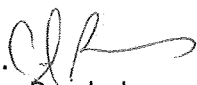


January 3, 2012

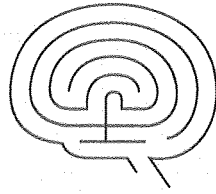
MEMORANDUM

TO: Trustees, The McKnight Brain Research Foundation
J.G. Clarkson, M.D.
J. L. Dockery, M.D.
M.L. Dockery, M.D.
N. Ellenbogen Raim, M.D., J.D.
J.A. Salerno, M.D., M.S.
M.A. Cianciotto, Corporate Trustee

FROM: C.A. Barnes, Ph.D. 
Regents' Professor, Psychology and Neurology
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, 2010 through June 30, 2011 and scientific reports for the period of January 1, 2011 through December 31, 2011.





**Evelyn F. McKnight
Brain Institute**

Annual Report

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

Scientific Report Period: January 1, 2011 – December 31, 2011

Financial Report Period: July 1, 2010 – June 30, 2011

Institution: University of Arizona

Submitted January 4, 2012

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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. The Director has pioneered and developed two primary scientific tools that are used by her laboratory and in collaboration with others. The first involves the ability to monitor cognitive decline in aged rodents and nonhuman primates, in combination with live imaging methodologies, and state-of-the-art ensemble electrophysiological recording in behaving animals. The second is a molecular imaging technology (the catFISH method) that allows the examination of individual cells that participate in circuits critical for memory, and in combination with other methods, can detect transcriptional and epigenetic factors that are altered in these circuits by behavior and aging.

A number of exciting papers were published during 2011, among these include:

Because of the backlog of manuscripts held at Neurobiology of Aging, the collaborative project between the Arizona and Alabama Evelyn F. McKnight Brain Institutes was delayed until 2011. In this paper, the network composition and transcriptional participation of individual cells activated by behavior were examined in young and old rats, using the catFISH imaging methods and brain-region selective RT-PCR developed in Tucson, in combination with an assessment of DNA methylation methods developed in Alabama. The result was the first demonstration that methylation of the *Arc* gene may be responsible for age-related decreases in behaviorally-induced *Arc* transcription in the hippocampus, and that the subregion-specific epigenetic and transcriptional changes may be an important target for memory enhancement.

Two manuscripts using the catFISH method were also published electronically during this year with Institute affiliate member Diano Marrone. Interestingly, there is a second “wave” of *Arc* transcription that occurs about 8 hours after a behavioral experience. In aged rats, granule cells in the dentate gyrus, a region of the hippocampus particularly vulnerable to aging, show reduced late phase *Arc* expression, that is hypothesized to be required for effective consolidation and memory stabilization processes. Importantly, this decreased *Arc* expression in old rats was correlated with impaired spatial memory (Marrone et al., Neurobiology of Aging). Additionally, we studied the ability of adult-born granule cell neurons of old rats to survive and be integrated into the dentate gyrus. Even though neurogenesis is reduced in the old rats compared to adults, the adult born granule cells that survive in the aged brain remain equally responsive to spatial behavior, and can express *Arc* as do younger animals. This suggests that the cells born in the aged dentate gyrus do retain the capacity to participate in functional hippocampal networks (Marrone et al., Hippocampus), which is a promising target for therapeutic intervention for altering memory in aged populations.

The Tucson McKnight Institute funded a collaboration with Leyla de Toledo-Morrell, and the data from this work is now in press. Investigations of rat models of aging have demonstrated that there are the same number of pyramidal cells in layer II of the entorhinal cortex, as well as in hippocampal CA3 and dentate gyrus regions. There are, however, indications of synapse loss from this input, and electrophysiological data suggest that there is a pruning of axon collaterals from the major input pathway from the entorhinal cortex to the hippocampus (the perforant path). If there is,

indeed, a cross-species correspondence in the types of brain changes that occur during aging, then the rodent data predict that humans should also show reductions (pruning) in the region of the perforant pathway as a function of age. *In vivo* structural MRI methods were applied to healthy older individuals and young adults to examine the volume of the white matter that includes the perforant pathway. The results suggest that, indeed, there is a reduction in the white matter projections to the hippocampus in healthy older adults compared to younger persons – consistent with predictions from the animal studies (Stoub et al., in press).

We are excited to have our first manuscript accepted for publication from the group of bonnet macaques that the McKnight Institute in Tucson has maintained. The study was one that compared object discrimination function in young and old rats, and also in these young and old monkeys. The data from both the old rats and old monkeys suggest that behaviors requiring the perirhinal cortex are disrupted in advanced age, and that at least some of these impairments may be explained by deficits during aging in high-level perceptual processing of objects that share common features. The aging deficit appears to be associated with neural computations that require ‘pattern separation’, and involves a particular vulnerability to interference in the old animals. (Burke et al., 2011)

Scott Small and I have talked about writing a ‘position paper’ on the distinction between normal age-related cognitive decline and diseases that also tend to co-occur in aging populations. The manuscript that we originally prepared together, along with 2 others, focused on normal aging and Alzheimer’s disease, but it did not make it through the review process. We changed the focus of the article to include other diseases that affect the hippocampus, found 2 other co-authors expert in the added areas, and this time we were successful in getting this paper published in Nature Reviews Neuroscience. (Small et al., 2011)

The EMBI speaker series at the University of Arizona continues to be an effective tool for facilitating interaction among the affiliate members, when they present their data, as well as adding to the educational benefits that arise from bringing scientists to the Institute from outside Arizona who can inform our future directions for cutting-edge research. Our submission of a Program Project Grant from the group was a significant milestone. The project focuses on the mechanisms underlying individual differences that result in successful rather than unsuccessful cognitive aging in a given organism. The grant involves both human and animal experiments that will define and examine mechanisms conducive to cognitive competence. Dr. Gene Alexander is PI, Barnes co-PI, and affiliate members Drs. Ryan, Huentelman, Coleman and Trouard all have Projects and/or Cores. Our priority score was excellent but not in the fundable range. Dr. Molly Wagster has helped guide us on strategies for our resubmission with we plan for May 25, 2012.

The first round of reviews of a proposal in response to a Request for Proposals “Epigenomics of Human Health and Disease” entitled “Methylation and Transcription Patterns Associated with Differential Cognitive Phenotypes Across Age” that Barnes submitted in collaboration with Coleman and Huentelman was not given a fundable priority score. The focus in this grant is on several specific hippocampal neuronal cell types known to make fundamental contributions to the function of memory circuits in the brain, and to age selectively and independently. We are preparing a revised proposal for the March 5, 2012 deadline.

2. Publications in peer reviewed journals

From Barnes

- Shamy, J.L., Habeck, C., Hof, P.R., Amaral, D.G., Fong, S.G., Buonocore, M.H., Stern, Y., Barnes, C.A., and Rapp, P.R. (2011) Volumetric correlates of spatiotemporal working and recognition memory impairment in aged rhesus monkeys. *Cerebral Cortex*, 21:1559-1573.
- Burke, S.N., Maurer, A.P., Nematollahi, S., Uprety, A.R., Wallace, J.L., and Barnes, C.A. (2011) The Influence of Objects on Place Field Expression and Size in Distal Hippocampal CA1. *Hippocampus*, 21: 783-801.
- Tsai, C.-L., Lister, J.P., Bjornsson, C.J., Smith, K., Shain, W., Barnes, C.A., and Roysam, B. (2011) Robust, globally consistent, and fully-automatic multi-image registration and montage synthesis for 3-D multi-channel images. *Journal of Microscopy*, 243:154-171.
- Small, S.A., Schobel, S.A., Buxton, R.B., Witter, M.P., and Barnes, C.A. (2011) The pathophysiological framework based of hippocampal dysfunction in aging and disease. *Nature Reviews Neuroscience*, 12:585-601.
- Penner, M.R., Roth, T.L., Chawla, M.K., Hoang, L.T., Roth, E.D., Lubin, F.D., Sweatt, D.J., Worley, P.F. and Barnes C.A. (2011) Age-related changes in Arc transcription and DNA methylation within the hippocampus. *Neurobiology of Aging*, 32:2198-2210.
- Burke, S.N., Wallace, J.L., Hartzell, A.L., Nematollahi, S., Plange, K., and Barnes, C.A. (2011) Age-associated deficits in pattern separation functions of perirhinal cortex: A cross-species consensus. *Behavioral Neuroscience*, 125:836-847.
- Marrone, D.F., Satvat, E., Schaner, M.J., Worley, P.F. and Barnes C.A. Attenuated long-term Arc expression in the aged fascia dentata. *Neurobiology of Aging*, in press. [epub ahead of print 20 Sep 2010 DOI: 10.1016/j.neurobiolaging. 2010.07.022]
- Maurer, A.P., Burke, S.N., Lipa, P., Barnes, C.A. Greater running speeds result in increased hippocampal sequence compression. *Hippocampus*, in press. [epub ahead of print 27 Apr 2011 DOI: 10.1002/hipo.20936]
- Stoub, T.R., Barnes, C.A., Shah, R.C., Stebbins, G.T., Ferrari, C., and deToledo-Morrell, L. Age-related changes in the mesial temporal lobe: The parahippocampal white matter region. *Neurobiology of Aging*, in press. [epub ahead of print 3 Apr 2011 DOI:10.1016/j.neurobiolaging. 2011.02.010]
- Marrone, D.F., Ramirez-Amaya, V., and Barnes, C.A. Neurons generated in senescence maintain capacity for functional integration. *Hippocampus*, in press. [epub ahead of print 21 Jun 2011 10.1002/hipo.20959]

From Selected Affiliates

- Campbell, J., Nadel, L., Duke, D., Ryan, L. (2011) Remembering all that and then some: recollection of autobiographical memories after a 1-year delay. *Memory*, 19:406-415.
- Caselli, R.J., Dueck, A.C., Locke, D.E.C., Sabbagh, M.N., Ahern, G.L., Rapcsak, S.Z., Baxter, L.C., Yaari, R., Woodruff, B.K., Snyder, C.H., Rademakers, R., Findley, S., Reiman, E.M. (2011) Cerebrovascular risk factors influence preclinical memory decline in cognitively normal APOE $\epsilon 4$ homozygotes. *Neurology*, 76:1078-1084.
- Chen, K., Ayutyanont, N., Langbaum, J.B., Fleisher, A.S., Reschke, C., Lee, W., Liu, X., Bandy, D., Alexander, G.E., Thompson, P.M., Shaw, L., Trojanowski, J.Q., Jack, C.R., Jr., Landau, S.M., Foster, N.L., Harvey, D.J., Weiner, M.W., Koeppe, R.A., Jagust, W.J., Reiman, E.M.; and

- the Alzheimer's Disease Neuroimaging Initiative. (2011) Characterizing Alzheimer's disease using a hypometabolic convergence index. *Neuroimage*, 56:52-60.
- Combs, F.J. Jr., Erly, W.K., Valentino, C.M., and Rance, N.E. (2011) Best cases from the AFIP: *Balamuthia mandrillaris* amebic meningoencephalitis. *Radiographics*, 31:31-35.
- Dacks, P.A., Krajewski, S.K., and Rance, N.E. (2011) Ambient Temperature and 17 β -estradiol modify Fos-immunoreactivity in the median preoptic nucleus, a putative control center for thermoregulation. *Endocrinology*, 152:2750-2759.
- Dacks, P.A., Krajewski, S.K., and Rance, N.E. (2011) Activation of neurokinin 3 receptors in the median preoptic nucleus decreases body temperature in the rat. *Endocrinology*, 152:4894-4905.
- Edmonds, E.C., Glisky, E.L., Bartlett, J.C., and Rapcsak, S.Z. (2011) Cognitive mechanisms of false facial recognition in older adults. *Psychology and Aging*, doi:10.1037/a0024582.
- Grilli, M.D., and Glisky, E.L. (2011) The self-imagination effect: Benefits of a self-referential encoding strategy on cued recall in memory-impaired individuals with neurological damage. *Journal of the International Neuropsychological Society*, 17:929-933
- McFarland, C., and Glisky, E.L. (2011) Implementation intentions and imagery: individual and combined effects on prospective memory among young adults. *Memory & Cognition*, doi:10.3758/s13421-011-0126-8.
- O'Donnell, R.M., and Kasznik, A.W. (2011) Charting late-life affective disorders. *Generations: Journal of the American Society on Aging*, 35:46-57.
- Ryan, L., Walther, K., Bendlin, B.B., Lue, L.-F., Walker, D.G., and Glisky, E.L. (2011) Age-related differences in white matter integrity and cognitive function are related to APOE status. *NeuroImage*, 54:1565-1577.
- Sano, M., Bell, K.L., Galasko, D., Galvin, J.E., Thomas, R.G., van Dyck, C.H., and Aisen, P.S., for the Alzheimer's Disease Cooperative Study Group (incl. Ahern G.L.) (2011) A randomized, double-blind, placebo-controlled trial of simvastatin to treat Alzheimer disease. *Neurology*, 77:556-563.
- Walther, K., Bendlin, B., Glisky, E., Trouard, T., Lisse, J., Posever, J., and Ryan L. (2011) Anti-inflammatory drugs reduce age-related decreases in brain volume in cognitively normal older adults. *Neurobiology of Aging*, 32:497-505.
- Alexander, G.E., Bergfield, K.L., Chen, K., Reiman, E.M., Hanson, K.D., Lin, L., Bandy, D., Caselli, R.J., and Moeller, J.R. Gray matter network associated with risk for Alzheimer's disease in young to middle-aged adults. *Neurobiology of Aging*, provisionally accepted.
- Ewers, M., Walsh, C., Trojanowski, J.Q., Shaw, L.M., Petersen, R.C., Jack, C.R., Jr., Feldman, H.H., Bokde, A.W.L., Alexander, G.E., Scheltens, P., Vellas, B., Dubois, B., Weiner, M., Harald Hampel, H., in collaboration with the North American Alzheimer's Disease Neuroimaging Initiative (ADNI). Prediction of Conversion from Mild Cognitive Impairment to Alzheimer's Disease Dementia Based upon Biomarkers and Neuropsychological Test Performance, *Neurobiology of Aging*, in press.
- Henry, M.L., Beeson, P.M., Alexander, G.E., Rapcsak, S.Z. Written language impairments in primary progressive aphasia: A reflection of damage to central semantic and phonological processes, *Journal of Cognitive Neuroscience*, in press.
- Hua, X., Gutman, B., Boyle, C., Rajagopalan, P., Leow, A.D., Yanovsky, I., Kumar, A.R., Toga, A.W., Jack, C.R., Schuff, N., Alexander, G.E., Chen, K., Reiman, E.M., Weiner, M.W., Thomson, P.M., and the Alzheimer's Disease Neuroimaging Initiative. Accurate measurement of brain changes in longitudinal MRI scans using tensor-based morphometry. *Neuroimage*, in press.

McFarland, C., and Glisky, E. Implementation intentions and prospective memory among older adults: An investigation of the role of frontal lobe function. *Aging, Neuropsychology, and Cognition*, in press.

3. Publications (other)

From Barnes

Barnes, C.A. (2011) Secrets of aging. *The Scientist*, 25:30-35.

Barnes, C.A. (2011) Secrets of aging: What does a normally aging brain look like? *F1000 Biology Reports*, 3:22.

Hoang, L. and Barnes, C.A. (2011) The ageing hippocampus. In: *Clinical Neurobiology of the Hippocampus*. Bartsch, T. (ed.) Oxford University Press, in press.

From Selected Affiliates

Glisky, E. L. (2011) Forgetting. In J. S. Kreutzer, J. DeLuca, and B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology*. New York: Springer.

Glisky, E. L. (2011) Implicit memory. In J. S. Kreutzer, J. DeLuca, and B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology (Part 9)*, pp. 1301-1302. New York: Springer.

Glisky, E. L. (2011) Incidental memory. In J. S. Kreutzer, J. DeLuca, and B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology (Part 9)*, 1303-1304. New York: Springer.

Glisky, E. L. (2011) Method of vanishing cues. In J. S. Kreutzer, J. DeLuca, and B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology (Part 13)*, pp. 1586-1587. New York: Springer.

Glisky, E. L. (2011) Memory. In J. S. Kreutzer, J. DeLuca, and B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology (Part 13)*, pp. 1555-1560. New York: Springer.

Kaszniak, A.W. (2011) Meditation, mindfulness, cognition, and emotion: Implications for community-based older adult programs. In P. Hartman-Stein and A. LaRue (Eds.), *Enhancing cognitive fitness in adults: A guide to the use and development of community-based programs* (pp. 85-106). New York: Springer.

Kaszniak, A.W. Contemplative pedagogy: Perspectives from cognitive and affective science. In H. Bai, E. Sarath, and C. Scott (Eds.), *Contemplative approaches to learning and inquiry across disciplines*. New York: State University of New York Press, in press.

Kaszniak, A.W., and Menchola, M. Behavioral neuroscience of emotion in aging. In M.-C. Pardon and M. Bondi (Eds.), *Behavioral Neurobiology of Aging*. Berlin: Springer-Verlag, in press.

Levy, D.M., Wobbrock, J.O., Kaszniak, A.W. and Ostergren, M. (2011) Initial results from a study of the effects of meditation on multitasking performance. In: *Proceedings of ACM CHI 2011 Conference on Human Factors in Computing Systems* (pp. 2011-2016). New York: ACM Press.

Kihlstrom, J. F., and Glisky, E.L. Amnesia. In V. S. Ramachandran (Ed.), *Encyclopedia of human behavior* (2nd Ed). Oxford: Elsevier., in press.

4. Presentations at scientific meetings

From Barnes

Barnes, C.A. (2011) Neurobiology Mechanisms of Memory Decline in Normal Aging. Basic Medical Sciences Seminar Series, College of Medicine Phoenix Campus, Phoenix, AZ, February 2011. (Invited)

- Barnes, C.A. (2011) Age-Related Memory Declined Methylation of the Arc Gene. Winter Conference on Neural Plasticity 23rd Annual Meeting, Moorea, Tahiti, February 2011. (Invited)
- Barnes, C.A. (2011) Input to Lateral Entorhinal Cortex from Perirhinal Cortex: Changes with Aging. Winter Conference on Neural Plasticity 23rd Annual Meeting, Moorea, Tahiti, February 2011. (Invited)
- Barnes, C.A. (2011) Symposium entitled "A Cross-Species Consensus on the Neurobiology of Normal Aging: From Single Unit Activity to Behavioral Output", Spring Brain Conference, Tucson, Arizona, March 2011. (Invited)
- Barnes, C.A. (2011) Neural correlates of age-related memory deficits in rats and monkeys. Biology of Aging Workshop Seminar, Oregon Primate National Research Center, Beaverton, OR, March, 2011. (Invited)
- Barnes, C.A. (2011) Impact of Aging on Circuits Critical for Memory, Brains and Behavior Distinguished Lecture Series, Brains and Behavior Program, Georgia State University, Atlanta, GA, April, 2011. (Invited)
- Barnes, C.A. (2011) Effect of aging on object recognition and perirhinal cell ensembles. Symposium entitled "That 'Other' Part of the Temporal Lobe Involved in Perception and Memory," Spring Hippocampal Research Conference, Verona, Italy, May 2011. (Symposium)
- Barnes, C.A. (2011) Brain Changes Underlying Changes in Information Processing and Memory During Late Ontogeny (Senescence), Healthy Brain 2011 - Aging and Brain Disease Conference, Oslo, Norway, June 2011. (Invited)
- Barnes, C.A. (2011) Brain Mechanisms of Memory: Changes During Normal Aging, 2011 Annual Meeting of the Society for Psychophysiological Research. Boston, MA, September 2011. (Invited)
- Barnes, C.A. (2011) Cognitive Consequences of Aging Neural Circuits, Behavioral Neuroscience Symposium, Gladstone Institute, San Francisco, CA, September 2011. (Invited)
- Barnes, C.A. (2011) Brain Mechanisms of Learning and Memory in Aging: What is "Normal"?, Notter Lecture, Department of Neurobiology and Anatomy, University of Rochester, Rochester, NY, October 2011. (Invited)
- Zelikowsky, M., Chawla, M.K., Hast, T., Bennet, R., Barnes, C.A., and Fanselow, M.S. (2011) Unique neuronal ensembles in the infralimbic and prelimbic cortices represent fearful environments. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Hartzell, A.L., Burke, S.N., Hoang, L.T., Lister, J.P., Rodriguez, C., and Barnes, C.A. (2011) Transcription of the immediate-early gene Arc in the hippocampus reveals activity differences along the transverse axis of the CA1 subregion. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Lister, J.P., Clasen, S.J., Hartzell, A.L., Burke, S.N., and Barnes, C.A. (2011) Aging affects the pattern of Arc expression in lateral entorhinal cortex during object exploration. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Allen, A.N., Chawla, M.K., Corneveaux, J.J., Reiman, E.M., Rose, H.E., Barnes, C.A., and Huentelman, M.J. (2011) Next generation RNA sequencing identifies novel dendritic mRNA species in the hippocampus. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Maurer, A.P., Hoang, L.T., Burke, S.N., Hindley, T., Marsh, R., and Barnes, C.A. (2011) Back to the future: Dissociation of head direction and motion alters CA1 place fields. Abstract

- Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Hoang, L.T., Richards, A., Allen, A.N., Biwer, L.A., Alexander, G.E., Hale, T.M., Mitchell, K.D., Huentelman, M.J., and Barnes, C.A. (2011) Cognitive consequences of the gradual induction of hypertension in middle age using Cyp1a1-Ren2 transgenic rats. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Alexander, G.E., Lin, L., Yoshimaru, E., Hoang, L.T., Bergfield, B.L., Lister, J.P., Chen, K., Moeller, J.R., Barnes, C.A., and Trouard, T.P. (2011) Regional network pattern of MRI gray matter in the aged rat. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Plange, K., Burke, S.N., Nematollahi, S., Gazzaley, A., and Barnes, C.A. (2011) The effects of distraction and interruption forms of interference on recognition memory in young and aged bonnet macaques. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Thome, A., Lipa, P., Erickson, C.A., and Barnes, C.A. (2011) Experience-dependent modification of temporal correlations between cortical neurons in awake behaving rhesus macaques. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Schimanski, L.A., Lipa, P., and Barnes, C.A. (2011) Direction-dependent context discrimination is deficient in aged rats. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Insel, N. and Barnes, C.A. (2011) Uncertainty is associated with changes in the dorsal medial frontal cortex related to movement and the expectation of future movement. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Lester, A.W., Samson, R.D., Lipa, P., Schimanski, L.A., and Barnes, C.A. (2011) Ensemble correlates of reward uncertainty in the amygdala. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Samson, R.D., Patel, D.H., Venkatesh, A., Lipa, P., and Barnes, C.A. (2011) Altered threshold for contingency degradation in aged F344 rats. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Venkatesh, A., Samson, R.D., Weinstein, A.T., Lipa, P., and Barnes, C.A. (2011) Aged F344 rats opt for the safe yet disadvantageous option, in a risk-based decision making task. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Barnes, C.A. (2011) Learning and Memory in Aging: What is "Normal", Notable Neuroscientist Lecture Series (Scientific Presentation), West Virginia University, Morgantown, WV, December 2011. (Invited)

From Selected Affiliates

- Kaszniak, A.W. (2011) Zen brain: Consciousness and the fundamental nature of mind – Perspectives from Buddhism, neuroscience, and philosophy. Retreat/seminar (A.W. Kaszniak & J. Halifax, organizers) held at the Upaya Zen Center, Santa Fe, NM, January 2011. (Invited)
- Ahern, G.L. (2011) Assessment and Treatment of Dementia: Part 1. Current Clinical Practice; Psychopharmacology Review. University of Arizona Department of Psychiatry, Ventana Canyon Resort, Tucson, AZ, February 2011. (Invited)

- Ahern, G.L. (2011) Assessment and Treatment of Dementia: Part 2. Current Clinical Practice; Psychopharmacology Review. University of Arizona Department of Psychiatry, Ventana Canyon Resort, Tucson, AZ, February 2011. (Invited)
- Grilli, M.D., and Glisky, E.L. (2011) Enhancing cued recall in memory-impaired individuals: The mnemonic advantage of self-imagining. International Neuropsychological Society, Boston, MA, February 2011. (Abstract)
- Grilli, M.D., and Glisky, E.L. (2011) Imagining from a field perspective enhances recognition memory more than imagining from an observer perspective. International Neuropsychological Society, Boston, MA, February 2011. (Abstract)
- Edmonds, E.C., Glisky, E.L., and Rapcsak, S.Z. (2011) Pathological false recognition in FTD/ALS: Evidence for a general impairment of frontal executive memory functions. International Neuropsychological Society, Boston, MA, February 2011. (Abstract)
- Kaszniak, A.W. (2011) The role and potential impact of contemplative practices in a course on the psychology of empathy and compassion. Invited paper presented at the conference, Throughout the Curriculum: Contemplative Practices in Higher Education, Amherst, MA, March 2011. (Invited)
- Ahern, G.L. (2011) Alzheimer's Disease: What Women Need to Know. 10th Annual Women's Health Symposium. University of Arizona Department of Psychiatry, UA Student Union, Tucson, AZ, March 2011. (Invited)
- Alexander, G.E. (2011) Impact of hypertension and aerobic fitness on cognitive aging. Fourth Annual McKnight Brain Research Foundation Inter-Institutional Meeting, Miami, FL, May 2011. (Invited)
- Levy, D. M., Wobbrock, J.O., Kaszniak, A.W., and Ostergren, M. (2011) Can meditation improve multitasking? ACM CHI Annual Conference on Human Factors in Computing Systems, Vancouver, B.C., Canada, May 2011. (Abstract)
- Rance, N.E. (2011) Role of Neurokinin B in the Hypothalamic Regulation of Reproduction, Seminar Speaker, Netherlands Institute on Neuroscience, Amsterdam, The Netherlands., May 2011. (Invited)
- Ryan, L. (2011) Functional compensation in older adults: interactions between frontal and perirhinal functions. Symposium entitled "That 'Other' Part of the Temporal Lobe Involved in Perception and Memory," Spring Hippocampal Research Conference, Verona, Italy, May 2011 (Symposium)
- Alexander, G.E. (2011) Neuroimaging of the aging brain. McKnight Seminar Series, University of Miami, Miami, FL, June 2011. (Invited)
- Alexander, G.E. (2011) Networks of regional covariance in MRI gray matter: Reproducible multivariate patterns in AD, MCI and healthy aging. Presented at the Arizona Alzheimer's Consortium Annual Scientific Conference, Scottsdale, AZ, June 2011. (Abstract)
- Alexander, G.E., Hanson, K.D., Bergfield, K.L., Hishaw, G.A., Bowen, T.A., Vargas, I.M., Lin, L., Valfre, M.E., Aiken, L.S., Luecken, L.J., Chen, K., Reiman, E.M., Ahern, G.L., Huentelman, M.J., Trouard, T.P., Moeller, J.R. (2011) Impact of hypertension and aerobic fitness on brain and cognitive aging: a network analysis of MRI gray matter in healthy late middle-aged and older adults. Presented at the Arizona Alzheimer's Consortium Annual Scientific Conference, Scottsdale, AZ, June 2011. (Abstract)
- Burns, C.M., Chen, K., Kaszniak, A.W., Lee, W., Alexander, G.E., Bandy, D.J., Fleisher, A., Caselli, R.J., and Reiman, E.M. (2011) Investigating the association between fasting serum glucose levels and cerebral metabolic rate for glucose in brain regions affected by Alzheimer's disease. Data Blitz presentation at the Arizona Alzheimer's Consortium Annual Scientific Conference, Scottsdale, AZ, June 2011. (Invited)

- Jessup, C.J., Betcher, K.M., Reisdorf, K.K., Minopoli, E.M., Slosky, L.M., Le, E.T., Brock, J.H., Day, B.K., Alexander, G.E. (2011) Southern Arizona Healthy Aging Registry. Presented at the Arizona Alzheimer's Consortium Annual Scientific Conference, Scottsdale, AZ, June 2011. (Abstract)
- Walther, K., Kawa, K.H., Pu, L., Baena, E., Alexander, G.E., Ryan, L. (2011) Varying task difficulty in younger and older adults in an fMRI source memory task. Presented at the Arizona Alzheimer's Consortium Annual Scientific Conference, Scottsdale, AZ, June 2011. (Abstract)
- Kaszniak, A.W. (2011) The Francisco J. Varela Research Grant program, 2011 Mind and Life Summer Research Institute, "New Frontiers in Contemplative Science," Garrison, N.Y., June 2011. (Invited)
- Burns, C.M., Chen, K., Kaszniak, A.W., Lee, W., Alexander, G.E., Bandy, D.J., Fleisher, A., Caselli, R.J., and Reiman, E.M. (2011) Investigating the association between serum glucose levels and cerebral metabolic rate for glucose in brain regions affected by Alzheimer's disease, International Conference on Alzheimer's Disease, Paris, France, July 2011. (Abstract)
- Kaszniak, A.W. (2011) Empathy and compassion: Neuroscientific perspectives, Zen Brain: Trauma, Stress, Loss, and Happiness retreat/seminar (A.W. Kaszniak & J. Halifax, organizers, Upaya Zen Center, Santa Fe, NM, August 2011. (Invited)
- Kaszniak, A.W., Halifax, J., Chrousos, G., Bonnano, G., and Golden, P. (2011) Discussion panel at the "Zen Brain: Trauma, Stress, Loss, and Happiness retreat/seminar (A.W. Kaszniak & J. Halifax, organizers) held at the Upaya Zen Center, Santa Fe, NM, August 2011. (Invited)
- Alexander, G.E. (2011) Neuroimaging in Aging and Alzheimer's Disease. Neurosurgery Didactic Conference, University of Arizona College of Medicine, Tucson, AZ, October 2011. (Invited)
- Glisky, E.L. (2011) Longitudinal changes in memory and executive function in normal aging. Invited symposium on "Memory Decline and Rehabilitation," Annual Meeting of the Canadian Association on Gerontology, Ottawa, Canada, October 2011. (Invited)
- Alexander, G.E., Lin, L., Yoshimaru, E., Hoang, L.T., Bergfield, B.L., Lister, J.P., Chen, K., Moeller, J.R., Barnes, C.A., and Trouard, T.P. (2011) Regional network pattern of MRI gray matter in the aged rat. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Baena, E., and Ryan, L. (2011) Functional compensation in response to increasing task difficulty: An fMRI investigation of episodic and semantic memory in young adults. Annual meeting of the Society for Neuroscience, Washington DC, November 2011. (Abstract)
- Bergfield, K.L., Hanson, K.L., Lin, L., Hishaw, G.A., Minopoli, E.M., Haws, K.A., Chen, K., Reiman, E.M., Trouard, T.P., Moeller, J.R., and Alexander, G.E. (2011) Network of MRI gray matter volume associated with cognitive performance in healthy elderly. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Cholanian, M., Krajewski, S.J. McMullen, N.T., and Rance, N.E. (2011) Characterization of a Tac2-EGFP mouse for the study of arcuate NKB neurons. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Forbes, C.E., Cox, C., Schmader, T., and Ryan, L. (2011) Negative stereotype activation alters interaction between neural correlates of arousal, inhibition and cognitive control. Annual meeting of the Society for Neuroscience, Washington DC, November 2011. (Abstract)
- Hanson, K.D., Bergfield, K.L., Lin, L., Chen, K., Minopoli, E.M., Haws, K.A., Ryan, L., Glisky, E.L., Kaszniak, A.W., Reiman, E.M., Moeller, J.R., Trouard, T.P., Hishaw, G.A., and Alexander, G.E. (2011) Relationship of aerobic fitness to brain aging and cognition in older adults. Annual meeting of the Society for Neuroscience, Washington DC, November 2011. (Abstract)

- Haws, K., Minopoli, E.M., Hanson, K.D., Bergfield, K.L., Hishaw, G.A., Lin, L., Luecken, L.J., and Alexander, G.E. (2011) Nocturnal blood pressure variation and hypertension interact to influence neuropsychological performance in cognitive aging. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011 (Abstract)
- Hishaw, G.A., Bergfield, K.L., Hanson, K.D., Lin, L., Minopoli, E.M., Haws, K.A, Chen, K., Reiman, E.M., Trouard, T.P., Moeller, J.R., and Alexander, G.E. (2011) Relation of MRI white matter hyperintensity severity to the age-related network pattern of gray matter in healthy cognitive aging. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011 (Abstract)
- Kawa, K., Ryan, L., Pandurangi, S., Hirschman, P., Hackett, N., and Huentelman, M.J. (2011) The role of education in the association between KIBRA genotypes and episodic memory performance. Annual meeting of the Society for Neuroscience, Washington DC, November 2011. (Abstract)
- Krajewski, S. J., Smith, M.A., Williams, H., Ciofi, P., Lai, J.Y., McMullen N. T., and Rance N.E. (2011) Ablation of NK3 receptor-expressing KNDy neurons in the rat arcuate nucleus using [MePhe7]Neurokinin B-Saporin. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Lin, L., Bergfield, K.L., Hanson, K.D., Hishaw, G.A., Haws, K., Minopoli, E.M., Chen, K., Trouard, T., Reiman, E.M., Moeller, J.R., and Alexander, G.E. (2011) Regional network covariance networks of MRI cortical thickness in healthy aging. . Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Minopoli, E.M., Bergfield, K.L., Hanson, K.D., Hishaw, G.A., Haws, K.A., Lin, L., and Alexander, G.E. (2011) Age-related differences in executive cognitive performance is influenced by level of physical leisure activity in healthy elderly. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Ryan, L., Kevin, K.H., Walther, K., Hackett, N., Huentelman, M.J. (2011) KIBRA gene variants are associated with age-related white matter integrity in healthy elderly. Annual meeting of the Society for Neuroscience, Washington DC, November 2011. (Abstract)
- Smith, M.A., Williams, H., Krajewski, McMullen N. T., and Rance N.E. (2011) Arcuate NK3 receptor-expressing KNDy neurons are essential for estrogen modulation of LH secretion and body weight in the female rat. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, November 2011. (Abstract)
- Rance, N.E. (2011) Menopause and the Human Hypothalamus, Colloquium speaker, Department of Integrative Physiology, University of Colorado, Boulder, December 2011. (Invited)

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

From Barnes

- Barnes, C.A. (2011) The Neural Mechanisms of Memory and the Aging Brain. Osher Lifetime Learning Institute Seminar Series, University of Arizona, February 2011 (Invited)
- Barnes, C.A. (2011) Normal Aging. What happens to our Brains. WaveLengths, KUAT – Channel 6 (Pam White Interviewer), February 2011.
- Barnes, C.A. (2011) What Can we Learn From Animals about Successful Aging? Forum on the Aging Brain: How to Age Successfully, Pima Community College Performing Arts Center, Green Valley, AZ, March, 2011 (Invited)

- Barnes, C.A. (2011) Memory & Aging: Myth vs Fact. Adults Night Out, Arizona Science Center, Phoenix, April 2011 (Invited)
- Barnes, C.A. (2011) Memory & Aging: Myth vs Fact, Notable Neuroscientist Lecture Series, Notable Neuroscientist Lecture Series (General Audience Presentation), West Virginia University, Morgantown, WV, December 2011 (Invited)

From Selected Affiliates

- Glisky, E.L. (2011) Memory: How does it work, how is it measured, and how does it change with age? Osher Lifelong Learning Institute, Tucson, AZ, January 2011. (Invited)
- Glisky, E.L. (2011) Memory changes with age: What to do about it? Osher Lifelong Learning Institute, Tucson, AZ, February 2011. (Invited)
- Kaszniak, A.W. (2011) Bridging the worlds of contemplative practice and science. Invited teleseminar in the series on "Shifting Paradigms," Institute of Noetic Sciences, February 2011. (Invited)
- Glisky, E.L. (2011). Memory changes with age: What to do about it? College of Science Forum on "The Aging Brain: How to Age Successfully," Green Valley, AZ, March 2011. (Invited)
- Ryan L. (2011) The University Within – Understanding the brain. University of Arizona Humanities Seminar Series (4 three hour lectures). Tucson AZ, June 2011. (Invited)
- Ahern G.L., and Reiman E.M. (2011) Recent Research Developments in Alzheimer's Disease. KUAT-Channel 6 Arizona Illustrated, Interviewer - Pam White, June 29, 2011. (Invited)
- Ryan L. (2011) Neuroimaging studies of memory, aging, and risk for Alzheimer's disease. University of Denver, Department of Psychology Colloquium. Denver CO, July 2011. (Invited)
- Ahern G.L., and Reiman E.M. (2011) Recent Research Developments in Alzheimer's Disease. KTTU-Channel 18 In Focus, Interviewer - Bob Lee, July 17, 2011. (Invited)
- Ahern G.L., and Reiman E.M. (2011) Recent Research Developments in Alzheimer's Disease. KMSB-Channel 11 Fox-11 Forum, Interviewer - Bob Lee, 7/24/2011. (Invited)
- Glisky, E.L. (2011) What did you say your name was? Faculty Fellows Luncheon, University of Arizona, Tucson, AZ, August 2011. (Invited)
- Ryan L. (2011) Aging, memory, and risk for Alzheimer's disease. Invited address, Rotary Club, Tucson AZ, August 2011. (Invited)
- Glisky, E.L. (2011) Memory changes with age: What to do about it? College of Science, Science Café, Saddlebrooke, AZ, September, 2011. (Invited)
- Ryan L. (2011) Aging successfully – neuroimaging studies of memory and aging. College of Science Café, SaddleBrooke Community. Oracle AZ, October 2011. (Invited)
- Alexander, G.E. (2011) Press Conference at the Society for Neuroscience Annual Meeting entitled "Aerobic Fitness May Reduce Brain Aging", Washington, DC, November 2011. (Invited)

6. Awards (from McKnight Affiliates)

- Ahern, G.A. Cited in S Naifeh and GW Smith (eds.), The Best Doctors in America, 2011-2012
- Barnes, C.A., Elected Galileo Fellow, College of Science, University of Arizona, 2011.
- Barnes, C.A., APA Division 6 D.B. Marquis Behavioral Neuroscience Award for Behavioral Neuroscience, 124:559-573, 2010 (Burke SN, Wallace JL, Nematollahi S, Uprety A and Barnes CA)
- Bootzin, R.R. 2011 Distinguished Scientist Award, Society for a Science of Clinical Psychology.

Glisky, E.L. Recipient of the Elizabeth Hurlock Beckman Award for work in establishing concepts and procedures to help older adults and other with memory disorders preserve their memories by tapping into preserved self-knowledge, 2011.

Mehl, M.R. Identified as a Rising Star by the Association for Psychological Science, 2011.

Mehl, M.R. 2010 Best Paper Award from the Journal of Research in Personality for (Holtzman, Vazire, Mehl, Sounds like a narcissist: Behavioral manifestations of narcissism in everyday life (44: 478-484), 2011.

Mehl, M.R. The Honors College Outstanding Faculty Award for Exceptional Commitment to Mentoring Honors Students; University of Arizona, 2011.

Reiman, E.M. Most Admired CEOs/Leaders Award, Phoenix Business Journal. 2011.

Reiman, E.M. Alzheimer's Research Forum Open Innovation Award, 2011.

7. Faculty

There are two levels of faculty participation in the Evelyn F. McKnight Brain Institute at the University of Arizona: the Scientific Advisory Board (all of whom are Affiliate Faculty members), and Affiliate Faculty members. The Scientific Advisory Board consists of Dr. Geoff Ahern, Dr. Gene Alexander, Dr. Carol Barnes (Director), Dr. Betty Glisky, Dr. Al Kaszniak, Dr. Naomi Rance and Dr. Lee Ryan. The Advisory Board's one-year abbreviated curricula vitae are included in the following pages.

BIOGRAPHICAL SKETCH

NAME <p style="text-align: center;">Carol A. Barnes, Ph.D.</p>	POSITION TITLE <p style="text-align: center;">Regents' Professor</p>		
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, University 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**, Psychology, Neurology, ARL Div Neural Systems, Memory & Aging, Univ. Arizona, Tucson
- 2006 - **Regents' Professor**, Psychology, Neurology, Bio5, ARL Division of Neural Systems, Memory & Aging, University of Arizona, Tucson
- 2006 - **Director**, Evelyn F. McKnight Brain Institute, University of Arizona, Tucson, AZ
- 2006 - **Evelyn F. McKnight Endowed Chair for Learning and Memory in Aging**, University of Arizona
- 2008 - **Director**, ARL Division of Neural Systems, Memory and Aging, University of Arizona, Tucson
- 2009 - **Associate Director**, Bio5, 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 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 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 Publications

- Shamy, J.L., Habeck, C., Hof, P.R., Amaral, D.G., Fong, S.G., Buonocore, M.H., Stern, Y., Barnes, C.A., and Rapp, P.R. (2011) Volumetric correlates of spatiotemporal working and recognition memory impairment in aged rhesus monkeys. *Cerebral Cortex*, 21:1559-1573.
- Burke, S.N., Maurer, A.P., Nematollahi, S., Uprety, A.R., Wallace, J.L., and Barnes, C.A. (2011) The Influence of Objects on Place Field Expression and Size in Distal Hippocampal CA1. *Hippocampus*, 21: 783-801.
- Tsai, C.-L., Lister, J.P., Bjornsson, C.J., Smith, K., Shain, W., Barnes, C.A., and Roysam, B. (2011) Robust, globally consistent, and fully-automatic multi-image registration and montage synthesis for 3-D multi-channel images. *Journal of Microscopy*, 243:154-171.
- Barnes, C.A. (2011) Secrets of aging. *The Scientist*, 25:30-35.
- Small, S.A., Schobel, S.A., Buxton, R.B., Witter, M.P., and Barnes, C.A. (2011) The pathophysiological framework based of hippocampal dysfunction in aging and disease. *Nature Reviews Neuroscience*, 12:585-601.
- Barnes, C.A. (2011) Secrets of aging: What does a normally aging brain look like? *F1000 Biology Reports*, 3:22.
- Penner, M.R., Roth, T.L., Chawla, M.K., Hoang, L.T., Roth, E.D., Lubin, F.D., Sweatt, D.J., Worley, P.F. and Barnes C.A. (2011) Age-related changes in Arc transcription and DNA methylation within the hippocampus. *Neurobiology of Aging*, 32:2198-2210.
- Burke, S.N., Wallace, J.L., Hartzell, A.L., Nematollahi, S., Plange, K., and Barnes, C.A. (2011) Age-associated deficits in pattern separation functions of perirhinal cortex: A cross-species consensus. *Behavioral Neuroscience*, 125:836-847.
- Marrone, D.F., Satvat, E., Schaner, M.J., Worley, P.F. and Barnes C.A. Attenuated long-term Arc expression in the aged fascia dentata. *Neurobiology of Aging*, in press. [epub ahead of print 20 Sep 2010 DOI: 10.1016/j.neurobiolaging. 2010.07.022]
- Maurer, A.P., Burke, S.N., Lipa, P., Barnes, C.A. Greater running speeds result in increased hippocampal sequence compression. *Hippocampus*, in press. [epub ahead of print 27 Apr 2011 DOI: 10.1002/hipo.20936]
- Stoub, T.R., Barnes, C.A., Shah, R.C., Stebbins, G.T., Ferrari, C., and deToledo-Morrell, L. Age-related changes in the mesial temporal lobe: The parahippocampal white matter region. *Neurobiology of Aging*, in press. [epub ahead of print 3 Apr 2011 DOI:10.1016/j.neurobiolaging. 2011.02.010]
- Marrone, D.F., Ramirez-Amaya, V., and Barnes, C.A. Neurons generated in senescence maintain capacity for functional integration. *Hippocampus*, in press. [epub ahead of print 21 Jun 2011 10.1002/hipo.20959]
- Hoang, L. and Barnes, C.A. The ageing hippocampus. In: *Clinical Neurobiology of the Hippocampus*. Bartsch, T. (ed.) Oxford University Press, 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, Woodward/White
1996-1997	Cited in S Naifeh & GW Smith(eds.), The Best Doctors in America, Pacific Region, Woodward/White
1997	Elected, American Neurological Association
1998-1999	Cited in S Naifeh & GW Smith(eds.), The Best Doctors in America, 4th Edition, Woodward/White
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	Cited in S Naifeh and GW Smith (eds.), The Best Doctors in America, 2009-2010
2010	Cited in S Naifeh and GW Smith (eds.), The Best Doctors in America, 2011-2012

2011 Publications

Caselli, R.J., Dueck, A.C., Locke, D.E.C., Sabbagh, M.N., Ahern, G.L., Rapcsak, S.Z., Baxter, L.C., Yaari, R., Woodruff, B.K., Snyder, C.H., Rademakers, R., Findley, S., Reiman, E.M. (2011) Cerebrovascular risk factors influence preclinical memory decline in cognitively normal APOE ε4 homozygotes. *Neurology*, 76:1078-1084.

BIOGRAPHICAL SKETCH

NAME <p style="text-align: center;">Gene E. Alexander, Ph.D.</p>	POSITION TITLE <p style="text-align: center;">Professor</p>		
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
2008-date	Professor , Grad Interdisciplinary Prog on Neuroscience, Univ of Arizona, Tucson
2007-date	Professor , Clinical and Cognition & Neural Systems Programs, Department of Psychology, University of Arizona, Tucson, Arizona

Honors, Awards and Advisory Committees

1995- date	Ad Hoc Reviewer, 15 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- date	External Adv, Aging Brain: Vasculature, Ischemia & Behav. Prog Proj, USC, 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	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 Member, Executive Committee, Neuroscience GIDP, University of Arizona
- 2010 Member, Academic Program Review Faculty Committee, Psych. Dept., Univ of Arizona
- 2010 Member, Faculty Search Committee, Cognitive & Neural Systems, Psychology Dept., University of Arizona
- 2011 Chairperson, Member Special Emphasis Panel, ZAG1 ZIJ-7 (J1), NIA, NIH, 2011.
- 2011 Member, Neuroscience of Aging Review Committee, NIA-N, NIA, NIH, 2011.
- 2011 Advisory Editor, Neurobiology of Aging, Elsevier.
- 2011 Member, Evelyn F. McKnight Brain Institute, Cognitive Aging Working Group.
- 2011 Member, Scientific Advisory Board, Evelyn F. McKnight Brain Institute, University of Arizona, Tucson, Arizona.
- 2011 Member, Executive Committee, Neuroscience Graduate Interdisciplinary Program, University of Arizona, Tucson, Arizona.
- 2011 Member, VA MHBB Merit Review Subcommittee, Veterans Administration, 2011.
- 2011 Member, Special Emphasis Panel, Loan Repayment Program, ZNS1 SRB-M (76), NIA, NIH, 2011.
- 2011 Member, Special Emphasis Panel, Biobehavioral Research Awards for Innovative New Scientists (BRAINS), ZMH1 ERB-L-04, NIA, NIMH, NIH, 2011.

2011 Publications

- Chen, K., Ayutyanont, N., Langbaum, J.B., Fleisher, A.S., Reschke, C., Lee, W., Liu, X., Bandy, D., Alexander, G.E., Thompson, P.M., Shaw, L., Trojanowski, J.Q., Jack, C.R., Jr., Landau, S.M., Foster, N.L., Harvey, D.J., Weiner, M.W., Koeppe, R.A., Jagust, W.J., Reiman, E.M.; and the Alzheimer's Disease Neuroimaging Initiative. (2011) Characterizing Alzheimer's disease using a hypometabolic convergence index. *Neuroimage*, 56:52-60.
- Ewers, M., Walsh, C., Trojanowski, J.Q., Shaw, L.M., Petersen, R.C., Jack, C.R., Jr., Feldman, H.H., Bokde, A.W.L., Alexander, G.E., Scheltens, P., Vellas, B., Dubois, B., Weiner, M., Harald Hampel, H., in collaboration with the North American Alzheimer's Disease Neuroimaging Initiative (ADNI). Prediction of Conversion from Mild Cognitive Impairment to Alzheimer's Disease Dementia Based upon Biomarkers and Neuropsychological Test Performance, *Neurobiology of Aging*, in press.
- Hua, X., Gutman, B., Boyle, C., Rajagopalan, P., Leow, A.D., Yanovsky, I., Kumar, A.R., Toga, A.W., Jack, C.R., Schuff, N., Alexander, G.E., Chen, K., Reiman, E.M., Weiner, M.W., Thomson, P.M., and the Alzheimer's Disease Neuroimaging Initiative. Accurate measurement of brain changes in longitudinal MRI scans using tensor-based morphometry. *Neuroimage*, in press.
- Henry, M.L., Beeson, P.M., Alexander, G.E., Rapcsak, S.Z. Written language impairments in primary progressive aphasia: A reflection of damage to central semantic and phonological processes, *Journal of Cognitive Neuroscience*, in press.
- Alexander, G.E., Bergfield, K.L., Chen, K., Reiman, E.M., Hanson, K.D., Lin, L., Bandy, D., Caselli, R.J., Moeller, J.R. Gray matter network associated with risk for Alzheimer's disease in young to middle-aged adults. *Neurobiology of Aging*, provisionally accepted.

BIOGRAPHICAL SKETCH

NAME <p style="text-align: center;">Elizabeth L. Glisky, Ph.D.</p>	POSITION TITLE <p style="text-align: center;">Professor</p>		
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

2011 Publications

- Walther, K., Bendlin, B., Glisky, E., Trouard, T., Lisse, J., Posever, J., and Ryan, L. (2011) Anti-inflammatory drugs protect against age-related differences in brain volume. *Neurobiology of Aging*, 32:497-505.
- Glisky, E.L. (2011) Forgetting. In J. S. Kreutzer, J. DeLuca, & B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology*. New York: Springer.
- Glisky, E.L. (2011) Implicit memory. In J. S. Kreutzer, J. DeLuca, & B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology (Part 9)*, pp. 1301-1302. New York: Springer.
- Glisky, E.L. (2011) Incidental memory. In J. S. Kreutzer, J. DeLuca, & B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology (Part 9)*, 1303-1304. New York: Springer.
- Glisky, E.L. (2011) Method of vanishing cues. In J. S. Kreutzer, J. DeLuca, & B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology (Part 13)*, pp. 1586-1587. New York: Springer.
- Glisky, E.L. (2011) Memory. In J. S. Kreutzer, J. DeLuca, and B. Caplan (Eds.), *Encyclopedia of Clinical Neuropsychology (Part 13)*, pp. 1555-1560. New York: Springer.
- Ryan, L., Walther, K., Bendlin, B.B., Liu L-F., Walker, D.G., and Glisky, E.L. (2011) Age-related differences in white matter integrity and cognitive function are related to APOE status. *NeuroImage*, 54:1565-1577.

- Grilli, M.D., and Glisky, E.L. (2011) The self-imagination effect: Benefits of a self-referential encoding strategy on cued recall in memory-impaired individuals with neurological damage. *Journal of the International Neuropsychological Society*, 17:929-933
- Edmonds, E.C., Glisky, E.L., Bartlett, J.C., and Rapcsak, S.Z. (2011) Cognitive mechanisms of false facial recognition in older adults. *Psychology and Aging*, doi:10.1037/a0024582.
- McFarland, C., and Glisky, E. (2011) Implementation intentions and imagery: individual and combined effects on prospective memory among young adults. *Memory & Cognition*, doi:10.3758/s13421-011-0126-8.
- McFarland, C., and Glisky, E. Implementation intentions and prospective memory among older adults: An investigation of the role of frontal lobe function. *Aging, Neuropsychology, and Cognition*, in press.
- Kihlstrom, J.F., and Glisky, E.L. Amnesia. In V. S. Ramachandran (Ed.), *Encyclopedia of human behavior* (2nd Ed). Oxford: Elsevier, in press.

BIOGRAPHICAL SKETCH

NAME Alfred W. Kaszniak, Ph.D.	POSITION TITLE 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

2011 Publications

- Levy, D.M., Wobbrock, J.O., Kaszniak, A.W. and Ostergren, M. (2011) Initial results from a study of the effects of meditation on multitasking performance. In: Proceedings of ACM CHI 2011 Conference on Human Factors in Computing Systems (pp. 2011-2016). New York: ACM Press.
- Kaszniak, A.W. (2011) Meditation, mindfulness, cognition, and emotion: Implications for community-based older adult programs. In P. Hartman-Stein & A. LaRue (Eds.), *Enhancing cognitive fitness in adults: A guide to the use and development of community-based programs* (pp. 85-106). New York: Springer.
- O'Donnell, R.M., and Kaszniak, A.W. (2011) Charting late-life affective disorders. *Generations: Journal of the American Society on Aging*, 35:46-57.
- Kaszniak, A.W. Contemplative pedagogy: Perspectives from cognitive and affective science. In H. Bai, E. Sarath, & C. Scott (Eds.), *Contemplative approaches to learning and inquiry across disciplines*. New York: State University of New York Press, in press.
- Kaszniak, A.W., and Menchola, M. Behavioral neuroscience of emotion in aging. In M.-C. Pardon & M. Bondi (Eds.), *Behavioral Neurobiology of Aging*. Berlin: Springer-Verlag, in press.

BIOGRAPHICAL SKETCH

NAME <p style="text-align: center;">Naomi E. Rance, M.D., Ph.D.</p>	POSITION TITLE <p style="text-align: center;">Professor of Pathology</p>		
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

2011 Publications

- Combs, F.J. Jr., Erly, W.K., Valentino, C.M., Rance, N.E. (2011) Best cases from the AFIP: Balamuthia mandrillaris amebic meningoencephalitis. Radiographics, 31:31-35.
- Dacks, P.A., Krajewski, S.K. and Rance, N.E (2011) Ambient Temperature and 17 β -estradiol modify Fos - immunoreactivity in the median preoptic nucleus, a putative control center for thermoregulation. Endocrinology, 152:2750-2759.
- Dacks, P.A., Krajewski, S.K and Rance, N.E. (2011) Activation of neurokinin 3 receptors in the median preoptic nucleus decreases body temperature in the rat. Endocrinology, 152:4894-4905, 2011.

BIOGRAPHICAL SKETCH

NAME <p style="text-align: center;">Lee Ryan, Ph.D.</p>	POSITION TITLE Associate 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 - present **Associate Professor**, Departments of Psychology and Neurology, University of Arizona, Tucson, AZ
- 2007 - present **Associate Professor**, Evelyn F. McKnight Brain Institute, University of Arizona, Tucson, AZ
- 2008 - present **Associate Head**, Department of Psychology, 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

2011 Publications

- Campbell, J., Nadel, L., Duke, D., Ryan, L. (2011) Remembering all that and then some: recollection of autobiographical memories after a 1-year delay. *Memory*, 19:406-15.
- Ryan, L., Walther, K., Bendlin, B.B., Lue, L.-F., Walker, D.G., and Glisky, E.L. (2011) Age-related differences in white matter integrity and cognitive function are related to APOE status. *NeuroImage*, 54:1565-77.
- Walther, K., Bendlin, B., Glisky, E., Trouard, T., Lisse, J., Posever, J., and Ryan, L. (2011) Anti-inflammatory drugs reduce age-related decreases in brain volume in cognitively normal older adults. *Neurobiology of Aging*, 32:497-505.
- Walther, K., and Ryan, L. White matter integrity in older adults is altered by increased body fat. *Obesity*, submitted.

7. Faculty (continued)

The full Affiliate faculty list is given below:

- 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
- E. Fiona Bailey, Ph.D., Assistant Professor of Physiology, 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, 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: Research Scientist, 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
- Ralph F. Fregosi, Ph.D., Professor of Physiology, University of Arizona
- Andrew J. Fuglevand, Ph.D., Associate Professor of Physiology, University of Arizona
- Elizabeth Glisky, Ph.D., Professor, Department of Psychology, University of Arizona
- Katalin M. Gothard, M.D., Ph.D., Associate Professor of Physiology, University of Arizona
- Marco Herrera-Valdez, Ph.D., UA Associate: Assistant Research Scientist, Evelyn F. McKnight Brain Institute, University of Arizona; Assistant Research Professor, Mathematical, Computational and Modeling Sciences Center, Arizona State University
- Matthew J. Huentelman, Ph.D., UA Associate: Assistant Research Scientist, Evelyn F. McKnight Brain Institute, University of Arizona; Investigator, Neurobehavioral Research Unit, Translational Genomics Research Institute
- Alfred W. Kaszniak, Ph.D., Head, Department of Psychology; Director, Coordinated Clinical Neuropsychology Program, University of Arizona
- Lalitha Madhavan, MBBS, Ph.D., Assistant Professor, Department of Neurology, University of Arizona
- Diano Marrone, Ph.D., UA Associate: Assistant Research Scientist, Evelyn F. McKnight Brain Institute; Assistant Professor, Psychology, Wilfrid Laurier University
- Lynn Nadel, Ph.D., Regents' Professor of Psychology, University of Arizona
- Matthias R. Mehl, Ph.D., Associate Professor, Department 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 Peterson, Ph.D., Professor of Psychology, 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

- Steve Rapcsak, M.D., Professor of Neurology, Psychology, and Speech, Hearing and Language Pathology, University of Arizona; Chief, Neurology Section, VA Medical Center
- 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)
- Linda L. Restifo, M.D., Ph.D., Professor, Neuroscience, Cell Biology & Anatomy, and BIO5 Institute, University of Arizona
- Lee Ryan, Ph.D., Associate Professor, Psychology; Director, Cognition and Neuroimaging Labs, University of Arizona
- Paige E. Scaff, Ph.D., Assistant Professor, Department of Psychology
- David A. Sbarra, Ph.D., Associate Professor and Director of Clinical Training, Department of Psychology, University of Arizona
- Robert S. Sloviter, Ph.D., Professor of Pharmacology and Neurology, University of Arizona
- Ted P. Trouard, Ph.D., Associate Professor, Biomedical Engineering

We added five new affiliate members to the Evelyn F. McKnight Institute at the University of Arizona in the past year:

Dr. Bootzin is a Professor of Psychology and Director of the Insomnia Clinic in the Department of Psychiatry at the University of Arizona. He is an expert in sleep and sleep disorders, with a particular interest in advancing our understanding and treatment of sleep disturbance. He has recently become interested in how sleep changes with age, which makes him an outstanding addition to our group.

Dr. Madhavan is a new MD./Ph.D. hire in Neurology, who has moved onto our floor in the Life Sciences North Building. She is interested in new therapeutic possibilities for neurological disorders using stem cells, and in central nervous system plasticity. We are currently collaborating on experiments in which she is culturing endogenous neural stem cells from aged rats to compare their properties with those of younger animals. We are very excited about potential findings from these studies as they may inform us on effective treatment strategies for application in normal aging as well as in disease states.

Dr. Mehl is an Associate Professor of Psychology, interested in the social implications of people's everyday social lives. He uses the Electronically Activated Recorder (EAR) device to track people's social behavioral in the real world, and has recently become interested in applying his methods to the study of older populations. He should make a strong collaborator for our growing 'normal aging' group here in Tucson.

Dr. Sbarra is the Director of Clinical Training in the Department of Psychology and his research area involves the study of social connectedness and health, with a special emphasis on personal relationships. Particularly relevant from the perspective of the McKnight Institute in Tucson is his study of social disruptions involving grief and grieving, often experienced by older individuals. This is an area we have not included previously in the group, and we particularly welcome his

expertise in the use of information processing methods as well as autonomic nervous system physiological measures in humans.

Dr. Scalf is a recently hired Assistant Professor in Psychology who has an interest in divided attention and visual perception. Her primary experimental methods are fMRI and psychophysical behavioral tests. While her primary work until now has not involved aged subjects, her work in divided attention would be a powerful tool to use to study older individuals, as this is one of the most prominent domains to change during normal aging. We are excited to welcome her into the group, and to begin to brain storm about possible collaborative experiments.

We currently have two recruitment efforts under way, each of which will have their laboratory space within the Evelyn F. McKnight Institute on the third floor of the Life Sciences North Building. Dr. Carol Barnes is the Chair of both search committees. The first position is the "McNaughton" position. The search committee has identified three candidates (from 69 applicants) for interview. The first came for a visit on December 5-6, 2011; the second is scheduled for January 18-19, 2012 and the third for February 8-9, 2012. They are all outstanding scientists and potentially perfect for this position. It will be difficult to decide among them, and the committee is very optimistic about the outcome in early 2012. For the position within the Clinical and Translational Science Institute that is targeted at an M.D./Ph.D. clinician/scientist (that Dr. Dubal unexpectedly declined last summer), we have re-opened the search, and hope to begin to interview candidates early in 2012.

8. Trainees (advisor in brackets)

Postdoctoral

Sara Burke, Ph.D. (Barnes)

Area of Interest: Ensemble recording approaches to determine age-related changes in perirhinal cortical function.

Monica Chawla, Ph.D. (Barnes)

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

James Engall, Ph.D. (Barnes)

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

Nathan Insel (Barnes)

Area of Interest: Prefrontal cortical function in aging rats.

Lan Lin, Ph.D. (Alexander)

Area of Interest: Development and implementation of MRI methods for small animal models and human studies of aging.

James Lister, Ph.D. (Barnes)

Area of Interest: Large-scale genetic imaging.

Andrew Maurer, Ph.D. (Barnes)

Area of Interest: Temporal lobe circuits involved in memory.

Rachel Samson, Ph.D. (Barnes)

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

Lesley Schimanski, Ph.D. (Barnes)

Area of Interest: Ensemble recording of aged rat hippocampus: evaluation of map dynamics.

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.

Kaitlin Bergfield (Alexander)

Area of Interest: Imaging and cognitive functioning associated with pathological and healthy aging in humans.

Molly Bisbee (Glisky)

Area of Interest: Executive function, associative memory, and APOE status in normal aging.

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.

Andrew Busch (Barnes)

Area of Interest: How ensembles of hippocampal neuron activity predict memory decline in aged rats.

Joe Cardoza (Ryan)

Area of Interest: fMRI studies of memory and aging.

Marina Cholanian (Rance)

Area of Interest: Third year graduate student with interest in the morphology and electrophysiology of Neurokinin B neurons.

Matt Grilli (Glisky)

Area of Interest: Self-referential processing, self-imagination, prospective memory, and memory rehabilitation (in normal aging and patient populations).

Megan Fitzbaugh (Alexander)

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

Krista Hanson (Alexander)

Area of Interest: Imaging and cognitive functioning associated with healthy aging and age-related neurodegenerative disease.

Kari Haws (Alexander)

Area of Interest: Cognition and neuroimaging in cognitive aging.

Kevin Kawa (Ryan)

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

Adam Lester (Barnes)

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

Suzanne Moseley (Glisky)

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

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.

Melinda Smith (Rance)

Area of Interest: Role of neurokinin B in menopausal flushes and the hypothalamic regulation of gonadotropin.

Alex Thome (Barnes)

Area of Interest: Age-related changes in alpha and gamma oscillations in primate neocortex.

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.

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

Neha Bandekar (Chawla)

Natasha Bolourirad (Burke)

Jonathan Ferng (Burke)

Jacqueline Friel (Burke)

Andrea Hartzell (Burke)

Tricia Hindley (Hoang)

Lauren Johnston (Lister)

Juliana Liang (Lister)

Sabhya Kumar (Lister)

Julia Liang (Lister)

Isaiah Morales (Lister)

Janssen Puracan (Chawla)

Amanda Richards (Hoang)

Crystal Rodriquez (Hoang)

Nima Sekhadia (Chawla)

Anu Venkatesh (Samson)

Toby Weinstein (Samson)

Monica Xiong (Lister)

Staff

Caroline Garcia, Assistant to the Vice President for Research

Kojo Plange, Research Specialist, Non-human Primates

Luann Snyder, Department Administrator

9. Clinical/translational programs

- 2008 - present An Open Label, Parallel Group, Multicenter Study, Comparing the Safety and Imaging Characteristics of 18F-AV-45 for Brain Imaging of Amyloid in Healthy Volunteers, Patients with Mild Cognitive Impairment (MCI) and Patients with Alzheimer's Disease (AD). Protocol # 18F-AV-45-A05. Avid Radiopharmaceuticals, Inc. Total grant: \$11,300 / patient. 2% salary support, 2% effort.
- 2009 - present Immunoglobulin Intravenous (IgIV) for Treatment of Alzheimer's Disease. Protocol # ADC-031. National Institute on Aging - Alzheimer's Disease Cooperative Study. Total grant: \$3,750 / patient. 2% salary support, 2% effort.
- 2009 - present Observational Study of Long-Term (18 Month) Cognitive Outcomes in Healthy Volunteers, Patients with Mild Cognitive Impairment (MCI) and Patients with Alzheimer's disease (AD) Who Have Previously had PET Imaging with Florpiramine F 18 (18F-AV-45) Injection. Protocol # 18F-AV-45-A11. Avid Radiopharmaceuticals, Inc. Total grant: \$4,000 / patient. 1% salary support, 1% effort.
- 2009 - present CONCERT: A Phase 3 Multicenter, Randomized, Placebo-Controlled, Double-Blind Twelve-Month Safety and Efficacy Study Evaluating Dimebon in Patients with Mild-to-Moderate Alzheimer's Disease on Donepezil. Protocol # DIM18. Medivation, Inc. Total grant: \$14,028 / patient. 1% salary support, 1% effort. (PI: G.A. Hishaw, MD)2010- A Phase 3 Extension, Multicenter, Double-Blind, Long Term Safety and Tolerability Treatment Trial of Bapineuzumab (AAB-001, ELN115727) in Subjects with Alzheimer's Disease who Participated in Study ELN115727-301 or in Study ELN115727-302. Protocol # ELN115727-351. Elan Pharmaceuticals, Inc. Total grant: \$ 43,491 / patient. 2% salary support, 2% effort.
- 2010 - present A Long-Term Follow-Up Study of Oral ELND005 (AZD-103) in Subjects with Alzheimer's Disease. Protocol # ELND005-AD251. Elan Pharmaceuticals, Inc. Total grant: \$ 11,901 / patient. 2% salary support, 2% effort.
- 2011 - present A Phase 2, Randomized, Double-Blind, Placebo-Controlled, Parallel Group, Multi-Center, Biomarker, Safety, and Pharmacokinetic Study of Bapineuzumab (AAB-001) Administered Subcutaneously at Monthly Intervals in Subjects with Mild to Moderate Alzheimer's Disease. Protocol # AAB-001-SC-ALZ-2003. Janssen Alzheimer Immunotherapy. Total grant: \$62,791 / patient. 2% salary support, 2% effort.
- 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.

10. Technology transfer

None

11. Budget update

Last year's budget and actual results - July 1, 2011 to June 30, 2012

	Budget	Expenditures
Personnel	\$ 750,000	\$549,490
Operations	\$ 250,000	\$285,729
Recruitment	<u>\$ 280,329</u>	<u>\$ 0</u>
Total	\$1,280,329	\$835,219

(a) Status of matching funds – FY 07, 08, 09, 10, 11

Year	MBRF Gift	Match
FY 06-07	\$1,000,000	\$1,779,500
FY 07-08	\$1,000,000	\$ 851,918
FY 08-09	\$1,300,000	\$1,251,309
FY 09-10	\$1,000,000	\$1,097,732
<u>FY 10-11</u>	<u>\$1,000,000</u>	<u>\$ 976,789</u>
Total	\$5,300,000	\$5,957,248

(b) Projected budget for coming year (FY 11/12)

Personnel	\$ 675,000 *
Operations	\$ 200,000 *
Recruitment	<u>\$ 280,329</u>
Total	\$1,155,329

* Funds in excess of \$750,000 withdrawal available from match carry-forward

(c) Extramural funding (covering period July 1, 2010 to June 30, 2011)

Grants Received – from Barnes

5 RO1 AG003376-27 (P.I.: Barnes)

Title: Neurobehavioral Relations in Senescent Hippocampus

Dates: 06/15/11 – 4/30/12 (5/10 – 4/15 project period)

Amount: \$760,616/year (\$674,385 direct costs)

5 R37 AG012609-17 (P.I.: Barnes)

Title: Cell Assemblies, Pattern Completion and the Aging Brain*

Dates: 07/01/10 – 06/30/11 (7/09 – 6/14 project period)

Amount: \$304,793/year (\$202,950 direct)

5 RC1 AG036053-02 (P.I.: Barnes)

Title: Functional Activity Mapping of Brain Networks

Date: 09/30/10 – 08/31/11 (9/09 – 8/11 project period)

Amount: \$399,362/year (325,810 direct costs)

1 R44 AG035446-01(P.I.: LaComb; co-PI Barnes)

Title: Whole-brain fluorescence and brightfield imaging at single-cell level
Dates: 04/01/11 – 08/31/11 (9/10 – 8/12 project period)
Amount: \$46,206/year (\$30,499 direct)

1 P30 AG019610-10 (PI: Reiman – Barnes, Director, Ad Hoc Review Program)*

Title: Arizona Alzheimer's Disease Core Center Ad Hoc Review
Dates: 07/01/10 – 06/30/11 (7/06 – 6/11 project period)
Amount: \$20,502/year (\$13,533 direct)

State of Arizona, DHS Grant

Title: Arizona Alzheimer's Consortium - UA Evelyn F. McKnight Brain Institute
Date: 07/01/10 – 06/30/11
Amount: \$7,500/year (direct costs)

Canadian Institutes of Health Research

Postdoctoral Fellowship to Dr. Rachel Samson

Title: Age-related changes in network activity of the amygdale during emotional learning
Date: 07/01/10 – 3/31/11 (7/08 – 6/11 project period)
Amount: \$50,000 Canadian dollars

5 F32 AG033460-02 (Sponsor: Barnes; NRSA to J. Lister)

Title: Age effects on grid cell and scene recognition systems of entorhinal cortex"
Date: 09/01/10 – 08/31/11 (September 2009 – August 2012)
Amount: \$55,154 (direct costs)

* Received competitive renewal for additional five years

Grants Received - From Selected Affiliates

1 P30 AG019610-10 (PI: Reiman – Ahern co-PI, UAHSC Clinical Core)*

Title: Arizona Alzheimer's Disease Core Center
Dates: 07/01/10 – 06/30/11 (7/06 – 7/11 project period)
Amount: \$60,748/year (\$46,853 direct costs)

1 R01 AG025526 (PI: Alexander)

Title: Neuroanatomical Substrates of Aging & Cognitive Decline
Dates: 07/1/10 – 6/30/11 (7/98 – 6/12 project period w/ no cost extension)
Amount: \$1,066,581/year (\$798,381 direct costs)

2 R01 MH57899 (PI: Reiman – Alexander co-PI)

Title: PET, APOE, & the Preclinical Course of Alzheimer disease
Dates: 07/1/10 – 6/30/11 (7/98 – 6/13 project period)
Amount: 164,417/year (\$116,769 direct costs)

Cognitive Science Summer RA Award (Sponsor: Glisky, E.L.)

Title: Social Networking for Older Adults

Dates: Summer 2011

Amount: \$1,050

2 P30 AG019610 (PI: Reiman – Kaszniak co-PI, Education and Information Core)*

Title: Arizona Alzheimer's Disease Core Center

Dates: 07/01/10 – 06/30/11 (7/06 – 6/11 project period)

Amount: \$75,562/year (\$51,187 direct costs)

RO1 AG032315 (PI: Rance)

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

Dates: 08/01/10 – 06/30/13 (8/08 – 6/13 project period)

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

* Received competitive renewal for additional five years

Grants Submitted – from Barnes

1 F32 NS070464-01A1 (Sponsor: Barnes; NRSA to Andrew Maurer)

Title: Hippocampal ensembles dynamics during active ambulation, passive movement & rest

Dates: 04/01/11 – 03/31/12 (requested dates of project)

Amount: \$50,474/year (requested direct costs)

Status: Awarded with a July 1, 2011 start date

1 PO1 AG041126-01 (PI: Alexander; co-PIs: Barnes, Billheimer, Coleman, Huentelman, Ryan, Trouard)

Title: Successful Cognitive Aging: Genetics, Health Status & Neural Systems

Dates: 12/01/11 – 11/30/16

Amount: \$1,503,996/year (requested direct costs)

Status: Not funded – to be resubmitted for the May 25, 2012 deadline

1 RO1 AG039990-01A1 (P.I.: Huentelman; co-PI: Barnes)

Title: Hippocampal Circuit-Specific Molecular Changes in Normal Cognitive Aging

Dates: 04/01/12 – 03/31/17 (requested dates of project)

Amount: \$225,561/year (requested direct costs)

Status: Not funded.

1 RO1 ES 020228-01 (P.I.: Barnes; co-PIs: Huentelman and Coleman)

Title: Methylation and Transcription Patterns Associated with Differential Cognitive Phenotypes Across Age

Dates: 07/01/11 – 06/30/16 (requested dates of project)

Amount: \$879,864/year (requested direct costs)

Status: Not funded – to be resubmitted for the March 5, 2012 deadline

1 R13 NS078783-01

Title: 2012 Neurobiology of Cognition Gordon Research Conference
Dates: 04/01/2012 – 08/31/2012 (requested dates of project)
Amount: \$50,000 (requested direct costs)
Status: Priority Score 36 – to be resubmitted for the April 12, 2012 deadline

1 R21 MH094540-01A1 (P.I.: Galbraith; co-PI; Barnes)

Title: Epigenomics within single cell types of the Central Nervous System
Dates: 07/01/11 – 06/31/13
Amount: \$10,893/year (requested direct costs)
Status: Not funded

1 F32 AG042240-01 (Sponsor: Barnes; NRSA to James Engel)

Title: The Contribution of Degraded Sensory Systems on Memory Function in the Aged
Dates: 04/01/12 – 03/31/15 (requested dates of project)
Amount: \$46,346/year (requested direct costs)
Status: Not funded – to be resubmitted for the April 8, 2012 deadline

Grants Submitted - From Selected Affiliates

Mind and Life Summer Research Institute and Varela Awards (PI: Kaszniak)

John Templeton Foundation

Dates: 06/01/12 – 05/31/15 (requested dates of project)
Amount: \$991,899 (total costs requested)
Status: Under review

Mind and Life Postdoctoral Training Fellowship (PI: Kaszniak)

John Templeton Foundation

Title: Investigating the Effects of Meditation on Multitasking Performance
Dates: 06/01/12 – 05/31/15 (requested dates of project)
Amount: \$991,899 (total costs requested)
Status: Under review

National Science Foundation (PI: Levy; co-PI: Kaszniak)

Title: Investigating the Effects of Meditation on Multitasking Performance
Dates: 07/01/11 – 06/30/14 (requested dates of project)
Amount: \$370,000 (total costs requested)
Status: Not funded – in preparation for resubmission

NIA RO3 (PI: Hischaw; co-PI: Alexander)

Title: The Impact of Traumatic Brain Injury on Brain Aging: Structure and Cognition
Dates: 07/01/11 – 06/30/13 (requested dates of project)
Amount: \$151,199 (total costs requested)
Status: Not funded – in preparation for resubmission

1R01AG041187-01 NIA (PIs: Alexander and Ryan)

Title: Age-related functional compensation with increasing memory task difficulty
Dates: 09/1/11-08/31/16 (requested dates of project)
Amount: \$1,250,000 (requested total direct costs)
Status: Not funded.

1 PO1 AG041126-01 (PI: Alexander; co-PIs: Barnes, Billheimer, Coleman, Huentelman, Ryan, Trouard)

Title: Successful Cognitive Aging: Genetics, Health Status & Neural Systems
Dates: 12/01/11 – 11/30/16 (requested dates of project)
Amount: \$1,503,996/year (requested direct costs)
Status: Not funded – to be resubmitted for the May 25, 2012 deadline

BIO5 Pilot Grants that Span Fields Relevant to Biological Sciences (PI: Alexander)

Title: Neuroimaging Biomarkers for Animal Models of Brain Aging
Dates: 01/15/12 – 01/14/13 (requested dates of project)
Amount: \$74,082/year (requested direct costs)
Status: Not funded.

12. Educational programs focusing on age related memory loss (January 1, 2011 – December 31, 2011)

Scientific

Event: *Evelyn F. McKnight Brain Institute Seminar Series*

Summary: This Seminar Series is designed to bring together people across campus as well as the EMBI affiliates to hear state of the art presentations from leading investigators in the field of normal aging, and provide opportunities for one-on-one interactions that may foster future collaborations.

Date: January 24, 2011
Title: Computing Spatial Information within Neural Circuits: From Grid Cells to Place Cells
Presenter: Stefan Leutgeb, Ph.D., Assistant Professor, Division of Biological Sciences, University of California, San Diego

Date: January 24, 2011
Title: The Coding of Temporal Context in the Hippocampus
Presenter: Jill Leutgeb, Ph.D., Assistant Professor, Division of Biological Sciences, University of California, San Diego

Date: February 21, 2011
Title: Aging-induced Cognitive Vulnerability to Infection and Injury: Role of Microglia
Presenter: Steven F. Maier, Ph.D., Distinguished Professor, Psychology; Director, Center for Neuroscience, University of Colorado, Boulder

Date: March 21, 2011
Title: Aberrant granule cell integration is sufficient to cause epilepsy -- implications for epileptogenesis throughout the lifespan
Presenter: Steve Danzer, Ph.D., Assistant Professor, Department of Anesthesia, Cincinnati Children's Hospital Medical Center

Date: April 18, 2011
Title: Aging of the Female Brain: Phenotypes of Vulnerability and Targets of Opportunity to Prevent Neurodegenerative Disease
Presenter: Roberta Diaz Brinton, Ph.D., Professor of Pharmacology and Pharmaceutical Sciences, Biomedical Engineering and Neurology, Norris Foundation Laboratory for Neuroscience Research University of Southern California

Event: Spring Brain Conference

Date: March 16-19, 2011

Venue: Westin La Paloma, Tucson, AZ

Symposium: A Cross-Species Consensus on the Neurobiology of Normal Aging: From Single Unit Activity to Behavioral Output

Chair: Carol A. Barnes (University of Arizona)

Presentations: Do old rats learn new places? Reduced activity of aged hippocampal place cells during spatial encoding

Lesley Schimanski, Ph.D., Research Associate, Evelyn F. McKnight Brain Institute, Univ of Arizona

Rat and monkeys show age-associated deficits in perirhinal cortical-dependent pattern separation

Sara Burke, Ph.D., Research Associate, Evelyn F. McKnight Brain Institute, Univ. of Arizona

Age-related changes in neural oscillations in rat frontal cortex

Nathan Insel, Ph.D., Research Associate, Evelyn F. McKnight Brain Institute, Univ. of Arizona

White Matter Changes as a Common Denominator for Neuronal Dysfunction and Cognitive Aging in the Rhesus Monkey

Douglas Rosene, Ph.D., Professor, Stanford University

Event: Spring Hippocampal Research Conference

Date: May 21-27, 2011

Venue: Verona, Italy

Symposium: That "Other" Part of the Temporal Lobe Involved in Perception and Memory

Presentations: Mechanisms of forgetting: Neural representations for memory and perception
Morgan Barese, University of Toronto

Abnormal Shape Memory Influences on Figure-Ground Perception in Medial Temporal Lobe Amnesia

Mary Peterson, University of Arizona

Functional compensation in older adults: interactions between frontal and perirhinal functions

Lee Ryan, University of Arizona

Role of perirhinal cortex in memory and perception: conjunctive representations for object identification

Betsy Murray, National Institute of Mental Health

Effect of aging on object recognition and perirhinal cell ensembles

Carol Barnes, University of Arizona

Event: Fourth McKnight Inter-Institutional Meeting

Date: May 1-3, 2011

Venue: Evelyn F. McKnight Center for Age-Related Memory Loss, University of Miami

Participating Institutions:

UA Evelyn F. McKnight Brain Institute, University of Arizona,

UAB Evelyn F. McKnight Brain Institute, University of Alabama

Evelyn F. McKnight Brain Institute, University of Florida,

Evelyn F. McKnight Center for Age-Related Memory Loss, Univ of Miami

Summary: 27 members of the University of Arizona Evelyn F. McKnight Brain Institute attended the McKnight Brain Research Foundation 4th Inter-Institutional Meeting in Miami, Florida.

Public

Event: Osher Lifetime Learning Institute Seminar Series

Title: The Neural Mechanisms of Memory and the Aging Brain

Date: February 23, 2011

Venue: University Services Annex, University of Arizona

Speaker: Carol A. Barnes, Ph.D.

Event: Forum on the Aging Brain: How to Age Successfully

Date: March 11, 2011

Venue: Pima Community College Performing Arts Center, Green Valley

Speakers: What can we learn from animals about successful aging?

Carol Barnes, Ph.D., Regents' Professor, Departments of Psychology, Neurology

Good for your heart, good for your brain: Lessons from MRI

Lee Ryan, Ph.D., Associate Professor, Department of Psychology

Memory changes with age: What to do about it?

Betty Glisky, Ph.D., Professor and Head, Department of Psychology

Matthias Mehl, Ph.D., Associate Professor, Department of Psychology

The social psychology of successful aging: 2.9 and beyond

Event: Adults Night Out

Title: Memory & Aging: Myth vs Fact

Date: April 1, 2011

Venue: Arizona Science Center, Phoenix, AZ

Speaker: Carol A. Barnes, Ph.D.

Event: Notable Neuroscientist Lecture Series (General Audience Presentation)
Title: Memory & Aging: Myth vs, Fact
Date: December 9, 2011
Venue: West Virginia University
Speaker: Carol A. Barnes, Ph.D.

13. Collaborative programs with McKnight institutions and research programs

Huentelman /Coleman/Barnes

We have begun to explore the possibility of using laser capture microdissection technologies for isolating specific cells in the hippocampus. Barnes has provided the tissue from young and aged rats to Huentelman and Coleman who are testing to determine whether their methodologies for examining transcriptional fidelity and methylation processes can be successfully applied following our specific brain extraction techniques. Additionally, we are working out the details for a method that will allow us to select out single *Arc*-positive and *Arc*-negative cells in the hippocampus of young and old rats. If we can achieve this, it will enable, for the first time, experience-driven gene expression in the precise cells that are activated by specific behaviors. We have the preliminary data, and have used it to apply for grant support.

Trouard/Alexander/Barnes

Dr. Trouard has 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 are attempting to optimize the pulse sequences and the duration of the scanning to times that will allow scanning of larger numbers of rats to make rat brain templates, against which the effects of aging can be tracked. Dr. Alexander has begun to do the network analysis that he has developed for humans, on these preliminary rat brain data, and remarkably, the patterns of volumetric change in rats mimics remarkably well those observed in the human. We used these data as preliminary data for the Program Project Grant that we submitted last year, and have finished a full study. Dr. Alexander is taking the lead in writing this up for publication.

Peterson/Ryan

We are just now beginning to understand how normative aging processes affect regions of the medial temporal lobe that are involved in recognition memory – both in humans and animal models (such as rats – e.g., Burke et al., 2010, and now our bonnet macaques as well, Burke et al., 2011). Drs. Ryan and Peterson are collaborating on an MRI experiment supported by the EMBI in Tucson that will use Dr. Ryan's MRI sequences and her elderly subjects, and Dr. Peterson's figure-ground perceptual displays that should allow them to examine perirhinal cortex function with functional imaging methods as well as with sophisticated psychophysical behavioral methods. They have collected the data, are analyzing it now, and have a target submission date of March for the final manuscript to be completed that shows age-related object recognition impairments that appear to result from a diminished ability in advanced age to pattern separate between complex stimuli that share common features.

Trouard /Alexander/Burke/Barnes

At the end of the past summer, we spent 5 very long days conducting a thorough MRI study on our 14 bonnet macaques. Even with anesthetic treatment for over 2 hours, we had no recovery issues with the older monkeys, and we look forward for using these images in several ongoing studies, the ones that are best worked out, mentioned below.

Gothard/Barnes/Burke/Thome

Sara Burke and Kojo Plange have finished a behavioral study with the young and old bonnet macaques that implicates changes in the function of the amygdala and orbitofrontal cortex. We plan to put the data on the reinforcer devaluation task together with volumetric analysis of these two cortical structures. Dr. Gothard is an expert on the amygdala, and will be able to guide us in our assessment of this very complex region.

Engle/Burke/Barnes

Dr. Engle came out to Tucson this fall to administer auditory evoked potential and visual evoked response tests to our young and old bonnet macaques. He serves as a postdoctoral fellow in my laboratory out 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. During the next year, Drs. Engle and Burke are going to do 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.

14. Collaborative programs with non-McKnight institutions:

Fanselow/Chawla/Barnes

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. The data from neurons in the hippocampus, amygdala and medial prefrontal cortex are analyzed, and we are writing this manuscript up over the next months.

Toledo-Morrell /Rogalski/Barnes

A prediction from rat aging models is that normal aging leads to axonal pruning of the entorhinal cortical projection cells to the hippocampus. This has been verified electrophysiologically by Barnes and others, as well as anatomically (Geinisman and colleagues). Dr. de Toledo-Morrell and her colleagues have demonstrated that the fiber tract from the entorhinal cortex to the hippocampus declines in normal aging (Stoub et al., reported above) using volumetric MRI. The question remained was whether the integrity of this temporal lobe projection pathway to the hippocampus was compromised in old adults when compared with young subjects, when using tractography methods. We were able to report that, in fact, there are white matter changes in this pathway as assessed by diffusion tensor analysis in older individuals. The manuscript reporting the results of this analysis has been reviewed, is revised, and has been resubmitted.

Gazzaley/Burke/Plange/Barnes

Gazzaley has investigated the ability of young and healthy older adults to ignore information that is not relevant to the performance of simple working memory tasks. He noted that the elderly that he interacts with as a Neurologist often complain that they are much more distractible than they were when younger, and there have been many psychological experiments that have shown that older individuals are disproportionately affected by distractors in a variety of tasks. While Gazzaley has obtained behavioral, fMRI and event related potential data that show that healthy older adults have a deficit in suppression of cortical activity that is associated with task-irrelevant representations, it remains an open question what underlying mechanisms are responsible for these changes in memory and attention. To understand this better, nonhuman primate aging models will be extremely helpful. Over the past two years, a series of behavioral studies 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. We will continue collecting behavioral data from the remaining monkeys on these experiments, and hope to be able to have enough data for publication by summer.

Redish/Busch/Bohanick/Barnes

Dr. Redish and his students have reported that neural representations of space exist at fast time scales when animals are at decision points on mazes. These location representations reflect future possible choices rather than recently traveled paths. This suggests that the hippocampus is involved in active, forward-shifted spatial representations, as well as instantaneous local neural representations. We continue to collaborate with Dr. Redish to examine whether aged rats show these transient nonlocal representations at critical choice points, and whether the decisions made by the animals at such choices are reflected in an individual animal's ability to accurately represent these nonlocal activity patterns in hippocampal cells. The older rats that we have trained had some difficulty at learning the multiple-choice T maze task in which many decision points can be examined within recording sessions. We have scaled back the number of decision points, and the older animals are now able to learn this task. We have continued to have issues with the health of the old rats, and their ability to make it to the end of the study. But we are gearing up for a major effort on this project in the upcoming year, after Andrew Busch finishes his comprehensive exams. Our prediction for the outcome of this experiment is that old rats may never be as accurate as younger rats, and that the sweeping forward of spiking activity that reflects future spatial locations at decision points will be defective in the old animals and correlated with deficits in spatial behavioral tasks.

Small/Coleman/Barnes

A gene involved in transcriptional silencing was identified that increases over age in Dr. Small's normal aged human population. Barnes looked across the lifespan in the rat, and found that RbAp48 also changes over age in rats, and that lower expression of RbAp48 was correlated with defective spatial memory. We are waiting to publish these data until results from monkey brain tissue can also be analyzed. Barnes provided brain tissue from hippocampus and entorhinal cortex from young and old behaviorally-characterized monkeys to Dr. Coleman to perform this analysis. Coleman has been able to use his newly developed laser capture technology to facilitate measurement of mRNA content in the fixed tissue that Barnes provided. For additional sensitivity, fluorescent quantum dots have been attached to the RbAp48 probe which was hoped to increase

sensitivity for detection of age-related changes. The quantum dot labeling procedures proved to be problematic, and even after enlisting the assistance of Dr. Eberwine at SUNY (one of the pioneers of this technology), we were unsuccessful in optimizing quantification with this method. Over the past year, however, Dr. Coleman has found a procedure that does work. He has completed the full set of animals, and we have a teleconference call about the data scheduled in January. If we believe that the data are robust, then we can combine the rat, monkey and human RbAp48 data together for publication.

DeCarli/Barnes/Kohama

Dr. DeCarli has been interested in the use of MRI methodologies that quantify characteristic hippocampal shape parameters, and that have been useful in detecting early Alzheimer's disease pathology and in children with autism spectrum disorder. The question with respect to our collaboration is whether there are hippocampal deformations that specifically identify memory-related performance variables in young and/or aging human populations, and specifically whether we could see evidence for changes in hippocampal shape in a population of nonhuman primates that were imaged and behaviorally characterized. We explored the possibility of looking at samples of monkeys – and Barnes included a group from Oregon Primate Center (Steve Kohama) in this discussion who will be able to add “n” to the study by mid next year. Once the animals are behaviorally tested and given MRI tests, we will be able to analyze all the animals together, and write the manuscript.

Beach/Barnes

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 identified tissue that was sent to Beach, and he reports that he has it all stained for amyloid markers. We will be meeting about the results within the next several months.

Jezek/ Barnes

There was a remarkable Nature paper that was published during 2011 by Karel Jezek, who was a postdoctoral fellow in the Moser's laboratory in Trondheim. Because of my yearly visits to that lab, I was aware of this work – which he refers to as his “teletransportation” experiment. The fascinating thing about the behavioral apparatus that he developed is that he can “instantly” change all the features of the room, essentially switching between one environment and another, and can do this while recording ensembles of hippocampal neurons. The way in which the hippocampal representation flickers between that of one environment then the other, until it stabilizes into the representation of the environment that is present, is a measure of the network “settling in” the correct representation. Dr. Jezek now has his own laboratory in Prague, but has agreed to collaborate to set up the behavioral apparatus and computer control necessary to assist with a full aging experiment. This is a very exciting study that I believe will be the next critical step to provide a fuller understanding of how network dynamics change in the normal aged brain.

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. We have begun a collaboration 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 all in August. Lan Hoang and I brought the brains back from Boulder to Tucson, and since August have systematically sectioned, performed the *in situ* hybridization for *Arc*, and have collected data from the high resolution confocal microscope, so that the catFISH analysis can begin. We will be finished collecting the necessary confocal images by February, and can start the cell counts after that time. This is a long-term investment – but the study may be very “high pay off”, and we may 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 the collaborations mentioned in #13 and #14 above, but in addition to those experiments, we continue with the following.

Cognitive Testing of Young and Old Bonnet Macaques

We continue to conduct behavioral experiments on the 7 young and 7 old bonnet macaques to screen for age-related cognitive impairment. We have completed seven tasks: reinforcer devaluation, reversal learning, object discrimination, delayed response, a delayed nonmatching to sample memory task with delays from 10 seconds to 10 minutes, a delayed nonmatching to sample task with interference in the first batch of monkeys, and an object discrimination task in which the object pair to be discriminated shares features. The four newer monkeys received in 2009 are currently still being tested on the delayed nonmatching to sample task with interference, designed with Adam Gazzaley, but this should be complete within the next several months. We have enlisted the help of Mark Moss, from Boston University, and were able to successfully build and test the automated behavioral testing system that we require to begin to examine executive function in young and old monkeys with a conceptual set shifting task. All animals should be at least partially, and some of them completely through testing with this task in the coming year.

Technological Innovations

Electrophysiological Methods:

Our plans for the telemetered recordings in freely behaving monkeys is moving forward with our collaborators at Neuralynx, Triangle Biosystems, XSens and Vicon Inc. The first implantation of a hyperdrive for recording using the telemetered device is going to take place at the California

National Primate Research Center in Davis, in February 2012, if all goes as planned. I have identified a young rhesus macaque who is a good candidate for this project, and he has been trained to run from one end of a 27 foot track to the other for his favorite food treats. January is the big test of the integration of the Neuralynx data acquisition system, the Triangle telemetry system, the Vicon tracking system and the XSens head accelerometer and compass system that we will be using together to collect the data. Once the system is tested and the monkey in Davis implanted, this will be a huge technical landmark for us – because this will mean that we are successfully recording for the first time from an entirely unrestrained and free to behave primate. We will then be able to make the decision on whether to use this new technology for recording from the bonnet macaques. Because most of the behavioral experiments that we had planned will be nearing completion at the end of this year, my target is to begin serious recording studies from this precious population of animals beginning in 2013. This timeline is planned to coincide with my sabbatical (officially from Aug 2013 - Aug 2014), on which I intend to do a substantive part of the recordings myself, arranging to free my time so that I may give my full attention to this very critical electrophysiological data collection component for these animals.

Whole Brain Imaging with Single Cell Resolution -

My collaborator at Rensselaer Polytechnic Institute in New York, Dr. Badri Roysam continued to work on our grant that was awarded to facilitate solutions to the “whole brain imaging” tissue montaging problems that will allow us to accurately put tissue sections back together in 3 dimensions. This step is essential before the algorithms for identifying the fluorescent gene product can be implemented over significant portions of the brain. The new associative image analysis procedures that are being developed should allow us to make joint registration possible with little error accumulation that would otherwise limit image registration methods. We are writing papers on these new algorithms and tests of it we have done. Dr. Lister from my lab continues interact with Roysam’s group (he has now taken over as Chair of the Electrical and Computer Engineering Department at the University of Houston.) and this continues to be a very productive interaction, with clearly met milestones.

In addition, Dr. Roysam is assisting with another collaborative project that we are working on with DMetrix here in Tucson. Together with Joe Zhou, we have written an SBIR grant for the development of an Array Confocal Fluorescent Microscope for Whole-Brain Tissue Slides – which will be reviewed early this year. We are very excited by these new developments, as it means that if we are successful in our development plans, that we will be able to do very fast and high throughput of monkey tissue as well as rat tissue – an enormous advantage, opening up many experimental possibilities. With Roysam involved, this means that we will be assured of having solutions for analysis of these large datasets at hand.

16. Endowment investment results (July 1, 2010 to June 30, 2011)

Endowed Chair

Summary for 12 months ending June 30, 2011

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

A. Beginning Balance on July 1, 2010	\$ 789,766
B. Investment Growth	\$ 112,953
C. Distributions (to Endowed Chair Expendable Account)	\$ (36,393)
D. Additional Contributions	\$ 0
E. Ending Balance on June 30, 2011	\$ 866,326

Institute

Summary for 12 months ending June 30, 2011

Account Name: Evelyn F. McKnight Brain Institute

A. Beginning Balance on July 1, 2010	\$ 2,716,603
B. Investment Growth	\$ 508,814
C1. Distributions (6% development fund fee)	\$ (60,000)
C2. Distributions (to Institute Expendable Account)	\$ (28,930)
D. Additional Contributions	\$ 1,000,000
E. Ending Balance on June 30, 2011	\$ 4,136,487

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 a great 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. Although we have not identified the "McNaughton replacement", we have 3 extremely strong candidates, and I believe

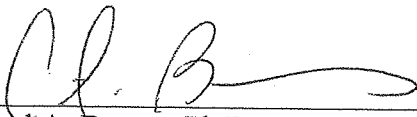
this will be finalized in 2012. The Clinical and Translational Neuroscience position is also open again during the next year, and I will be coordinating the invitations for interviews in the first months of the year. Although the search was not completed as we had anticipated last year, we were fortunate to gain a great M.D./Ph.D. colleague through that search (Dr. Madhavan), who Neurology found a position for, and who will be a tremendous asset to our basic biology research efforts on aging going forward.

Another remarkable aspect of the past year was how the McKnight representatives from each institution came together to work as a truly effective team in putting together the Inter-Institutional Cognitive Test Battery. This working group met twice last year (August 3-4, 2011 and December 1-2, 2011). While I had no doubt that this group would be able to contribute substantively to the conceptual and practical development of test batteries for humans and other animals – I must say, the result has surpassed my most optimistic expectations. The result of our meeting in December was a clear demonstration of the intellectual caliber of our group, and the benefit of the Foundation's strategic support of this initiative. We are clearly working as a 'unit', sharing good ideas (and bad ideas) freely, taking positive and negative feedback gracefully, and making something happen in a condensed timeframe that even I (admitted overachiever) am pleased with.

I am particularly excited that the Inter-Institutional Meeting will once again be in Tucson in 2012. One of the highlights of this 2012 event will be presentation of our ideas and hard work on the test battery to the entire group. I am confident that this effort will be noticed, broadly, across the field.

Because 2011 marks the final gift year from the McKnight Brain Research Foundation, and match from the University and State of Arizona, I have begun discussing with colleagues and administrators here in Tucson the possibility that community and University matching funds might be found to extend the efforts of the Evelyn F. McKnight Institute with greater support. I have had some positive feedback, at least enough to encourage me to ask whether the Trustees would be willing to consider supporting this effort in Tucson with another gift. I will be planning a proposal outlining ideas for this next step to discuss when we meet here next April. I believe that I have played an important role in the evolution of the McKnight Institutions' interactions, which emboldens me to discuss with you how we may be able to do even more to advance the field with the goal of understanding the biological basis of normal age-related memory decline, and an eye to fostering ideas and realizing treatments that will alleviate these symptoms.

22.



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

January 3, 2012
Date