

**Evelyn F. McKnight
Brain Institute**

Annual Report

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

**Report Period: July 1, 2007 – June 30, 2008
Institution: University of Arizona**

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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 two of our fundamental scientific goals for the Institute, including progress on experiments designed to examine age-related memory change in a primate model of normal aging, using our colony of bonnet macaques, and in our goals for whole brain imaging of the individual cells participating in circuits critical for memory. Additionally (as listed in #2 below), several significant papers were published on the electrophysiological changes that accompany normal aging in rodent and primate models. Moreover, we have invited outside speakers throughout the past year who were directly chosen for their potential to develop scientific interactions with EMBI affiliate faculty here in Arizona, and have nurtured and expanded collaborations between our McKnight affiliates in Tucson, between “McKnight ‘Family’ Institutions”, as well as with those outside these institutions. The progress in each of these areas will be outlined in the sections below, as well as the challenges that have arisen following Bruce McNaughton’s departure to take up the Alberta Heritage Foundation for Medical Research Polaris Award in Lethbridge, Canada.

2. Publications in peer reviewed journals

From Barnes

- Marrone, D.F., Schaner, M.J., McNaughton, B.L., Worley, P.F. and Barnes, C.A. (2008) Immediate-early gene expression at rest recapitulates recent experience. *The Journal of Neuroscience*, 28:1030-1033.
- Alexander, G.E., Chen, K., Aschenbrenner, M., Merkley, T.L., Santerre-Lemmon, L.E., Shamy, J.L., Skaggs, W.E., Buonocore, M.H., Rapp, P.R. and Barnes, C.A. (2008) Age-related regional network of MRI gray matter in the rhesus macaque. *The Journal of Neuroscience*, 28:2710-2718.
- Burke, S.N., Maurer, A.P., Yang, Z., Navratilova, Z. and Barnes, C.A. (2008) Glutamate receptor-mediated restoration of experience-dependent place field expansion plasticity in aged rats. *Behavioral Neuroscience*, 122:535-548.
- Yang, Z., Krause, M., Rao, G., McNaughton, B.L. and Barnes, C.A. (2008) Synaptic commitment: Developmentally-regulated reciprocal changes in hippocampal granule cell NMDA and AMPA receptors over the lifespan. *Journal of Neurophysiology*, 99:2760-2768.
- Krause, M. Yang, Z., Rao, G. and Barnes, C.A. (2008) Altered dendritic integration in hippocampal granule cells of spatial learning-impaired, aged rats. *Journal of Neurophysiology*, 99:2769-2778.
- Gerrard, J.L., Burke, S.N., McNaughton, B.L. and Barnes, C.A. (2008) Sequence reactivation in the hippocampus is impaired in aged rats. *The Journal of Neuroscience*, 28:7883-7890.
- Insel, N., Ruiz-Luna, M.L., Permenter, M., Vogt, J., Erickson, C.A. and Barnes, C.A. (2008) Aging in rhesus macaques is associated with changes in novelty preference and altered saccade dynamics. *Behavioral Neuroscience*, 122:1328-1342.
- Huentelman, M.J., Stephan, D.A., Talboom, J., Reiman, D.M., Gerber, J.D., Barnes, C.A., Alexander, G.E., Reiman, E.M. and Bimonte-Nelson, H.A. Peripheral delivery of a ROCK inhibitor improves learning and working memory. *Behavioral Neuroscience*, in press.

- Jenstad, M., Quazi, A.Z., Zilberter, M., Haglerød, C., Berghuis, P., Saddique, N., Gojny, M., Buntup, D., Davanger, S., Haug, F.M., Barnes, C.A., McNaughton, B.L., Ottersen, O.P., Storm-Mathisen, J., Harkany, T. and Chaudhry, F.A. System A transporter SAT2 mediates replenishment of dendritic glutamate pools controlling retrograde signaling by glutamate. *Cerebral Cortex*, in press.
- Lister, J. and Barnes, C.A. Neurobiological changes in the hippocampus during normative aging. *Archives of Neurology*, in press.
- Wu, W., Brickman, A.M., Luchsinger, J., Farrazano, P., Pichiule, P., Brown, T., DeCarli, C., Barnes, C., Mayeux, R., Vannucci, S. and Small, S.A. The brain in the age of old: The hippocampal formation is targeted differentially by diseases of late-life. *Annals of Neurology*, in press.

From Selected Affiliates

- Alexander, G.E., Chen, K., Aschenbrenner, M., Merkle, T.L., Santerre-Lemmon, L.E., Shamy, J.L., Skaggs, W.E., Buonocore, M.H., Rapp, P.R. and Barnes, C.A. (2008) Age-related regional network of MRI gray matter in the rhesus macaque. *The Journal of Neuroscience*, 28:2710-2718.
- Boyes, R.G., Gunter, J.L., Frost, C., Janke, A.L., Yeatman, T., Hill, D.L., Bernstein, M.A., Thompson, P.M., Weiner, M.W., Schuff, N., Alexander, G.E., Killiany, R.J., DeCarli, C., Jack, C.R., Fox, N.C. (2008) Intensity non-uniformity correction using N3 on 3-T scanners with multichannel phased array coils. *Neuroimage*, 39:1752-62.
- Caselli, R.J., Chen, K., Lee, W., Alexander, G.E., Reiman, E.M. (2008) Correlating cerebral hypometabolism with future memory decline in subsequent converters to amnesic pre-mild cognitive impairment. *Archives of Neurology*, 65:1231-6.
- Glisky, E. L. and Kong, L. L. (2008) Do young and older adults rely on different processes in source memory tasks? A neuropsychological study. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 34:809-822.
- Glisky, E. L. and Marquine, M. J. (2008) Semantic and self-referential processing of positive and negative trait adjectives in older adults. *Memory*: 1-14.
- Griffin-Pierce, T., Silverberg, N., Jim, M., Connor, D., Jim, M., Peters, J., Kaszniak, A.W. and Sabbagh, M. (2008) Challenges to the recognition and assessment of dementia in American Indians of the Southwestern United States. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, 4:291-199.
- Hua, X., Leow, A.D., Lee, S., Klunder, A.D., Toga, A.W., Lepore, N., Chou, Y.Y., Brun, C., Chiang, M.C., Barysheva, M., Jack, C.R. Jr, Bernstein, M.A., Britson, P.J., Ward, C.P., Whitwell, J.L., Borowski, B., Fleisher, A.S., Fox, N.C., Boyes, R.G., Barnes, J., Harvey, D., Kornak, J., Schuff, N., Boreta, L., Alexander, G.E., Weiner, M.W., Thompson, P.M., Alzheimer's disease neuroimaging initiative. (2008) 3D characterization of brain atrophy in Alzheimer's disease and mild cognitive impairment using tensor based morphometry. *Neuroimage*, 41:19-34.
- Jack, C.R., Bernstein, M.A., Fox, N.C., Thompson, P., Alexander, G., Harvey, D., Borowski, B., Britson, P.J., Whitwell, J., Ward, C., Dale, A.M., Felmlee, J.P., Gunter, J.L., Hill, D.L., Killiany, R., Schuff, N., Fox-Bosetti, S., Lin, C., Studholme, C., DeCarli, C.S., Krueger, G., Ward, H.A., Metzger, G.J., Scott, K.T., Mallozzi, R., Blezek, D., Levy, J., Debbins, J.P., Fleisher, A.S., Albert, M., Green, R., Bartzokis, G., Glover, G., Mugler, J., Weiner, M.W.

- (2008) Alzheimer's disease neuroimaging initiative: MRI methods. *Journal of Magnetic Resonance Imaging*, 4:685-91.
- Kong, L.L., Allen, J. J. B., and Glisky, E. L. (2008) Inter-identity memory transfer in dissociative identity disorder. *Journal of Abnormal Psychology*, 117:686-692.
- Lane, R.D., McRae, K.L., Reiman, E.M., Chen, K., Ahern, G.L. and Thayer, J.F. (2009) Neural correlates of heart rate variability during emotion. *NeuroImage*, 44:213-222.
- Milman, L.H., Holland, A., Kaszniak, A.W., D'Agostino, J., Garrett, M. and Rapcsak, S.R. (2008) Initial validity and reliability of the SCCAN: Using tailored testing to assess adult cognition and communication. *Journal of Speech, Language, and Hearing Research*, 51:49-69.
- Rance, N.E. Menopause and the human hypothalamus: Role of kisspeptin/neurokinin B neurons in the regulation of estrogen negative feedback. *Peptides*, in press.
- Reiman, E.M., Chen, K., Caselli, R.J., Alexander, G.E., Bandy, D., Adamson, J.L., Lee, W., Cannon, A., Stephan, E.A., Stephan, D.A., Papassotiropoulos, A. (2008) Cholesterol-related genetic risk scores are associated with hypometabolism in Alzheimer's affected brain regions. *Neuroimage*, 40:1214-21.
- Romoto, A.M. and Rance, N.E. (2008) Changes in prodynorphin gene expression and neuronal morphology in the hypothalamus of postmenopausal women. *Journal of Neuroendocrinology* 20:1376-1381.
- Thayer, J.F., Sollers, J.J., Labiner, D.M., Weinand, M.E., Herring, A.M., Lane, R.D. and Ahern G.L. Age related differences in prefrontal control of heart rate in humans: A pharmacological blockade study. *International Journal of Psychophysiology*, in press.

3. Publications (other)

From Barnes

- Burke, S.N. and Barnes, C.A. (2008) Aging ensembles: Circuit contributions to memory deficits. In: *Hippocampal Place Fields: Relevance to Learning and Memory*. Mizumori, S.J.Y. (ed) New York: Oxford University Press, pp 364-384.

From Selected Affiliates

- Bondi, M., Salmon, D. and Kaszniak, A.W. (2008) The neuropsychology of dementia. In I. Grant and K. Adams (Eds.), *Neuropsychological Assessment of Neuropsychiatric & Neuromedical Disorders* (3rd ed.), New York: Oxford University Press.
- Corneveaux, J.J., Liang, W.S., Reiman, E.M., Webster, J.A., Myers, A.J., Zismann, V.L., Joshipura, K.D., Pearson, J.V., Hu-Lince, D., Craig, D.W., Coon, K.D., Duncley, T., Bandy, D., Lee, W., Chen, K., Beach, T.G., Mastroeni, D., Grover, A., Ravid, R., Sando, S.B., Aasly, J.O., Heun, R., Jessen, F., Kölsch, H., Rogers, J., Hutton, M.L., Melquist, S., Petersen, R.C., Alexander, G.E., Caselli, R.J., Papassotiropoulos, A., Stephan, D.A., Huentelman, M.J. Evidence for an association between KIBRA and late onset Alzheimer's disease. *Neurobiology of Aging*, in press.
- Glisky, E. L. and Glisky, M. L. (2008) Memory rehabilitation in older adults. In: *Cognitive Neurorehabilitation: Evidence and applications*, 2nd Edition (pp. 541-561), D. T. Stuss, G. W. Winocur and I. H. Robertson (eds.), London, UK: Cambridge University Press.

- Kaszniak, A.W. and Edmonds, E. Anosognosia and Alzheimer's disease: Behavioral studies. In G. Prigatano (Ed.), *Advances in the study of anosognosia*. New York: Oxford University Press, in press.
- Huentelman, M.J., Stephan, D.A., Talboom, J., Reiman, D.M., Gerber, J.D., Barnes, C.A., Alexander, G.E., Reiman, E.M. and Bimonte-Nelson, H.A. Peripheral delivery of a ROCK inhibitor improves learning and working memory. *Behavioral Neuroscience*, in press.

4. Presentations at scientific meetings

From Barnes

- Barnes, C.A. The role of neurogenesis in the dentate gyrus to learning and memory. 32nd Annual Winter Conference on the Neurology of Learning & Memory, Park City, Utah, January 2008 (Invited)
- Broersma, B.M., Schimanski, L.A., Harley, C.W., Fisher, M.G., Bohanick, J.D., McNaughton, B.L. and Barnes, C.A. Aging reduces performance on a spatial version of classical eyeblink conditioning in the rat. Nineteenth Annual Undergraduate Biology Research Program, University of Arizona, Tucson, Arizona, January 2008. (Abstract)
- Nematollahi, S., Uprety, A., Burke, S.N., Wallace, J. and Barnes, C.A. The effect of age and context on object recognition. Nineteenth Annual Undergraduate Biology Research, University of Arizona, Tucson, Arizona, Program, January 2008. (Abstract)
- Szewczyk, D., Insel, N. and Barnes, C.A. A novel task to assess prefrontal function and the affects of aging in rats. Nineteenth Annual Undergraduate Biology Research Program, University of Arizona, Tucson, Arizona, January 2008. (Abstract)
- Uprety, A., Nematollahi, S., Burke, S.N., Maurer, A.P., Wallace, J. and Barnes, C.A. A dissociation of the influence of objects on the firing characteristics of perirhinal and hippocampal neurons. Nineteenth Annual Undergraduate Biology Research Program, University of Arizona, Tucson, Arizona, January 2008. (Abstract)
- Barnes, C.A. Neural correlates of age-related memory deficits in rats and monkeys. Molecular, Cellular and Integrative Neuroscience Seminar Series, Colorado State University, Ft. Collins, Colorado, March 2008 (Invited)
- Barnes, C.A. Hippocampal contributions to age-related memory deficits, Department of Psychology and Brain Sciences Seminar Series, Dartmouth College, Hanover, New Hampshire, March 2008 (Invited)
- Barnes, C.A. The aging hippocampus: Molecules, maps and memory, Neurology of Aging Training Symposium, University of Texas Health Sciences Center, Fort Worth, Texas, April 2008 (Invited)
- Barnes, C.A. Ensemble recordings and MRI analyses in behaviorally-characterized young and old rhesus macaques, AGE Pre-Meeting Conference, Boulder, Colorado, May 2008 (Invited)
- Barnes, C.A. Hippocampal granule cells: An enigma? Neural Networks, Place Representation and Memory Conference, Spitsbergen, Svalbard, Norway, June 2008 (Invited)
- Barnes, C.A. Normative aging of the primate brain differs from Alzheimer's disease, 2nd International Genome Dynamics in Neuroscience Meeting, Pacific Grove, California, June 2008 (Invited)
- Barnes, C.A. Symposium Moderator: Molecular Cellular and Circuit Contributions to Cognitive Decline in Normal Aging, FENS – Geneva, Switzerland, July 2008

- Barnes, C.A. Plasticity in aging, International Conference on Cognitive Neuroscience, Bodrum, Turkey, September 2008 (Invited)
- Schimanski, L.A., Broersma, B.M., Harley, C.W. and Barnes, C.A. A spatial version of eyeblink conditioning of young and old rats. International Conference on Cognitive Neuroscience, Bodrum, Turkey, September 2008. (Abstract)
- Barnes, C.A. Memory and hippocampal networks: The impact of aging. Presidential Special Lecture, 38th Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008 (Invited)
- Stoub, T.R., Shah, R.C., Barnes, C.A. and deToledo-Morrell, L. (2008) Parahippocampal white matter changes in healthy older individuals. Program No. 391.6. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Brickman, A.M., Muraskin, J., Shamy, J., Steffener, J., Buonocore, M.H., Rapp, P.R., Alexander, G.E., Barnes, C.A. and Small, S.A. (2008) Cerebral blood volume magnetic resonance imaging reveals localized correlates of age-associated cognitive decline in rhesus monkeys. Program No. 391.7. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Plange, K., Burke, S.N. and Barnes, C.A. (2008) Control of response selection by reinforcer value in young and aged bonnet macaques. Program No. 391.8. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Burke, S., Maurer, A.P., Nematollahi, S.N., Uprety, A., Wallace, J.L. and Barnes, C.A. (2008) The effect of aging and novelty on the single-unit activity of perirhinal cortical neurons. Program No. 391.9. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Uprety, A.R., Burke, S.N., Nematollahi, S.N., Maurer, A.P., Wallace, J.L. and Barnes, C.A. (2008) A dissociation of the influence of objects on the firing characteristics of perirhinal and hippocampal neurons. Program No. 391.10. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Nematollahi, S., Burke, S.N., Uprety, A., Wallace, J.L. and Barnes, C.A. (2008) The effect of age and context on object recognition. Program No. 391.11. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Insel, N.E., Szwedczyk, D., Samson, R.D., Patron, L. and Barnes, C.A. (2008) Aged rats show intact learning in a cross-modal switching task. Program No. 391.12. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Schimanski, L.A., Broersma, B.M., Harley, C.W., Fisher, M.G., Bohanick, J.D., Lipa, P., McNaughton, B.L. and Barnes, C.A. (2008) A spatial twist on classical eyeblink conditioning. Program No. 391.13. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Buzzetti, R., Penner, M.R., Worley, P.F. and Barnes, C.A. (2008) Reduced *Arc* transcription in CA1 pyramidal cells of aged, memory-impaired rats. Program No. 391.14. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Penner, M.R., Hoang, L.T., Roth, T.L., Roth, E.D., Sweatt, J.D. and Barnes, C.A. (2008) DNA methylation of *Arc* in the hippocampus of memory-impaired aged rats. Program No. 391.1. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Hoang, L.T., Fellous, J.-M. and Barnes, C.A. (2008) Expression of the immediate-early gene *Arc* in ventral tegmental neurons during aging. Program No. 391.21. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.

- Tsai, C.L., Lister, J.P., Al-Kofahi, Y., McNaughton, B.L., Roysam, B. and Barnes, C.A. (2008) Automatic 3-dimensional joint montage synthesis from arrays of confocal images and neuronal layer identification by associative image analysis. Program No. 391.22. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Lister, J.P., Seymour, E. and Barnes, C.A. (2008) Moving through "fictive space": Hippocampal expression of the immediate early gene *Arc* during running on a fixed wheel occurs equivalent to proportions of cell exploring an environment. Program No. 391.19. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Chawla, M.K., Olson, K., Lister, J.P., Buzzetti, R., McNaughton, B.L. and Barnes, C.A. (2008) Sparse behavior-induced expression of the immediate-early gene *Arc* in the rat ventral hippocampus. Program No. 391.17. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Miyashita, T., Marrone, D.F., Bohanick, J.D, Schaner, M.J., McNaughton, B.L., Barnes, C.A. and Guzowski, J.F. (2008) Activation of immediate-early gene transcription in hippocampus and neocortex during REM sleep. Program No. 391.4. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Maurer, A.P., Burke, S.N., Barnes, C.A. and McNaughton, B.L. (2008) Temporal compression in precessing neuronal ensembles increases with running speed. Program No. 391.18. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Rogalski, E.J., Murphy, C.M., deToledo-Morrell, L., Barnes, C.A., Shah, R.C. and Stebbins, G.T. (2008) Parahippocampal white matter integrity as a function of healthy aging and in individuals with amnesic mild cognitive impairment. Program No. 47.9. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.
- Alme, C., Leutgeb, J.K., Tashiro, A., Leutgeb, S., Barnes, C., Moser, M.-B., Moser, E.I., and McNaughton, B.L. (2008) Does the dentate gyrus support temporal tagging of memories? Program No. 94.10. 2008 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.

From Selected Affiliates

- Kaszniak, A.W. Zen and the affective neuroscience of compassion: A developing research program. Presentation given at the "Zen Brain, Selfless Insight" seminar/retreat (A.W. Kaszniak and J. Halifax, Organizers), Upaya Zen Center and Institute, Santa Fe, New Mexico, January 2008.
- Kaszniak, A.W. Discussant. Early risk and protective factors for cognitive decline. Symposium (organized by Sherry Willis) Annual Meeting of the International Neuropsychological Society, Waikoloa, Hawaii, February 2008.
- Kong, L., Glisky, E., Kaszniak, A., Bieliauskas, L. and Rapsak, S. Source memory and executive functioning in Parkinson's disease. Annual Meeting of the International Neuropsychological Society, Waikoloa, Hawaii, February 2008.
- Marquine, M.J., Walther, K., Glisky, E. and Rapsak, S. Impaired self-knowledge, but preserved other-person knowledge in a case of confabulation. Annual Meeting of the International Neuropsychological Society, Waikoloa, Hawaii, February 2008.
- McFarland, C.P. and Glisky, E.L. Frontal lobe involvement in a task of time-based prospective memory. Annual Meeting of the International Neuropsychological Society, Waikoloa, Hawaii, February 2008.

- Recknor, E.C., Kaszniak, A.W., Glisky, E.L. and Rapcsak, S.Z. False facial recognition: The relationship between false alarms and frontal lobe functioning in older adults. International Neuropsychological Society, Waikola, Hawaii, February 2008.
- Walther K., Glisky E. and Ryan L. Longitudinal changes in diffusion-weighted MRI and cognitive function in older adults. Annual Meeting of the International Neuropsychological Society, Waikola, Hawaii, February 2008.
- Walther, K., Bendlin, B., McGill, M., Birdsill, A., Marengo, F., Glisky, E. and Ryan, L. White matter pathology in older adults is related to frontal function. Annual Meeting of the International Neuropsychological Society, Waikola, Hawaii, February 2008.
- Alexander, G.E. Impact of genomics on neuroimaging: Implications for translational studies in aging and Alzheimer's disease. Presentation at the Neuroimaging in Dementia conference, 18th Annual Rotman Research Institute Conference, Toronto, Canada, March 2008
- Walther, K., Bendlin, B., Glisky, E., Trouard, T., Walker, D., Lue, L. and Ryan, L. Age-related changes in diffusion weighted MRI and the relationship to memory performance in older adults with and without genetic risk for Alzheimer's disease. Poster presented at the 18th Annual Rotman Research Institute Conference, Toronto, Ontario, Canada, March 2008.
- McFarland, C.P. and Glisky, E.L. Frontal lobe and medial temporal lobe contributions to time-based prospective memory. Cognitive Aging Conference, Atlanta, Georgia, April 2008.
- Walther, K., Birdsill, A., Bendlin, B., Glisky, E., Ryan, L. Cerebral differences related to obesity – a VBM study. Cognitive Aging Conference, Atlanta, Georgia, April 2008.
- Ray, C.A. and Kaszniak, A.W. Does engagement in an emotion regulation strategy in response to a previously conditioned stimulus result in enduring fear inhibition? Cognitive Neuroscience Society, San Francisco, California, April 2008.
- Lue, L-F., Moses, G. S. D., Walker, D. G., Lehman, J., Irwin, K., Glisky, E. L., Ryan, L., Connor, D. and Sabbagh, M. R. Is more plasma soluble RAGE beneficial as we get older? Arizona Alzheimer's Consortium Annual Conference, Phoenix, Arizona, May 2008.
- Menchola, M., Kaszniak, A. and Burton, K. Development and evaluation of educational material on Alzheimer's disease: A pilot study with Hispanic elderly. Arizona Alzheimer's Consortium Annual Conference, Phoenix, Arizona, May 2008.
- Menchola, M., Kaszniak, A. and Burton, K. Age differences in self-report and physiological measures of emotional responding. Arizona Alzheimer's Consortium Annual Conference, Phoenix, Arizona, May 2008.
- O'Donnell, R.M., Kaszniak, A.W. and Menchola, M. Self-reported emotion regulation strategy, health, and perceived burden among caregivers of persons with dementia. Arizona Alzheimer's Consortium Annual Conference, Phoenix, Arizona, May 2008.
- Dreyfus, G., Dunne, J., Kaszniak, A.W., Klein, A., Pessoa, L., Meyer, D., Thompson, E. and Zelazo, P. Attention and emotion in cognitive neuroscience and Buddhist phenomenology and epistemology. Panel discussion presented at the annual Mind and Life Summer Research Institute, Garrison, New York, June 2008.
- Kaszniak, A.W. The cognitive/affective neuroscience of multitasking. Invited presentation given at the "No Time to Think" conference (David Levy, Univ. Washington, Organizer), Seattle, Washington, June 2008.
- Glisky, E.L., Ryan, L. and Walther, K. Longitudinal changes in memory and executive function in normal aging. For Better or Worse: Memory Changes Across the Lifespan, International Neuropsychological Society Mid-Year Meeting, Buenos, Aires, Argentina, July 2008.

- Glisky, E.L., Marquine, M.J. and Grilli, M. Effects of emotion on memory in brain-injured patients. 5th Satellite Symposium on Neuropsychological Rehabilitation, Iguacu Falls, Brazil, July 2008.
- Marquine, E.L. and Glisky, E.L. Effect of self- and other-referential processing on memory in memory-impaired individuals. 5th Satellite Symposium on Neuropsychological Rehabilitation, Iguacu Falls, Brazil, July 2008.
- Alexander, G.E., Hanson, K.D., Chen, K., Reiman, E.M., Bernstein, M.A., Kornak, J., Schuff, N., Fox, N.C., Thompson, P.M., Weiner, M.W., Jack, C.R. Six month MRI gray matter declines in Alzheimer's dementia evaluated by voxel based morphometry with multivariate network analysis: Preliminary findings from the ADNI Study. Abstract for presentation at the Alzheimer's Imaging Consortium meeting, Chicago, Illinois, August 2008.
- Ayutyanont, N., Chen, K., Liu, X., Reschke, C., Lee, W., Bandy, D., Alexander, G.E., Jagust, W.J., Koeppe, R.A., Foster, N.L., Reiman, E.M. Differentiating amnesic MCI converting to probable AD from stable amnesic MCI using FDG-PET and an AD-related hypometabolism overlap index. Abstract for presentation at the Alzheimer's Imaging Consortium meeting, Chicago, Illinois, August 2008.
- Chen, K., Lee, W., Xiafen L., Alexander, G.E., Bandy, D., Reschke, C., Foster, N., Weiner, M., Koeppe, R., Jagust, W., Reiman, E. The consistency of hypometabolic brain voxels in probable Alzheimer's disease and amnesic mild cognitive impairment patients from the Alzheimer's Disease Neuroimaging Initiative. Abstract for presentation at the Alzheimer's Imaging Consortium meeting, Chicago, Illinois, August 2008.
- Langbaum, J., Reiman, E.M., Chen, K., Alexander, G.E., Bandy, D., Smilovici, O, Lee, W., Reschke, C., Caselli, R. Regional hypometabolism in cognitively normal Hispanic carriers of the apolipoprotein E epsilon4 allele. Abstract for presentation at the Alzheimer's Imaging Consortium meeting, Chicago, Illinois, August 2008.
- Lee, W., Langbaum, J., Chen, K., Reschke, C., Bandy, D., Alexander, G.E., Foster, N.L., Weiner, M.W., Koeppe, R.A., Jagust, W., Reiman, E.M. Categorical and correlational analysis of baseline fluorodeoxyglucose positron emission tomography images from the Alzheimer's Disease Neuroimaging Initiative. Abstract for presentation at the Alzheimer's Imaging Consortium meeting, Chicago, Illinois, August 2008.
- Reiman, E.M., Chen, K., Ayutyanont, N., Lee, W., Reschke, D.B.C., Alexander, G.E., Weiner, M.W., Koeppe, R.A., Foster, N.L., Jagust, W.J. Twelve-month cerebral metabolic declines in probable Alzheimer's disease and amnesic mild cognitive impairment: Preliminary findings from the Alzheimer's Disease Neuroimaging Initiative. Abstract for presentation at the Alzheimer's Imaging Consortium meeting, Chicago, Illinois, August 2008.
- Zhang, H., Wu, T., Bae, M.-H., Reiman, E.M., Alexander, G.E., Thompson, P.M., Jack Jr, C.R., Chen, K. Use of the support vector machine and sensitivity of an Alzheimer's disease-related region-of-interest gray matter classifier in identifying amnesic mild cognitive impairment subjects who convert to Alzheimer's disease: Preliminary findings from the Alzheimer's Disease Neuroimaging Initiative. Abstract for presentation at the Alzheimer's Imaging Consortium meeting, Chicago, Illinois, August 2008.
- Glisky, E.L. Longitudinal changes in memory and executive function in normal aging. Neuroscience Community Data Blitz, University of Arizona, August 2008.
- Dorjee Khenchen, D., Garrett, F. M. and Glisky, E. L. Frontal mechanisms in language pragmatics: Evidence from older adults processing implicatures. *Architecture and Mechanisms for Language Processing*, Cambridge, United Kingdom, September 2008.

- Menchola, M., Kaszniak, A.W. and Burton, K.W. Interaction between habitual and voluntary emotion regulation and the chronometry of affective responses. Poster presented at the 48th annual meeting of the Society for Psychophysiological Research, Austin, Texas, October 2008.
- Kaszniak, A.W., and Edmonds, E.C. Anosognosia and Alzheimer's disease: Behavioral studies. Invited paper presented at the Conference on Advances in the Study of Anosognosia (George Prigatano, Barrow Neurological Institute, Organizer), Phoenix, Arizona, October 2008.
- Rance, N.E. Kisspeptin neurons in the human hypothalamus: distribution, morphology and changes in KiSS1 gene expression in postmenopausal women. First World Conference on Kisspeptin Signaling in the Brain, Cordoba, Spain, October 2008.
- Ray, C.A., Sokal, B., Allen, J.J.B. and Kaszniak, A.W. Beating hearts and sweaty palms: Mean skin conductance response during fear conditioning is larger for those with lower resting respiratory sinus arrhythmia. Poster presented at the 48th annual meeting of the Society for Psychophysiological Research, Austin, TX, October 2008.
- Kaszniak, A.W. The psychology of empathy and compassion: Contemplative and scientific perspectives. Invited presentation (on an undergraduate course development) given at the 2008 Contemplative Practice Fellowship Meeting (supported by the Center for Contemplative Mind in Society and the Fetzer Institute), Kalamazoo, MI, November 2008.
- Bergfield, K.L., Hanson, K.D., Chen, K., Teipel, S.J., Hampel, H., Rapoport, S.I., Moeller, J.R., Alexander, G.E. Age-related regional MRI gray matter network pattern in healthy aging: A replication study. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Brickman, A.M., Muraskin, J., Shamy, J.L., Steffener, J., Buonocore, M.H., Rapp, P.R., Alexander, G.E., Barnes, C.A., Small, S.A. Cerebral blood volume magnetic resonance imaging reveals localized correlates of age-associated cognitive decline in rhesus monkeys. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Campbell, J.L., Woolverton, C., Nadel, L. and Ryan, L. Repeated retrieval of recent and remote autobiographical memories results in increased hippocampal activation: An fMRI study. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Corneveaux, J.J., Lian, W.S., Reiman, E.M., Webster, J.A., Pearson, J.V., Craig, D.W., Duncley, T., Bandy, D., Lee, W., Chen, K., Beach, T., Grover, A., Mastroeni, D., Roger, J., Alexander, G., Caselli, R., Papassiotropoulos, A., Stephan, D., Huentelman, M.J. Transcriptomic, brain imaging, & genetic evidence for an association between KIBRA and late-onset Alzheimer's disease. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Cox, C.L., Pu, L., Nadel, L. and Ryan, L. Keeping it in perspective: Precuneus activation to events remembered and imagined from first and third person points of view. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Dacks, P.A. and Rance, N.E. Estrogen alters Fos-immunoreactivity in the median preoptic nucleus, a putative control center for thermoregulation. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Edgin, J.O., Hanson, K.D., Chen, K., Bergfield, K.L., Nadel, L., Teipel, S.J., Hampel, H., Rapoport, S.I., Schapiro, M.B., Alexander, G.E. Regional network of MRI gray matter reductions associated with aging in non-demented adults with Down Syndrome. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Hanson, K.D., Bergfield, K.L., Chen, K., Reiman, E.M., Bernstein, M.A., Kornak, J., Harvey, D.J., Schuff, N.W., Thompson, P.M., Weiner, M.W., Jack, C.R., Alexander, G.E. Twelve month MRI gray matter declines in Alzheimer's dementia evaluated by voxel-based

- morphometry with multivariate network analyses: Findings from the Alzheimer's Disease Neuroimaging Initiative. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Krajewski, S.J., Burke, M.C., McMullen, N.T. and Rance, N.E. Projections of arcuate neurokinin B neurons in the rat hypothalamus: a study using neonatal ablation of the arcuate nucleus by monosodium L-glutamate. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Langbaum, J.B.S., Chen, K., Lee, W., Recshke, C., Reeder, S., Bandy, D., Alexander, G.E., Caselli, R.J., Reiman, E.M. Hypertension is associated with hypometabolism in brain regions affected by Alzheimer's disease and normal aging: preliminary results. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Lin C-Y, Ryan L and Frank M. A computational model of behavioral priming, repetition suppression and the effects of frontal lesion. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Papassotiropoulos, A., Webster, J., Myers, A., Chen, K., Hardy, J., Jessen, F., Kolsch, H., Alexander, G., Heward, C., Stephan, D., Reiman, E. (2008) A genome wide-derived genetic cluster and aggregate risk score for sporadic Alzheimer's disease. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Pu L, Cox CL and Ryan L. Group independent component analysis of autobiographical memories vs. imagined events. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Rogalski, E.J., Murphy, C.M., deToledo-Morrell, L., Barnes, C.A., Shah, R.C., and Stebbins, G.T. Parahippocampal white matter integrity as a function of healthy aging and in individuals with amnesic mild cognitive impairment. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Ryan, L., Pu, L. and Cox, C.L. Comparing time courses of brain activation for remembered and imagined events identified by two analysis methods: General Linear Modeling and Probabilistic Independent Component Analysis. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Smith, J.F., Alexander, G.E., Chen, K., Braun, A.R., Horwitz, B. Assessing the functional organization of visual-semantic memory: An fMRI study of linguistic and non-linguistic visual-to-auditory associations. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Valfre M.E. and Ryan L. Decision-making and aging: The influence of age-related changes in executive function, emotional regulation, and theory of mind. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.
- Walther, K., Bendlin, B., Glisky, E., Walker, D. G., Lue, L. and Ryan, L. The relation between APOE e4 gene dosage, diffusion weighted MRI and cognition in healthy older adults. Society for Neuroscience Annual Meeting, Washington, DC, November 2008.

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

From Barnes

Barnes, C.A. Memory, Aging and the Brain, The Arizona Senior Academy, Tucson, Arizona, April 2008.

From Selected Affiliates

- Ahern, G.L. Pharmacological treatment of Alzheimer's disease, Grand Rounds Presentation, Department of Neurology, University of Arizona, Tucson, Arizona, February 2008.
- Kaszniak, A.W. Compassion, equanimity, and the brain: Neuroscientific studies of long-term meditators. Invited public lecture given at the Arizona Senior Academy, Tucson, Arizona, February 2008.
- Ahern, G.L. Alzheimer's disease: What women need to know, 7th Annual Women's Health Symposium, University of Arizona Department of Psychiatry, UA Student Union, Tucson, Arizona, March 2008.
- Kaszniak, A.W. As time goes on: Understanding Alzheimer's disease progression and coping with caregiving challenges. Invited public lecture presented at the Tucson Main Library, Tucson, Arizona, March 2008.
- Ahern, G.L. Pharmacological treatment of Alzheimer's disease, College of Psychiatric and Neurologic Pharmacists Annual Meeting. Scottsdale, Arizona, April 2008.
- Kaszniak, A.W. Organizer and Chairperson, Public Awareness Forum. Presented at the Arizona Alzheimer's Consortium Annual Conference, Phoenix, Arizona, May 2008.
- Ahern, G.L. Featured in the forgetting: A portrait of Alzheimer's disease, KUAT-Channel 6, Interviewer - Bill Buckmaster, Tucson, Arizona, August 2008.
- Ahern, G.L. Pharmacological treatment of Alzheimer's disease, Encore Senior Living Center, Tucson, Arizona, October 2008.

6. Awards

- Ahern, Geoffrey – Recipient of Bruce and Lorraine Cumming Endowed Chair in Alzheimer's Research, 2007
- Barnes, Carol - Elected Fellow, American Association for the Advancement of Science, 2007
- Barnes, Carol - Elected Executive Committee, Dana Alliance for Brain Initiatives, 2007
- Glisky, Betty – Elected Fellow of the Association for Psychological Science, 2007
- Kaszniak, Alfred - Distinguished Contribution to the Science of Psychology Award, Arizona Psychological Association, 2007
- Kaszniak, Alfred - Contemplative Practice Fellow, Center for Contemplative Mind in Society, 2008
- Rance, Naomi - Vernon and Virginia Furrow Award for Excellence in Innovation in Teaching, University of Arizona College of Medicine, 2007

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. Their 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;">Professor</p>		
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	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

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 Publications

- Marrone, D.F., Schaner, M.J., McNaughton, B.L., Worley, P.F. and Barnes, C.A. (2008) Immediate-early gene expression at rest recapitulates recent experience. *The Journal of Neuroscience*, 28:1030-1033.
- Alexander, G.E., Chen, K., Achenbrenner, M., Merkle, T.L., Santerre-Lemmon, L.E., Shamy, J.L., Skaggs, W.E., Buonocore, M.H., Rapp, R.P., and Barnes, C.A. (2008) Age-related regional network of MRI gray matter in the rhesus macaque. *The Journal of Neuroscience*, 28:2710-2718.
- Burke, S.N. and Barnes, C.A. (2008) Aging ensembles: Circuit contributions to memory deficits. In: *Hippocampal Place Fields: Relevance to Learning and Memory*. Mizumori, S.J.Y. (ed) New York: Oxford University Press, pp 364-384.
- Burke, S.N., Maurer, A.P., Navratilova, Z., Yang, Z. and Barnes, C.A. (2008) Glutamate receptor-selective restoration of experience-dependent place field expansion plasticity in aged rats. *Behavioral Neuroscience*, 122:535-548 .
- Yang, Z., Krause, M., Rao, G., McNaughton, B.L. and Barnes, C.A. (2008) Synaptic commitment: Developmentally-regulated reciprocal changes in hippocampal granule cell NMDA and AMPA receptors over the lifespan. *Journal of Neurophysiology*, 99:2760-2768 .
- Krause, M., Yang, Z., Rao, G. and Barnes, C.A. (2008) Altered dendritic integration in hippocampal granule cells of spatial learning-impaired, aged rats. *Journal of Neurophysiology*, 99:2769-2778 .
- Gerrard, J.L., Burke, S.N., McNaughton, B.L., and Barnes, C.A. (2008) Sequence reactivation in the hippocampus during slow wave sleep is impaired in aged rats. *Journal of Neuroscience*, 28:7883-7890.
- Insel, N., Ruiz-Luna, M.L., Permenter, M., Vogt, J., Erickson, C.A., and Barnes, C.A. (2008) Aging in rhesus macaques is associated with changes in novelty preference and altered saccade dynamics. *Behavioral Neuroscience*, 122:1328-1342.
- Huentelman, M.J., Stephan, D.A., Talboom, J., Reiman, D.M., Gerber, J.D., Barnes, C.A., Alexander, G.E., Reiman, E.M., Bimonte-Nelson, H.A. Peripheral delivery of a ROCK inhibitor improves learning and working memory. *Behavioral Neuroscience*, in press.
- Jenstad, M., Quazi, A.Z., Zilberter, M., Haglerød, C., Berghuis, P., Saddique, N., Goiny, M., Buntup, D., Davanger, S., Haug, F.M., Barnes, C.A., McNaughton, B.L., Ottersen, O.P., Storm-Mathisen, J., Harkany, T., and Chaudhry, F.A. System A transporter SAT2 mediates replenishment of dendritic glutamate pools controlling retrograde signaling by glutamate. *Cerebral Cortex*, in press.
- Lister, J. and Barnes, C.A. Neurobiological changes in the hippocampus during normative aging. *Archives of Neurology*, in press.
- Wu, W., Brickman, A.M., Luchsinger, J., Farrazano, P., Pichiule, P., Brown, T., DeCarli, C., Barnes, C., Mayeux, R., Vannucci, S., and Small, S.A. The brain in the age of old: The hippocampal formation is targeted differentially by diseases of late-life. *Annals of Neurology*, in press.

BIOGRAPHICAL SKETCH

NAME <p style="text-align: center;">Geoffrey Lawrence Ahern, M.D., Ph.D.</p>	POSITION TITLE <p style="text-align: center;">Professor</p>		
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	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, University 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	Cited in S Naifeh & GW Smith(eds.), The Best Doctors in America, 2 nd Ed, Woodward/White, 1994-1995
1996	Cited in S Naifeh & GW Smith(eds.), The Best Doctors in America, Pacific Region, Woodward/White, 1996-1997
1997	Elected, American Neurological Association
1998	Cited in S Naifeh & GW Smith(eds.), The Best Doctors in America, 4th Ed. Woodward/White, 1998-1999
2003	Cited in S Naifeh and GW Smith (eds.), The Best Doctors in America, 2003-2004

2008 Publications:

- Thayer JF, Sollers JJ, Labiner DM, Weinand ME, Herring AM, Lane RD, and Ahern GL. (2008) Age related differences in prefrontal control of heart rate in humans: A pharmacological blockade study. International Journal of Psychophysiology, in press.
- Lane RD, McRae KL, Reiman EM, Chen K, Ahern GL, Thayer JF. (2009) Neural correlates of heart rate variability during emotion. NeuroImage, 44, 213-222.

BIOGRAPHICAL SKETCH

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

Positions

1991 - 1993 **Research Scientist I**, Dept. of Brain Imaging, New York State Psychiatric Institute, NY, NY
 1993 - 1999 **Staff Fellow to Sr. Staff Fellow**, Lab. of Neurosci., National Inst. on Aging, Bethesda, MD
 1993 - 1999 **Chief**, Neuropsychology Unit, Lab. of Neurosci., National Institute on Aging, Bethesda, MD
 1999 - 2003 **Research Associate Professor**, Dept. of Psychology, Arizona State University, Tempe, AZ
 1999 - Date **Director**, MRI Morphology Core, Arizona Alzheimer's Disease Research Center, Phoenix, AZ
 2001 - Date **Director**, Data Management Program/Core, NIA Arizona Alzheimer's Disease Core Center, AZ
 2001 - Date **Member**, Executive Committee, NIA Arizona Alzheimer's Disease Core Center, AZ
 2003 - 2007 **Associate Professor and Professor**, Psychology Dept., Arizona State University, Tempe, AZ
 2007 - Date **Professor**, Psychology and Evelyn F. McKnight Brain Institute, Univ of Arizona, Tucson, AZ
 2007 - Date **Director**, Brain Imaging, Behavior, & Aging Lab, Psychology Dept., Univ of Arizona, Tucson

Honors, Awards and Advisory Committees:

1995-Date Ad Hoc Reviewer, 18 journals in Neuropsychology, Psychiatry, Neurology, Neuroscience
 1996-1999 Staff Recognition Awards (annual), Lab. of Neurosciences, National Institute 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, Special Emphasis Panel, WHIMS, Review Branch, NHLBI, NIH
 2004 Member, Special Emphasis Panel, Alzheimer's Disease Center Grant Review, NIA, NIH
 2004 Ext. Advisor, Aging Brain: Vasculature, Ischemia, & Behavior Prog Proj, USC, UC SF/LA/Davis
 2005 - date Member, Specialist Peer Review Comm, Psychology: Exp/Clinical, Fulbright Scholar Prog
 2006 Chair, Special Emphasis Panel, Clinical Neurosci & Disease, ZRG1 BDCN-E, IRG, CRS
 2008 Member, Program Project 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 Center Review, ZHL1 CCT-B C2 1, NHLBI,
 2008 Member, Prog Proj Review Group, Biobehavioral & Behavioral Processes, Z RG1 BBP-J, CSR

2008 Publications

Alexander G.E, Chen K, Aschenbrenner M, Merkley TL, Santerre-Lemmon LE, Shamy JL, Skaggs WE, Buonocore MH, Rapp P, Barnes CA. (2008) Age-related regional network pattern of MRI gray matter in the rhesus macaque. *Journal of Neuroscience*, 28:2710-8.

Boyes RG, Gunter JL, Frost C, Janke AL, Yeatman T, Hill DL, Bernstein MA, Thompson PM, Weiner MW, Schuff N, Alexander GE, Killiany RJ, Decarli C, Jack CR, Fox NC; for the ADNI study. (2008) Intensity non-uniformity correction using N3 on 3-T scanners with multichannel phased array coils. *Neuroimage*, 39:1752-62.

Caselli RJ, Chen K, Lee W, Alexander GE, Reiman EM. (2008) Correlating cerebral hypometabolism with future memory decline in subsequent converters to amnesic pre-mild cognitive impairment. *Arch Neurol*, 65:1231-6.

Hua X, Leow AD, Lee S, Klunder AD, Toga AW, Lepore N, Chou YY, Brun C, Chiang MC, Barysheva M, Jack CR Jr, Bernstein MA, Britson PJ, Ward CP, Whitwell JL, Borowski B, Fleisher AS, Fox NC, Boyes RG, Barnes J, Harvey D, Kornak J, Schuff N, Boreta L, Alexander GE, Weiner MW, Thompson PM, Alzheimer's Disease Neuroimaging Initiative. (2008) 3D characterization of brain atrophy in Alzheimer's disease and mild cognitive impairment using tensor based morphometry. *Neuroimage*, 41:19-34.

Jack CR, Bernstein MA, Fox NC, Thompson P, Alexander G, Harvey D, Borowski B, Britson PJ, L Whitwell J, Ward C, Dale AM, Felmlee JP, Gunter JL, Hill DL, Killiany R, Schuff N, Fox-Bosetti S, Lin C,

- Studholme C, DeCarli CS, Krueger G, Ward HA, Metzger GJ, Scott KT, Mallozzi R, Blezek D, Levy J, Debbins JP, Fleisher AS, Albert M, Green R, Bartzokis G, Glover G, Mugler J, Weiner MW. (2008) Alzheimer's Disease Neuroimaging Initiative: MRI methods. *Journal of Magnetic Resonance Imaging*, 4:685-91.
- Reiman EM, Chen K, Caselli RJ, Alexander GE, Bandy D, Adamson JL, Lee W, Cannon A, Stephan EA, Stephan DA, Papassotiropoulos A. (2008) Cholesterol-related genetic risk scores are associated with hypometabolism in Alzheimer's affected brain regions. *Neuroimage*, 40:1214-21.
- Corneveaux JJ, Liang WS, Reiman EM, Webster JA, Myers AJ, Zismann VL, Joshipura KD, Pearson JV, Hu-Lince D, Craig DW, Coon KD, Dunckley T, Bandy D, Lee W, Chen K, Beach TG, Mastroeni D, Grover A, Ravid R, Sando SB, Aasly JO, Heun R, Jessen F, Kölsch H, Rogers J, Hutton ML, Melquist S, Petersen RC, Alexander GE, Caselli RJ, Papassotiropoulos A, Stephan DA, Huentelman MJ. Evidence for an association between KIBRA and late onset Alzheimer's disease. *Neurobiology of Aging*, in press.
- Huentelman MJ, Stephan DA, TJ, Reiman DM, Gerber JD, Barnes CA, Alexander GE, Reiman EM, Bimonte-Nelson HA. Peripheral Delivery of a ROCK Inhibitor Improves Learning and Working Memory. *Behavioral Neuroscience*, in press.

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			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	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 , Department 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 -	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

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

2008 Publications

- Glisky, E. L., and Glisky, M. L. (2008) Memory rehabilitation in older adults. In: Cognitive neurorehabilitation: Evidence and applications, 2nd Edition (pp. 541-561), D. T. Stuss, G. W. Winocur and I. H. Robertson (eds.), London, UK: Cambridge University Press.
- Kong, L.L., Allen, J. J. B. and Glisky, E. L. (2008) Inter-identity memory transfer in dissociative identity disorder. *Journal of Abnormal Psychology*, 117, 686-692.
- Glisky, E. L. and Kong, L. L. (2008) Do young and older adults rely on different processes in source memory tasks? A neuropsychological study. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 34, 809-822.
- Glisky, E. L. and Marquine, M. J. (2008) Semantic and self-referential processing of positive and negative trait adjectives in older adults. *Memory*, 1-14.
- McFarland, C. P. and Glisky, E. L. (in press). Frontal lobe involvement in a task of time-based prospective memory.

BIOGRAPHICAL SKETCH

NAME <p style="text-align: center;">Alfred W. Kaszniak, Ph.D.</p>	POSITION TITLE <p style="text-align: center;">Head of Psychology Professor of Psychology, Neurology & Psychiatry</p>		
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	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 Neuropsychology

Positions

1976 - 1979	Assistant Professor , Department of Psychology, Rush College of Medicine, Chicago
1979 - 1985	Assistant to Associate Professor , Department of Psychiatry, Univ of Arizona, Tucson
1985 - 1987	Associate Professor , Depts of Psychology and Psychiatry, Univ of Arizona, Tucson
1987 -	Professor , Depts of Psychology, Psychiatry, and Neurology, Univ of Arizona, Tucson
2002 -	Head , Department of Psychology, University of Arizona, Tucson
2007 -	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 Association; 1988 Fellow, American Psychological Society
1995	President, Section on Clinical Geropsychology, Division 12, American Psychological Association
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

2008 Publications

- Griffin-Pierce, T., Silverberg, N., Jim, M., Connor, D., Jim, M., Peters, J., Kaszniak, A.W., & Sabbagh, M. (2008). Challenges to the recognition and assessment of dementia in American Indians of the Southwestern United States. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, 4, 291-199.
- Bondi, M., Salmon, D., & Kaszniak, A.W. (2008) The neuropsychology of dementia. In I. Grant, & K.Adams (Eds.), *Neuropsychological Assessment of Neuropsychiatric & Neuromedical Disorders* (3rd ed.). New York: Oxford University Press.
- Milman, L.H., Holland, A., Kaszniak, A.W., D'Agostino, J., Garrett, M., & Rapcsak, S.R. (2008). Initial validity and reliability of the SCCAN: Using tailored testing to assess adult cognition and communication. *Journal of Speech, Language, and Hearing Research*, 51, 49-69.
- Kaszniak, A.W., & Edmonds, E. (in press). Anosognosia and Alzheimer's disease: Behavioral studies. In G. Prigatano (Ed.), *Advances in the study of anosognosia*. New York: Oxford University 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>
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EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	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

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, University 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	<i>Ad Hoc</i> member, Biochemical Endocrinology Study Section, NIH, Bethesda
1995	John Davis Outstanding Residency Teaching Award, Dept. of Pathology, Univ of Arizona
1995, 1997	<i>Ad Hoc</i> Reviewer, National Science Foundation
1998 - 2004	Site Visit Review Committees, NIH, NIA Program Project Grants
1999	Basic Science Educator of the Year, University of Arizona College of Medicine
2000	Basic Science Educator of the Year, University of Arizona College of Medicine
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
2004	Invited Speaker, Annual Meeting of the Endocrine Society of Australia, Sidney, Australia.2004
2004	Invited Speaker, Reproductive Endocrine Unit, Massachusetts General Hospital, Boston
2007	Invited Speaker, Symposium Session entitled "Lifecycle of the GnRH neuron", Annual Meeting of the Endocrine Society in June, Toronto
2007	Vernon and Virginia Furrow Award for Excellence in Innovation in Teaching, University of Arizona College of Medicine

2008 Publications

- Rometo, A.M. and Rance, N.E. (2008) Changes in Prodynorphin Gene Expression and Neuronal Morphology in the Hypothalamus of Postmenopausal Women. *Journal of Neuroendocrinology* 20, 1376-1381, 2008
- Rance, N.E. Menopause and the human hypothalamus: Role of kisspeptin/neurokinin B neurons in the regulation of estrogen negative feedback. *Peptides*, in press.

BIOGRAPHICAL SKETCH

NAME Lee Ryan, Ph.D.	POSITION TITLE Associate Professor, Psychology, Neurology, and Neurosciences Program
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EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	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
University of California, San Diego, San Diego, CA	Postdoc	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 - **Associate Professor**, Departments of Psychology and Neurology, University of Arizona, Tucson, AZ
- 1996- **Director**, Cognition & Neuroimaging Laboratories, University of Arizona, Tucson, AZ
- 2007 **Associate Professor**, Evelyn F. McKnight Brain Institute, University of Arizona, Tucson, AZ

Honors

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

2008 Publications

- Ryan, L., Cox, C., Hayes, S. and Nadel, L. (2008). Hippocampal Activation during Episodic and Semantic Memory Retrieval: Category Production and Category Cued Recall. *Neuropsychologia*, 46, 2109-2121.
- Ryan, L., Hoscheidt, S. and Nadel, L. (2008) Time, space, and episodic memory. In E. Dere, A. Easton, J. Huston, and L. Nadel (Eds.). *Handbook of Episodic Memory Research*.
- Ryan, L., Lin, C.Y., Ketcham, K. and Nadel, L. (in press). The role of medial temporal lobe in retrieving spatial and nonspatial relations from memory. *Hippocampus*.
- Campbell, J., Nadel, L., Duke, D., & Ryan, L. (submitted). Remembering All That and Then Some after a One-Year Delay. *Psychological Science*.
- Walther, K., Bendlin, B., Glisky, E., Trouard, T., Lisse, J., Posever, J., & Ryan, L. (in revision). Anti-inflammatory drugs protect against age-related differences in brain volume measured by voxel-based morphometry. *Neurobiology of Aging*.

7. Faculty (continued)

The full Affiliate faculty list is given below:

- Geoffrey L. Ahern, M.D., Ph.D., Professor, Neurology, Psychology and Psychiatry; Director, Behavioral Neuroscience and Alzheimer's Clinic, University of Arizona
- Gene E. Alexander, Ph.D., Professor of Psychology, University of Arizona
- 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; Director, ARL Division of Neural Systems, Memory and Aging, University of Arizona
- Jean-Marc Fellous, Ph.D., Associate Professor of Psychology, University of Arizona
- Ralph F. Fregosi, Ph.D., Professor of Physiology, University of Arizona
- Andrew J. Fuglevand, Ph.D., Associate Professor of Physiology, University of Arizona
- Betty Glisky, Ph.D., Professor and Acting Head, Department of Psychology, University of Arizona
- Katalin M. Gothard, M.D., Ph.D., Assistant Professor of Physiology, University of Arizona
- Alfred W. Kaszniak, Ph.D., Professor, Psychiatry, Psychology and Neurology; Head, Department of Psychology; Director, Coordinated Clinical Neuropsychology Program, University of Arizona
- Lynn Nadel, Ph.D., Regents' Professor of Psychology, University of Arizona
- Janko Nikolich-Zugich, M.D., Ph.D., Professor and Chairman, Department of Immunobiology; Co-Directory, 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
- Eric M. Reiman, M.D., Ph.D., Professor of Psychiatry, University of Arizona; Director of the Arizona Alzheimer's Disease Consortium; Executive Director, Banner Alzheimer's Institute
- Linda L. Restifo, M.D., Ph.D., Professor of Neurobiology, University of Arizona
- Lee Ryan, Ph.D., Associate Professor, Psychology; Director, Cognition and Neuroimaging Labs, University of Arizona
- Robert S. Sloviter, Ph.D., Professor of Pharmacology, University of Arizona
- Andrea J. Yool, Ph.D., Professor of Physiology, University of Adelaide, Australia

Two new additions to the affiliate faculty are official since the previous report. First, we completed our recruitment of Dr. Gene Alexander to the Department of Psychology in August 2007, which we would not have been able to do were it not for the matching funds generated as a result of the McKnight Brain Research Foundation gift. He has joined the EMBI Scientific Advisory Board in Tucson, and plays a critical role in enriching the breadth of our affiliates interested in aging and memory in Tucson. He has brought a significant NIA-funded research program to the University of Arizona, and participates collaboratively with myself and other affiliate members, including Drs. Ryan, Glisky, Ahern and Reiman.

In addition to Dr. Alexander, the College of Medicine has just recruited Dr. Janko Nikolich-Zugich to head a new Department of Immunobiology at the University of Arizona. Dr. Nikolich-

Zugich is a renowned immunologist interested in changes of the immune system that normally occur across the lifespan. He works with nonhuman primates, and is hoping to transfer his colony of young and old rhesus macaques from the Oregon Primate Center, to the University of Arizona in the coming year. His focus on optimizing immune function that can promote long, healthy and functional lives for older people fits extremely well with the mission of the EMBI.

8. Trainees (advisor in brackets)

Postdoctoral

Monica Chawla, Ph.D. (Barnes)

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

Haiyen Chen, Ph.D. (Gothard, Barnes)

Area of Interest: Amygdala frontal cortical interactions in emotion and aging in the non-human primate.

George Hirschaw, M.D. (Ahern)

Area of Interest: Neuropsychological testing for cognitive changes in aging in humans.

James Lister, Ph.D. (Barnes)

Area of Interest: Large-scale genetic imaging.

Lingling Pu, Ph.D. (Ryan)

Area of Interest: Magnetic resonance image processing and data analysis methods.

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.

Katrin Walther, Ph.D. (Ryan)

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

Predocctoral

Elsa Baena (Ryan)

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

Christine Burns (Kaszniak)

Area of Interest: Memory and executive functioning in relation to blood glucose and positron emission measures of brain glucose metabolism in Hispanic and non-Hispanic middle-aged and older adults.

Sara Burke (Barnes)

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

Emily Connally (Glisky)

Area of Interest: Source memory and neuroimaging in normal aging; memory rehabilitation.

Christine Cox (Ryan)

Area of Interest: Memory and social interactions.

Penny Dacks (Rance)

Area of Interest: Age-related changes in temperature regulation in menopause.

- Matt Grilli (Glisky)
Area of Interest: Self-referential processing in normal aging; memory rehabilitation.
- Lan Hoang (Barnes)
Area of Interest: Age-related changes in dopaminergic systems.
- Siobhan Hoscheidt (Ryan)
Area of Interest: The impact of anxiety on memory function.
- Nathan Insel (Insel)
Area of Interest: Prefrontal cortical function in aging rats.
- Kevin Kawa (Ryan)
Area of Interest: fMRI studies of memory and aging.
- Chun-Yu Lin (Ryan)
Area of Interest: The neural basis of memory and consciousness.
- Thabelo Khoboko (Barnes)
Area of Interest: Age-related changes in population dynamics of hippocampal granule cells.
- Craig McFarland (Glisky)
Area of Interest: Frontal deficits in normal aging; prospective memory and memory rehabilitation.
- Melinda Mittleman (Sloviter)
Area of Interest: Increases in susceptibility to epilepsy in aging.
- Marsha Penner (Barnes)
Area of Interest: Selectivity of gene expression changes across hippocampal regions in aging.
- Colleen Ray (Kaszniak)
Area of Interest: Emotion regulation and conditioned fear in healthy adults.
- Emily Recknor (Glisky)
Area of Interest: Neuropsychology of normal aging and dementia; face recognition, metamemory.
- Alex Thome (Barnes)
Area of Interest: Age-related changes in alpha and gamma oscillations in primate neocortex.
- Michelle Valfre (Ryan)
Area of Interest: Decision making and memory in normal older adults.
- Janelle Wohltmann (Glisky)
Area of Interest: Rehabilitation of memory in normal aging; neuroimaging.

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

- Keshav Anand (Lister)
 Brittanie Broersma (Schimanski)
 Sarah Clasen (Chawla)
 Kumari Neha Datta (Khoboko)
 Ana Egurrola (Hoang)
 Danah Huerta (Burke)
 Anthony Murata (Lister)
 Saman Nematollahi (Burke)

Amy Nguyen (Chawla)
Lilian Patron (Insel)
Nima Sekhadia (Chawla)
Elizabeth Seymour (Lister)
Daniel Szewczyk (Insel)
Khoa Truong (Chawla)
Ajay Uprety (Burke/Hoang)
Jennifer Vega (Insel)
Ellen Wann (Hoang)

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

- 2006-2008 Ahern, PI: A Double-Blind, Randomised, Placebo-Controlled, Parallel-Group Study to Investigate the Effects of Rosiglitazone (Extended Release Tablets) on Cerebral Glucose Utilisation and Cognition in Subjects with Mild to Moderate Alzheimer's Disease (AD). GlaxoSmithKline.
- 2008- Ahern, PI: A Phase 3, Multicenter, Randomized, Double-Blind, Placebo-Controlled, Parallel-Group, Efficacy and Safety Trial of Bapineuzumab (AAB-001, ELN115727) in Patients with Mild to Moderate Alzheimer's Disease Who Are Apolipoprotein E ϵ 4 Non-Carriers. Elan Pharmaceuticals, Inc.
- 2008- Ahern, PI: A Phase 3, Multicenter, Randomized, Double-Blind, Placebo-Controlled, Parallel-Group, Efficacy and Safety Trial of Bapineuzumab (AAB-001, ELN115727) in Patients with Mild to Moderate Alzheimer's Disease Who Are Apolipoprotein E ϵ 4 Carriers. Elan Pharmaceuticals, Inc.
- 2008- Ahern, PI: A Randomized, Double-Blind, Placebo-Controlled, Dose-Ranging, Safety and Efficacy Study of Oral ELND005 (AZD-103) in Alzheimer's Disease. Elan Pharmaceuticals, Inc.
- 2008- Ahern, PI: 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). Avid Radiopharmaceuticals, Inc.

10. Technology transfer

None

11. Budget update

(a) Last year's budget and actual results - July 1, 2007 to June 30, 2008

	Budget	Expenditures
Carry forward from prior year	\$ 339,978	
Personnel	\$ 500,000	\$ 815,856.38
Operations	<u>\$ 500,000</u>	<u>\$ 524,121.46</u>
Total	\$1,339,978	\$1,339,977.84

(b) Status of matching funds – FY 06-07 and 07/08 Actual and FY 08-09 Pending

<u>Year</u>	<u>MBRF Gift</u>	<u>Match Reported</u>	<u>Additional match to be Reported in FY 08/09</u>
FY 06-07	\$1,000,000	\$1,779,500	
FY 07-08	\$1,000,000	\$ 851,918	
FY 08-09	<u>\$1,300,000</u>		<u>\$ 668,582</u>
Total	\$3,300,000	\$2,631,418	\$ 668,582

(c) Projected budget for coming year (FY 08/09)

Personnel	\$ 600,000
Operations	\$ 400,000
Recruitment	<u>\$ 300,000</u>
Total	\$ 1,300,000

d) Extramural funding

Grants Received – from Barnes

1 P30 AG019610-07 (PI: Reiman – Barnes, Director, Ad Hoc Review Program)
 Title: Arizona Alzheimer's Disease Core Center Ad Hoc Review
 Dates: 07/01/2007 – 06/30/2008 (7/06 – 7/11 project period)
 Amount: \$19,331/year (\$12,802 direct)

5 RO1 AG012609-14 (P.I.: Barnes)
 Title: Cell Assemblies, Pattern Completion and the Aging Brain
 Dates: 07/01/07 – 06/30/08 (7/04 – 6/09 project period)
 Amount: \$304,247/year (\$201,488 direct)

5 RO1 AG003376-24 (P.I.: Barnes)
 Title: Neurobehavioral Relations in Senescent Hippocampus
 Dates: 02/01/07 – 01/31/09 (2/03 - 1/09 with no cost extension)
 Amount: \$197,592/year (\$130,856 direct) in bridging funds

State of Arizona, DHS Grant

Title: Arizona Alzheimer's Consortium - UA Evelyn F. McKnight Brain Inst
Date: 07/01/07 – 06/30/08
Amount: \$350,000/year (direct costs)

State of Arizona, DHS Grant

Title: Arizona Alzheimer's Consortium – ISAC Support
Date: 07/01/07 – 06/30/08
Amount: \$42,933/year (direct costs)

Canadian Institutes of Health Research Aging Fellowship

Postdoctoral Fellowship to Dr. Lesley Schimanski (Advisor: Dr. Carol Barnes)

Title: The Link Between Ensemble Activity Patterns at the Systems, Level with Performance Accuracy at the Behavioral Level Using a Spatial Eyeblink Conditioning Task in Young and Aged Rats
Date: 12/01/07 – 11/31/08 (12/05 – 11/08 project period)
Amount: \$50,000/year direct costs (Canadian dollars)

Alberta Heritage Foundation for Medical Research

Postdoctoral Fellowship to Dr. Lesley Schimanski (Advisor: Dr. Carol Barnes)

Title: The Link Between Ensemble Activity Patterns at the Systems, Level with Performance Accuracy at the Behavioral Level Using a Spatial Eyeblink Conditioning Task in Young and Aged Rats
Date: 12/01/07 – 11/31/08 (12/05 – 11/08 project period)
Amount: \$10,000/year direct costs (Canadian dollars)

5 F31 NS054465-03

NRSA to Sara Burke, graduate student (Advisor: Dr. Carol Barnes)

Title: Aging and Neural Ensembles in the Perirhinal Cortex
Date: 01/09/2008 – 01/08/2009 (01/06 – 01/09 project period)
Amount: \$34,346/year direct costs

Grants Received - From Selected Affiliates

1 P30 AG019610-07 (PI: Reiman – Ahern co-PI, UAHSC Clinical Core)

Title: Arizona Alzheimer's Disease Core Center
Dates: 07/01/2007 – 06/30/2008 (7/06 – 7/11 project period)
Amount: \$68,048/year (\$45,065 direct costs)

State of Arizona, DHS Grant (PI: Reiman – Ahern: co-PI)

Title: Clinical Core
Date: 07/01/07 – 06/30/08
Amount: \$46,627/year (direct costs)

1 R01 AG025526 (PI: Alexander)

Title: Neuroanatomical Substrates of Aging & Cognitive Decline

Dates: 4/01/07-6/30/12

Amount: \$533,970/year (\$358,104 direct costs)

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

Title: PET, APOE, & the Preclinical Course of Alzheimer disease

Date: 07/1/98 – 6/30/13

Amount: 172,324/year (\$115,764 direct costs)

1 UO1 AG024904-01 (PI: Weiner – Alexander co-PI)

Title: Alzheimer's Disease Neuroimaging Initiative

Dates: 10/1/04-9/30/10

Amount: \$50,200/year (\$33,245 direct costs)

2 P30 AG19610 (PI: Reiman – Alexander co-PI, Data Management and Statistics Core)

Title: Arizona Alzheimer's Disease Core Center

Dates: 07/01/2007 – 06/30/2008 (7/06 – 7/11 project period)

Amount: \$60,029/year direct costs

State of Arizona, DHS Grant (PI: Reiman – Alexander co-PI)

Title: Magnetic Resonance Imaging of Amyloid Plaques in a Mouse Model of Alzheimer's Disease

Dates: 7/1/07-6/30/08

Amount: \$27,720/year (direct costs)

State of Arizona, DHS Grant (PI: Reiman – Alexander co-PI)

Title: Image Acquisition and Analysis

Dates: 7/1/07-6/30/08

Amount: \$111,733 /year (direct costs)

State of Arizona, DHS Grant (PI: Reiman – Alexander co-PI)

Title: Biomarkers Project

Dates: 7/1/07-6/30/08

Amount: \$24,638 /year (direct costs)

State of Arizona, DHS Grant (PI: Reiman – Alexander co-PI)

Title: Arizona Alzheimer's Center Database

Dates: 7/1/07-6/30/08

Amount: \$35,867 /year (direct costs)

State of Arizona, DHS Grant (PI: Reiman – Glisky: co-PI)

Title: Longitudinal study of neuropathologic markers in Alzheimer's disease

Date: 07/01/07 – 06/30/08

Amount: \$43,040/year (direct costs)

AG 014792 (PI: Van Petten – Glisky: co-PI)
Title: Cognitive and Neural Bases of Aging and Memory
Date: 09/01/05 – 07/30/10
Amount: \$420,038 /year (\$281,237 direct costs)

9 RO1AG 031581 (PI: Reiman; Kaszniak: co-PI)
Title: PET, APOE and the Preclinical Course of Alzheimer's Disease
Date: 07/01/07 – 06/30/12 (7/1/07 – 6/30/12 project period)
Amount: \$45,181/year (subcontract total costs)

State of Arizona, DHS Grant
Title: Arizona Alzheimer's Consortium (PI: Reiman – Kaszniak: co-PI)
Diversity Education and Outreach Program
Date: 07/01/07 – 06/30/08
Amount: \$17,993/year (direct costs)

State of Arizona, DHS Grant
Title: Arizona Alzheimer's Consortium (PI: Reiman – Kaszniak: co-PI)
Outreach and Information Dissemination Program
Date: 07/01/07 – 06/30/08
Amount: \$122,374 /year (direct costs)

ARCS (Achievement Rewards for College Scientists) VanDenburgh Scholar
Penny Letts, graduate student (Advisor: Dr. Naomi Rance)
Date: Fall 2006 – Spring 2008
Amount: \$7,000/yr + \$2,500 Graduate College Match

1 F31 AG030881-01
NRSA to Penny Letts, graduate student (Advisor: Dr. Naomi Rance)
Title: The Neuronal Circuitry Underlying Estrogen Effects in Thermoregulation
Dates: July 1, 2007 – June 30, 2008 (7/07 – 6/10 project period)
Amount: \$26,556/year

2 R56 AG009215-15A1 (PI: Rance)
Title: Reproductive Aging and the Human
Dates: 07/15/07 – 06/30/09
Amount: \$540,277 (\$366,243 direct costs)

Arizona Biomedical Research Committee (PI: Rance)
Title: Effects of Estrogen Withdrawal on Hypothalamic Thermoregulation
Dates: 07/01/06 – 06/30/09
Amount: \$49,504/year (\$45,000 direct costs)

RO1 AG032315 (PI: Rance)

Title: The Role of Neurokinin B in the Generation of Menopausal Flushes
Dates: 08/01/08 – 06/30/13
Amount: \$277,576 (\$183,325 direct costs)

R01 NS044107 (PI: Ryan)

Title: fMRI Studies of Episodic and Semantic Memory Retrieval
Date: 3/1/2003 – 2/28/2009
Amount: \$223,845/year (\$161,379 direct costs)

R01 NS044107-S1 (PI: Ryan; minority supplement to Michelle Valfre)

Title: fMRI Studies of Episodic and Semantic Memory Retrieval
Date: 8/1/2005 – 2/28/2009
Amount: \$36,794/year (\$24,367 direct costs)

State of Arizona, DHS Grant

Title: Arizona Alzheimer's Consortium (PI: Reiman – Ryan: co-PI)
Cognition & Neuroimaging Laboratories
Date: 07/01/1998 – 06/30/2009 (renewable)
Amount: \$172,811/year direct costs (w/\$172,811 institutional match)

State of Arizona, DHS Grant

Title: Arizona Alzheimer's Consortium (PI: Reiman – Glisky: co-PI)
Longitudinal study of neuropathologic markers in Alzheimer's disease
Date: 07/01/07 – 06/30/08
Amount: \$88,697/year (direct costs)

Grants Submitted – from Barnes

2 R01 AG003376-26A1 (PI: Barnes)

Title: Neurobehavioral Relations in Senescent Hippocampus
Dates: 07/01/09 – 06/30/14 (requested dates)
Amount: \$586,848 (requested annual direct costs)
Status: Under review

2R01AG023309-04A2 (PI: Barnes)

Title: Genetic Mapping of Neuronal Neural Networks and Circuits
Dates: 04/01/09 – 03/31/14 (requested dates)
Amount: \$397,175 (requested annual direct costs)
Status: Under review

Grants Submitted - From Selected Affiliates

National Institutes of Health (PI: Alexander)

Title: Genetic Influences on Age-Related Cognitive Health

Dates: 07/01/09 –06/30/14 (requested dates)

Amount: \$725,721 (requested annual direct costs)

National Institutes of Health (PI: Nadel - Alexander: co-PI)

Title: Beyond 21, Factors Influencing Neuropsychological Development in Down's Syndrome

Dates: 07/01/09 –06/30/14 (requested dates)

Amount: \$250,000 (requested annual direct costs)

National Institute on Aging (PI: Glisky)

Title: Longitudinal Changes in Frontal and Medial Temporal Lobe Function in Older Adults

Date: Revised Applications Submitted 2007

Status: Unfunded

RFA-AG-09-009 National Institute on Aging (PI: Glisky; Ryan: co-PI; Alexander: co-PI)

Title: Cognitive Training and Aerobic Exercise: An Intervention to Reduce Memory Decline in Normal Aging

Date: 07/01/09 – 06/30/12 (requested dates)

Amount: \$175,000 (requested annual direct costs)

Status: Under review

RO1 NS044107 (Ryan, PI)

Title: fMRI studies of episodic and semantic memory retrieval

Date: 07/01/09 – 06/30/14 (requested dates)

Status: Under review

12. Educational programs focusing on age related memory loss

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: September 24, 2007

Title: Synaptic Loss and Malfunctions in Alzheimer's Disease

Presenter: Paul D. Coleman, Ph.D., Sun Health Research Institute and University of Rochester Medical Center

Date: December 3, 2007

Title: Vision and the Aging Brain

Presenter: Allison B. Sekuler, Ph.D., Professor and Canada Research Chair in Cognitive Neuroscience, Department of Psychology, Neuroscience & Behavior
McMaster University

Date: February 8, 2008

Title: Top-down modulation and normal aging: The crossroads of attention and memory

Presenter: Adam Gazzaley, M.D., Ph.D., Assistant Professor of Neurology and Physiology; Director, Neuroscience Imaging Center, University of California, San Francisco

Date: February 25, 2008

Title: Regulation of beta-secretase activity: Implications for normal aging of the brain and Alzheimer's disease

Presenter: Giuseppina Tesco, M.D., Ph.D., Assistant Professor of Neurology, Genetics and Aging Research Unit, Massachusetts General Hospital

Date: April 7, 2008

Title: Neural Implementation of Cognitive Reserve

Presenter: Yaakov Stern, Ph.D., Professor of Clinical Neurology – Aging and Dementia, Taub Institute for the Research on AD and the Aging Brain; Director, Cognitive Neuroscience Division, Gertrude H. Sergievsky Center, Columbia University

Event: *McKnight Inter-Institutional Meeting*

Date: April 17-18, 2008

Venue: Evelyn F. McKnight Brain Institute, University of Arizona and Arizona Inn

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: The University of Arizona Evelyn F. McKnight Brain Institute hosted the first McKnight Brain Research Foundation 1st Inter-Institutional Meeting in Tucson in April 2008. The meeting was well attended by approximately 115 faculty, postdocs, graduate students and research staff from the four institutions (University of Alabama at Birmingham, University of Arizona, University of Florida and University of Miami). Institutional leaders (Carol Barnes, University of Arizona; Dennis Steindler and Tom Foster, University of Florida; Ralph Sacco and Clinton Wright, University of Miami; David Sweatt, University of Alabama at Birmingham) provided an overview of the research at their respective institutions, and all investigators then met for a brainstorming session to discuss potential intra-institutional collaborations.

Event: *6th Forum of European Neuroscientists*

Date: July 12-17, 2008

Venue: Geneva, Switzerland

Symposium: Molecular Cellular and Circuit Contributions to Cognitive Decline in Normal Aging

Chairperson: Carol A. Barnes (Tucson, Arizona)

Presentations: Threshold changes in plasticity: relation to memory decline
T.C. Foster (Gainesville, Florida)

Modulating the age-related increase in microglial activation attenuates the
neuroinflammatory changes which are associated with deficits in LTP
M.A Lynch (Dublin, Ireland)

Differential outcomes in neurocognitive aging
M. Gallagher (Baltimore, Maryland)

New models of cognitive aging emerging from gene array and calcium-related
physiological studies
P.W. Landfield (Lexington, Kentucky)

Summary: Normal aging leads to subtle, but reliable alterations in brain function and behavior. Speakers in this symposium have contributed substantively to identifying age-related gene expression changes, altered cellular homeostatic mechanisms, selective changes in synaptic plasticity, and altered network dynamics in the circuits responsible for cognition. As the mechanisms of age-related memory change become unraveled, predictions for therapeutic targets aimed at postponing or alleviating age-related memory impairment can be made. Barnes will discuss age-related changes in behaviorally-induced plasticity and consolidation mechanisms in hippocampal networks, and treatments that affect the function of aging circuits through modification of the NMDA receptor. Foster discussed how alterations in Ca²⁺ sources, including NMDA receptors, can alter the thresholds for synaptic plasticity, and how behavioral and pharmacological treatments can avert or ameliorate threshold changes. Gallagher reviewed the neurobiology of differential outcomes in aging with a focus on cellular alterations in the CA3 region of hippocampus that distinguish dysfunction underlying cognitive decline from adaptive adjustments that support preserved cognitive capacities. Landfield discussed new integrative models of hippocampal cell type-specific processes in aging-related cognitive decline emerging from studies that combine gene/protein expression profiling, electrophysiology and behavioral analyses.

Event: *Presidential Special Lecture*

Date: November 16, 2008

Venue: 38th Annual Meeting of the Society for Neuroscience
Washington, DC (November 15-19, 2008)

Speaker: Carol A. Barnes, Ph.D.

Talk Title: Memory and Hippocampal Networks: The Impact of Aging

Summary: An understanding of the neural basis of cognition requires examination of the dynamics of large populations of neurons in behaviorally-driven networks. Developments in ensemble electrophysiological recording and functional imaging methods provide a framework for understanding how the hippocampus stores and retrieves information. This lecture reviews how changes in plasticity mechanisms and network dynamics during aging impact the computations that presumably underlie initial episodic memory formation and contribute to cognitive deficits observed in older mammals. Attended by approximately 7,500 members of the Society for Neuroscience.

13. Collaborative Programs with other McKnight institutions and research programs

Gene Alexander/Carol Barnes

Because of Alexander's sophisticated mathematical network analysis methods, we were able to identify a distinct "normal aging pattern" in MRI images from monkeys ranging in age from 6 years to 29 years of age, that were behaviorally characterized. These are the animals that Barnes maintains out at the California National Primate Research Center in Davis. The network changes identified using this voxel-based morphometric method involved a prefrontal cortical circuit, and importantly, the extent that a monkey showed this 'aging network pattern' correlated with poorer performance on a delayed response task known to be sensitive to frontal cortical function.

Marsha Penner/Lan Hoang/Tanya Roth/Eric Roth/ David Sweatt/ Carol Barnes

Dr. Penner, as part of her dissertation, found that although the same numbers of young and old CA1 pyramidal cells express the immediate early gene *Arc* (as measured by catFISH), there is less *Arc* mRNA per cell (as measured by rtPCR). Because *Arc* is necessary for the maintenance of long-term memory, it was important to determine the potential reason for the reduced *Arc* transcription in aged hippocampal cells. Thus, we tested the hypothesis that *Arc* transcription may be regulated by epigenetic mechanisms that lead to transcriptional silencing such as altered DNA methylation. In fact, Marsha found a significant age difference in methylated *Arc* between young and old rats, a finding that was presented at the Society for Neuroscience meeting this year (Penner, Hoang, Roth, Roth, Sweatt, and Barnes, 2008). We believe that these data have tremendous potential relevance for therapeutic strategies, and the Barnes and Sweatt laboratories are preparing the data for submission to a high impact journal.

Lan Hoang/Jean-Marc Fellous/Carol Barnes

Ms. Hoang has begun her dissertation project on the influence of aging on the dopaminergic reward systems of the ventral tegmental area of the brain, a brain system in which Dr. Fellous has considerable expertise. She has used the catFISH behavioral imaging method to examine the extent to which old and young rat VTA neurons are activated by naturally rewarding stimuli. The preliminary data suggest that fewer old neurons are responsive to these types of stimuli, and suggest that VTA neuronal firing should be less robust in older animals. She presented the results of this experiment at the Society for Neuroscience meetings this year (Hoang, Fellous, and Barnes, 2008). In addition, she has submitted an NRSA proposal to support this age comparison using the catFISH method, in combination with electrophysiological recordings.

14. Collaborative programs with non-McKnight institutions:

Collaborators at Non-McKnight Institutions

Heather Bimonte-Nelson, Ph.D., Assistant Professor, Department of Psychology, Arizona State University

Veronique Bohbot, Ph.D., Assistant Professor, Department of Psychiatry, McGill University

Adam M. Brickman, Ph.D., Assistant Professor of Neurology, Taub Institute, Columbia University

Paul D. Coleman, Ph.D., Professor Emeritus of Neurobiology and Anatomy, University of Rochester; Research Scientist, Sun Health Research Institute, Sun City, Arizona

Leyla de Toledo-Morrell, Ph.D., Jean Schweppe Armour Professor of Neurological Sciences,
Rush University

Adam Gazzaley, M.D., Ph.D., Director, Neuroscience Imaging Center, Departments of
Neurology and Physiology, University of California, San Francisco.

Matthew J. Huentelman, Ph.D., Associate Investigator, Neurogenomic Section, The
Translational Genomics Research Institute

A. David Redish, Ph.D., Department of Neuroscience, University of Minnesota

Scott A. Small, Ph.D. Associate Professor of Neurology, Sergievsky Center and Taub Institute,
Columbia University

Heather Bimonte-Nelson/Matt Huentelman/Dietrich Stephan/Eric Reiman/Carol Barnes

We have collaborated on a project for preclinical screening of a genetically implicated compound for the enhancement of memory in memory-impaired aged rats. It has been suggested that the biological pathways involving the KIBRA gene play an important role in aging-associated episodic memory decline (in recent studies published by Drs. Reiman, Stephan and colleagues). The experiments conducted here tested compounds that influence KIBRA pathways, and the results suggest selective enhancement of hippocampal-dependent spatial working and reference memory performance in aged rats. This manuscript has recently been accepted for publication in Journal of Behavioral Neuroscience (Huentelman et al., 2008).

Veronique Bohbot

The EMBI in Tucson provided seed money that enabled the behavioral testing, as well as functional and structural MRI scanning, of 3 experimental human participants and 3 controls, before and after a spatial memory training program in the Bohbot Memory & Motion Laboratory at the Douglas Hospital, in Montreal Quebec. The spatial memory training program is aimed at promoting growth in hippocampal circuits, and was modeled after a program originally designed for mice that resulted positive growth. Three experimental participants successfully completed the spatial memory training program, in addition to two behavioral control participants. One additional participant is currently being tested and 4 more will be included in the next months. Analysis of these data is not complete, however, subjective reports indicate that participants in the experimental group felt that their ability to notice details in the real world had improved, a necessary factor for building accurate spatial relationships. If the objective measurement data are consistent with subjective reports, this method has the potential to improve spatial orientation, engender more confidence and autonomy which could lead to a better quality of life for the elderly.

Adam Brickman/Scott Small/Gene Alexander/Carol Barnes

Small and Barnes previously assessed basal levels of metabolism in the temporal lobe of Barnes' population of young and old rhesus macaques at the California National Primate Research Center in Davis. Adam Brickman was interested in expanding the analysis of these data to the frontal cortex. He performed univariate voxelwise statistical parametric mapping to derive CBV maps of frontal cortex and to examine the metabolic correlates across age and performance on a spatiotemporal memory test, a delayed response task, and a delayed non-matching to sample task. Correlations between age and CBV were observed bilaterally in prefrontal cortex, and CBV in prefrontal regions was also significantly correlated with performance on the delayed non-matching to sample task. We presented these data at the Society for Neuroscience meeting

this year (Brickman, Muraskin, Shamy, Steffener, Buonocore, Rapp, Alexander, Barnes, and Small, 2008).

Leyla de Toledo-Morrell/Travis Stoub/Emily Rogalski/Carol 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 Alzheimer's disease patients compared to age-matched controls. The question remained as to whether normal aged individuals would show declines in this important temporal lobe projection pathway to the hippocampus when compared with young subjects. We were able to report that, in fact, there is a white matter volume loss that occurs in humans as a result of the normal aging process, using two different imaging methods. We presented these results at the Society for Neuroscience meeting this year (Stoub, Shah, Barnes, de Toledo-Morrell, 2008; Rogalski, Murphy, de Toledo-Morrell, Barnes, Shah, Stebbins, 2008). Dr. de Toledo-Morrell is currently writing up the results of these studies for publication.

Adam Gazzaley/Sara Burke/Kojo Plange/Carol 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 in 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. We are currently designing experiments that can be used in our bonnet macaques that can directly assess competing ideas about the neural changes in these kinds of behaviors. After we have obtained preliminary data in the bonnet macaques, we hope to submit a grant proposal within the next year that involves experiments that go back and forth between nonhuman primate and human tests.

A. David Redish/Andrew Maurer/Joe Bohanick/Carol Barnes

Recently Redish has found evidence from recordings of hippocampal cells in young rats that suggests 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 are collaborating with 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 individual animal's ability to accurately represent these nonlocal activity patterns in hippocampal cells. We are currently training young and old animals in a multiple-choice T maze task in which many decision points can be examined within recording sessions. Although the older rats have been slower to learn the task, and perhaps will never be as accurate as younger rats, these behavioral variables should allow specific predictions to be made for

performance outcomes, in relation to the “nonlocal sweeping forward” of spiking activity that reflects future spatial locations at decision points.

Scott Small/Paul Coleman/Carol 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 has 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 should increase sensitivity for detection of age-related changes. While these procedures have taken some time to develop, once they are optimized, then other genes can also be tested using similar methods. We will combine the rat, monkey and human RbAp48 data together when the full dataset is available.

15. Plans for future research

Cognitive Testing of our Young and Old Bonnet Macaque Colony

The monkeys are all adapted to Barnes, Burke, Plange and two undergraduate students who are participating in the behavioral training of these monkeys as part of their Undergraduate Biology Research Program laboratory research fellowships.

Progress: We got our new Wisconsin General Testing Apparatus set up and working here in Arizona, and began to administer our cognitive test battery to these animals. We presented an abstract at the Society for Neuroscience meeting this year reporting the results of one of our behavioral experiments with these young and old monkeys. The focus of the experiment was on a task that requires the interaction between the orbital prefrontal cortex and amygdala for its performance. We know from human work that the prefrontal cortex is particularly vulnerable to the process of normal aging, and that the amygdala also may show functional changes during aging. One of our goals with these monkeys is to examine the prefrontal cortex, and thus, we began with a “reinforcer devaluation” task, dependent on these brain regions. The older monkeys did not learn to associate specific objects with appropriate food rewards as well as did the younger monkeys, suggesting that there may be a decline during aging in the functional connectivity between the amygdala and orbital prefrontal cortex (Plange, Burke and Barnes, 2008). This will be important to follow up in our recording experiments.

Plans: We will continue with the conduct of our thorough behavioral test battery for these monkeys during the upcoming year. They are right now being tested on a delayed non-matching to sample task which is sensitive to medial temporal lobe function. As described above, we are also designing behavioral experiments with Gazzaley that will examine the effects of distractor conditions on memory performance. We were unable to conduct the MRI scans that we had hoped to coordinate with Dr. Ryan during the past year, because the anesthesia apparatus that we intended to use turned out to be inadequate for safely keeping our monkeys continuously

anesthetized for the time periods necessary to obtain a meaningful scan. Thus, we needed to purchase and set up a primate anesthesia machine that was compatible with the MRI unit available in Dr. Ryan's imaging suite. We have recently tested the new anesthesia system in collaboration with one of our EMBI affiliates (Dr. Katalin Gothard), who safely and successfully scanned one of her rhesus macaques using the new system within the past month. Thus, we believe we will be able to begin scans on our population in the next year.

Technological Innovations

Electrophysiological Methods

Progress: In the past year we have begun to collaborate with our long-time engineering colleagues at Neuralynx, Inc. on testing and setting up their new telemetric technology for monitoring behavior in awake freely-behaving monkeys. The idea is to use the hyperdrive technology that Barnes has developed and used at the California Regional Primate Research Center at Davis to record from young and old monkeys. Current methods allow these recordings to be obtained while the animals are awake and participating in behavioral tasks, but their heads are fixed in standard primate chairs during the behavior. For the newly-planned experiment, the hyperdrive will be adapted to enable telemetric neural signal acquisition while the animal is unrestrained. This will be a major technical contribution to the field, and we have generated significant excitement about realizing this possibility. Barnes has initiated a collaboration in this regard with Drs. Elizabeth Buffalo and Jocelyn Bachevalier at the Yerkes Primate Center at Emory. They have sophisticated behavioral and eye tracking monitoring devices already working to record behavior in large cages, while monkeys find the location of food rewards in boxes mounted in 3-dimensions throughout the environment. They have trained young rhesus macaques who now can do this task, and can be accurately behaviorally monitored.

Plans: As a first step towards telemetered recordings of unrestrained monkeys, the Tucson group will load the hyperdrives, and will do the initial implant surgery at Yerkes on one young trained monkey. We will troubleshoot the telemetric recording system at Emory (bring our Neuralynx system out there), and collect and analyze the initial pilot single unit and behavioral data from one of their young monkeys. After we have worked out the procedure, the investigators at Yerkes will set up their own recording system there, and we will adapt the eye tracking and video monitoring of behavior to one of our primate behavior rooms in Tucson and take our recording system back to Tucson for subsequent experiments. In this way we plan to determine if this method will be suitable for the bonnet macaque experiments.

Whole Brain Imaging with Single Cell Resolution (the "catFISH" method)

Progress: We made significant progress with our Rensselaer Polytechnic Institute colleagues in New York on testing and optimizing new algorithms for software that will "stitch" tissue sections together (montage synthesis) from arrays of confocal image stacks. We reported the results of these efforts at the Society for Neuroscience meeting this year, in which we were able to begin to objectively identify distinct cortical layers, which is the next step in our whole brain image analysis goal (Tsai, Lister, Al-Kofahi, McNaughton, Roysam and Barnes, 2008). With these new associative image analysis procedures, joint registration is possible with little error accumulation that would otherwise limit image registration methods.

Plans: Barnes and Roysam (plus investigators from the Allen Brain Institute, and MIT) have written a pre-proposal for an NSF technology development center, which would reside in Tucson

with collaborating groups in New York, Boston and Seattle participating towards the advancement of the goals of developing whole brain imaging technology that has cellular and genetic specificity. We will hear back by the end of January whether our pre-proposal has been selected for development into a full proposal. In anticipation of this possibility, Barnes has scheduled a date in February that this group will meet in Tucson to develop further the ideas for proposal focus and implementation. If we do not receive an invitation to submit a full proposal, we may meet anyway, as there are at least two other mechanisms for funding such a consortium that could be explored.

16. Endowment investment results (July 1, 2007 to June 30, 2008)

Evelyn F. McKnight Chair for Learning and Memory in Aging

Endowment Account

Beginning Balance/Market Value as of July 1, 2007	\$ 1,058,618
Fiscal Year Change in Market Value (7/07 - 6/08)	\$ (108,259)
Year-end Balance (6/30/08)	\$ 950,359

Income to Chair (Expendable Account)

Beginning Balance as of July 1, 2007	\$ 13,394
Payout from the Endowment	\$ 36,826
Personnel Expenditures (7/1/07 - 6/30/08)	\$ (36,825)
Year End Balance (6/30/08)	\$ 13,395

Evelyn F. McKnight Brain Institute

Beginning Balance	\$ 1,000,000
6% Development Fund	\$ (60,000)
Entry to the Endowment	\$ 27,190
Fiscal Year Change in Market Value	\$ (80,887)
Year-end Balance (6/30/08)	\$ 886,304

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

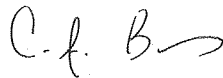
20. Loss of personnel

Dr. Bruce McNaughton was given the opportunity to take up the first Polaris Award given to a Neuroscientist at The University of Lethbridge in Canada. The award from the Alberta Heritage Foundation is ten million dollars, and this is to be matched by an additional ten million dollars from the Province of Alberta. When we learned that he was a candidate for the award, and that he was likely to leave the University of Arizona, we began to search for potential replacements for the EMBI core faculty. With the support of the Trustees of the McKnight Brain Research Foundation, Dr. James Knierim was initially targeted as an outstanding fit for the position that Bruce was leaving. In the end, Dr. Knierim accepted an offer from The Johns Hopkins University which he will take up in the coming year. Dr. Cusanovich (Director of the Arizona Research Laboratories) and Dr. Donnerstein (Dean, Social and Behavioral Sciences) subsequently agreed to allow a search to be mounted to recruit an individual in systems neuroscience that would be a fit for the McNaughton faculty line. Barnes heads the Search Committee, we had ~80 applicants (application date closed November 30), interviewed one candidate in December, have scheduled another interview for January, and have plans to schedule two additional interviews in February. The caliber of the applicant pool is high, and we are optimistic that we will find an outstanding new colleague to join us in the coming year.

21. Additional comments

N/A

22.



Carol A. Barnes, Ph.D.
Director, Evelyn F. McKnight Brain Institute
Evelyn F. McKnight Chair for Learning and Memory in Aging

12/19/08

Date