & Aging, ZAG1 ZIJ-5 JF, NIA
2009-date	Member, Faculty Annual Performance Comm, Psychology Dept., Univ. of Arizona
2010	Member, Neurological Sciences & Disorders K Review Committee, NSD-K, NINDS, NIH
2010	Member, Neuroscience of Aging Review Committee, NIA-N, NIA, NIH

- 2010 Member, SEP, Program Project Review Group, Exercise, Motor Deficits, & Aging, ZAG1-ZIJ-9, NIA, NIH
- 2010 Member, SEP, Program Project Review Group, Dopaminergic Dysfunction in Aging, ZAG1 ZiJ-6 J3, NIA, NIH
- 2010-2013 Member, Executive Committee, Neuroscience GIDP, University of Arizona
- 2010 Member, Academic Program Review Faculty Committee, Psych. Dept., Univ of Arizona
- 2010-2013 Elected to NIH Continuous Submission Status for substantial rev. service over the past 3 years
- 2011 Chairperson, Member Special Emphasis Panel, ZAG1 ZIJ-7 (J1), NIA, NIH
- 2011 Member, Neuroscience of Aging Review Committee, NIA-N, NIA, NIH
- 2011-date Advisory Editor, Neurobiology of Aging, Elsevier.
- 2011-2012 Member, Cognitive Aging Working Group, Evelyn F. McKnight Brain Institute
- 2011 Member, VA MHBB Merit Review Subcommittee, Veterans Administration
- 2011 Member, SEP, Loan Repayment Program, ZNS1 SRB-M (76), NIA, NIH
- 2011 Member, SEP, Biobehav. Res. Awards for Innovative New Scientists (BRAINS), ZMH1 ERB-L-04, NIMH, NIH
- 2011 Reviewer, Alzheimer's Disease Pilot Grant Program, Arizona Alzheimer's Disease Center
- 2011-date Fellow, Association for Psychological Science
- 2012 Member, Neurological Sciences & Disorders K Review Committee, NSD-K, NINDS, NIH
- 2012 Member, Neuroscience of Aging Review Committee, ZAG1 ZIJ-4 (J1), NIA, NIH
- 2012-date Member, Cognitive Workgroup, Evelyn F. McKnight Brain Institute
- 2012-date Member, MRI Standardization Workgroup, Evelyn F. McKnight Brain Institute
- 2012-date Director, Annual Conference on Successful Aging, University of Arizona
- 2013 Member, SEP, Neurodegen. & Neurodevelopmental Dis., ZRG1BDCN-Y(02), NIA, NIH
- 2013 Member, SEP, Psychol. Health, Development & Aging, 10 ZRG1 BBBP-D (02), NIA, NIH
- 2013 Member, Development Committee, Department of Psychology, University of Arizona
- 2013 Member, MRI Operations Committee, University of Arizona
- 2013 Member, Alzheimer's Disease Research Centers Review, ZAG1ZIJ4J1, NIA, NIH
- 2013-2019 Member, Neuroscience of Aging Review Comte, NIA-N, NIA, NIH (elected to 6 yr term)
- 2014 Member and Chairperson, Biobehavioral and Behavioral Processes Review Group, ZRG1 BBBP Y 04, CSR, NIH

2014 Publications

- Yoshimaru E, Totenhagen J, Alexander GE, Trouard TP. (2014) Design, manufacture, and analysis of customized phantoms for enhanced quality control in small animal MRI systems. *Magnetic Resonance Medicine*, 71:880-884.
- Raichlen, D., Alexander, G.E. (2014) Exercise, APOE genotype, and the evolution of the human lifespan. *Trends in Neurosciences*, 37, 247-255.

BIOGRAPHICAL SKETCH

NAME Elizabeth L. Glisky, Ph.D.	POSITION TITLE Professor		
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
University of Toronto, Ontario, Canada	B.A.	1958-1962	Psychology
University of Toronto, Ontario, Canada	Ph.D.	1978-1983	Psychology
University of Toronto, Ontario, Canada	Postdoc	1983-1987	Psychology

Positions

1987 - 1989	Visiting Assistant Professor , Dept of Psychology, University of Arizona, Tucson
1989 - 1995	Assistant Professor , Department of Psychology, University of Arizona, Tucson
1995 - 1999	Associate Professor , Department of Psychology, University of Arizona, Tucson
2000 - 2002	Head , Interdisciplinary Program in Gerontology, University of Arizona, Tucson
1999 -	Professor , Department of Psychology, University of Arizona, Tucson
2004 - 2008	Associate Head and Graduate Coordinator , Department of Psychology, University of Arizona, Tucson
2007 -	Professor , Evelyn F. McKnight Brain Institute, University of Arizona, Tucson
2008 – 2009	Acting Head , Department of Psychology, University of Arizona, Tucson
2010 -	Head , Department of Psychology, University of Arizona, Tucson

Honors, Awards and Advisory Committees

1980 - 1981	Natural Sciences and Engineering Research Council postgraduate scholarship
1981 - 1982	University of Toronto open fellowship
1982 - 1983	Ontario Government scholarship
1983 - 1886	University of Toronto postdoctoral award to research fellow
1989 - 1990	University of Arizona, Provost's Teaching Award
2003	Social and Behavioral Sciences Research Professorship
2007	Fellow of the Association for Psychological Science
2011	Elizabeth Hurlock Beckman Award

2014 Publications

Jones, B., Pest, S. M., Vargas, I.M., Glisky, E. L. and Fellous, J-M. Contextual reminders fail to trigger memory reconsolidation in aged humans and rats. *Neurobiology of Learning and Memory*, accepted w/ minor revisions.

BIOGRAPHICAL SKETCH

NAME	POSITION TITLE		
Alfred W. Kaszniak, Ph.D.	Professor of Psychology, Neurology & Psychiatry		
EDUCATION/			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
University of Illinois, Chicago	B.S.	1970	Psychology
University of Illinois, Chicago	M.A.	1973	Clinical Psychology
University of Illinois, Chicago	Ph.D.	1976	Clinical Psychology
Rush Medical College, Chicago	Postdoc	1973-1974	Clinical

Positions

- 1976 - 1979 **Assistant Professor**, Department of Psychology, Rush College of Medicine, Chicago
- 1979 - 1985 **Assistant to Associate Professor**, Department of Psychiatry, University of Arizona, Tucson
- 1985 - 1987 **Associate Professor**, Departments of Psychology and Psychiatry, University of Arizona, Tucson
- 1987 - present **Professor**, Departments of Psychology, Psychiatry and, Neurology, University of Arizona, Tucson
- 2002 - 2010 **Head**, Department of Psychology, University of Arizona, Tucson
- 2007 - present **Professor**, Evelyn F. McKnight Brain Institute, University of Arizona, Tucson

Fellowships, Honors and Awards

- 1978 Distinguished Contribution Award (for dissertation research), Division 20 (Adult Development and Aging), American Psychological Association
- 1989 Commendation for special contributions as a member of the Veterans Administration Geriatrics and Gerontology Advisory Board, Washington, DC
- 1989 Fellow, American Psychological Assoc; 1988 Fellow, Amer Psychological Society
- 1995 President, Section on Clinical Geropsychology, Div 12, Amer Psychological Assoc
- 2004 Koffler Prize for Outstanding Accomplishments in Public Service/Outreach
- 2006 University of Arizona Alumni Association Extraordinary Faculty Award
- 2007 Distinguished Contribution to the Science of Psychology Award, Arizona Psychological Association
- 2008 Contemplative Practice Fellow, Center for Contemplative Mind in Society
- 2009 Fellow, Mind and Life Institute, 2009

2014 Publications

- O'Connor, M.-F., Arizmendi, B. and Kaszniak, A.W. Virtually supportive: A Feasibility pilot study of an online support group for dementia caregivers in a 3D virtual environment. *Journal of Aging Studies*, 30:87-93, 2014.
- Kaszniak, A.W. Preface to *Dialectical behavior therapy for wellness and recovery: Interventions and Activities for Diverse Client Needs* (pp. ix-xi) by Andrew Bein, New York: Wiley, 2014.
- Kaszniak, A.W. Contemplative pedagogy: Perspectives from cognitive and affective science. In O. Gunnlaugson, E.W. Sarath, C. Scott & H. Bai, (Eds.), *Contemplative learning and inquiry across disciplines* (pp. 197-211). New York: State University of New York Press, 2014.
- Back, A.L., Rushton, C.H., Kaszniak, A.W. and Halifax, J.S. Why are we doing this? Clinician helplessness in the face of suffering. *Journal of Palliative Medicine*, in press.

BIOGRAPHICAL SKETCH

NAME Naomi E. Rance, M.D., Ph.D.		POSITION TITLE Professor of Pathology	
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
University of Maryland, College Park	B.S.	1973	Psychology
University of Maryland, Baltimore	Ph.D.	1981	Physiology
University of Maryland, Baltimore	M.D.	1983	Medicine
The Johns Hopkins Hospital	Fellowship	1989	Neuropathology

Positions

1976 -1981 **Predoctoral Fellow**, Department of Physiology, University of Maryland, Baltimore, MD
 1983 -1986 **Resident**, Anatomic Pathology, The Johns Hopkins Hospital, Baltimore, MD
 1986 -1987 **Chief Resident**, Anatomic Pathology, The Johns Hopkins Hospital, Baltimore, MD
 1987 -1989 **Clinical and Research Fellow**, Neuropathology Lab, Johns Hopkins Hospital, Baltimore
 1989 -1995 **Assistant Professor**, Dept of Pathology College of Medicine, Univ of Arizona, Tucson, AZ
 1989 - **Chief**, Division of Neuropathology, University Medical Center, Tucson, AZ
 1989 - **Neuropathology Consultant**, Forensic Science Center, Pima County, Tucson, AZ
 1995 - **Associate Professor**, Dept of Pathology College of Medicine, Univ of Arizona, Tucson, AZ
 1996 - **Associate Chairperson**, Dept of Pathology College of Medicine, Univ of Arizona, Tucson
 2000 - **Professor**, Department of Pathology, Univ of Arizona College of Medicine, Tucson, AZ
 2007 - **Professor**, Evelyn F. McKnight Brain Institute, University of Arizona, Tucson, AZ

Honors, Awards and Advisory Committees

1973 Phi Beta Kappa
 1983 Rudolph Virchow Prize for Research in Pathology, University of Maryland
 1993 Advisory Group, Workshop on Menopause, NIH, Bethesda
 1994, 1997 Ad Hoc member, Biochemical Endocrinology Study Section, NIH, Bethesda
 1995 John Davis Outstanding Residency Teaching Award, Dept. of Pathology, Univ of Arizona
 1995, 1997 Ad Hoc Reviewer, National Science Foundation
 1998 - 2004 Site Visit Review Committees, NIH, NIA Program Project Grants
 1999, 2000, 2001 Basic Science Educator of the Year, University of Arizona College of Medicine
 2001 Advisory Group, NIA Workshop on Primate Models of Menopause, NIH, Bethesda
 2002 Basic Science Educator of the Year Lifetime Award, Univ of Arizona College of Medicine
 2007 Vernon and Virginia Furrow Award for Excellence in Innovation in Teaching, Univ Arizona
 2009 Ad Hoc Reviewer, ICER Study Section, NIH Bethesda
 2010 Ad Hoc Reviewer, Burroughs Welcome Trust
 2011 Ad Hoc Reviewer, ICER Study Section, Chicago Illinois

2014 Publication

Cholanian, M., Krajewski-Hall, S. J., Levine, R.B., McMullen, N. T. and Rance, N.E. (2014)
 Electrophysiology of Arcuate Neurokinin B Neurons in Female Tac2-EGFP Transgenic Mice.
 Endocrinology, 155:2555-2565.

BIOGRAPHICAL SKETCH

NAME		POSITION TITLE	
Lee Ryan, Ph.D.		Professor, Psychology, Neurology, and Neurosciences Program	
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
University of Toronto, Toronto, Canada	BMus	1979	Music
University of Toronto, Toronto, Canada	MA	1981	Music
University of Toronto, Toronto, Canada	BS	1988	Psychology/Neuroscience
University of British Columbia, Vancouver, Canada	Ph.D.	1992	Clinical/Cognitive Psychology
University of California, San Diego, CA	Postdoctoral	93-95	Neuropsychology

Positions

1992 - 1993	Clinical Internship , Department of in Neuropsychology, VA Medical Center, La Jolla, and University of California at San Diego, San Diego, CA
1993 - 1996	Research Scientist , Department of Psychiatry, University of California, San Diego, CA
1998	Participant , Summer Institute on Aging Research, National Institute on Aging
1996 - 2003	Assistant Professor , Departments of Psychology and Neurology, University of Arizona, Tucson, AZ
1996 - present	Director , Cognition & Neuroimaging Laboratories, University of Arizona, Tucson, AZ
2003 - 2014	Associate Professor , Departments of Psychology and Neurology, University of Arizona, Tucson, AZ
2007 - 2014	Associate Professor , Evelyn F. McKnight Brain Institute, University of Arizona, Tucson, AZ
2008 - present	Associate Head , Department of Psychology, University of Arizona, Tucson, AZ
2014 - present	Professor , Departments of Psychology and Neurology, Evelyn F. McKnight Brain Institute, University of Arizona, Tucson, AZ

Honors

1988 - 1992	National Science & Engineering Research Council of Canada Graduate Fellowships
1993 - 1995	National Science & Engineering Research Council of Canada Postdoctoral Fellowships
2000	Member, Memory Disorders Society

2014 Publications

- Hoscheidt, S.M., Labar, K.S., Ryan, L., Jacobs, W.J. and Nadel, L. (2014) Encoding negative events under stress: High subjective arousal is related to accurate emotional memory despite misinformation exposure. *Neurobiology of Learning and Memory*, 112:237-247.
- Lane, R., Ryan, L., Nadel, L. and Greenberg, L. (2014) Memory Reconsolidation, Emotional Arousal and the Process of Change in Psychotherapy: New Insights from Brain Science. *Behavioral and Brain Sciences*, 15:1-80. [Epub ahead of print]
- Ryan, L. and Walther, K. (2014) White matter integrity in older females is altered by increased body fat. *Obesity*, 22:2039-2046.

8. Trainees (faculty advisor in brackets)

Postdoctoral

Monica Chawla, Ph.D. (Barnes)

Area of Interest: Immediate early gene expression in aging in the rat.

James Engle, Ph.D. (Barnes)

Area of Interest: Interactions between peripheral sensory systems and cortical association areas as contributors to age-related memory declines in primates.

Accepted position in Electroneurodiagnostics, Neurodynamics Inc., San Diego, CA

Andrew Maurer, Ph.D. (Barnes)

Area of Interest: Temporal lobe circuits involved in memory. Fellowship ended June 30, 2014. Accepted faculty position, Assistant Professor or Neuroscience, University of Florida, July 2014.

Rachel Samson, Ph.D. (Barnes)

Area of Interest: Age-related changes in the amygdala and emotional perception in the rat.

Predoctoral

Dev Ashish (Kaszniak)

Area of Interest: Aging, mindfulness, attention, and memory.

Elsa Baena (Ryan)

Area of Interest: fMRI studies of memory function in normal older adults.

Christine Burns (Kaszniak)

Area of Interest: Ethnicity, metabolic syndrome, and AD genetic risk as predictors of PET regional glucose metabolism in middle-aged and older adults.

Joe Cardoza (Ryan)

Area of Interest: fMRI studies of memory and aging.

Marina Cholanian (Rance)

Area of Interest: Morphology and electrophysiology of Neurokinin B neurons in the hypothalamic arcuate nucleus.

Megan Fitzhugh (Alexander)

Area of Interest: Translation of human neuroimaging methods to animal models of aging.

Daniel Gray (Barnes)

Area of Interest: Circuits involved in working memory and their decline with age in a non-human primate model of aging.

Kari Haws (Alexander)

Area of Interest: Cognition and neuroimaging in cognitive aging.

Mingzhu Hou (Glisky)

Area of Interest: Source memory and aging.

Kevin Kawa (Ryan)

Area of Interest: Brain imaging, genetics, and cognitive changes in normal older adults.

Ashley Lawrence (Ryan)

Area of Interest: Cardiovascular risk factors and glucose metabolism and the impact on aging.

Adam Lester (Barnes)

Area of Interest: Spatial computations made by the entorhinal cortex and how this changes in aging rats.

Molly Memel (Ryan)

Area of Interest: The underlying mechanisms of memory impairment in older adults.

Suzanne Moseley (Glisky)

Area of Interest: Self-referential processing and metamemory in normal aging.

Laura Nguyen (Alexander)

Area of Interest: Relation of cognitive complaints in relation to cognition and aging in the elderly.

Rose Marie O'Donnell (Kaszniak)

Area of Interest: Developing stress resiliency in middle-aged and older adult caregivers of persons with neurodegenerative disorders.

Angelina Polsinelli (Glisky)

Area of Interest: Emotion and autobiographical memory in normal aging.

Brooke Reid (Alexander)

Area of Interest: Effects of sleep on cognition.

Ruth Robbins (Glisky)

Area of Interest: Social interaction and cognitive function in normal aging.

Ariana Stickel (Ryan)

Area of Interest: Brain imaging, genetics, and cognitive changes in normal older adults.

Autumn Wiley (Kaszniak)

Area of Interest: Mindfulness and attention in younger and older adults.

Janelle Wohltmann (Glisky)

Area of Interest: Social networking in normal aging; memory and executive function; source memory.

Cindy Woolverton (Glisky)

Area of Interest: Self-referential processing in young and older adults.

Undergraduate Students (from Barnes' lab with graduate student / postdoctoral mentor in brackets)

Sarah Ashford (Gray)

Jessica Burkhart (Gray/Lester)

Alison Comrie (Gray)

Leroy Duarte (Samson)

Arturo Espinosa (Uprety)

Marcus Fimbres (Gray)

Adele Koutia (Lester)

Surbhi Patel (Gray/Lester)

Reena Puri (Chawla)

Wonn Ryan (Gray)

Chelsea Takamatsu (Gray)

9. Clinical/translational programs

- 2011- present A Phase 2, Multicenter, 24-Month, Randomized, Third-Party Unblinded, Placebo-Controlled, Parallel-Group Amyloid Imaging Positron Emission Tomography (PET) and Safety Trial of AAC-001 and QS-21 Adjuvant in Subjects with Early Alzheimer's Disease. Protocol # B2571010. Pfizer. Total grant: \$56,031 / patient. 2% salary support, 2% effort.
- 2013 - present A Placebo-controlled, Double-blind, Parallel-group, Bayesian Adaptive Randomization Design and Dose Regimen-finding Study to Evaluate Safety, Tolerability and Efficacy of BAN2401 in Subjects With Early Alzheimer's Disease. Protocol # BAN2401-G000-201. Eisai. Total grant: \$107,194/patient. 2% salary support, 2% effort.
- 2013 - present Effect of Passive Immunization on the Progression of Mild Alzheimer's Disease: Solanezumab (LY2062430) versus Placebo. Protocol # H8A-MC-LZAX. Lilly Pharmaceuticals. Total grant: \$32,863/patient. 2% salary support, 2% effort.
- 2013 - present A Randomized, Double-Blind, Placebo-Controlled, Parallel-Group, 26-Week, Phase 3 Study of Two Doses of EVP-6124 or Placebo in Subjects with Mild to Moderate Alzheimer's Disease Currently or Previously Receiving an Acetylcholinesterase Inhibitor Medication. Protocol # EVP-6124-025. EnVivo Pharmaceuticals. Total grant: \$27,944/patient. 2% salary support, 2% effort.
- 2013 - present A Phase III, Randomized, Double-Blind, Placebo-Controlled, Parallel Group, Double-Blind Clinical Trial to Study the Efficacy and Safety of MK-8931 (SCH 900931) in Subjects with Amnesic Mild Cognitive Impairment Due to Alzheimer's Disease (Prodromal AD). Protocol # 019-00. Merck Sharp & Dohme. Total grant: \$37,069/patient. 2% salary support, 2% effort.
- 2014-present A 26-Week Extension Study of the Safety and Clinical Effects of EVP-6124 in Subjects with Alzheimer's Disease Currently or Previously Receiving an Acetylcholinesterase Inhibitor Medication. Protocol # EVP-6124-025. EnVivo Pharmaceuticals. Total grant: \$27,944/patient. 2% salary support, 2% effort.

10. Technology transfer

Patent issued to Drs. Linda Restifo (McKnight affiliate) and Robert Kraft by U.S. Patent & Trademark Office: U.S. Patent 8,785,149, "*In Vitro* Cellular Bioassay For Neurotoxicity Testing," July 22, 2014.

11. Budget update

Last year's budget and actual results - July 1, 2013 to June 30, 2014

Evelyn F. McKnight Brain Institute

	Budget	Expenditures
Personnel	\$ 500,000	\$ 481,082
Operations	<u>\$ 250,000</u>	<u>\$ 180,261</u>
Total	\$ 750,000	\$ 661,343

Cowen Recruitment Account

	Budget	Expenditures
Cowen start-up	\$ 263,961	\$ 52,352

(a) Status of matching funds

Not Applicable.

(b) Projected budget for coming year (FY 14/15)

Evelyn F. McKnight Brain Institute

Personnel	\$ 500,000
Operations	<u>\$ 250,000</u>
Total	\$ 750,000 *

* \$350,000 2006 gift agreement quasi endowment
\$200,000 2014 gift agreement MBRF operations
\$200,000 2014 gift agreement Institutional match

Cowen Recruitment Account

Cowen start-up	\$ 211,609
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(c) Extramural funding (covering period July 1, 2013 to June 30, 2014)

Grants Received – from Barnes

5 RO1 AG003376-30 (PI: Barnes)

Title: Neurobehavioral Relations in Senescent Hippocampus
Dates: 05/01/14 – 4/30/15 (5/10 – 4/15 project period)
Amount: \$674,882/year total costs (\$594,557/year direct)

5 R37 AG012609-20 (PI: Barnes)

Title: Cell Assemblies, Pattern Completion and the Aging Brain
Dates: 07/01/13 – 06/30/14 (7/09 – 6/14 project period)
Amount: \$276,854/year total costs (\$184,347/year direct)

1 R44 AG035446-04 (PI: LaComb; co-PI: Barnes)

Title: Whole-brain fluorescence and brightfield imaging at single-cell level
Dates: 09/01/13 – 07/31/14 (9/10 – 7/15 project period)
Amount: \$96,398/year total costs (\$63,629/year direct)

2 P30 AG019610-13 (PI: Reiman – Barnes, Director, Ad Hoc Review Program)

Title: Arizona Alzheimer's Disease Core Center Ad Hoc Review
Dates: 07/01/13 – 06/30/14 (7/11 – 6/16 project period)
Amount: \$19,106/year total costs (\$12,611/year direct) / UA Subcontract

State of Arizona, DHS Grant (PI: Barnes)

Title: Arizona Alzheimer's Consortium - UA Evelyn F. McKnight Brain Institute
Date: 07/01/13 – 06/30/14
Amount: \$26,613/year direct costs

1 F32 NS070464-02 (Sponsor: Barnes; NRSA to A. Maurer)

Title: Hippocampal ensemble dynamics during active ambulation, passive movement & rest
Date: 07/01/13 – 06/30/14 (07/11 – 06/14 project period)
Amount: \$55,670 direct costs

McKnight Brain Research Foundation (UA PI: Barnes; co-I: Huentelman)

Title: Evelyn F. McKnight Inter-Institutional Bio-Informatics Core
Date: 12/1/13 – 12/1/15
Amount: \$150,000 direct costs / \$300,000 over 2 years

Sarver Heart Center (PI: Hay; co-PI's: Konhilas, Huentelman, Barnes)

Title: Heart Failure and Cognitive Impairment: Ang-(1-7) Cognitive Protective Therapy
Dates: 01/01/14 – 12/31/17
Amount: \$120,000 direct costs (total project period)

Grants Received - From Selected Affiliates (McKnight affiliate faculty underlined)

State of Arizona, DHS Grant (PI: Ryan)

Title: Arizona Alzheimer's Consortium – The influence of hypertension on the compensation response in older adults
Date: 07/01/13 – 06/30/14
Amount: \$94,263/year direct costs

State of Arizona, DHS Grant (PI: Alexander)

Title: Arizona Alzheimer's Consortium - Risk factors for brain aging and cognitive health
Date: 07/01/13 – 06/30/14
Amount: \$92,575/year direct costs

State of Arizona, DHS Grant (PI: Ahern)

Title: Arizona Alzheimer's Consortium – Clinical Core Enhancement

Date: 07/01/13 – 06/30/14

Amount: \$6,000/year direct costs

2 P30 AG019610-13 (PI: Reiman; co-PI: Ahern)

Title: Arizona Alzheimer's Disease Core Center (UA Clinical Core)

Dates: 07/01/12 – 06/30/13 (7/11 – 7/16 project period)

Amount: \$63,532/year total costs (\$43,255 direct costs) / UA Subcontract

2 P30 AG019610-13 (PI: Reiman; co-PI: Kaszniak)

Title: Arizona Alzheimer's Disease Core Center (Education and Information Core)

Dates: 07/01/12 – 06/30/13 (7/11 – 7/16 project period)

Amount: \$69,225/year total costs (\$45,363 direct costs) / UA subcontract

1 R01 AG025526 (PI: Alexander)

Title: Neuroanatomical Substrates of Aging & Cognitive Decline

Dates: 07/1/13 – 6/30/14 (7/98 – 7/14 project period w/ no cost extension)

Amount: \$1,066,581 total project costs (\$798,381 project direct costs)

R01 AG032315 (PI: Rance)

Title: The Role of Neurokinin B in the Generation of Menopausal Flushes

Dates: 07/01/13 – 06/30/14 (8/08 – 6/14 project period)

Amount: \$277,576 total project costs (\$183,325 project direct costs)

R01 AG031581-15A1 (PI's: Reiman, Caselli; co-PI: Alexander)

Title: PET, APOE & The Preclinical Course of Alzheimer Disease

Dates: 5/1/14 - 3/31/15

Amount: \$14,644/year total costs (UA Subcontract)

Grants Submitted – from Barnes

1 R01 AG049465-01 (PI: Barnes; co-PI's: Alexander, Billheimer, Huentelman, Trouard)

Title: Neural System Dynamics and Gene Expression Supporting Successful Cognitive Aging

Dates: 08/01/13 – 07/31/18 (requested dates of project)

Amount: \$4,602,655 (\$3,750,167 direct)

Status: Awarded 8/1/2014 (\$3,593,688 total costs, \$2,898,554 direct)

1 R01 AG049464-01 (PI's: Coleman, Barnes, Alexander; co-PI's: Billheimer, Huentelman, Trouard)

Title: Epigenetic, Neuroimaging and Behavioral Effects of Hypertension in the Aging Brain

Dates: 08/01/13 – 07/31/18 (requested dates of project)

Amount: \$3,141,968 (\$2,690,142 direct)

Status: Awarded 8/1/2014 (\$2,453,403 total costs, \$2,093,655 direct)

1 R01 AG048907-01 (PI's: Huentelman, Barnes, co-PI: Okuno)

Title: CATT: Development and Application of a Neuronal Cell Activity-Tagging Toolbox
Dates: 08/01/14 – 07/31/17 (requested dates of project)
Amount: \$1,056,635 (\$815,334 direct)
Status: Awarded 9/30/2014 (\$1,056,635 total costs, \$815,334 direct) (UA subcontract \$146,127/year total costs; \$96,483/year direct costs)

State of Arizona, DHS Grant (PI: Barnes)

Title: Arizona Alzheimer's Consortium - Animal Models of Normative Human Aging: From Rodents to Nonhuman Primates
Dates: 07/01/14 – 06/30/15
Amount: \$60,063/year (direct costs)
Status: Awarded 07/01/14

State of Arizona, DHS Grant (PI: Barnes)

Title: Arizona Alzheimer's Consortium - Technologies to Visualize Cells, Pathways and Molecular Circuits in Intact Brains: Interrogating Networks in Normal and Pathological Brains
Dates: 07/01/14 – 06/30/15
Amount: \$100,000/year (direct costs)
Status: Awarded 07/01/14

State of Arizona, DHS Grant (PI: Barnes)

Title: Arizona Alzheimer's Consortium – Internal Scientific Advisory Committee
Dates: 07/01/14 – 06/30/15
Amount: \$10,000/year (direct costs)
Status: Awarded 07/01/14

UA Office of Research & Discovery Institutional Award (PI: Liang; co-PI's: Barnes, Utzinger)

Title: Development of the H2L2-CFM System for Whole Brain Imaging
Dates: December 2014 – December 2015
Amount: \$165,000
Status: Awarded 12/2014

1 R44 EB019329-01 (PI: Zhou, co-PI: Barnes)

Title: Scalable Array Confocal Fluorescent Microscope
Dates: 04/01/14 – 03/31/19 (requested project dates)
Amount: \$250,906 (UA subcontract requested total costs)
Status: Not funded

National Institutes of Health (PI: Machado, co-PI: Barnes)

Title: Temporal Characteristics of Pharmacogenetic Neural Manipulation
Dates: 07/01/14 – 06/30/16 (requested dates)
Amount: \$86,706 (UA subcontract requested total costs)
Status: Not funded

1 R44 EB019329-01 (PI: Liang, co-PI: Barnes)

Title: Novel Confocal Fluorescence Microscope for Mapping Behavior Driven Brain Circuits
Dates: 07/01/14 – 06/30/16 (requested project dates)
Amount: \$396,735 total costs requested
Status: Not funded

2 R01 AG012609-21A1 (PI: Barnes)

Title: Cell Assemblies, Pattern Completion and the Aging Brain
Dates: 09/01/14 – 08/31/19 (requested dates of project)
Amount: \$1,860,725 total costs requested (\$1,250,000 direct costs)
Status: Not funded

National Institutes of Health (PI: Madhavan; co-PI's: Barnes, Davidson, Huentelman)

Title: Neural Stem Cells and the Aging Trajectory
Dates: 09/01/14 – 08/31/19
Amount: \$1,934,591 total costs requested (\$1,379,416 direct)
Status: Not funded.

1 UO1 MH105928-02 (PI: Galbraith; co-PI's: Barnes, Coleman, Huentelman, Merchant)

Title: A Molecular Consensus of Individual Cells and Circuits within Selected Brain Regions
Dates: 09/01/14 – 08/31/17
Amount: \$5,863,730 total costs requested (\$3,670,342 direct)
Status: Not funded.

1 UO1 MH106016-01 (PI's: Liang, Barnes; co-PI's: Hay, Huentelman, Koshy, Merchant, Utzinger)

Title: Mapping of Behavior Circuits: A Scalable Acquisition and Data Management System
Dates: 09/01/14 – 08/31/17
Amount: \$2,262,336 total costs requested (\$1,471,803 direct)
Status: Not funded.

1 R21 MH104979-01A1 (PI: Liang; co-PI's: Barnes, Merchant)

Title: Novel Confocal Fluorescence Microscope for Mapping Behavior-Driven Brain Circuits
Dates: 04/01/15 – 03/31/17
Amount: \$396,735 total costs requested (\$275,000 direct)
Status: Not funded.

1 T32 AG044402-01A1 (PI: Barnes, co-PI's: Coleman, Reiman, Bimonte-Nelson, Huentelman)

Title: Postdoctoral Training, Neurobiology of Aging and Alzheimer's Disease
Dates: 04/01/15 – 03/31/20 (requested dates of project)
Amount: \$1,201,047 total costs requested (\$1,112,105 direct)
Status: Not funded

NIH RO1 (PI's: Sweitzer, Ryan; co-PI's: Alexander, Barnes, Billheimer, Glisky, Hay, Konhilas, Trouard)
Title: Probiotic therapy and memory training to improve cognition in heart failure
Dates: 04/01/15 – 03/31/20 (requested dates of project)
Amount: \$3,804,896 total costs requested (\$2,481,181 direct)
Status: Not funded

Grants Submitted - From Selected Affiliates (McKnight affiliate faculty underlined)

1 RO1 AG049465-01 (PI: Barnes; co-PIs: Alexander, Billheimer, Huentelman, Trouard)
Title: Neural System Dynamics and Gene Expression Supporting Successful Cognitive Aging
Dates: 08/01/13 – 07/31/18 (requested dates of project)
Amount: \$4,602,655 (\$3,750,167 direct)
Status: Awarded 8/1/2014 (\$3,593,688 total costs, \$2,898,554 direct)

1 RO1 AG049464-01 (PI's: Coleman, Barnes, Alexander; co-PI's: Billheimer, Huentelman, Trouard)
Title: Epigenetic, Neuroimaging and Behavioral Effects of Hypertension in the Aging Brain
Dates: 08/01/13 – 07/31/18 (requested dates of project)
Amount: \$3,141,968 (\$2,690,142 direct)
Status: Awarded 8/1/2014 (\$2,453,403 total costs, \$2,093,655 direct)

NIA 1R01AG047887 (PI: Rance)
Title: Role of preoptic NK3R neurons in the estrogen modulation of body temperature
Dates: 8/15/14 - 4/30/2019 (requested dates of project)
Amount: \$1,511,470
Status: Awarded 8/15/14 (\$301,074/year total costs; \$205,000 direct)

State of Arizona, DHS Grant (PI: Alexander)
Title: Arizona Alzheimer's Consortium - Arizona Traumatic Brain Injury Research Planning Workgroup
Dates: 07/01/14 – 06/30/15
Amount: \$30,000/year (direct costs)
Status: Awarded 07/01/14

State of Arizona, DHS Grant (PI: Alexander, co-PI: Raichlen)
Title: Arizona Alzheimer's Consortium – Risk Factors for Brain Aging and Cognitive Health
Dates: 07/01/14 – 06/30/15
Amount: \$67,562/year (direct costs)
Status: Awarded 07/01/14

State of Arizona, DHS Grant (PI: Ryan)

Title: Arizona Alzheimer's Consortium – The Impact of Family History for Alzheimer's Disease on Cognition and Brain Function

Dates: 07/01/14 – 06/30/15

Amount: \$67,562/year (direct costs)

Status: Awarded 07/01/14

State of Arizona, DHS Grant (PI: Ahern)

Title: Arizona Alzheimer's Consortium – Patient Recruitment and Outreach for Alzheimer's Disease and Related Disorders

Dates: 07/01/14 – 06/30/15

Amount: \$6,000/year (direct costs)

Status: Awarded 07/01/14

McKnight Brain Research Foundation (UA PI: Alexander)

Title: McKnight Inter-institutional Neuroimaging Core and Brain Aging Registry

Date: 01/01/15 – 12/31/18

Amount: \$228,730 total costs (UA Field Center)

Status: Awarded 01/01/15

UA BIO5 Fellowship FLW2014-03 (PI's: Alexander; Raichlen)

Title: Aerobic and Cognitive Training to Enhance Brain Aging

Date: 11/1/14 – 5/31/16

Amount: \$30,000 total costs

Status: Awarded 11/1/14

NIH (PI: Alexander; co-P'Is: Glisky, Gries, Hishaw, Rhee, Ryan, Trouard)

Title: Multimodal Imaging & Cognitive Measures for Detection of Mild TBI in the Elderly

Dates: 12/01/13 – 11/30/15 (requested dates of project)

Amount: \$416,625 total costs requested (\$275,000 direct costs)

Status: Not funded

NIH (PI: Alexander; co-PI's: Bootzin, Glisky, Hishaw, Raichlen, Ryan)

Title: NREM Sleep in the Aging Brain, Cognitive Decline & Preclinical Risk for AD

Dates: 07/01/14 – 06/30/19 (requested dates of project)

Amount: \$3,768,470 total costs requested (\$2,612,745 direct costs)

Status: Not funded

Arizona Biomedical Research Commission (PI: Alexander; co-PI's Ryan, Glisky)

Title: Impact of Sleep and Blood Pressure Variation on Brain and Cognitive Health in the Elderly

Dates: 07/01/14 - 06/30/17 (requested dates of project)

Amount: \$749,332 total costs requested

Status: Not funded

NIA RO1 / U Florida (PI's: Cohen, Marsiske; UA PI: Gene E. Alexander; co-PI: Kaszniak)
Title: Augmenting Cognitive Training in Older Adults.
Dates: 9/1/14 - 8/31/19 (requested dates of project)
Amount: \$2,923,169 total costs requested (UA Field Center subcontract)
Status: Not funded

1 RO1 AG050242-01 (PI's: Sweitzer, Ryan; co-PI's: Alexander, Barnes, Billheimer, Glisky, Hay, Konhilas, Trouard)
Title: Probiotic therapy and memory training to improve cognition in heart failure
Dates: 04/01/15 – 03/31/20 (requested dates of project)
Amount: \$3,804,896 total costs requested (\$2,481,181 direct)
Status: Not funded

NSF (PI: Latifi; co-PI: Ryan)
Title: Dynamic intraoperative decision-making of surgeons
Dates: 08/08/14 – 08/17/17 (requested dates of project)
Amount: \$520,593 total costs requested
Status: Not Funded

Arizona Biomedical Research Commission / TGEN (PI: Huentelman; co-I's: Ryan, Glisky)
Title: Genetic factors associated with family history for Alzheimer's disease and their impact on cognitive function
Dates: 07/01/14 – 06/30/17 (requested dates of project)
Amount: \$315,535 total costs requested (UA Subcontractd)
Status: Not Funded

12. Educational programs focusing on age related memory loss (January 1, 2014 – December 31, 2014)

Event: Annual Conference on Successful Aging: Reducing your Risk for Alzheimer's Disease
Date: February 21, 2014
Venue: Double Tree Hotel, Tucson, AZ
Summary: This one day conference was attended by 300 members of the Tucson community and health-care workers.

13. Collaborative programs with McKnight institutions and research programs

Huentelman/Coleman/Barnes

With funds from the first McKnight gift, we explored the possibility of using laser capture microdissection technologies for isolating specific cells in the hippocampus. Barnes provided the tissue from young and aged rats to Huentelman and Coleman who developed methodologies for examining transcriptional fidelity and methylation processes that can be successfully applied following our specific brain extraction techniques. We used these data as “preliminary findings”

in a submitted R01 grant (AG049465). The grant that will make use of these technologies has been funded during the past year.

Trouard/Alexander/Barnes

With funds from the first McKnight gift, Dr. Trouard conducted a number of pilot experiments on a group of young and old rats with his small animal 7T magnet here at the University of Arizona. We have optimized the pulse sequences and the duration of the scanning to times to create rat brain templates, against which the effects of aging can be tracked. Dr. Alexander completed the network analysis for the rat, modeled after the analyses he has developed for humans. We used these preliminary data in the R01 reported above (AG049465), which was funded this past year. Remarkably, the patterns of volumetric change in the rat appears to mimic remarkably well those observed in the human.

Sweatt/Foster/Barnes/Huentelman

We have collaborated on the creation of a new Inter-institutional Epigenetics Core, which was funded during the past year by the McKnight Brain Research Foundation. This core will pioneer a comprehensive program to test an epigenetic hypothesis of cognitive aging across all Evelyn F. McKnight Brain Institutes.

Coleman/Huentelman/Trouard/Alexander/Barnes

With funds from the first McKnight gift, we collected pilot data aimed at exploring whether hypertension alters cognitive performance, structural brain volumes, and epigenetic profiles of genes known to be critical for cognition in a rat model of hypertension. Kenneth Mitchell from Tulane University supplied us with middle-aged F344 transgenic rats in which hypertension can be induced by the administration of a specific xenobiotic compound in the standard rat chow. This model allows us to induce hypertension gradually over months, which more accurately mimics the trajectory of development of hypertension in humans. We started inducing hypertension in 15mo rats, that approximate the typical human age at onset for hypertension (~55yrs). We used these preliminary behavior, imaging and molecular data in a submitted RO1 (AG049464). This grant was funded in the past year.

Huentelman/Okuno/Barnes

With funds from the first McKnight gift, we have worked on a novel method for creating behavior-driven persistent *Arc* expression in single cells that will facilitate our ability to extend the time course of our *Arc* catFISH method. These preliminary data were in a grant that was funded this past year (AG048907) through the prestigious “Eureka” grant mechanism. These grants are awarded for particularly novel and promising new methods designed to understand brain circuits.

Gothard/Barnes/Burke/Thome/Trouard

With funds from the first McKnight gift, Sara Burke and Kojo Plange finished a behavioral study with the young and old bonnet macaques that implicate changes in the function of the amygdala and orbitofrontal cortex in age-related cognitive change. From the MRI scans that have been conducted on these animals, we completed a detailed volumetric analysis of these two cortical structures in relation to these behaviors. The manuscript reporting these findings was published in 2014.

Engle/Burke/Barnes

With funds from the first McKnight gift, James Engle came out to Tucson to administer auditory evoked potential and visual evoked response tests to our young and old bonnet macaques. He was a postdoctoral fellow in my laboratory at the Primate Center in Davis, and he has expertise in sensory system function with aging. These electrophysiological methods are well-studied clinical measures of auditory and visual function. Drs. Engle and Burke have done volumetric analysis from the MRIs obtained from these animals of primary auditory and visual cortex, to determine if there are any relationships between the physiology obtained and brain structure. Both Drs. Engle and Burke moved during the previous year, and while we did present a poster from this work at the Society for Neuroscience, we have not yet completed all the analyses we wish to conduct, but aim to write up a manuscript from the results in the coming year.

14. Collaborative programs with non-McKnight institutions and research programs:

Fanselow/Chawla/Barnes

With funds from the first McKnight gift, we have used our catFISH single cell imaging method on a problem that requires circuit analysis across wide regions of the brain with Dr. Michael Fanselow from UCLA. This collaboration involves an investigation of how context-activated neuronal ensembles change when a context has been fear conditioned. Dr. Fanselow behaviorally prepared the animals for us, and Dr. Chawla sectioned and conducted *in situ* hybridization of the tissue for this experiment. We trained Dr. Fanselow's graduate student, Moriel Zelikowsky, to conduct the cell segmentation and gene product cell localization analysis using our 3D catFISH software. Together, the data demonstrate a dissociable role for the hippocampus and amygdala in processing the contextual and emotional properties of a fear memory. These data were published this past year.

Gazzaley/Burke/Plange/Barnes/Erickson/Gray

With funds from the first McKnight gift, we collaborated in the design and conduct of a series of behavioral studies that were designed and completed in our young and old bonnet macaques that examined the effects of distraction and interruption forms of interference on delay non-matching to sample task performance. These tests were all designed to be conceptually comparable to those that Gazzaley had conducted in older humans, and for which he found older individuals are disproportionately affected by distractors in a variety of tasks. The tasks developed for the bonnet macaques were all conducted using the manual version of the Wisconsin General Testing Apparatus for the interference tasks (Burke/Plange). We have adapted these behavioral tasks using a computer-controlled apparatus, with responses made using a joy stick (Gray/Erickson) to begin to prepare for the next stage of our experiments that will simultaneously record electrophysiological signals from the prefrontal cortex while the monkeys are performing the memory tests. We have successfully trained the animals on the computer-controlled behaviors, and used the preliminary data from them on this task for a grant that was submitted to support the continuation of this work in the fall of 2014.

Beach/Barnes/Engle

Although it appears that no other animal other than humans develop the hallmark neuropathological markers of Alzheimer's disease (amyloid plaques and neurofibrillary tangles), a variety of animals have been found to have some amyloid accumulation, and others scattered intraneuronal tangles. Because of Barnes' tissue bank of behaviorally-characterized rhesus macaques, a systematic analysis can be done in these animals of the distribution and extent of the appearance of these markers in the monkey brain in relation to memory. Barnes has now identified tissue samples from 24 young and aged monkeys that have been sent to Tom Beach for staining of amyloid and tau distribution in these brains. With funds from the first McKnight gift, the last of the tissue sections have now been stained, and Dr. Beach (lead Neuropathologist for the Alzheimer's Core Center in Arizona) indicates that he will have the neuropathological assessments complete by the time of our Center retreat in the spring. Although there have been dozens of reports on the presence or absence of these neuropathological features in a few animals (typically with no cognitive assessment), the present data constitute the only thorough cognitive/tau and amyloid deposition analysis in the primate that exists, and thus should provide the materials to prepare a landmark manuscript.

Maier/Barnes/Barrientos/Hoang

At the second Cognitive Aging Summit I heard a talk given by a colleague that I had had in Boulder, when I was at the University of Colorado from 1982-1990 – Steve Maier. The gist of his talk was that older organisms are more vulnerable to the consequences of a peripheral immune challenge (such as peripheral injection of *E. coli*) than are younger animals. I was amazed to see that not only do the old rats have memory deficits that suggest that consolidation of hippocampus-dependent memory processes are disrupted, but that when they went on to do the physiology, the durability of long-term potentiation, the presumed biological mechanism of memory, was also altered. The idea that a negative life event such as an infection can produce memory impairments, and may contribute to the variability noted in older animals, is intriguing – especially since these effects may be great therapeutic targets for protecting animals from age-related cognitive deterioration. With funds from the first McKnight gift, we conducted an experiment with the Maier lab to assess what brain regions are affected by the immune challenge, using the catFISH method. We prepared the animals, trained them and tested their memory, and sacrificed them and removed their brains. We sectioned the brains in Tucson, and performed *in situ* hybridization for *Arc*, and have collected data from the high resolution confocal microscope. The data need to be organized and summarized so that we can start writing a publication. We did not make more progress towards finishing this experiment this past year, in part because of the heavy load of grant writing over this period; however, this is a long-term investment – but the study may be very “high pay off”, and we should be able to use the data to apply for funding to start trying to test agents that may prevent this negative cognitive outcome in older organisms.

15. Plans for future research

Future research will include continuation and completion of many of the collaborations mentioned above. In addition to those experiments, we will continue with computerized cognitive testing in the young and old bonnet macaques with the goal of conducting our first

behavior/electrophysiological recording studies on these animals in March of this year. We have been engaged in the development and testing of telemetric recording devices for which the McKnight Institute is the primary experimental site for this technology advance. We hope to have the new “Neuralynx Cube” device ready to implement in our bonnet macaques for experimental data acquisition this spring, so that we can eliminate the need to use the more cumbersome (but currently standard) tethered recording method. This will be a great advance for the field of ensemble brain recordings – both in primates and in rats.

We will also continue to develop our goals for whole brain imaging, with single cell resolution. One of the submitted proposals in the past year was particularly well-reviewed for the call for proposals under Obama’s BRAIN Initiative. This was a project that I initiated in collaboration with colleagues in Optical Science here at the University of Arizona. These individuals have been focused on studying the cosmos – and are exceptionally skilled at optical designs. They have an idea for a completely novel approach to microscopy, to enable the imaging of an entire rat brain with single cell resolution. Our reviewers thought that this approach had great promise, but it will be expensive to build a prototype for ‘proof of principle’, and thus we did not have ‘preliminary data’. I have been collecting funds from various sources to support this initial “build”, so that we can resubmit the grant with proof of concept data during the upcoming BRAIN Initiative call for applications in 2015. The new Senior Vice President for Research and Innovation has just awarded our team the additional funds that will be needed to implement this ‘build’. This will likely be an exciting development to emerge over the next year.

16. Endowment investment results (July 1, 2013 to June 30, 2014)

Endowed Chair

Summary for 12 months ending June 30, 2014

Account Name: Evelyn F. McKnight Chair for Learning and Memory in Aging

A. Beginning Balance on July 1, 2013	\$ 863,562
B. Investment Growth	\$ 119,130
C. Distributions (to Endowed Chair Expendable Account)	\$ (33,657)
D. Additional Contributions	\$ 0
E. Ending Balance on June 30, 2014	\$ 946,035

Institute

Summary for 12 months ending June 30, 2014

Account Name: Evelyn F. McKnight Brain Institute

A. Beginning Balance on July 1, 2013	\$ 2,672,916
B. Investment Growth	\$ 240,587
C. Distributions (to Institute Expendable Account)	\$ (646,812)
D. Additional Contributions	\$ 0
E. Ending Balance on June 30, 2014	\$ 2,266,691

17. Where any funds used for a Prohibited Purpose during the report period?

No

18. Do you recommend any modification to the Purpose or mandates in the Gift Agreement?

No

19. Did all activities during the report period further the Purpose?

Yes

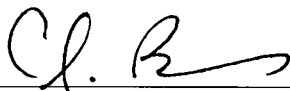
20. Negative Events

No

21. Additional comments

This was an excellent year in terms of research output from the Tucson Evelyn F. McKnight Institute principle lab itself and with collaborators, as well as for its affiliate labs. The McKnight Brain Research Foundation decided to fund the Epigenetics Core, for which there is great enthusiasm among the four Institutes, and for which we showed great progress at the McKnight Poster Session in the form of a poster at the Society for Neuroscience meeting in Washington DC. The gift agreement to establish a permanent endowment for the Tucson EMBI was formalized during the past year, the Foundation has appointed a full time Development Officer for the EMBI to assist with fund raising activities that will be required for the match. Since August, Barnes has participated in five events – including 3 with President Hart herself, aimed at creating the possibility for generating donor interest for the match. This additional gift has created great opportunities for us in Tucson, and we enter into 2015 with optimism about the Arizona philanthropic community.

22.



Carol A. Barnes, Ph.D.
Director, Evelyn F. McKnight Brain Institute

1/18/15
Date