

## CURRICULUM VITAE

**NAME** Carol A. Barnes, Ph.D. December 2013

**TITLES:** Regents' Professor, Psychology, Neurology and Neuroscience  
Evelyn F. McKnight Chair for Learning and Memory in Aging  
Director, Evelyn F. McKnight Brain Institute  
Director, ARL Division of Neural Systems, Memory and Aging  
Associate Director, BIO5

### DEGREES

B.A. (Honors) 1971 Psychology, University of California, Riverside, California, U.S.A.  
M.A. 1972 Psychology, Carleton University, Ottawa, Ontario, Canada  
Ph.D. (Cum Laude) 1977 Psychology, Carleton University, Ottawa, Ontario, Canada

### POSTDOCTORAL TRAINING

Sept 1977 – Dec 1978 **Research Associate** (In the laboratory of Professor G. V. Goddard)  
Department of Psychology, Dalhousie University, Halifax, Nova Scotia, Canada  
Jan 1979 – Jan 1981 **NIH Postdoctoral Fellow** (In the laboratory of Professor P. Andersen)  
Institute of Neurophysiology, University of Oslo, Oslo, Norway  
Jan 1981 – Jan 1982 **NATO Postdoctoral Fellow** (In the laboratory of Dr. J. O'Keefe)  
Cerebral Functions Group, Department of Anatomy and Embryology,  
University College London, London WC1E 6BT, England

### FACULTY APPOINTMENTS

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 – present **Professor**, Departments of Psychology and Neurology and ARL Division of Neural  
Systems, Memory and Aging. University of Arizona, Tucson  
2006 – present **Regents' Professor**, Departments of Psychology, Neurology and ARL NSMA,  
University of Arizona, Tucson  
2006 – present **Director**, Evelyn F. McKnight Brain Institute, University of Arizona, Tucson  
2006 – present **Evelyn F. McKnight Endowed Chair for Learning and Memory in Aging**,  
University of Arizona, Tucson  
2008 – present **Director**, ARL Division of Neural Systems, Memory and Aging, University of  
Arizona, Tucson  
2009 – present **Regents' Professor**, Department of Neuroscience, University of Arizona, Tucson  
2009 – present **Associate Director**, Bio5 Institute, University of Arizona, Tucson

### SOCIETY MEMBERSHIPS

Society for Neuroscience  
The Gerontological Society of America  
American Association for the Advancement of Science

### HONORS, AWARDS and ADVISORY COMMITTEES

APA Award for Distinguished Scientific Contributions, 2014

Ralph W. Gerard Prize in Neuroscience, Society for Neuroscience, 2013  
Elected: Galileo Fellow, College of Science, University of Arizona, 2011  
2011 APA Division 6 D.B. Marquis Behavioral Neuroscience Award for Behavioral Neuroscience, 124:559-573, 2010  
Society for Neuroscience Mika Salpeter Lifetime Achievement Award, 2010  
Elected: Chair, Gruber Foundation Neuroscience Prize Advisory Board, 2010-2014  
2009 APA Division 6 D.B. Marquis Behavioral Neuroscience Award for Behavioral Neuroscience, 122:535, 2008  
Elected: Chair, Society for Neuroscience International Affairs Committee – US National Committee, 2008-2011 (Incoming Chair, 2007-2008)  
Elected: Executive Committee, Dana Alliance for Brain Initiatives, 2007  
Elected: Fellow, American Association for the Advancement of Science, 2007  
Elected: Gruber Foundation Neuroscience Prize Advisory Board, 2007  
Recipient of Endowed Chair: Evelyn F. McKnight Chair for Learning and Memory in Aging, 2006  
Appointed: Regents' Professor, University of Arizona, 2006  
MERIT Award, National Advisory Council on Aging, 2004  
Elected: Foreign Member, The Royal Norwegian Society of Sciences and Letters (Natural Sciences), 2004  
Elected: President-Elect, Society for Neuroscience, 2003-2004; President, Society for Neuroscience, 2004-2005; Past-President, Society for Neuroscience, 2005-2006  
Elected: Secretary, Society for Neuroscience, 2000-2002  
Elected: Board of Scientific Counselors, National Institute of Mental Health, 1999-2004  
Elected: Medical and Scientific Advisory Council, Alzheimer's Association, 1997 - 2000  
Elected: Councilor, Society for Neuroscience, 1996-2000  
Elected: National Science Advisory Council, American Federation for Aging Research, 1995-2002  
Elected: National Advisory Council on Aging, National Institutes of Health, National Institute on Aging, 1994-1997  
ADAMHA Research Scientist Award, National Institute of Mental Health, 1994-1999  
Elected: Medical and Scientific Advisory Board, Alzheimer's Association, 1991-1997  
ADAMHA Research Scientist Development Award, National Institute of Mental Health, 1989-1994  
Elected: Neuroscience, Behavior and Sociology of Aging Review Committee A, National Institute on Aging, 1987-1991  
Research Career Development Award, National Institutes of Health, 1984-1989  
Delegate: Family/Institutional Care for the Aging Delegation to the People's Republic of China, 1984  
NATO Postdoctoral Fellowship in Science, 1981-1982  
NIH National Research Service Award, 1979-1981  
Ontario Graduate Fellowship, 1972-1974  
Elected Phi Beta Kappa, 1971  
National Science Foundation Summer Research Fellowship, 1969

## THESES

- Barnes, C. Tolerance to delta-9 tetrahydrocannabinol in adult rats with differential drug exposure during infancy. M.A. Thesis, Carleton University, 1972 (Dr. P. A. Fried, supervisor).
- Barnes, C.A. Memory deficits associated with senescence: A neurophysiological and behavioral study in the rat. Ph.D. Thesis, Carleton University, 1977 (Dr. P. A. Fried, supervisor; Dr. G. V. Goddard, co-supervisor).

## BOOK CHAPTERS

- Goddard, G.V., McNaughton, B.L., Douglas, R.M. and Barnes, C. A. (1978) Synaptic change in the limbic system: Evidence from studies using electrical stimulation with and without seizure activity. In: K.E. Livingston and O. Hornykiewicz (Eds.), Limbic Mechanisms: The Continuing Evolution of the Limbic System Concept. New York: Plenum Press, pp. 355-368.
- Barnes, C.A. and McNaughton, B.L. (1980) Spatial memory and hippocampal synaptic plasticity in middle-aged and senescent rats. In: D. Stein (Ed.), Psychobiology of Aging: Problems and Perspectives. New York: Elsevier Press/North-Holland, pp. 253-272.
- Barnes, C.A. and McNaughton, B.L. (1983) Excitability changes in hippocampal granule cells of senescent rat. In: J.-P. Changeux, J. Glowinski, M. Imbert, and F.E. Bloom (Eds.), Molecular and Cellular Interactions Underlying Higher Brain Functions (Progress in Brain Research). New York: Elsevier Science Publishers, pp. 445-451.
- Barnes, C.A. (1983) The physiology of the senescent hippocampus. In: W. Seifert (Ed.), Neurobiology of the Hippocampus. New York: Academic Press, pp. 87-108.
- McNaughton, B.L., Barnes, C.A., and Rao, G. (1984) Presynaptic versus postsynaptic control over long-term synaptic enhancement. In: G. Lynch, J.L. McGaugh, and N.M. Weinberger (Eds.), Neurobiology of Learning and Memory. New York: Guilford Publications, pp. 466-469.
- Barnes, C.A. Electrophysiological correlates of memory changes in senescent animals. (1985) In: S.O. Mercer, M.C. Sloan, and H.J. Lane (Eds.), Family and Institutional Care for the Aging Project to the People's Republic of China. Washington: People to People Publications, pp. 172-179.
- Barnes, C.A. and McNaughton, B.L. (1985) Spatial information: How and where is it stored? In: N.M. Weinberger, J.L. McGaugh and G. Lynch (Eds.), Memory Systems of the Brain: Animal and Human Cognitive Processes. New York: Guilford Publications, pp. 49-61.
- Barnes, C.A. (1988) Selectivity of neurological and mnemonic deficits in aged rats. In: T. Petit and G. Ivy (Eds.), Neural Plasticity: A Lifespan Approach. New York: Alan R. Liss, pp. 235-264.
- Barnes, C.A. (1990) Animal models of age-related cognitive decline. In: F. Boller and J. Grafman (Eds.), Handbook of Neuropsychology. Amsterdam: Elsevier Science Publishers, pp. 169-196.
- Barnes, C.A. (1990) Synaptic enhancement in hippocampal circuits: Behavioral evidence for a role in spatial learning. In: L.R. Squire (Ed.), Symposium Medica Hoechst 23: The Biology of Memory. New York: Schattauer Verlag, pp. 275-291.
- Barnes, C.A. (1991) Memory changes with age: Neurobiological correlates. In: J.L. Martinez, Jr. and R.P. Kesner (Eds.), Learning and Memory: A Biological View. New York: Academic Press, pp. 259-296.
- McNaughton, B.L., Barnes, C.A., Mizumori, S.J.Y., Green, E.J. and Sharp, P E. (1991) Contribution of granule cells to spatial representation in hippocampal circuits: A puzzle. In: F. Morrell (Ed.), Kindling and Synaptic Plasticity: The Legacy of Goddard. Boston, Massachusetts: Birkhauser, Inc., pp. 110-123.
- Barnes, C.A., McNaughton, B.L., Erickson, C.A. (1991) Behaviorally-induced synaptic enhancement: Memory or modulation? In: M. Baudry, J. Davis and S. Laroche (Eds.), Long-Term Potentiation: A Debate of Current Issues. New York: MIT Press, pp. 247-257.
- Barnes, C.A., Baranyi, A., Bindman, L.J., Dudai, Y., Fregnac, Y., Ito, M., Knopfel, T., Lisberger, S.G., Morris, R.G.M., Moulins, M., Movshon, J.A., Singer, W. and Squire, L.R. (1994) Group Report: Relating activity-dependent modifications of neuronal function to changes in neural systems and behavior. In:

- Selverston A.I. and Ascher P. (Eds) Dahlem Workshop on Cellular and Molecular Mechanisms Underlying Higher Neural Functions. New York: John Wiley & Sons, pp. 81-110.
- Barnes, C.A., McNaughton, B.L., Bredt, D.S., Ferris, C.D. and Snyder, S.H. (1994) Nitric oxide synthase inhibition *in vivo*: Lack of effect on hippocampal synaptic enhancement or spatial memory. In: M. Baudry and J. Davis (Eds), Long-term potentiation: A debate of current issues, vol. 2, pp. 37-43.
- Barnes, C.A., Erickson, C.A., Davis, S. and McNaughton, B. L. (1995) Hippocampal synaptic enhancement as a basis for learning and memory: A selected review of current evidence from behaving animals. In: J.L. McGaugh (Ed) Brain and Memory: Modulation and Mediation of Neuroplasticity. London: Oxford University Press, pp. 259-276.
- Barnes, C.A., Rao, G., Shen, J. and McNaughton, B.L. (1996) Long-term potentiation in the hippocampus: Selective deficits during aging. In: T. Ono, B.L. McNaughton, S. Molotchnikoff, E.T. Rolls and H. Nishijo (Eds) Perception, memory and emotion: Frontiers in neuroscience. Oxford, Pergamon Press, pp. 197-207.
- Treves, A., Barnes, C. A. and Rolls, E. T. (1996) Quantitative analysis of network models and of hippocampal data. In: T. Ono, B. L. McNaughton, S. Molotchnikoff, E. T. Rolls, and H. Nishijo (Eds) Perception, memory and emotion: Frontier in neuroscience. Oxford, Pergamon Press, pp. 567-579.
- Barnes, C.A. (1998) Memory changes during normal aging: Neurobiological correlates. In: J.L. Martinez, Jr. and R.P. Kesner (Eds.), Neurobiology of Learning and Memory. New York: Academic Press, 247-287.
- Barnes, C.A. (1998) Spatial cognition and functional alterations of aged rat hippocampus. In: E. Wang and D.S. Snyder (Eds.), Handbook of the Aging Brain, New York: Academic Press, pp. 51-66.
- Barnes, C.A. (2000) Plasticity in the aging central nervous system. In: J. Engel and D.H. Lowenstein (Eds) Brain Plasticity and Epilepsy: A Tribute to Frank Morrell. New York: Academic Press, pp. 339-354.
- Barnes, C.A. (2002) Normal aging: Memory loss in normal aging: Animal models of neural mechanisms. In: R.F. Thompson and J.L. McClelland (Eds) International Encyclopedia of the Social and Behavioral Sciences, vol. 22, London: Elsevier, pp. 15222-15225.
- McNaughton, B.L., Barnes, C.A., Battaglia, F.P., Bower, M.R., Cowen, S.L., Ekstrom, A.D., Gerrard, J.L., Hoffman, K.L., Houston, F.P., Karten, Y., Lipa, P., Pennartz, C.M.A., Sutherland, G.R. (2003) Off-line reprocessing of recent memory and its role in memory consolidation: a progress report. In: P. Maquet, C. Smith and B. Stickgold (Eds) Sleep and Brain Plasticity, Oxford: Oxford University Press, pp. 225-246.
- Barnes, C.A. (2004) Long-term potentiation and the ageing brain. In: T.V.P. Bliss, G.L. Collingridge and R.G.M. Morris (Eds.) Long-Term Potentiation: Enhancing Neuroscience for 30 years, Oxford University Press: United Kingdom, pp. 263-276.
- Penner, M.R. and Barnes, C.A. (2007) Memory changes with age: Neurobiological correlates. In: R.P. Kesner and J.L. Martinez, Jr. (Eds). Neurobiology of Learning and Memory 2<sup>nd</sup> Edition, Elsevier: Amsterdam, pp. 483-518.
- Burke, S.N. and Barnes, C.A. (2008) Aging ensembles: Circuit contributions to memory deficits. In: S.J.Y. Mizumori (Ed) Hippocampal Place Fields: Relevance to Learning and Memory, New York: Oxford University Press, pp. 364-384.
- Hoang, L.T., Lister, J.P. and Barnes, C.A. (2012) The ageing hippocampus. In: T. Bartsch (Ed) Clinical Neurobiology of the Hippocampus. Oxford University Press: United Kingdom, pp. 152-173.
- Schimanski, L.A. and Barnes, C.A. (2013) Insights into age-related cognitive decline: Coupling neurophysiological and behavioral approaches. In: H.A. Bimonte-Nelson and W. Waltz (Eds) The Maze Book: Your Guidebook to Theories, Practice, and Protocols for Testing Rodent Cognition. Springer: New York, in press.

## PEER REVIEWED PUBLICATIONS

- Barnes, C. and Fried, P.A. (1974) Tolerance to delta-9-THC in adult rats with differential delta-9-THC exposure when immature or during early adulthood. **Psychopharmacologia (Berlin)**, 34:181-190.

- Barnes, C.A., McNaughton, B.L., Goddard, G.V., Douglas, R.M. and Adamec, R. (1977) Circadian rhythm of synaptic excitability in rat and monkey central nervous system. **Science**, 197:181-190.
- McNaughton, B.L. and Barnes, C.A. (1977) Physiological identification and analysis of dentate granule cell responses to stimulation of the medial and lateral perforant pathways in the rat. **Journal of Comparative Neurology**, 175:439-454.
- Barnes, C.A. (1979) Memory deficits associated with senescence: A neurophysiological and behavioral study in the rat. **Journal of Comparative and Physiological Psychology**, 93:74-104.
- Barnes, C.A. and McNaughton, B.L. (1979) Neurophysiological comparison of dendritic cable properties in adolescent, middle-aged and senescent rats. **Experimental Aging Research**, 5:195-206.
- Barnes, C.A., Nadel, L. and Honig, W.K. (1980) Spatial memory deficit in senescent rats. **Canadian Journal of Psychology**, 34:29-39.
- Barnes, C.A. and McNaughton, B.L. (1980) Physiological compensation for loss of afferent synapses in rat hippocampal granule cells during senescence. **Journal of Physiology (Lond)**, 309:473-485.
- McNaughton, B.L., Barnes, C.A. and Andersen, P. (1981) Synaptic efficacy and EPSP summation in granule cells of rat fascia dentata studied *in vitro*. **Journal of Neurophysiology**, 46:952-966.
- Wigström, H., McNaughton, B.L. and Barnes, C.A. (1982) Long-term synaptic enhancement in hippocampus is not regulated by postsynaptic membrane potential. **Brain Research**, 233:195-199.
- Barnes, C.A., McNaughton, B.L. and O'Keefe, J. (1983) Loss of place specificity in hippocampal complex-spike cells of senescent rat. **Neurobiology of Aging**, 4:113-119.
- McNaughton, B.L., Barnes, C.A. and O'Keefe, J. (1983) The contributions of position, direction, and velocity to single unit activity in the hippocampus of freely-moving rats. **Experimental Brain Research**, 52:41-49.
- McNaughton, B.L., O'Keefe, J., and Barnes, C.A. (1983) The stereotrode: A new technique for simultaneous isolation of several single units in the central nervous system from multiple unit records. **Journal of Neuroscience Methods**, 8:391-397.
- Sharp, P.E., McNaughton, B.L., and Barnes, C.A. (1985) Enhancement of hippocampal field potentials in rats exposed to a novel, complex environment. **Brain Research**, 339:361-365.
- Lovinger, D.M., Akers, R.F., Nelson, R.B., Barnes, C.A., McNaughton, B.L. and Routtenberg, A. (1985) A selective increase in phosphorylation of protein F1, a protein kinase C substrate, directly related to three day growth of long term synaptic enhancement. **Brain Research**, 343:137-143.
- Barnes, C.A. and McNaughton, B.L. (1985) An age-comparison of the rates of acquisition and forgetting of spatial information in relation to long-term enhancement of hippocampal synapses. **Behavioral Neuroscience**, 99:1040-1048.
- McNaughton, B.L. and Barnes, C.A. (1985) The hippocampus, synaptic enhancement, and intermediate-term memory. **Behavioral and Brain Sciences, Commentary**, 8:507-508.
- McNaughton, B.L., Barnes, C.A., Rao, G., Baldwin, J. and Rasmussen, M. (1986) Long-term enhancement of hippocampal synaptic transmission and the acquisition of spatial information. **Journal of Neuroscience**, 6:563-571.
- Rao, G., Barnes, C.A. and McNaughton, B.L. (1986) Intracellular fluorescent staining with carboxyfluorescein: A rapid and reliable method for quantifying dye-coupling in mammalian central nervous system. **Journal of Neuroscience Methods**, 16:251-263.
- Sharp, P.E., Barnes, C.A. and McNaughton, B.L. (1987) Effects of aging on environmental modulation of hippocampal evoked responses. **Behavioral Neuroscience**, 101:170-178.
- Rao, G., Barnes, C.A. and McNaughton, B.L. (1987) Occlusion of hippocampal electrical junctions by intracellular calcium injection. **Brain Research**, 408:267-270.
- Barnes, C.A., Rao, G. and McNaughton, B.L. (1987) Increased electrotonic coupling in aged rat hippocampus: A possible mechanism for cellular excitability changes. **Journal of Comparative Neurology**, 259:547-558.

- Barnes, C.A. (1987) Aging and the neuronal mechanisms of spatial memory in the rat. **Neuroscience Letters**, Suppl. 29:S145.
- Barnes, C.A., Green, E.J., Baldwin, J. and Johnson, W.E. (1987) Behavioral and neurophysiological examples of functional sparing in senescent rat. **Canadian Journal of Psychology**, 41:131-140.
- Leonard, B.J., McNaughton, B.L. and Barnes, C.A. (1987) Suppression of hippocampal synaptic plasticity during slow wave sleep. **Brain Research**, 425:174-177.
- Barnes, C.A. (1988) Spatial learning and memory processes: the search for their neurobiological mechanisms in the rat. **Trends in Neuroscience**, 11:163-169.
- Barnes, C.A., Mizumori, S.J.Y., Lovinger, D.M., Sheu, F.-S., Murakami, K., Chan, S.Y., Linden, D.J., Nelson, R.B. and Routtenberg, A. (1988) Selective decline in protein-F1 phosphorylation in hippocampus of senescent rat. **Neurobiology of Aging**, 9:393-398.
- Barnes, C.A. (1988) Aging and the physiology of spatial memory. **Neurobiology of Aging**, 9:563-568.
- Barnes, C.A. (1988) Neurological and behavioral investigations of memory failure in aging animals. **International Journal of Neurology**, 22:130-136.
- Mizumori, S.J.Y., McNaughton, B.L. and Barnes, C.A. (1989) A comparison of supramammillary and medial septal influences on hippocampal field potentials and single unit activity. **Journal of Neurophysiology**, 61:15-31.
- Barnes, C.A., Eppich, C. and Rao, G. (1989) Selective improvement of aged rat short-term spatial memory by 3,4-diaminopyridine. **Neurobiology of Aging**, 10:337-341.
- Sharp, P.E., McNaughton, B.L. and Barnes, C.A. (1989) Exploration-dependent modulation of evoked responses in fascia dentata: Fundamental observations and time course. **Psychobiology**, 17:257-269.
- McNaughton, B.L., Barnes, C.A., Meltzer, J. and Sutherland, R.J. (1989) Hippocampal granule cells are necessary for normal spatial learning but not for spatially-selective pyramidal cell discharge. **Experimental Brain Research**, 76:485-496.
- Mizumori, S.J.Y., McNaughton, B.L., Barnes, C.A. and Fox, K.B. (1989) Preserved spatial coding in hippocampal CA1 pyramidal cells during reversible suppression of CA3c output: Evidence for pattern completion in hippocampus. **Journal of Neuroscience**, 9:3915-3928.
- Mizumori, S.J.Y., Barnes, C.A. and McNaughton, B.L. (1989) Reversible inactivation of the medial septum: Selective effects on the spontaneous unit activity of different hippocampal cell types. **Brain Research**, 500:99-106.
- Castro, C.A., Silbert, L.H., McNaughton, B.L. and Barnes, C.A. (1989) Recovery of spatial learning deficits after decay of electrically-induced synaptic enhancement in the hippocampus. **Nature**, 342:545-548.
- Rasmussen, M., Barnes, C.A. and McNaughton, B.L. (1989) A systematic test of cognitive mapping, working-memory and temporal discontinuity theories of hippocampal function. **Psychobiology**, 17:335-348.
- Barnes, C.A., McNaughton, B.L., Mizumori, S.J.Y., Leonard, B. W. and Lin, L.-H. (1990) Comparison of spatial and temporal characteristics of neuronal activity in sequential stages of hippocampal processing. **Progress in Brain Research**, 83:287-300.
- Mizumori, S.J.Y., Barnes, C.A. and McNaughton, B.L. (1990) Behavioral correlates of theta-on and theta-off cells recorded from hippocampal formation of mature young and aged rats. **Experimental Brain Research**, 80:365-373.
- Green, E.J., McNaughton, B.L. and Barnes, C.A. (1990) Exploration-dependent modulation of evoked responses in fascia dentata: Dissociation of motor, EEG, and sensory factors and evidence for a synaptic efficacy change. **Journal of Neuroscience**, 10:1455-1471.
- Markowska, A.L., Ingram, D.K., Barnes, C.A., Spangler, E.L., Lemken, V.J., Kametani, H., Yee, W. and Olton, D.S. (1990) Acetyl-L-carnitine. 1: Effects on mortality, pathology, and sensory-motor performance in aging rats. **Neurobiology of Aging**, 11:491-498.

- Barnes, C.A., Markowska, A.L., Ingram, D.K., Kametani, H., Spangler, E.L., Lemken, J. and Olton, D.S. (1990) Acetyl-L-carnitine. 2: Effects on learning and memory performance of aged rats in simple and complex mazes. **Neurobiology of Aging**, 11:499-506.
- Mizumori, S.J.Y., Perez, G.M., Alvarado, M.C., Barnes, C.A. and McNaughton, B. L. (1990) Reversible inactivation of the medial septum differentially affects two forms of learning in rats. **Brain Research**, 528:12-20.
- Green, E.J., McNaughton, B.L. and Barnes, C.A. (1990) Role of the medial septum and hippocampal theta rhythm in exploration-related synaptic efficacy changes in rat fascia dentata. **Brain Research**, 529:102-108.
- Barnes, C.A. (1990) Effects of aging on the dynamics of information processing and synaptic weight changes in the mammalian hippocampus. **Progress in Brain Research**, 86:89-104.
- McNaughton, B.L. and Barnes, C.A. (1990) From cooperative synaptic enhancement to associative memory: Bridging the abyss. **Seminars in the Neurosciences**, 2:403-416.
- Barnes, C.A., Forster, M.J., Fleshner, M., Ahanotu, E.N., Laudenslager, M.L., Mazzeo, R.S., Maier, S.F. and Lal, H. (1991) Exercise does not modify spatial memory, brain autoimmunity, or antibody response in aged F-344 rats. **Neurobiology of Aging**, 12:47-53.
- Foster, T.C., Barnes, C.A., Rao, G. and McNaughton, B L. (1991) Increase in perforant path quantal size in aged F-344 rats. **Neurobiology of Aging**, 12:441-448.
- Leonard, B.W., Barnes, C.A., Rao, G., Heissenbuttel, T. and McNaughton, B.L. (1991) The influence of postmortem delay on evoked hippocampal field potentials in the *in vitro* slice preparation. **Experimental Neurology**, 113:373-377.
- Barnes, C.A., Foster, T.C., Rao, G. and McNaughton, B.L. (1991) Specificity of functional changes during normal brain aging. **Annals of the New York Academy of Sciences**, 640:80-85.
- Barnes, C.A., Rao, G., Foster, T.C. and McNaughton, B.L. (1992) Region-specific age effects on AMPA sensitivity: Electrophysiological evidence for loss of synaptic contacts in hippocampal field CA1. **Hippocampus**, 2:457-468.
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- Rao, G., Barnes, C.A. and McNaughton, B.L. (1993) Effects of age on L-glutamate-induced depolarization in three hippocampal subfields. **Neurobiology of Aging**, 14:27-33.
- Davis, S., Markowska, A.L., Wenk, G.L. and Barnes, C.A. (1993) Acetyl-L-carnitine: Behavioral, electrophysiological, and neurochemical effects. **Neurobiology of Aging**, 14:107-115.
- Barnes, C.A. (1993) Electrophysiological markers of age-related memory deficits in rats. **Neuroscience Facts**, 4:26.
- Green, E.J., Barnes, C.A. and McNaughton, B.L. (1993) Behavioral state dependence of homo- and hetero-synaptic modulation of dentate gyrus excitability. **Experimental Brain Research**, 93:55-65.
- Erickson, C.A., McNaughton, B.L. and Barnes, C.A. (1993) Comparison of long-term enhancement and short-term exploratory modulation of perforant path synaptic transmission. **Brain Research**, 615:275-280.
- Barnes, C.A. (1993) Electrophysiological changes in hippocampus of aged rodents: predictions for functional change in aged primate. **Neurobiology of Aging**, 14:645-646.
- Worley, P.F., Bhat, R.V., Baraban, J.M., Erickson, C.A., McNaughton, B.L. and Barnes, C.A. (1993) Thresholds for synaptic activation of transcription factors in hippocampus: correlation with long-term enhancement. **Journal of Neuroscience**, 13:4776-4786.

- Yamagata, K., Andreasson, K.I., Kaufmann, W.E., Barnes, C.A. and Worley, P.F. (1993) Expression of a mitogen-inducible cyclooxygenase in brain neurons: regulation by synaptic activity and glucocorticoids. **Neuron**, 11:371-386.
- Meberg, P.J., Barnes, C. A., McNaughton, B.L. and Routtenberg, A. (1993) Protein kinase C and F1/GAP-43 gene expression in hippocampus inversely related to synaptic enhancement lasting 3 days. **Proceedings of the National Academy of Sciences, USA** 90:12050-12054.
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- McNaughton, B.L., Shen, J., Rao, G., Foster, T.C. and Barnes, C.A. (1994) Persistent increase of hippocampal presynaptic axon excitability after repetitive electrical stimulation: Dependence on N-methyl-D-aspartate receptor activity, nitric-oxide synthase, and temperature. **Proceedings of the National Academy of Sciences, USA**, 91:4830-4834.
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**As of December 2013, Dr. Barnes' publications have been cited 18,444 times. She has an h-index of 71.**

**INVITED PRESENTATIONS, PAPERS PRESENTED AT SCIENTIFIC MEETINGS, ABSTRACTS**

- McNaughton, B.L. and Barnes, C.A. Physiological identification and analysis of dentate granule cell responses to stimulation of the medial and lateral perforant pathways in the rat. Sixth Annual Meeting of the Society for Neuroscience, Toronto, Ontario, Canada, 1976. (Abstract)
- Barnes, C.A. Neurophysiological and behavioral correlates of senescence in the rat. Seventh Annual Meeting of the Society for Neuroscience, Anaheim, California, 1977. (Abstract)
- Barnes, C.A. and McNaughton, B.L. Cross-sectional analysis of hippocampal synaptic response waveform in rat: Evidence for constancy of cable properties in granule cell dendrites. Eighth Annual Meeting of the Society for Neuroscience, St. Louis, Missouri, 1978. (Abstract)
- Barnes, C.A., Nadel, L. and Honig, W.K. Spatial memory deficit in senescent rats. Meeting of the Psychonomic Society San Antonio, Texas, 1978. (Abstract)
- Barnes, C.A. and McNaughton, B.L. Spatial memory and hippocampal synaptic plasticity in middle-aged and senescent rats. The First International Conference on the Psychobiology of Aging, Walferdange, Luxembourg, 1979. (Invited)
- McNaughton, B.L. and Barnes, C.A. Opposite effects of paired stimuli on intermediate and distal synapses on dentate granule cells. Meeting of the European Neuroscience Society, Rome, Italy, 1979. (Abstract)
- Barnes, C.A. and McNaughton, B.L. Daily high-frequency stimulation differentially prolongs synaptic enhancement in middle-aged and senescent rat hippocampus. Ninth Annual Meeting of the Society for Neuroscience, Atlanta, Georgia, 1979. (Abstract)
- McNaughton, B.L. and Barnes, C.A. Cooperativity in the generation of post-tetanic synaptic enhancement appears to require near simultaneity of afferent input. Ninth Annual Meeting of the Society for Neuroscience, Atlanta, Georgia, 1979. (Abstract)
- Barnes, C.A. Spatial memory and hippocampal synaptic plasticity. Meeting of the Brain Research Association, London, England, 1980. (Invited)
- Barnes, C.A. and McNaughton, B.L. Compensation for loss of synapses in senescent rat hippocampus. Tenth Annual Meeting of the Society for Neuroscience, Cincinnati, Ohio, 1980. (Abstract)
- McNaughton, B.L. and Barnes, C.A. Quantal analysis in fascia dentata granule cells. Tenth Annual Meeting of the Society for Neuroscience, Cincinnati, Ohio, 1980. (Abstract)
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- Barnes, C. A. and McNaughton, B. L. Excitability changes in hippocampal granule cells of senescent rat. International Neurobiology Society, Ninth Meeting, Abbaye Royale de Fontevraud, France, 1981. (Invited)
- McNaughton, B.L., Barnes, C.A. and Wigström, H. Postsynaptic hyperpolarization does not affect long-term enhancement of CA1 synapses. Eleventh Annual Meeting of the Society for Neuroscience, Los Angeles, California, 1981. (Abstract)
- Barnes, C.A. The physiology of the senescent hippocampus. International Symposium on the Molecular, Cellular and Behavioral Neurobiology of the Hippocampus, Castle Ringberg am Tegernsee, Bavaria, Germany, 1981. (Invited)
- Barnes, C.A., McNaughton, B.L. and O'Keefe, J. Loss of place specificity in hippocampal complex-spike cells of senescent rat. Twelfth Annual Meeting of the Society for Neuroscience, Minneapolis, Minnesota, 1982. (Abstract)
- McNaughton, B.L., Barnes, C.A. and O'Keefe, J. Directional specificity of rat hippocampal "place cells" on a radial 8-arm maze. Twelfth Annual Meeting of the Society for Neuroscience, Minneapolis, Minnesota, 1982. (Abstract)

- McNaughton, B.L. and Barnes, C.A. Position and velocity tuning of "theta cells" in hippocampus of the freely-moving rat. Conference on the Neurobiology of Learning and Memory, Irvine, California, 1982. (Invited)
- Barnes, C.A. Memory and the senescent brain. Seventh Winter Conference on Neurobiology of Learning and Memory, Park City, Utah, 1983. (Invited)
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- Barnes, C.A. Functional correlates of cell loss in mammalian limbic system. Fortieth Annual Scientific Meeting of the American Geriatrics Society, New York, New York, 1983. (Invited)
- McNaughton, B.L., Barnes, C.A. and O'Keefe, J. Isolation of multiple single units using a dual-channel probe. XXIX Congress of International Union of Physiological Sciences, Sydney, Australia, 1983. (Abstract)
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- Barnes, C.A. A multilevel analysis of normal aging. Tenth Winter Conference on the Neurobiology of Learning and Memory, Park City, Utah, 1986. (Invited)
- Barnes, C.A. Animal models of age-related learning-memory impairments. Sixth European Winter Conference on Brain Research, Avoriaz, France, 1986. (Invited)
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- Mizumori, S.J.Y., Barnes, C.A., McNaughton, B.L. and Keith, J. Supramammillary influences on hippocampal physiology: Facilitation of granule cell responsiveness to perforant path stimulation. Sixteenth Annual Meeting of the Society for Neuroscience, Washington, D.C., 1986. (Abstract)
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- Barnes, C. A. Aging and the physiology of spatial memory. National Institute on Aging Workshop on Experimental Models of Age-Related Memory Dysfunction, Baltimore, Maryland, 1987. (Invited)
- Barnes, C.A. Neurological and behavioral investigations of memory failure in aging animals. XIII International Symposium of the Fulton Society on Memory, San Francisco, California, 1987. (Invited)
- Jones Leonard, B., McNaughton, B.L. and Barnes, C.A. A multiple regression analysis of behavioral correlates of rat hippocampal neuron discharge. Seventeenth Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1987. (Abstract)
- Green, E.J., Barnes, C.A. and McNaughton, B.L. Effects of behavioral state on feedback and feedforward inhibition and facilitation in rat fascia dentata. Seventeenth Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1987. (Abstract)
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- Barnes, C.A. Memory failure in aging animals: Possible neurological causes. 154th Annual Meeting of the Association for the Advancement of Science, Boston, Massachusetts, 1988. (Abstract)
- Barnes, C.A. Age-related changes in functional connectivity of hippocampal afferents. Spring Hippocampal Research Conference, St. Thomas, U.S.V.I., 1988. (Invited)
- Mizumori, S.J.Y. and Barnes, C.A. Use of animal models for the study of age-related cognitive dysfunction. Rocky Mountain Psychological Association, Snowbird, Utah, 1988. (Abstract)
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- Barnes, C.A. Effects of aging on the dynamics of information processing and synaptic weight changes in the mammalian hippocampus. National Institute on Aging Conference on Molecular and Cellular Mechanisms of Neural Plasticity in Aging and Alzheimer's Disease, Bethesda, Maryland, 1989. (Invited)
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- Barnes, C.A. Synaptic enhancement in hippocampal circuits: Behavioral evidence for a role in spatial learning. Twenty-third Symposium Medicum Hoechst on The Biology of Memory, Munich, Germany, 1989. (Invited)
- Barnes, C.A. Associative mechanisms of information storage in hippocampus: Links between synaptic plasticity and behavior. Eighth National Meeting of the Brain Research Association, Bristol, U.K., 1990. (Invited)
- Barnes, C.A. Network Patterns of the Hippocampus in vivo and their relevance to synaptic plasticity. Spring Hippocampal Research Conference, Meeting II, Grand Cayman, BWI, 1990. (Invited)
- Barnes, C.A., McNaughton, B.L., Christy, B., Cole, A.J., Baraban, J.M. and Worley, P.F. Activation of transcription factor genes in hippocampus of chronically-prepared rats following induction of long-term synaptic enhancement. Twentieth Annual Meeting of the Society for Neuroscience, St. Louis, Missouri, 1990. (Abstract)
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- Chen, L.L., McNaughton, B.L., Barnes, C.A. and Ortiz, E.R. Head-directional and behavioral correlates of posterior cingulate and medial prefrontal cortex neurons in freely-moving rats. Twentieth Annual Meeting of the Society for Neuroscience, St. Louis, Missouri, 1990. (Abstract)
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- Meltzer, J., Barnes, C.A. and McNaughton, B.L. Regional variation in the propensity for exploration induced synaptic enhancement in the rat hippocampus. Twentieth Annual Meeting of the Society for Neuroscience, St. Louis, Missouri, 1990. (Abstract)
- Perez, G.M., Barnes, C.A. and McNaughton, B.L. Effects of medial septal inactivation on multiple unit activity in the subiculum and entorhinal cortex of anesthetized rats. Twentieth Annual Meeting of the Society for Neuroscience, St. Louis, Missouri, 1990. (Abstract)
- Barnes, C.A. The role of NMDA receptors and LTP in learning and memory: behavioral studies. Fifteenth Winter Conference on Neurobiology of Learning and Memory, Park City, Utah, 1991. (Invited)
- Barnes, C.A. Neuroplasticity in aging. Sixth Meeting of the International Study Group on the Pharmacology of Memory Disorders Associated with Aging, Zurich, Switzerland, 1991. (Invited)

- Barnes, C.A. Compensation for loss of synapses in senescent hippocampus: New data and new questions. Spring Canadian Conference on Behaviour and Brain, Whistler, British Columbia, Canada, 1991. (Invited)
- Barnes, C.A., Erickson, C.A., McNaughton, B.L., Bhat, R., Baraban, J.M., and Worley, P.F. Rapid induction of *zif* 268 mRNA is preserved in hippocampus of old F-344 rats following LTE-inducing stimulation. Twenty-first Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1991. (Abstract)
- Korol, D.L., Leonard, B.W., McNaughton, B.L., and Barnes, C.A. Effects of dorsal neocortical stimulation on perforant path evoked field potentials in the dentate gyrus of the rat. Twenty-first Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1991. (Abstract)
- Davis, S., Markowska, A.L., Barnes, C.A., McNaughton, B.L. and Olton, D. S. Reduced hippocampal LTE in aged rats following chronic administration of acetyl-L-carnitine. Twenty-first Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1991. (Abstract)
- Erickson, C.A., Barnes, C.A., McNaughton, B.L. and Gibbons, D.F. An age comparison of short-term exploratory modulation of rat perforant path synaptic efficacy. Twenty-first Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1991. (Abstract)
- Rao, G., Barnes, C.A., Foster, T.C. and McNaughton, B.L. Age-related decrease in CA1 EPSP to fiber potential ratio. Twenty-first Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1991. (Abstract)
- McNaughton, B.L., Erickson, C.A., Barnes, C.A. and Stevenson, G.D. Additive relationship between perforant path LTE/LTP and STEM suggests involvement of different synaptic populations. Twenty-first Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1991. (Abstract)
- Skaggs, W.E., McNaughton, B.L. and Barnes, C.A. 40-Hz "fluttering" oscillations in the rat hippocampus. Twenty-first Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1991. (Abstract)
- Chen, L.L., Lin, L.-H., McNaughton, B.L., Barnes, C.A. and Gibbons, D.F. Progressive decrease of behavioral modulation of head-direction cells in the pathway from medial prefrontal to retrosplenial cortex. Twenty-first Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1991. (Abstract)
- Gaese, B., Jung, M., McNaughton, B.L., Barnes, C.A. Spatially selective firing in hippocampal pyramidal cells is affected by the magnitude of the visually accessible environment. Twenty-first Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana, 1991. (Abstract)
- Barnes, C.A. Specificity of AMPA responsivity of subregions of senescent hippocampus. DataBlitz Session, Sixteenth Annual Winter Conference on the Neurobiology of Learning and Memory, Park City, January 1992. (Invited)
- Barnes, C.A. The aging hippocampus: region-specific functional alterations and compensatory processes. Workshop at the Center for The Neurobiology of Learning and Memory, University of California, Irvine, January 1992. (Invited)
- Barnes, C.A. Region-specific functional alterations in aging hippocampus. In: Hippocampal Structure and Function in Aging, Spring Hippocampal Research Conference, April 1992. (Invited)
- Barnes, C.A. Age-related memory deficits: Selective hippocampal contributions. Program in Neuroscience Retreat on Learning and Memory, Harvard Medical School Department of Neurobiology, May 1992. (Invited)
- Barnes, C.A. The aging hippocampus: behavioral consequences and region-specific functional alterations. Psychology Department's Colloquium Series, Northwestern University, May 1992. (Invited)
- Barnes, C. A. Region-specific functional alterations of the aged rat hippocampus and the possible consequences for spatial cognition. Department of Neurological Sciences Colloquium Series, Rush Presbyterian - St. Luke's Medical Center, May 1992. (Invited)
- Barnes, C.A. Aging, spatial memory, and the neurobiology of the senescent hippocampus. Plenary Speaker, Third International Congress of Neuroethology, Montreal, August 1992. (Invited)

- Barnes, C.A. Electrophysiological markers of age-related memory deficits in rats. Neuroscience Symposium Organizer and participant in Cognitive and Neurobiological Consequences of Normal Aging: From Rats to Primates, Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, October 1992. (Invited)
- Markus, E.J., Barnes, C.A., McNaughton, B.L., Gladden, V., Abel, T.W. and Skaggs, W.E. Decrease in the information content of hippocampal CA1 cell spatial firing patterns in the dark. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Rao, G., Maren, S., Tocco, G., Baudry, M., Thompson, R.F., McNaughton, B.L. and Barnes, C.A. Changes in the binding properties of glutamate receptors following long-term enhancement (LTE) of perforant path synaptic transmission in awake rats. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Worley, P.F., Bhat, R.V., Baraban, J.M., Stevenson, G.D., McNaughton, B.L., Rao, G. and Barnes, C.A. Synaptic activation of transcription factors: Dissociation of stimulus repetition and LTE in hippocampus of awake behaving rats. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Barnes, C.A., McNaughton, B.L., Bredt, D.S., Ferris, C.D. and Snyder, S.H. Nitric oxide synthase inhibition *in vivo* has no effect on hippocampal synaptic enhancement or spatial memory. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Shen, J., Rao, G., Barnes, C.A. and McNaughton, B.L. Lack of an effect of temperature on tetanus induced enhancement of synaptic field potentials in CA1. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Gothard, K.M., Skaggs, W.E., McNaughton, B.L., Barnes, C.A. and Youngs, S.P. Place field specificity depends on proximity of visual cues. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Erickson, C.A., Korol, D.L., Barnes, C.A., and McNaughton, B.L. Exploration-induced changes in synaptic strength in hippocampus can predict spatial memory in the Morris water task. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Davis, S., Wenk, G.L., Sage, A., Barnes, C.A. and McNaughton, B.L. The role of noradrenergic input in the generation of short-term synaptic plasticity in the dentate gyrus. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Korol, D.L., Abel, T.W., Church, L.T., Barnes, C.A. and McNaughton, B.L. Does saturation of long-term enhancement of perforant path synapses impair spatial learning in the Morris water task? A failure to replicate. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Meberg, P.J., Barnes, C.A., McNaughton, B.L., and Routtenberg, A. Altered structural gene expression after LTE/LTP of the same proteins (PKC and F1/GAP-43) which have phosphorylation activity altered by LTE/LTP. Twenty-second Annual Meeting of the Society for Neuroscience, Anaheim, California, 1992. (Abstract)
- Barnes, C. A. Electrophysiological changes in hippocampus of aged rodents: Predictions for functional change in aged primates, *The Aging Monkey: Behavior and Neurobiology - Current Status and Future Trends*, Baltimore, November 1992. (Invited)
- Barnes, C.A., Rao, G., Foster, T.C. and McNaughton, B.L. Region- and agonist-specific effects on glutaminergic transmission over the lifespan of the F344 rat. Fifth Annual Winter Conference on Neural Plasticity, St. Lucia, Caribbean, February 1993. (Invited, Abstract)
- McNaughton, B.L., Shen, J., Rao, G., Foster, T.C. and Barnes, C.A. Temperature, NMDA receptor, and nitric oxide synthase dependent increase in CA1 axon terminal excitability following repetitive stimulation. Fifth Annual Winter Conference on Neural Plasticity, St. Lucia, Caribbean, February 1993. (Abstract)

- Barnes, C.A. The relation of hippocampal synaptic plasticity to memory: Insights and issues from combined electrophysiological and behavioral studies. XXXII International Congress of Physiological Sciences, Glasgow, Scotland, August 1993. (Invited, Abstract)
- Barnes, C.A. Region-specificity of neurophysiological changes in hippocampus during aging. Nagoya International Symposium on Aging and Health, Nagoya, Japan, October 1993. (Invited, Abstract)
- Gothard, K.M., Skaggs, W.E., Gaese, B., McNaughton, B.L. and Barnes, C.A. Hippocampal place cells convey more information when visual cues are proximal. XXXII International Congress of Physiological Sciences, Glasgow, Scotland, August 1993. (Abstract)
- Barnes, C.A., McNaughton, B.L., Andreasson, K., Church, L. and Worley, P.F. Comparison of the LTE-inducing stimulation and electroconvulsive shock on the rostral-caudal extent of hippocampal zif268 mRNA activation, synaptic enhancement, and spatial memory disruption. Twenty-third Annual Meeting of the Society for Neuroscience, Washington D.C., November 1993. (Abstract)
- Shen, J., Barnes, C.A., McNaughton, B.L., Rao, G. and Abel, T.W. Effects of aging on a slow, atropine-, AP5- and CNQX-sensitive depolarizing response in hippocampal region CA1 following tetanization of stratum oriens/alveus. Twenty-third Annual Meeting of the Society for Neuroscience, Washington D.C., November 1993. (Abstract)
- Rao, G., Barnes, C.A., McNaughton, B.L., Shen, J. and Abel, T.W. Age-related decrease in the NMDA-mediated EPSP in CA1. Twenty-third Annual Meeting of the Society for Neuroscience, Washington D.C., November 1993. (Abstract)
- Erickson, C.A., McNaughton, B.L. and Barnes, C.A. Temperature-dependent reduction in population spike area does not alter functional output of the fascia dentata in rat hippocampus. Twenty-third Annual Meeting of the Society for Neuroscience, Washington D.C., November 1993. (Abstract)
- Uecker, A., Rao, G., Stevenson, G.D., McNaughton, B.L. and Barnes, C.A. Reduced glycogen phosphorylase A activity in the dentate gyrus molecular layer after exploration. Twenty-third Annual Meeting of the Society for Neuroscience, Washington D.C., November 1993. (Abstract)
- Stevenson, G. D., Korol, D.L., Galganski, M.E., Abel, T.W., McNaughton, B.L. and Barnes, C.A. "Saturation" of perforant path granule cell LTE/LTP does disrupt some spatial tasks. Twenty-third Annual Meeting of the Society for Neuroscience, Washington D.C., November 1993. (Abstract)
- Korol, D.L., Jung, M.W., Barnes, C.A. and McNaughton, B. L. How widespread is LTE "saturation" at perforant path - granule cell synapses? Twenty-third Annual Meeting of the Society for Neuroscience, Washington D.C., November 1993. (Abstract)
- Qin, Y., Markus, E.J., McNaughton, B.L. Barnes, C.A. and Gothard, K.M. Place field directionality: Relation to visual, behavioral and spatial variables. Twenty-third Annual Meeting of the Society for Neuroscience, Washington D.C., November 1993. (Abstract)
- Markus, E.J., McNaughton, B.L. and Barnes, C.A. Spatially selective increase in hippocampal theta amplitude in relation to environmental novelty. Twenty-third Annual Meeting of the Society for Neuroscience, Washington D.C., November 1993. (Abstract)
- Barnes, C.A. Regional-specificity of age-related changes in electrophysiological properties of hippocampal cells. Winter Conference on Brain Research, Snowbird, Utah, January 1994. (Panel Session)
- Markus, E.J., Qin, Y., McNaughton, B.L. and Barnes, C.A. Place fields are affected by behavioral and spatial constraints. Inaugural Meeting of the Cognitive Neuroscience Society, San Francisco, CA, March 1994 (Abstract)
- Barnes, C.A. Possible neurobiological substrates of cognitive changes during aging in the rat. The Neurobiology of Learning and Memory: Where We Are and Where We Should Be Going, The Center for Behavioral Neuroscience, State University of New York at Stony Brook, May 1994. (Symposium, Invited)
- Barnes, C.A., Rao, G., Shen, J. and McNaughton, B.L. Regional complexity of neurotransmitter system alterations during aging of rat hippocampus. Twelfth International Australasian Winter Conference on Brain Research, Queenstown, New Zealand, August 1994. (Abstract)

- McNaughton, B.L., Wilson, M.A., Barnes, C.A., Shen, B. Hippocampal memories of recently visited places and their reactivation during sleep: experiment and simulation. Twelfth International Australasian Winter Conference on Brain Research, Queenstown, New Zealand, August 1994. (Abstract)
- Abdulaziz, T.M., Barnes, C.A., McNaughton, B.L., Duffield, L.T. and Church, L.T. A delayed conditional spatial discrimination task for rats. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Lanahan, A., Worley, P.F., Lyford, G., Stevenson, G.S., Rao, G., Church, L, and Barnes, C.A. Altered IEG induction after LTP in memory-deficient aged rats. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Moore, K.M., McNaughton, B.L., Barnes, C.A., Skaggs, W.E., Duffield, C., and D'Monte, R. Temporal dynamics of population correlation structure during REM sleep in the hippocampus and neocortex resembles waking behavior rather than slow-wave sleep. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Skaggs, W.E., McNaughton, B.L., Barnes, C.A., Moore, K., Duffield C., Frank, L. and D'Monte, R. Sparse vs. distributed population coding in superficial and deep layers of rat neocortex. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Uecker, A., Rao, G., McNaughton, B.L., Barnes, C.A., Foley, T.A., and Reiman, E.M. Arousal dependent activation of FD molecular layer glycogen phosphorylase-A. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Shen, J., Rao, G., and Barnes, C.A. Age-related decrease in cholinergic synaptic transmission in FD, CA3, and CA1 of rat hippocampus. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Rao, G., Barnes, C.A., McNaughton, B.L., and Shen J. Age-related decrease in the NMDA-mediated EPSP in RD. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Qin, Y., Markus, E.J., McNaughton, B.L. and Barnes, C.A. Hippocampal place fields change with navigational context. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Andreasson, K.I., Barnes, C.A. and Worley, P.F.  $\beta$ -A activin is regulated by synaptic activity and is expressed in the developing rat brain. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Lyford, G.L., Yamagata, K., Kaufmann, W., Lanahan, A., Barnes, C.A. and Worley, P.F. Arc, an activity-regulated cytoskeletal protein, is a brain specific immediate early gene that associates with the cytoskeleton. Twenty-fourth Annual Meeting of the Society for Neuroscience, Miami Beach, FL, November 1994 (Abstract)
- Barnes, C.A. LTP maintenance deficits and faster forgetting in old rats: is the NMDA receptor involved? Seventh Winter Conference on Neural Plasticity, Grenada, West Indies, February 1995. (Invited)
- Barnes, C.A. Spatial cognition and functional alterations of the aged rat hippocampus. Neuroscience Graduate Program Colloquium Series, University of Virginia, Charlottesville, VA, March 1995. (Invited)
- Barnes, C.A. Teaching the biological bases of behavior. First Lewis M. Terman Western Regional Teachers' Conference, Los Angeles, CA, April 1995. (Invited)
- Barnes, C.A. Selective changes in hippocampal synaptic transmission during normal aging: Implications for spatial cognition. Neuroscience Program Seminar Series, University of Texas at San Antonio, Texas, April 1995. (Invited)
- Jung, M.W., Qin, Y., McNaughton, B.L. and Barnes, C. A. Behavioral correlates of rat prefrontal cortical units during a spatial working memory task. Cognitive Neuroscience Society Meeting, San Francisco, CA, March 1995. (Abstract)

- Barnes, C.A. and McNaughton, B.L. Bilateral saturation of hippocampal LTP: Does it produce the predicted memory impairment? Fourth International Brain Research Organization World Congress of Neuroscience, Kyoto, Japan, July 1995. (Abstract)
- Barnes, C.A., Rao, G., Shen, J. and McNaughton, B.L. Does hippocampal LTP induction or maintenance change with aging? 4th IBRO Satellite Symposium on Perception, Memory, and Emotion: Frontier in Neuroscience, Toyama, Japan, July 1995. (Invited, Abstract)
- McNaughton, B.L., Barnes, C.A., Gothard, K., Skaggs, W., Wilson, M., Qin, Y.-L., Markus, E., Kudrimoti, H., Suster, M., Gerrard, J., D'Monte, R. and Stengel, K. Rapid encoding of both spatial and non-spatial representations in hippocampal ensembles, and their reactivation during off-line processing. 4th IBRO Satellite Symposium on Perception, Memory, and Emotion: Frontier in Neuroscience, Toyama, Japan, July 1995. (Invited, Abstract)
- Markus, E.J., Qin, Y., McNaughton, B.L. and Barnes, C.A. Hippocampal place cell encoding of the environment: Insights from simultaneous recording of multiple single units. Biomedical Engineering Society Meeting, September 1995. (Abstract)
- Bilkey, D.K., Barnes, C.A. and McNaughton, B.L. Exposure to novelty increases LTP duration in the hippocampus. Thirteenth International Australasian Winter Conference on Brain Research, Queenstown, New Zealand, August 1995. (Abstract)
- Barnes, C.A. Selectivity of neurobiological and cognitive changes during the aging process. Colloquium for the Program in the Neurobiology of Aging, University of California, San Diego, CA, September 1995. (Invited)
- Barnes, C.A. Aging and the hippocampus: compensatory and deteriorative processes. Colloquium for the Cognitive Neuroscience Group of Glaxo Research and Development Limited, Stevenage, U.K., October 1995. (Invited)
- Uecker, A., Rao, G., Barnes, C.A., McNaughton, B.L. and Reiman, E. Dentate gyrus glycogen metabolism is inversely correlated with EEG theta activity. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)
- Jung, M.W., Qin, Y., McNaughton, B.L. and Barnes, C.A. Behavioral correlates of rat prefrontal cortical units during spatial working memory tasks. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)
- Pierchala, B., Lanahan, A., Lyford, G., Worley, P.F., Stevensen, G.S. and Barnes, C.A. Identification of IEGs differentially regulated by LPT-inducing stimuli in young and old rats. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)
- Rao, G., Shen, J., Barnes, C.A. and McNaughton, B.L. Preserved LTP induction in CA1 of aged F-344 rats. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)
- Kudrimoti, H.S., McNaughton, B.L., Barnes, C.A. and Skaggs, W.E. Recent experience strengthens pre-existing correlations between hippocampal neurons during sleep. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)
- Qin, Y., McNaughton, B.L., Skaggs, W.E. and Barnes, C.A. Reactivation during sleep of cortico-cortical and hippocampo-cortical correlation states from preceding behavior. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)
- Shen, B., McNaughton, B.L. and Barnes, C.A. Matching pursuit analysis enables temporal-localization of frequency/phase patterns of hippocampal EEG and their relations to the neuronal state vector during sleep. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)
- Chialvo, D.R., Barnes, C.A., McNaughton, B.L., Gothard, K.M. and Mehta, M. Cooperative role of periodic driving and random background input in governing theta cell output in rat hippocampus. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)

- Gerrard, J.L., Ginzburg, I., Barnes, C.A., Sejnowski, T.J. and McNaughton, B.L. Accuracy of hippocampal place fields in predicting location is enhanced in the presence of theta rhythm. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)
- Andreasson, K. I., Lanahan, A., Brakemman, P., Barnes, C. A. and Worley, P. F. A novel member of the steroid hormone receptor family is regulated by synaptic activity and in the developing central nervous system. Twenty-fifth Annual Meeting of the Society for Neuroscience, San Diego, CA, November 1995. (Abstract)
- Barnes, C.A. Aging and the hippocampus: the good and the bad news. Symposium: Hippocampal Synapses and Beyond, Oslo, Norway, December 1995. (Invited)
- Barnes, C.A. Brain aging is not simple: Selectivity of age-related cognitive and neurobiological changes. Co-sponsored Colloquium for the Travelers Center on Aging, Neuroscience Program and Department of Psychology, University of Connecticut, Storrs, Connecticut, February 1996. (Invited)
- Barnes, C.A. Workshop on: New Theories of Brain Aging, Glenn Foundation for Medical Research, Santa Barbara, California, March, 1996. (Invited)
- Barnes, C.A. The good and the bad news of cognitive and neurobiological function during aging. Special Lectures in Neuroscience: Neurobiology of Aging, Purdue University Neuroscience, West Lafayette, Indiana, April 1996. (Invited)
- Barnes, C.A. Aging and hippocampal electrophysiology. Summer workshop on the Neurobiological Basis of Cognitive Decline in Aging. University of Kuopio, Kuopio, Finland, June 1996. (Invited).
- Barnes, C. A. Spatial cognition and functional alterations of the aged rat hippocampus. Seminar exchange for the Fact-finding mission on behalf of the American-German Cooperation in Health Research Initiative of the Federal Ministry for Education, Science, Research and Technology of Germany and the National Institute on Aging of the United States of America, Zentralinstitut für Seelische Gesundheit, Mannheim, Germany, June 1996. (Invited)
- Barnes, C.A. Getting lost: Aging-related neurobiological changes in the hippocampal spatial memory system. Scholars-in-Residence Speaker, Woods Hole Marine Biological Laboratory, Woods Hole, Massachusetts, July 1996. (Invited)
- Barnes, C.A. Does LTP play a role in memory? Evidence from evoked potential and single unit studies in behaving animals. Workshop in the Neural Systems and Behavior Summer Course, Woods Hole Marine Biological Laboratory, Woods Hole, Massachusetts, July 1996. (Invited)
- Barnes, C.A. Age-related neurobiological changes in the hippocampal spatial memory system. Department of Neurobiology Aging Seminar Series, Mt. Sinai School of Medicine, New York, October 1996. (Invited)
- Lyford, G.L., Stevenson, G.D., McNaughton, B.L. and Worley, P.F. Injection of arc antisense oligonucleotides selectively blocks hippocampal LTP maintenance in vivo. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Rao, G., Stevenson, G.D., Barnes, C.A., McNaughton, B.L. and Weaver, K.L. Age-related decrease in the Schaffer collateral evoked EPSP in chronically implanted F-344 rats. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Poe, G.R., McNaughton, B.L., Barnes, C.A., Suster, M.S., Weaver, K.L. and Gerrard, J.L. Place cell theta phase firing profile differences from maze running to REM sleep: familiar vs. novel place fields. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Kudrimoti, H.S., Skaggs, W.E. Barnes, C.A., McNaughton, B.L., Gerrard, J.L., Suster, M.S. and Weaver, K.L. REM sleep and the reactivation of recent correlation patterns in hippocampal neuronal ensembles. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Gerrard, J.L., Kudrimoti, H.S., Barnes, C.A., McNaughton, B.L., Suster, M.S. and Weaver, K.L. Reactivation of hippocampal correlation states during post-behavior sleep is impaired in aged F-344

- rats. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Suster, M.S., McNaughton, B.L., Barnes, C.A., Skaggs, W.E., Weaver, K.L., Gerrard, J.L. and Kudrimoti, H. S. Instability of spatial representation during aging. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Shen, J., Barnes, C.A., McNaughton, B.L., Skaggs, W.E., Suster, M.S., Weaver, K.L. and Gerrard, J.L. Effects of age on theta rhythm and theta phase precession in hippocampal neuronal populations. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Weaver, K.L., Shen, J., McNaughton, B.L., Barnes, C.A., Skaggs, W.E., Suster, M.S. and Gerrard, J.L. Theta phase precession in hippocampal pyramidal cells does not depend on visual input. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Qin, Y-L, McNaughton, B.L., Skaggs, W.E., Barnes, C.A., Suster, M. ., Weaver, K.L. and Gerrard, J.L. Interaction between hippocampus and neocortex in the replay of temporal sequences during sleep. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Mehta, M.R., McNaughton, B.L., Barnes, C.A., Suster, M.S., Weaver, K.L., and Gerrard, J.L. Rapid changes in the hippocampal population code during behavior: a case for Hebbian learning in vivo. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Andreasson, K.I., Barnes, C.A. and Worley, P.F. A novel cadherin-related molecule is regulated by synaptic activity and in the developing central nervous system. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Chialvo, D.R., Barnes, C.A. and McNaughton, B.L. Unsupervised extraction of spatial trajectories from hippocampal interneuron firing rate ensembles. Twenty-sixth Annual Meeting of the Society for Neuroscience, Washington, D.C., November 1996. (Abstract)
- Paul, B.M., Ellsworth, E., White, R.D., Alyan, S.H., Barnes, C.A. and McNaughton, B.L. A novel test of path integration behavior in rodents. Eighth Annual Undergraduate Biology Research Conference, University of Arizona, Tucson, AZ, January 1997. (Abstract)
- Kenny, K.C., Terrazas, A., McNaughton, B.L. and Barnes, C.A. Normal hippocampal theta rhythm during passive locomotion. Eighth Annual Undergraduate Biology Research Conference, University of Arizona, Tucson, AZ, January 1997. (Abstract)
- Teed, R.G.W., Poe, G.R., Barnes, C.A. and McNaughton, B.L. Graceful degradation and loss of spatial specificity in the aged rat hippocampus. Eighth Annual Undergraduate Biology Research Conference, University of Arizona, Tucson, AZ, January 1997. (Abstract)
- Dodge, E., Poe, G.R., Barnes, C.A. and McNaughton, B.L. Spatial memory deficits in old age, and their possible neurological causes. Eighth Annual Undergraduate Biology Research Conference, University of Arizona, Tucson, AZ, January 1997. (Abstract)
- Weissman, D., Rao, G. and Barnes, C.A. Neurobiological correlates of age-related spatial memory deficits. Eighth Annual Undergraduate Biology Research Conference, University of Arizona, Tucson, AZ, January 1997. (Abstract)
- Barnes, C.A. Spatial orientation in aging. NASA/NIA Meeting on Aging and Space Flight: Expanding the Science Base. Universities Space Research Association, Bethesda, MD, February 1997. (Invited)
- Barnes, C.A. Getting lost: Aging-related neurobiological changes in the hippocampal spatial memory system. General Biology Seminar, California Institute of Technology, Pasadena, CA, February 1997 (Invited)
- Barnes, C.A. Symposium on aging and the hippocampus: Channels, conditioning and cognitive maps. Ninth Annual Meeting of the Winter Conference on Neural Plasticity, St. Lucia, W.I., February 1997. (Invited, Abstract)

- Barnes, C.A. Getting lost: synaptic mechanisms and network dynamics in the aged hippocampus. The Physiological Society Research Symposium on the Neurobiology of Ageing, Dublin, Ireland, March 1997. (Invited, Abstract)
- Alyan, S.H., Barnes, C.A. and McNaughton, B.L. Testing for path integration mechanism in the rat. Cognitive Neuroscience Society Meeting, Boston, MA, March 1997. (Abstract)
- Barnes, C.A. Functional alterations of the aged rat hippocampus: impact on spatial cognition. Grass Traveling Scientist Program, Neuroscience Program, University of British Columbia, Vancouver, BC, April 1997. (Invited)
- Barnes, C.A. Getting lost: Age-related neurobiological changes in the hippocampal spatial memory system. Distinguished Guest Lectureship Series in Gerontology, University of South Florida, Tampa, FL, May 1997. (Invited)
- Terrazas, A., Barnes, C.A. and McNaughton, B.L. Normal hippocampal theta in rats engaged in a novel train driving task. American Physiological Society Meeting, Central Nervous System Section, New Orleans, LA, April 1997. (Abstract)
- Barnes, C.A. Neurobiological changes in the aged rat hippocampus: implications for age-related deficits in spatial cognition. Department of Neuroscience Colloquium Series, University of Pittsburgh, PA, May 1997. (Invited)
- Barnes, C.A. Spatial cognition and functional alterations of the aged rat hippocampus. Workshop on The Aging Brain, Montreal, Canada, June 1997. (Invited, Abstract)
- Barnes, C.A. New theories of brain aging. Glen Foundation for Medical Research Meeting, Santa Barbara, CA, August 1997. (Invited)
- Poe, G.R., Skaggs, W.E., Barnes, C.A. and McNaughton, B.L. Theta phase precession remnants in REM sleep. Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)
- McNaughton, B.L., Shen, J., Skaggs, W.E. and Barnes, C.A. A new definition of a unitary place field based on phase precession. . Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)
- Shen, J., McNaughton, B.L. and Barnes, C.A. Reactivation of neuronal ensembles in hippocampal dentate gyrus during sleep following spatial experience. Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)
- Kudrimoti, H.S., Barnes, C.A. and McNaughton, B. L. Long-term persistence of experience-induced neuronal correlations in hippocampal ensembles. . Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)
- Terrazas, A., Gothard, K.M., Kenny, K.C., Barnes, C.A. and McNaughton, B.L. All aboard! What train-driving rats can tell us about the neural mechanisms of spatial navigation. Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)
- Rosenzweig, E.S., Rao, G., McNaughton, B.L. and Barnes, C.A. What causes LTP-induction deficits in aged rats? Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)
- Rao, G., Barnes, C.A., Shen, J. and McNaughton, B.L. Age-related changes in the ratio of hippocampal NMDAR- and AMPAR-mediated EPSPs. Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)
- Houston, F.P., Stevenson, G.D., McNaughton, B.L. and Barnes, C.A. Faster forgetting of spatial context and altered consolidation dynamics in aged F344 rats. Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)
- Worley, P. Brooks, A., Chen, D., Lanahan, A., Lyford, G., Stevenson, G.D., Barnes, C.A. and Nikolich, K. A comprehensive comparison of IEG induction in young and aged rats. Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)

- Guzowski, J.G., Hittner, J.M., Barnes, C.A., Worley, P.F. and McGaugh, J. L. Behavioral regulation of the immediate-early gene Arc and its role in memory consolidation. Twenty-seventh Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 1997. (Abstract)
- Barnes, C. A. Selective neurobiological changes in aged rat hippocampus: implications for network dynamics and spatial cognition. Kentucky Symposium on Brain Aging, University of Kentucky, Lexington, KY, November, 1997. (Invited)
- Barnes, C.A. Electrophysiological evidence for preservation of hippocampal cell numbers, but reduced connectivity during normal aging in the rat: impact on spatial cognition. Symposium on the Functional Significance of Cell Death in the Aging Brain, Gerontological Society Meetings, Cincinnati, OH, November 1997. (Invited)
- Teed, R.G.W, White, R., Poe, G. and Barnes, C.A. Effect of functional removal of one or two hippocampal hemispheres on spatial information processing in young and old rats. Ninth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 1998. (Abstract)
- Paul, B., Houston, F.P., Worley, P.F. and Barnes, C. A. The role of Arc, an immediate early gene, in the maintenance of hippocampal long-term potentiation. Ninth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 1998. (Abstract)
- Baldwin, C.M., Podgornik, M.N., Rao, G., Young, R. S., Barnes, C.A. and Witten, M.L. Alterations in memory with repeated exposure to JP-8 jet fuel. Experimental Biology Conference, San Francisco, CA, April 1998. (Abstract)
- Baldwin, C.M., Podgornik M.N., Young, R.S., Rao, G., Houston, F., Barnes, C. A. and Witten, M.L. Memory and biobehavioral alterations related to moderate and high dose JP-8 jet fuel exposure. Proceedings of the International Jet Fuel Conference, San Antonio, TX, April 1998. (Abstract)
- Barnes, C.A. Getting lost: Age-related neurobiological changes in the hippocampal spatial memory system. Molecular, Cellular and Integrative Neurosciences Program Seminar Series, Colorado State University, Fort Collins, CO, February 1998. (Invited)
- Barnes, C.A. Getting lost: Synaptic mechanisms and network dynamics in the aged rat hippocampus. Neuroscience Program Seminar Series, University of Southern California, Los Angeles, CA, April 1998. (Invited)
- Barnes, C.A. Age-related neurobiological changes in the hippocampal spatial memory system. Gordon Research Conference on the Biology of Aging, Integrative Mechanisms of Aging, Il Ciocco, Barga, Italy, May, 1998. (Invited)
- Barnes, C.A. Ensemble recordings from aged rodent hippocampus: predictions for cognitive and neurobiological changes in the aging primate. Workshop on Age-related Neurobehavioral Research: An Integrative Cognitive Neuroscience Agenda for the 21st Century, National Institute on Aging, Bethesda, MD, June 1998. (Invited)
- Barnes, C.A. Locomotion/exploratory behavior, anxiety and developmental milestones: Working Group on Behavioral Assessment of Mutant and Transgenic Animals. The Office of Behavioral and Social Sciences Research, NIH, Bethesda, MD, July 1998. (Invited)
- Barnes, C.A. Getting lost: Synaptic mechanisms and network dynamics in the aged rat hippocampus. Neuroplasticity of Aging Training Grant Program Seminar Series, University of California @ San Diego, San Diego, CA, September 1998. (Invited)
- Barnes, C.A. Aging and spatial memory: from neuroplasticity to population dynamics. Special Psychology and Neuroscience Research Seminar, Dalhousie University, Halifax, Nova Scotia, Canada, October 1998. (Invited)
- Barnes, C.A. The aging hippocampus: Molecules, maps and memory. National Institutes of Health Neuroscience Lecture Series, NIH, Bethesda, MD, October 1998. (Invited)
- Terrazas, A., Gothard, K.M., Weaver-Sommers, K.L., McNaughton, B.L. and Barnes, C.A. Reduced phase precession in train-driving rats. Twenty-eighth Annual Meeting of the Society for Neuroscience, Los Angeles, CA, November 1998 (Abstract)

- Gerrard, J.L., Kudrimoti, H.S., Barnes, C.A. McNaughton, B.L. Effects of aging on dynamics of hippocampal memory reactivation during sharp-waves. Twenty-eighth Annual Meeting of the Society for Neuroscience, Los Angeles, CA, November 1998 (Abstract)
- Poe, G.R., White, R.D., Teed, R.W., Dodge, E., Insel, N. and Barnes, C.A. Left hippocampal inactivation differentially affects aged vs young rats in a spatial memory task. Twenty-eighth Annual Meeting of the Society for Neuroscience, Los Angeles, CA, November 1998 (Abstract)
- Rao, G., Orr, G., Barnes, C.A. and McNaughton, B.L. Theta Rhythm Modulation of CA1 evoked potential size during locomotion. Twenty-eighth Annual Meeting of the Society for Neuroscience, Los Angeles, CA, November 1998 (Abstract)
- Guzowski, J.F., Barnes, C.A. and Worley, P.F. Cellular and subcellular expression of the RNA encoding the immediate-early gene (IEG) *Arc* (*ARG3.1*): A comparison to other IEG RNAs. Twenty-eighth Annual Meeting of the Society for Neuroscience, Los Angeles, CA, November 1998 (Abstract)
- Cowen, S., Hau, B.S., McNaughton, B.L. and Barnes, C.A. Selective reactivation of hippocampal place cells associated with a single reward arm following a reference-memory task. Tenth Annual Undergraduate Biology Research Conference, Tucson, AZ January 1999. (Abstract)
- Bohanick, J., Redish, A.D., Rosenzweig, E.S., McNaughton, B.L. and Barnes, C.A. Can rats locate a point in space when that point is not stable relative to the hippocampal representation? Tenth Annual Undergraduate Biology Research Conference, Tucson, AZ January 1999. (Abstract)
- Poe, G.R., Teed, R.G.W., White, R., Insel, N. and Barnes, C.A. Left hippocampal inactivation differentially affects aged vs young rats in a spatial memory task. Tenth Annual Undergraduate Biology Research Conference, Tucson, AZ January 1999. (Abstract)
- White, R., Rao, G., McNaughton, B.L. and Barnes, C.A. Are glutamate receptor response ratio changes with age a signature of experience? Tenth Annual Undergraduate Biology Research Conference, Tucson, AZ January 1999. (Abstract)
- Barnes, C.A. Aging and spatial memory: from neuroplasticity to population dynamics. Institute of Neurosciences, CNRS, Paris, France, March 1999. (Invited)
- Barnes, C.A. Plasticity in the aging central nervous system. Morrell Symposium on brain plasticity and epilepsy, Woods Hole, MA, March, 1999. (Invited)
- Barnes, C.A. Ensemble recordings of neuronal populations: A window into understanding cognition and how it changes with age. Next Med2: Envisioning the Future of Medicine, Boston, MA, April 1999. (Invited, Abstract)
- Barnes, C.A. Cold Spring Harbor Laboratory Meeting on Learning and Memory, Cold Spring Harbor, NY, April 1999. (Invited)
- Barnes, C.A. Aging and the hippocampus: from neural plasticity to ensemble dynamics. Grand Rounds, Rush Presbyterian Hospital, Chicago, IL, May 1999. (Invited)
- Barnes, C.A. Getting lost: Synaptic mechanisms and network dynamics in the aged rat hippocampus. Seminar at the Mayo Clinic, Jacksonville, FL, June 1999. (Invited)
- Barnes, C.A. Successful aging versus Alzheimer's disease. Symposium on Emerging Therapeutic Concepts for Alzheimer's Disease: Does Nicotine Have a Role? 9<sup>th</sup> Congress of the International Psychogeriatric Association, Vancouver, BC, August 1999. (Invited)
- Guzowski, J.F., McNaughton, B.L., Barnes, C.A. and Worley, P.F. Visualization of hippocampal CA1 neuronal ensembles encoding two different spatial environments using fluorescent *in situ* hybridization to the immediate-early gene *arc*. Twenty-ninth Annual Meeting of the Society for Neuroscience, Miami, FL, October 1999. (Abstract)
- Lanahan, T., Worley, P.F., Houston, F.P., Stevenson, G.D. and Barnes, C.A. Identification of differentially regulated genes in hippocampus of aged, memory-impaired rats. Twenty-ninth Annual Meeting of the Society for Neuroscience, Miami, FL, October 1999. (Abstract)

- Rao, G., Houston, F.P., Barnes, C.A. and McNaughton, B.L. Age-related impairment in hippocampal LTP induced with intracellular current pulses in fascia dentata. Twenty-ninth Annual Meeting of the Society for Neuroscience, Miami, FL, October 1999. (Abstract)
- Orr, G., Rao, G., Stevenson, G.D., Barnes, C.A. and McNaughton, B.L. Hippocampal synaptic plasticity is modulated by the theta rhythm in the fascia dentata of freely behaving rats. Twenty-ninth Annual Meeting of the Society for Neuroscience, Miami, FL, October 1999. (Abstract)
- Redish, A.D., Rosenzweig, E.S., Bohanick, J.D., McNaughton, B.L. and Barnes, C.A. Dynamics of hippocampal MAP realignment. Twenty-ninth Annual Meeting of the Society for Neuroscience, Miami, FL, October 1999. (Abstract)
- Rosenzweig, E.S., Redish, A.D., Bohanick, J.D., McNaughton, B.L. and Barnes, C.A. Behavioral correlates of hippocampal MAP realignment. Twenty-ninth Annual Meeting of the Society for Neuroscience, Miami, FL, October 1999. (Abstract)
- Ekstrom, A.D., Quinn, L., Meltzer, J., Teed, R.G.W., McNaughton, B.L. and Barnes, C.A. The NMDA antagonist CPP blocks hippocampal place field expansion in the behaving rat. Twenty-ninth Annual Meeting of the Society for Neuroscience, Miami, FL, October 1999. (Abstract)
- Barnes, C.A. The hippocampus, memory retrieval and the dynamics of neuronal ensembles in aging. Cognitive Science Brownbag Seminar, University of Arizona, Tucson, AZ, November, 1999. (Invited)
- Barnes, C.A. Nicotine, spatial memory and hippocampal plasticity. Memory Disorders Research Society Meeting, Tucson, AZ, November, 1999. (Invited)
- Barnes, C.A. Getting lost: synaptic mechanisms and network dynamics of the aged rat hippocampus. Cajal Neuroscience Research Center Seminar Series, University of Texas, San Antonio, TX, November 1999. (Invited)
- Barnes, C.A. Neuropsychological/physiological correlates of memory impairments in rats. The Ninth Adler Symposium, Biology of Memory: Normal Functions and Age-associated Impairments, The Salk Institute, La Jolla, CA, February 2000. (Invited)
- Barnes, C.A. Getting lost: Synaptic mechanisms and network dynamics in the aged rat hippocampus. Psychology Department Colloquium, Harvard University, Boston, MA, February 2000. (Invited)
- Barnes, C.A. Aging and the hippocampus: from neural plasticity to ensemble dynamics. Bauer Foundation Colloquium Series, Volen Center, Brandeis University, Waltham MA, March 2000. (Invited)
- Barnes, C.A. The neurobiology of learning and memory – applications to Alzheimer's disease. Janssen-Cilag Mini-Symposium: New Targets for AD Therapies – Better Outcomes. Sixth International Stockholm/Springfield Symposium on Advances in Alzheimer Therapy, Stockholm, Sweden, April 2000. (Invited)
- Barnes, C.A. and Wenk G.L. Galantamine or donepezil in old rats: Memory, hippocampal plasticity and nicotinic receptors. Sixth International Stockholm/Springfield Symposium on Advances in Alzheimer Therapy, Stockholm, Sweden, April 2000. (Abstract)
- Barnes, C.A. Hippocampal connectivity in the aged rat: Implications for cognition. Spring Hippocampal Research Conference, Grand Cayman, BWI, April 2000. (Invited)
- Barnes, C.A. Getting lost: Synaptic mechanisms and network dynamics in the aged rat hippocampus. Colloquium in Neuroscience, University of Texas Health Science Center, Houston, TX, May 2000. (Invited)
- Barnes, C.A. Recording and behavior studies in rodents: Information encoding and aging. Department of Psychology Colloquium, The Johns Hopkins University, Baltimore, MD, May 2000. (Invited)
- Barnes, C. A. The hippocampus, memory, and aging: Experimental approaches. Workshop on The Hippocampus in Health and Disease, American Association of Neuropathologists, Atlanta, GA, June 2000. (Invited)
- Barnes, C.A. Age-related changes in hippocampal ensemble dynamics and spatial cognition. CREST Symposium, Japanese Institute of Science and Technology, Tokyo, Japan, July 2000. (Invited)

- Barnes, C.A. Aging and the hippocampus: neural plasticity, ensemble dynamics and gene transcription. National Institute for Longevity Sciences, Nagoya, Japan, July 2000. (Invited).
- Barnes, C.A. Cell biology and biophysics of the aging hippocampus. Symposium on the Molecular and Biophysical Mechanisms of Memory in Health and Disease, Oasi Institute for Research on Mental Retardation and Brain Aging, Catania, Sicily, Italy, August 2000. (Invited)
- Barnes, C.A. Aging and the hippocampus: from neural plasticity to ensemble dynamics. Neuroscience Seminar Series, University of Colorado Health Sciences Center, Denver, Colorado, October, 2000. (Invited)
- Guzowski, J.F., Chawla, M.K., McNaughton, B.L., Worley, P.F. and Barnes, C.A. Massed, but not spaced, exposure to a single environment attenuates transcription of the immediate-early gene *Arc* in hippocampal CA1 neurons. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Chawla, M.K., Guzowski, J.F., Hoffman, K.L., Marriott, L.K., Worley, P.F., Barnes, C.A. and McNaughton, B.L. Spatial experience induces *Arc* RNA expression selectively in the dorsal blade of the dentate gyrus. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Lanahan, T., Houston, F.P., Barnes, C.A. and Worley, P.F. Gene profiling of LTP in young and memory-impaired rats. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Smith, A.C., Gerrard, J.L., Barnes, C.A. and McNaughton, B.L. Altered firing characteristics of CA1 pyramidal cells during sleep in old rats. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Gerrard, J.L., Cowen, S.L., Kudrimoti, H.S., Rosenzweig, E.S., Redish, A.D., Barnes, C.A. and McNaughton, B.L. Equivalent reactivation of hippocampal memory traces for a novel experience in young adult and aged rats. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Ekstrom, A.D., Meltzer, J.A., McNaughton, B.L. and Barnes, C.A. Reactivation of recent hippocampal neural ensemble patterns does not require NMDA receptor dependent encoding. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Cowen, S.L., Kudrimoti, H.S., Gerrard, J.L., McNaughton, B.L. and Barnes, C.A. Three measures of neural ensemble reactivation in the hippocampus fail to reflect reward probabilities present in a familiar task. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Redish, A.D., Battaglia, F.P., Ekstrom, A.D., Gerrard, J.L., Lipa, P., Rosenzweig, E.S., McNaughton, B.L. and Barnes, C.A. Hippocampal pyramidal cells located near each other anatomically do not show related spatial firing correlates. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Rosenzweig, E.S., Ekstrom, A.D., Redish, A.D., McNaughton, B.L. and Barnes, C.A. Phase precession as an experience-independent process: Hippocampal pyramidal cell phase precession in a novel environment and under NMDA-receptor blockage. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Lipa, P., Barnes, C.A. and McNaughton, B.L. Hippocampal pyramidal cells show indistinguishable firing properties in local cue rich and poor environments. Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Barnes, C.A. Age, space and the hippocampus: from synapses to systems. Special Lecture, Thirtieth Annual Meeting of the Society for Neuroscience, New Orleans, November 2000. (Abstract)
- Barnes, C.A. The aging rat hippocampus: Molecules, maps and memory. The Aging Brain: Matter over Mind Symposium, Gerontological Society of America Meeting, Washington, DC, November 2000. (Invited)

- Barnes, C.A. Brain and behavioral aging in the rat: Molecules, maps and memory. Symposium at the Annual Meeting of the American College of Neuropsychopharmacology, San Juan, Puerto Rico, December 2000. (Invited)
- Dees, J.A., Terrazas, A., Bohne, K.M., DeDios, J.S., McNaughton, B.L. and Barnes, C. A. The theta rhythm and its correlates with navigation in a virtual environment. Twelfth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2001. (Abstract)
- Cui, Q., Chawla, M.K. and Barnes, C.A. Environment specific Arc expression in the CA3 region of the rat hippocampus. Twelfth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2001. (Abstract)
- Barnes, C.A. The aging hippocampus: Molecules, maps and memory. 2001 Presidential Symposium at the MidWinter Research Meeting of the Association for Research in Otolaryngology, St. Petersburg Beach, Florida, February 2001. (Invited)
- Barnes, C.A. Whole brain imaging of behavior: validation of predictions derived from ensemble recording studies. Winter Conference on Neural Plasticity, Antigua, BWI, February, 2001. (Abstract)
- Barnes, C.A. Aging and spatial memory: from neuroplasticity to population dynamics. Workshop on Brain Aging, Italian Association for Research in Brain Aging. Venice, Italy, March 2001. (Invited)
- Barnes, C.A. Aging and spatial memory: from neuroplasticity to population dynamics. Center for Neuroscience Seminar Series, University of Tennessee, Memphis, Tennessee, March 2001. (Invited).
- Barnes, C.A. Brain and behavioral aging in the rat: Molecules, maps and memory. Columbia University Seminar Series. New York, NY, June 2001. (Invited)
- Barnes, C.A. Aging and the hippocampus: from neural plasticity to ensemble dynamics. Organizing the Brain: Genes, Neurons and Circuits. Ascona, Switzerland, September 2001. (Invited)
- Barnes, C.A. Aging and the hippocampus: neural plasticity, ensemble dynamics and gene transcription. Brain Aging 2001: A challenge for the aging brain in a new millennium (symposium in Japan's Neuroscience Society meeting). Kyoto, Japan, September 2001. (Invited)
- Barnes, C.A. Aging and the hippocampus: from neural plasticity and network dynamics to spatial cognition. University of Minnesota, Minneapolis, MN, October, 2001. (Invited)
- Vazdarjanova, A.L., McNaughton, B.L., Barnes, C.A., Worley, P.F. and Guzowski, J.F. Neural activity mapping with temporal and cellular resolution using double fluorescence *in situ* hybridization to the immediate-early genes *Arc* and *HOMER 1A*. Seventh Conference on the Neurobiology of Learning and Memory, Irvine, California, November 2001. (Abstract)
- Erickson, C.A., Permenter, M., Rapp, P., Roberts, J.A. and Barnes, C. A. Aged monkeys show diminished preference to novelty in the visual paired comparison task. Seventh Conference on the Neurobiology of Learning and Memory, Irvine, California, November, 2001. (Abstract)
- Guzowski, J.F., Houston, F.P., Worley, P.F. and Barnes, C.A. Arc gene expression in hippocampal CA1 neurons is controlled both by NMDA-dependent and NMDA-independent mechanisms. Seventh Conference on the Neurobiology of Learning and Memory, Irvine, California, November, 2001. (Abstract)
- Vazdarjanova, A.L., McNaughton, B.L., Barnes, C.A., Worley, P.F. and Guzowski, J.F. Neural activity mapping with temporal and cellular resolution using double fluorescence *in situ* hybridization to the immediate-early genes *Arc* and *HOMER 1A*. Society for Neuroscience Meeting, San Diego, California, November 2001. (Abstract)
- Guzowski, J.F., Houston, F.P., Worley, P.F., and Barnes, C.A. Experience-dependent ARC gene transcription in hippocampal CA1 neurons is controlled both by NMDA-dependent and NMDA-independent mechanisms. Thirty-first Annual Meeting of the Society for Neuroscience, San Diego, California, November 2001. (Abstract)
- Houston, F.P., Lipa, P., Guzowski, J.F., Worley, P.F., McNaughton, B.L., and Barnes, C.A. Massed versus spaced exposure to an environment dissociates place-specific hippocampal cell firing and experience-

- induced *Arc* transcription. Thirty-first Annual Meeting of the Society for Neuroscience, San Diego, California, November 2001. (Abstract)
- Erickson, C.A., Chawla, M.K., Poremba, A., Worley, P.F., Guzowski, J.F., and Barnes C.A. The effects of auditory experience on neural activity revealed by expression of the immediate-early gene *Arc*. Thirty-first Annual Meeting of the Society for Neuroscience, San Diego, California, November 2001. (Abstract)
- Chawla, M.K., Guzowski, J.F., Worley, P.F., and Barnes, C.A. Altered behavior-induced *Arc* gene expression in hippocampus of aged rats. Thirty-first Annual Meeting of the Society for Neuroscience, San Diego, California, November 2001. (Abstract)
- Yang, Z., Krause, M., Rao, G., Houston, F.P., White, R., McNaughton, B.L. and Barnes C.A. Age-related change in ratio of AMPA<sub>R</sub>- to NMDA<sub>R</sub>-mediated synaptic transmission in FD is not modified by experience. Thirty-first Annual Meeting of the Society for Neuroscience, San Diego, California, November 2001. (Abstract)
- Gerrard, J.L., Bower, M.R., Insel, N., Lipa, P., Barnes, C.A. and McNaughton, B.L. A long day's journey into night. Thirty-first Annual Meeting of the Society for Neuroscience, San Diego, California, November 2001. (Abstract)
- Dees, J.A., Terrazas, A., Bohne, K.M., Krause, M., McNaughton, B.L. and Barnes, C.A. Presence of hippocampal theta during navigation without actual movement. Thirty-first Annual Meeting of the Society for Neuroscience, San Diego, California, November 2001. (Abstract)
- Terrazas, A., Krause, M., Bohne, K.M., Poneta, K.M., Dees, J.A., McNaughton, B.L. and Barnes, C.A. The contributions of vestibular and optic flow information to location specific firing of rat hippocampal pyramidal cells. Thirty-first Annual Meeting of the Society for Neuroscience, San Diego, California, November 2001. (Abstract)
- Pennartz, C.M.A., Geurtsen, A.M.S., Lipa, P. Barnes, C.A., and McNaughton, B.L. Reactivation of neuronal ensembles in the nucleus accumbens during sleep. Thirty-first Annual Meeting of the Society for Neuroscience, San Diego, California, November 2001. (Abstract)
- Barnes, C. A. Getting lost: Synaptic mechanisms and network dynamics in the aged rat hippocampus. Tenth Annual Puerto Rico Neuroscience Conference, San Juan, Puerto Rico, December 2001. (Invited)
- Barnes, C.A., Bickford, P., Votko, M.L., and Woodruff-Pak, D. Aging in rodents, monkeys and humans: Consider the alternative!, Winter Conference on Neural Plasticity, Tahiti, February 2002 (Invited, Abstract)
- Barnes, C.A., Rosenzweig, E.S., Redish, A.D., Chawla, M., and McNaughton, B.L. Hippocampal ensemble dynamics in old rats: what changes? Thirteenth Annual Spring Brain Conference, Sedona, Arizona, March 2002 (Abstract)
- Barnes, C.A. Age-related spatial impairments that occur in rats, monkeys and humans and how changes in hippocampal function may contribute to these deficits. Mold Cognitive Impairment: Concept and Realities Workshop, Divonne-les-Bains, France, April 2002 (Invited)
- Barnes, C.A. Neural correlates of age-related memory decline in rodents and non-human primates. Clinical, Physiological and Molecular Changes in Memory During Late Life Symposium, ADC Director's Meeting, Denver, CO, April 2002 (Invited)
- Barnes, C.A. The aging hippocampus, molecules, maps, and memory in rats and non-human primates. Aging from Molecules to Humans, 31<sup>st</sup> Annual Meeting of the American Aging Association, June 2002 (Invited, Abstract)
- Barnes, C.A. Neurobiological changes in the aged rat hippocampus: implications for age-related deficits in spatial cognition. 26<sup>th</sup> Annual Meeting of the Neurobehavioral Teratology Society, June 2002 (Invited)
- Barnes, C.A. Animal models of cognitive aging. Summer Institute in Cognitive Neuroscience, Hanover, NH July 2002 (Invited)
- Barnes, C.A. Hippocampal aging. Sixth International Symposium on the Neurobiology and Neuroendocrinology of Aging, July 2002 (Invited)

- Barnes, C.A. Aging and the hippocampus: neural plasticity, ensemble dynamics and gene expression. Neurobiology of Aging and Alcohol Symposium, Bethesda, MD, September 2002 (Invited, Abstract)
- Barnes, C.A. Aging and the hippocampus: from neural plasticity to ensemble dynamics. Workshop on Biology of Memory, Trondheim, Norway, October 2002 (Invited)
- Vazdarjanova, A., Houston, F.P., Worley, P.F., Barnes, C.A. and Guzowski, J.F. Similar activity-dependent immediate-early gene transcriptional responses in hippocampal pyramidal neurons and dentate gyrus granule cells. Thirty-second Annual Meeting of the Society for Neuroscience, Orlando, Florida, November 2002. (Abstract)
- Chawla, M.K., Vazdarjanova, A., Guzowski, J.F., McNaughton, B.L., Worley, P.F. and Barnes, C.A. Increased experience-dependent expression of the immediate-early gene *Arc* from granule cells to CA1 pyramidal cells in rat hippocampus parallels regional variation in coding sparsity. Thirty-second Annual Meeting of the Society for Neuroscience, Orlando, Florida, November 2002. (Abstract)
- Penner, M.R., Chawla, M.K., Lanahan, A., Worley, P.F., and Barnes, C.A. Differences in co-ordinate expression of immediate-early genes following behavioral stimuli or seizure. Thirty-second Annual Meeting of the Society for Neuroscience, Orlando, Florida, November 2002. (Abstract)
- Erickson, C.A., Permenter, M.R., Rapp, P., Roberts, J.A., Small, S.A., and Barnes, C.A. Medial temporal lobe-dependent cognitive impairments in aged monkeys: Functional neurobiological correlates. Thirty-second Annual Meeting of the Society for Neuroscience, Orlando, Florida, November 2002. (Abstract)
- Rosenzweig, E.S., Redish, A.D., McNaughton, B.L., and Barnes, C.A. Age-related changes in hippocampal map realignment. Thirty-second Annual Meeting of the Society for Neuroscience, Orlando, Florida, November 2002. (Abstract)
- Gerrard, J.L, Kudrimoti, H.S., Cowen, S.L., Redish, A.D., Rosenzweig, E.S., Barnes, C.A., and McNaughton, B.L. Dissociation of pattern and sequence reactivation efficiency in the aged rat hippocampus. Thirty-second Annual Meeting of the Society for Neuroscience, Orlando, Florida, November 2002. (Abstract)
- Karten, Y.J., Cowen, S.L., Lindstedt, E.R., Kudrimoti, H.S., Gerrard, J.L., McNaughton, B.L. and Barnes, C.A. Reactivation of activity of neural ensembles during sleep in the rat hippocampus is not affected by positive or negative events during waking. Thirty-second Annual Meeting of the Society for Neuroscience, Orlando, Florida, November 2002. (Abstract)
- Terrazas, A., Poneta, K., Bohne, K., Dees, J., Krause, M., McNaughton, B.L. and Barnes, C.A. Vection without vestibular activation disrupts place specific firing of rat ca1 pyramidal cells. Thirty-second Annual Meeting of the Society for Neuroscience, Orlando, Florida, November 2002. (Abstract)
- Yamaguchi, Y., Fuji, J, McNaughton, B.L., Barnes, C.A. and Lipa, P. Coupling between theta phase precession and experience dependent place field plasticity in rat hippocampal pyramidal cells. Thirty-second Annual Meeting of the Society for Neuroscience, Orlando, Florida, November 2002. (Abstract)
- Meyer, R., Houston, F., Yang, Z., Dees J. and Barnes, C.A. The effects of ampakines on the components of learning and memory in the hippocampus and aged rats. Fourteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2003. (Abstract)
- Barnes, C.A. Getting lost: Aging-related neurobiological changes in the hippocampal spatial memory system. Colloquium Speaker, Institute of Gerontology, Detroit, MI, February 2003. (Invited)
- Barnes, C.A. Aging and the hippocampus: From neural plasticity to ensemble dynamics. Keynote Speaker, Canadian Spring Conference on Behaviour and Brain, Fernie, British Columbia, February 2003. (Invited)
- Barnes, C.A. Aging and spatial memory: from neural plasticity to network dynamics. 3<sup>rd</sup> Picower-Riken Neuroscience Symposium, Massachusetts Institute of Technology, Cambridge, MI, March 2003. (Invited)
- Barnes, C.A. Aging and the hippocampus: From neural plasticity and network dynamics to spatial cognition. Cellular and Molecular Basis of Disease Seminar Series, University of New Mexico, Albuquerque, NM, April, 2003. (Invited)

- Barnes, C.A. Memory and the aging brain. Rotary Club, Green Valley, AZ, April 2003. (Invited)
- Barnes, C.A. Aging and spatial memory: from neuroplasticity to population dynamics. Fifth Annual Systems and Integrative Biology/Vision Retreat, Institute of Neurological Sciences, University of Pennsylvania, Philadelphia, PA, May 2003. (Invited)
- Barnes, C.A. Long-term potentiation and the aging brain. Long-term potential: enhancing neuroscience for 30 years, London, UK, May 2003. (Invited)
- Barnes, C.A. Age-related changes in neural plasticity: impact on hippocampal ensemble dynamics and memory. Gordon Research Conference on Neural Plasticity, Salve Regina University, Newport, RI, June 2003. (Invited)
- Skaggs, W.E., Permenter, M.J., Archibeque, M.J., Haworth, M.L. and Barnes, C.A. Synchronization of medial temporal lobe neurons to the alpha rhythm in awake, behaving rhesus monkeys. Sixth IBRO World Congress on Neuroscience, Prague, Czech Republic, July 2003. (Abstract)
- Barnes, C.A. Aging Brain and Plasticity. International Geriatric Epilepsy Symposium, Coral Gables, FL, September 2003. (Invited)
- Barnes, C.A., Skaggs, W.E., McNaughton, B.L., Haworth, M.L., Permenter, M., Archibeque, M. and Erickson, C.A. Chronic recording of neuronal populations in the temporal lobe of awake young adult and geriatric primates. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Burke, S.N., Chawla, M.K., Penner, M.R., McNaughton, B.L. and Barnes, C.A. Distribution of activity-induced *Arc* RNA confirms place and movement encoding distinction between hippocampus and posterior parietal cortex. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Chawla, M.K., Barnes, C.A., Rapp, P.R., Pierce, A.L. and Small, S.A. Aging selectively targets the dentate gyrus in rats, monkeys and humans. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Moser, E.I., Moser, M., Houston, F.P., Newton, M., Lipa, P., Meltzer, J., Barnes, C.A. and McNaughton, B.L. A test of the reverberatory short-term memory hypothesis for hippocampal 'place' cells. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Olson, K., Lin, G., Chawla, M.K., Vazdarjanova, A., Burke, S.N., McNaughton, B.L., Worley, P.F., Guzowski, J.F., Roysam, B. and Barnes, C.A. CatFISH functional brain imaging: Validation of an automated software tool for mapping functional neural networks and circuits. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Pennartz, C.M.A., Lee, E., Verheul, J., Lipa, P., Barnes, C.A. and McNaughton, B.L. Modulation of ensemble firing patterns in rat ventral striatum in close association with hippocampal ripples/sharp waves. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Penner, M.R., Chawla, M.K., Burke, S.N., Houston, F.P., Dees, J.A., Bohne, K.M., Meyer, R., Worley, P.F. and Barnes, C.A. *Arc* gene expression is more robustly increased in the CA fields of aged rats versus adult rats following environmental exploration. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Plummer, T.K., Barnes, C.A. and Vazdarjanova, A. Mapping electrophysiology to gene expression in individual cells. Society for Neuroscience Meeting, New Orleans, LA, November 2003. (Abstract)
- Poneta, K., Terrazas, A., Lipa, P., Barnes, C.A. and McNaughton, B.L. Effects of ambulation on the scale of the hippocampal representation of space: Taking a long walk off a short pier. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Ramirez-Amaya, V., Vazdarjanova, A., Houston, F.P., Olson, K., Worley, P.F. and Barnes, C.A. Time course of *Arc* protein expression in the hippocampus after spatial exploration. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)

- Rosi, S., Ramirez-Amaya, V., Barnes, C.A., Hauss-Wegrzyniak, B., Worley, P.F and Wenk, G.L. Altered *Arc* immediate early gene protein expression during chronic brain inflammation in the hippocampus. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Skaggs, W.E., McNaughton, B.L., Haworth, M.L., Permenter, M., Archibeque, M. and Barnes, C.A. Sharp waves and ripple events in the primate temporal lobe. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Sutherland, V.L., Chawla, M.K., McNaughton, B.L., Worley, P.F. and Barnes, C.A. Reduced experience-dependent expression of the immediate-early gene (*IEG*) *Arc* in ventral compared with dorsal hippocampal granule cells. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Terrazas, A., Poneta, K., McNaughton, B.L. and Barnes, C.A. Differential effects of ambulation on the first and second harmonics of the hippocampal theta rhythm. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Twining, J.L., Buonocore, M.H., Roberts, J.A., Amaral, D.G., Rapp, P.R. and Barnes, C.A. Hippocampal volume is preserved and fails to predict cognitive decline in aged rhesus monkeys. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Vazdarjanova, A., Ramirez-Amaya, V., Chawla, M.K., Sutherland, V.L., Worley, P.F., Barnes, C.A. and Guzowski, J.F. Behavior induces expression of the plasticity-related immediate-early gene *Arc* in excitatory hippocampal and cortical neurons, but not in astrocytes or inhibitory neurons. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Yang, Z., Houston, F.P. and Barnes, C.A. Effects of AMPAkinases on spatial learning and memory in aged rats. Thirty-third Annual Meeting of the Society for Neuroscience, New Orleans, LA, November 2003. (Abstract)
- Milliken, H., Sutherland, G.R., Barnes, C.A. and McNaughton, B.L. Involvement of the amygdala in memory consolidation of a place-dependent eyeblink conditioning task. Fifteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2004. (Abstract)
- Schaner, M., Chawla, M.K. and Barnes, C.A. Behavioral expression of delayed early response genes in the rat hippocampus. Fifteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2004. (Abstract)
- Mikhael, D., Ramirez-Amaya, V., Vazdarjanova, A., Worley, P.F. and Barnes, C.A. *Arc* protein expression after spatial exploration. Fifteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2004. (Abstract)
- Barnes, C.A. Aging and spatial memory: from neural plasticity to network dynamics. Neuroscience Seminar, Yale University, February 2004. (Invited)
- Barnes, C.A. Neurobiological changes in the aged rat hippocampus: Implications for Age Related Deficits in Spatial Cognition. The Biology of Learning and Memory Symposium, University of Texas at San Antonio, TX, March 2004. (Invited)
- Barnes, C.A. Functional relationships between physiology and behavior: Insights into the biological basis of individual differences in cognition. Science of Learning Symposium: Neural Systems from Cellular Resolution to Human Cognition, University of New Mexico, Albuquerque, NM, March 2004. (Invited)
- Barnes, C.A. Sequence reactivation efficiency is correlated with spatial memory performance. Spring Hippocampal Research Conference. Grand Cayman, BWI, May 2004. (Invited)
- Barnes, C.A. Hippocampal function: plasticity, network dynamics and cognition. Center for Behavioral Neuroscience, Atlanta, GA, May 2004. (Invited)
- Barnes, C.A. Getting lost: hippocampal contributions to age related memory dysfunction. 4<sup>th</sup> Forum of European Neuroscience Symposium on the Ageing Brain, Lisbon, Portugal, July 2004. (Invited)
- Barnes, C.A. Aging and the hippocampus: good and bad news. Department of Psychology Cognitive Sciences Brown Bag Seminar, September 2004. (Invited)

- Barnes, C.A. Aging without dementia in animal models: monkeys and rodents. Assessing Cognition for Emerging Therapeutics in Alzheimer's Disease, Baltimore, MD, September 2004. (Invited)
- Kent, K.A., Pierce, A., Houston, F.P., Leung, C., Kim, T., Honig, L., Vonsattel, J., Barnes, C.A. and Small, S.A. Combining functional imaging with microarray: The transcriptional-silencer RbAp48 is implicated in cognitive aging. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Guzowski, J.F., Miyashita, T., Maes, L., Barnes, C.A., Worley, P.F. and Sanderson, J. High degree of coincident transcriptional activation of the immediate-early genes Arc and Zif268 in hippocampal and neocortical neurons following exploratory behavior. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Miyashita, T., Maes, L., McNaughton, B.L., Worley, P.F., Barnes, C.A. and Guzowski, J.F. Recent behavioral history modifies coupling between neuronal activity and immediate-early gene transcription in hippocampal and neocortical neurons. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Olson, K.M., Lin, G., Chawla, M.K., Vazdarjanova, A., Burke, S.N., Sutherland, V.L., McNaughton, B.L., Worley, P.F., Guzowski, J.F., Barnes, C.A. and Roysam, B. Accurate FISH quantification using automated methods for three-dimensional compartment analysis of temporal gene transcription activity. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Sutherland, V.L., Timlin, J.A., Sinclair, M.B., Chawla, M.K., McNaughton, B.L., Worley, P.F., Roysam, B., Guzowski, J.F. and Barnes, C.A. Hyperspectral slide scanning: Potential for rapid whole brain gene imaging. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Insel, N., Houston, F.P., Vazdarjanova, A., Bower, M.R., Chawla, M.K., McNaughton, B.L. and Barnes, C.A. Imaging the schema: Characteristics of overlap between IEG-expressing neural populations in similar but cognitively distinct navigation tasks. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Burke, S.N., Chawla, M.K., Penner, M.R., Schaner, M.J., Worley, P.F., McNaughton, B.L. and Barnes, C.A. (2004) Differential distribution of activity-induced Arc RNA in deep and superficial lamina of the posterior parietal cortex. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Ramirez-Amaya, V., Vazdarjanova, A., Mikhael, D.M., Worley, P.F. and Barnes, C.A. Molecular reactivation of Arc protein after spatial exploration. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Vazdarjanova, A., Ramirez-Amaya, V., Insel, N., Worley, P.F., Guzowski, J.F. and Barnes, C.A. Behavior induces expression of the plasticity-related immediate-early gene Arc in excitatory and inhibitory CAMKII-positive neurons. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Rosi, S., Vazdarjanova, A., Ramirez-Amaya, V., Worley, P.F., Barnes, C.A. and Wenk, G.L. Neuroinflammation disrupts Arc immediate early gene expression in the DG. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Penner, M.R., Chawla, M.K., Burke, S.N., Milliken, H.L., Schaner, M.J., Xiao, B., Worley, P.F. and Barnes, C.A. Levels of IEGs responsible for receptor trafficking are unchanged in the aged hippocampus. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Chawla, M.K., Penner, M.R., Sutherland, V.L., Olson, K., Worley, P.F. and Barnes, C.A. Spatial-behavior induced cFos mRNA levels in the hippocampus of young and memory impaired old rats. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Houston, F.P., Yang, Z., Krause, M., McNaughton, B.L. and Barnes, C.A. Effects of extracellular cesium on evoked field potentials in the aged rat dentate gyrus. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)

- Skaggs, W.E., McNaughton, B.L., Permenter, M., Vogt, J., Archibeque, M. and Barnes, C.A. Hippocampal unit activity in a visual short-term memory task in rhesus macaques. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Stanis, J.J., Dees, J.A., Gerrard, J.L., Lipa, P., VanRhoads, S.R., McNaughton, B.L. and Barnes, C.A. Reactivation of hippocampal neural ensemble patterns is NMDA receptor-dependent. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Leutgeb, J.K., Leutgeb, S., Treves, A., Fyhn, M., Meyer, R., Barnes, C.A., McNaughton, B.L., Moser, M.-B. and Moser, E.I. Pattern completion and pattern separation in CA3 during morphing of two environments. Thirty-fourth Annual Meeting of the Society for Neuroscience, San Diego, CA, October 2004. (Abstract)
- Barnes, C.A. Memory and the aging brain, 2004 Pickering Lecture, Carleton University, Ottawa, Ontario, Canada, December 2004. (Invited)
- Barnes, C.A., Memory and the Aging Brain, Center for Biology and Memory, Trondheim, Norway, December 2004. (Invited)
- Barnes, C.A. Electrophysiological effects of memantine in rats. Twenty-ninth Annual Winter Conference on the Neurobiology of Learning and Memory, Park City, Utah, January 2005. (Invited)
- Crowell, B., Burke, S.N., Chawla, M.K., Penner, M.R., Worley, P.F., McNaughton, B.L., and Barnes, C.A. Differential encoding of movement and spatial context in superficial and deep layers of the posterior parietal cortex. Sixteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2005. (Abstract)
- Milliken, H., Penner, M.R., Chawla, M.K., Ramirez-Amaya, V., Burke, S.N., Worley, P.F., and Barnes, C.A. Arc expression in the hippocampus of adult vs. aged rats. Sixteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2005. (Abstract)
- Mikhael, D., Ramirez-Amaya, V., Vazdarjanova, A., Worley, P.F., and Barnes, C.A. Reactivation of Arc protein following behavioral exploration. Sixteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2005. (Abstract)
- Schaner, M., Chawla, M.K., Ito, R., Barnes, C.A., Everitt, B.J., and Robbins, T.W. Learning in the rat: Interactions between the hippocampus, amygdala, and nucleus accumbens. Sixteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2005. (Abstract)
- Sy, A., Rosi, S., Ramirez-Amaya, V., Vazdarjanova, A., Worley, P.F., Barnes, C.A., and Wenk, G.L. Neuroinflammation alters the hippocampal pattern of behaviorally-induced Arc expression. Sixteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2005. (Abstract)
- Barnes, C.A. Memory storage in the aged brain. Cortical Memory Storage Symposium, UCLA, Los Angeles, CA, January 2005. (Invited)
- Barnes, C.A. Memory and the Aging Brain. Society for Neuroscience Staff Lecture, Washington, DC, February 2005. (Invited)
- Barnes, C.A. Deficits in sequence reactivation in CA1 of old rats and/or sharp waves and memory trace reactivation in primate hippocampus. Winter Conference on Neural Plasticity, Guadeloupe, French Antilles, February 2005. (Invited)
- Barnes, C.A. Hippocampal contributions to cognitive deficits in mammals. University of Illinois at Urbana-Champaign Neuroscience Seminar, Urbana, IL, March 2005. (Invited)
- Barnes, C.A. Models of normal age-related memory changes: what are the primary neurobiological causes? Center for Neurobiology of Learning and Memory Colloquial Series, University of California at Irvine, Irvine, CA, March 2005. (Invited)
- Barnes, C.A. Getting lost: hippocampal contributions to age-related memory dysfunction. IBRO Regional Meeting, Cape Town, South Africa, April 2005. (Invited)
- Barnes, C.A. Linear and non-linear ensemble dynamics in CA3. Centre for the Biology of Memory Advisory Board Meeting, Trondheim, Norway, June 2005. (Invited)

- Barnes, C.A. Neurobiological correlates of memory deficits in normal aging. FENS 2005 Summer School: Neuro-glia Interaction in Aging and Disease, Ofir, Portugal, July 2005. (Invited)
- Quazi, A.Z., Janstad, M., Haglerod, C., Saddique, N., Ottersen, O.P. Davanger, S., Haug, F.M.S., Barnes, C.A., McNaughton, B.L. Storm-Mathisen, J. and Chaudhry, F.A. Glutamine shuttling by the system N and system A transporters is important for the regeneration of the neurotransmitter glutamate during high frequency firing. FASEB Summer Research Conference, Perspectives in Transport Biology, Saxtons River, VT, July 2005. (Abstract)
- Barnes, C.A. Neurobiological changes in the aged hippocampus: Implications for age-related deficits in spatial cognition. Syracuse Neuroscience Organization Distinguished Lecture Series, Syracuse University, Syracuse, NY, September 2005. (Invited)
- Barnes, C.A. Aging and the hippocampus: the good and bad news. Loucks Lecture Series in the Neurophysiological Basis of Learning and Memory, Department of Psychology, University of Washington, Seattle, WA, October 2005. (Invited)
- Barnes, C.A. Hippocampal network dynamics during aging: What is the impact on spatial cognition? Behavioral Neuroscience Group Lecture, Department of Psychology, University of Washington, Seattle, WA, October 2005. (Invited)
- Jenstad, M., Quazi, A.Z., Barnes, C.A., McNaughton, B.L., Storm-Mathisen, J., Chaudhry, F.A., Increased de novo synthesis of glutamate from glutamine upon high frequency stimulation of SAT2 expressing neurons. New Perspectives in Neurotransmitter Transporter Biology, Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington, DC, November 2005. (Abstract)
- Alexander, G.E, Chen, K., Santerre-Lemmon, L.E., Aschenbrenner, M., Rapp, P.R., Buonocore, M.H. and Barnes, C.A. Age-related regional network pattern of MRI gray matter in the rhesus macaque. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Ramirez-Amaya, V., Letts, P.A., Gage, F.H., Worley, P.F. and Barnes, C.A. New born granule cells show behaviorally-induced Arc expression: Evidence for integration into hippocampal networks. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Vazdarjanova, A., Rosi, S., Insel, N., Ramirez-Amaya, V., Olson, K., Guzowski, J.F., Worley, P.F. and Barnes, C.A. Differential Arc expression in the lateral versus basal amygdala nuclei following electroconvulsive seizure, but not spatial exploration. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Insel, N., Vazdarjanova, A., Ramirez-Amaya, V., Burke, S.N., Rosi, S., Chawla, M.K., McNaughton, B.L. and Barnes, C.A. Arc is expressed in both direct and indirect striatal projection neurons across different behaviors. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Lin, G., Olson, K., Chawla, M.K., Burke, S.N., Sutherland, V.L, McNaughton, B.L., Worley, P.F., Guzowski, J.F., Roysam, B. and Barnes, C.A. Advances in 3-D nuclear segmentation and catfish analysis. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Chawla, M.K., Ramirez-Amaya, V., Rosi, S., Worley, P.F. and Barnes, C.A. Spatial experience induced sustained transcription of IEG Arc in the rat fascia dentata. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Marrone, D.F., Chawla, M.K., Penner, M.R., Schaner, M.J., Lanahan, A., Worley, P.F., and Barnes, C.A. Behaviorally induced expression of neuropeptide Y and Arc in young and aged rodents. Society for Neuroscience Meeting, Washington DC, November 2005. (Abstract)
- Penner, M.R., Milliken, H.L., Chawla, M.K., Nemotollahi, S., Worley, P.F. and Barnes, C.A. Arc gene expression in the entorhinal cortex and CA3 field of aged rats versus adult rats following environmental exploration. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Rosi, S., Vazdarjanova, A., Ramirez-Amaya, V., Marchalant, Y., Worley, P.F., Barnes, C.A. and Wenk, G.L. The consequences of neuroinflammation upon hippocampal immediate early gene expression can be

- reversed by the NMDA receptor antagonist memantine. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Burke, S.N., Maurer, A.P., Insel, N., Navratilova, Z., McNaughton, B.L., Wenk, G.L. and Barnes, C.A. Effects of memantine on experience-dependent place field expansion in aged rats. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Maurer, A.P., Cowen, S.L., Burke, S.N., Meltzer, J., Dees, J.A., McNaughton, B.L. and Barnes, C.A. Lack of hysteresis of place fields during radial maze rotations. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Leutgeb, S., Leutgeb, J.K., Colgin, L., Jezek, K., Barnes, C.A., Moser, E.I., McNaughton, B.L., and Moser, M.-B. Independent codes for spatial and episodic memory in hippocampal neuronal ensembles. Thirty-fifth Annual Meeting of the Society for Neuroscience, Washington DC, November 2005. (Abstract)
- Barnes, C.A. Aging and the hippocampus: The good and bad news. The Gladstone Institute of Neurological Disease Seminar Series, University of California, San Francisco, CA, December 2005. (Invited)
- Navratilova, Z., Burke, S.N., Maurer, A.P., McNaughton, B.L. and Barnes, C.A. The effects of memantine on spatial memory impairments associated with aging. Seventeenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2006. (Abstract)
- Schaner, M., Marrone, D., Chawla, M., Penner, M., Worley, P. and Barnes, C.A. Behaviorally induced expression of neuropeptide Y and Arc in young and aged rodents. Seventeenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2006. (Abstract)
- Hendrickson, L., Satyanarayan, A., Barnes, C.A., McNaughton, B.L. and Chawla, M.K. Using immediate early genes to study behavior induced spatial memory in the rat hippocampus and associated brain structures. Seventeenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2006. (Abstract)
- Barnes, C.A. Neurobiological correlates of memory deficits in normal aging. 2006 Neural Control of Behavior Meeting, University of California, Los Angeles, CA, February 2006. (Invited)
- Barnes, C.A. Neurophysiological Contributions to Age-related Memory Decline. Eighth Conference on the Neurobiology of Learning and Memory. University of California, Irvine, CA, March 2006. (Invited)
- Barnes, C.A. Normal aging: What brain changes contribute to memory changes in old age? Research Seminar Series, University of Florida College of Medicine, Gainesville, FL, March 2006. (Invited)
- Barnes, C.A. Aging and the hippocampus: the good and the bad news. University of California at San Diego Neuroscience Graduate Student Seminar Series, San Diego, CA, April 2006. (Invited)
- Barnes, C.A. Age-related memory decline: What does the hippocampus contribute? Psychobiology and Behavioral Neuroscience Graduate Student Seminar Series, Ohio State University, Columbus, OH, April 2006. (Invited)
- Barnes, C.A. Age-related memory decline: what does the hippocampus contribute? Department of Neurobiology Seminar Series, University of Alabama, Birmingham, AL, May 2006. (Invited)
- Barnes, C.A. Hippocampal function in aging: plasticity, network dynamics and cognition. Molecular and Behavioral Neuroscience Institute 50<sup>th</sup> Anniversary Symposium, Ann Arbor, MI, June 2006. (Invited)
- Barnes, C.A. Age-related memory decline: what does the hippocampus contribute? Neuro-Coe Retreat 2006, The University of Tokyo, Hakone, Japan, July 2006. (Invited)
- Burke, S.N., Maurer, A.P., Navratilova, Z., Wenk, G.L., McNaughton, B.L. and Barnes, C.A. Effects of memantine on the ensemble dynamics of the aged rat hippocampus. 5<sup>th</sup> Forum of European Neuroscience, Vienna, Austria, July 2006. (Abstract)
- Maurer, A.P., Cowen, S.N., Burke, S.N., Barnes, C.A., and McNaughton, B.L. Spike timing of CA1 interneurons relative to the theta rhythm in the freely behaving rat. 5<sup>th</sup> Forum of European Neuroscience, Vienna, Austria, July 2006. (Abstract)
- Skaggs W.E., Permenter M.A., Vogt J.A., Archibeque M.J. and Barnes C.A. Transient Hippocampal Activation Related to Task Initiation in Rhesus Macaques. 5<sup>th</sup> Forum of European Neuroscience, Vienna, Austria, July 2006. (Abstract)

- Marrone, D.F., Schaner, M.J., Worley, P.F., McNaughton, B.L., and Barnes, C.A. Reactivation of IEG expression in the rodent hippocampus. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- Maurer, A.P., Cowen, S.L., Burke, S.N., Barnes, C.A. and McNaughton, B.L. Organization of hippocampal cell assemblies based on theta phase precession. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- McNaughton, B.L., Maurer, A.P., Cowen, S.L., Burke, S.N. and Barnes, C.A. Spike timing of CA1 interneurons relative to the theta rhythm in the freely behaving rat. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- Penner, M.R., Milliken, H.L., Chawla, M.K., Worley, P.F. and Barnes, C.A. No evidence for age-associated alterations in *zif268* mRNA expression in CA1 pyramidal neurons. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- Rosi, S., Ramirez, Amaya, V., Esparza, E.E., Vazdarjanova, A., Wenk, G.L, Worley, P.F. and Barnes, C.A. CA1 hippocampal networks remain stable during chronic neuroinflammation. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- Schaner, M.J., Marrone, D.F., Lanahan, A., Worley, P.F. and Barnes, C.A. Hippocampal expression of proenkephalin in the adult and aged rodent. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- Shamy, J.L., Buonocore, M.H., Amaral, D.G., Barnes, C.A. Hof, P.R. and Rapp, P.R. Regional volumetric correlates of spatiotemporal and recognition memory impairment in aged rhesus monkeys. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- Skaggs, W.E., Archibeque, M., Permenter, M., Vogt, J., McNaughton, B.L. and Barnes, C.A. High frequency EEG ripples in primate entorhinal cortex. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- Miyamoto, Y., Burke, S.N. and Barnes, C.A. The effect of aging on object recognition memory. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- Navratilova, Z., Burke, S.N., Maurer, A.P., McNaughton, B.L. and Barnes, C.A. The effects of memantine on the behavior of aged rats in the Morris water maze. 2006 Annual Meeting of the Society for Neuroscience, Atlanta, GA, October 2006. (Abstract)
- Barnes, C.A. Neurobiological correlates of memory deficits in normal aging, Neuroscience Seminar, Medical College of Georgia, Augusta, GA, January 2007. (Invited)
- Nematollahi, S., Burke, S.N., Miyamoto, Y. and Barnes, C.A. The effect of aging on object recognition memory. Eighteenth Annual Undergraduate Biology Research Conference, Tucson, AZ, January 2007. (Abstract)
- Barnes, C.A. Cognitive changes in normal aging: What does the hippocampus contribute? Symposium: The Cognitive Neuroscience and Neuropsychology of Normal Aging and Alzheimer's Disease. Thirty-fifth Annual Meeting International Neuropsychological Society, February 2007. (Invited Symposium)
- Barnes, C.A. How Arc is selectively changed in different hippocampal subregions during aging. Winter Conference on Neural Plasticity, Moorea, Tahiti, February 2007. (Invited)
- Barnes, C.A. Age related changes in neural plasticity, network dynamics and cognition, Neurology Grand Rounds, University of Arizona, March 2007. (Invited)
- Barnes, C.A. Memory and the aging brain: Alterations in plasticity mechanisms and emergent network Properties, Institute for Neurobiology at the National Autonomous University of Mexico, Queretaro City, Mexico, March 2007. (Invited)
- Barnes, C.A. The aging hippocampus: molecules, maps and memory, Spring 2007 Neurobiology of Aging Symposium, Department of Pharmacology and Neuroscience, University of North Texas Health Science, Fort Worth, Texas, March 2007. (Invited)

- Barnes, C.A. Hippocampal function in aging: plasticity, circuit dynamics and memory, Department of Psychology, Neuroscience and Behavior, McMaster University, Hamilton, Ontario, Canada, May 2007. (Invited)
- Barnes, C.A. Memory changes in normal aging: Neural correlates in rats and monkeys, Department of Neurological Sciences, Rush University, Chicago, IL, May 2007. (Invited)
- Barnes, C.A. Memory deficits in normal aging: Neurobiological correlates, Mechanisms of Aging and Dementia Training Grant Day, Northwestern University, Chicago, IL, May 2007. (Invited)
- Barnes, C.A. Normal aging and memory: A cross-species consensus on brain and behavioral changes, Neurobiology of the Aging Brain: Satellite Meeting of the International Brain Research Organization Meeting, Hobart, Tasmania, July 2007. (Invited)
- Barnes, C.A. Animal models of normal aging: Neurobiological correlates of memory decline, Memory Disorders Research Society Meeting, Cambridge, UK, September 2007. (Invited)
- Barnes, C.A. Neurobiological changes during normal aging: Impact on cognition. F.E. Bennett Lectureship, American Neurological Association Annual Meeting, Washington, DC, October 2007. (Invited)
- Barnes, C.A. Normal cognitive aging: Selective vulnerability, compensation, plasticity. Cognitive Aging Summit, Washington, DC, October 2007 (Invited)
- Barnes, C.A. Neurobiological changes in the aged hippocampus: implications for age-related deficits in spatial cognition. 5<sup>th</sup> International Symposium on Brain Functional Genomics, Shanghai Institute of Brain Functional Genomics, East China Normal University, Shanghai, October 2007. (Invited)
- Thome, A., Skaggs, W.E., Herrera-Valdez, M.A., McNaughton, B.L. and Barnes, C.A. Effects of performance accuracy on intra-cycle  $\alpha$ - and  $\gamma$ -band cross frequency coupling between temporal lobe sites of behaving monkeys. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Skaggs, W.E., Permenter, M., Vogt, J.A., Archibeque, M., McNaughton, B.L. and Barnes, C.A. Ensemble recording of novelty effects on unit activity in the rhesus macaque temporal lobe. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Maurer, A.P., Burke, S.N., Cowen, S.L., Lipa, P. Barnes, C.A. and McNaughton, B.L. Variation in hippocampal theta shoulders along the longitudinal axis of the hippocampal CA1 subregion. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Burke, S., Maurer, A.P., Navratilova, Z., McNaughton, B.L. and Barnes, C.A. Young and old rats show a full cycle of theta phase precession during the first pass through a place field in a familiar environment. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Penner, M.R., Milliken, H.L., Chawla, M.K., Worley, P.F. and Barnes, C.A. Basal levels of several immediate-early genes are lower in the aged rat hippocampus versus the adult rat hippocampus. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Buzzetti, R., Marrone, D.F., Schaner, M.J., Chawla, M.K., Bohanick, J.D., Khoboko, T., Seymour, A.W., Leutgeb, J.K., Leutgeb, S., Moser, E.I., Moser, M.-B., McNaughton, B.L. and Barnes, C.A. Do dentate gyrus granule cells tag time-specific experiences? 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Schaner, M.J., Marrone, D.F., Worley, P.F. and Barnes, C.A. The long-term environmentally selective expression of Arc in the rodent dentate gyrus is attenuated in aged rats. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Marrone, D.F., Schaner, M.J., Worley, P.F. and Barnes, C.A. Attenuated IEG reactivation in aged animals correlates with memory deficits. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Sandoval, C.J., Marrone, D.F., Schaner, M.J., Ramirez-Amaya, V. and Barnes, C.A. Decrease long-term survival of new neurons in the aging hippocampus. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)

- Chawla, M.K., Angulo-Perkins, A.A., Rosi, S., Worley, P.F., Barnes, C.A. and Ramirez-Amaya, V. Spatial experience induces a long-term sustained activity of the IEG Arc in the rat fascia dentata. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Rosi, S., Ramirez-Amaya, V., Esperanza, E., Wenk, G.L. and Barnes, C.A. Stability of hippocampal networks is influenced by the presence or absence of activated microglial cells. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Milliken, H.L., Rosi, S., Wenk, G.L., and Barnes, C.A. Behaviorally-induced immediate early gene Arc expression in the entorhinal cortex of the rat: deep versus superficial layers. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- McNaughton, B.L., Navratilova, Z., Burke, S.N. and Barnes, C.A. Delayed onset of post-natal expression of plasticity related immediate early gene Arc in medial entorhinal cortex grid cell network. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Henriksen, E.J., Leutgeb, S., Barnes, C.A., Witter, W.P., Moser, E.I. and Moser, M.-B. Spatial modulation along the proximodistal axis of the subiculum. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Quazi, A.Z., Jenstad, M., Haglerød, C., Berghuis, P., Saddique, N., Goiny, M., Ottersen, O.-P., Davanger, S., Haug, F.-M.S., Barnes, C., McNaughton, B., Harkany, T., Storm-Mathisen, J. and Chaudhry, F.A. The system A transporter, SAT2/SA1/ATA, is involved in the recycling of neurotransmitter glutamate. 2007 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2007. (Abstract)
- Barnes, C.A. Hippocampal contributions to aging memory, General Biology Seminar Series. California Institute of Technology, Pasadena, CA. December 2007. (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, 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 Program, January 2008. (Abstract)
- Barnes, C.A. The role of neurogenesis in the dentate gyrus to learning and memory. 32<sup>nd</sup> Annual Winter Conference on the Neurology of Learning and Memory, Park City, Utah, January 2008 (Invited)
- 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, 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, 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, CO, 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. Memory, Aging and the Brain, The Arizona Senior Academy, Tucson, Arizona, April 2008. (Invited)
- Barnes, C.A. Ensemble recordings and MRI analyses in behaviorally-characterized young and old rhesus macaques, AGE Pre-Meeting Conference, Boulder, CO, 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, 2<sup>nd</sup> International Genome Dynamics in Neuroscience Meeting, Pacific Grove, CA, June 2008. (Invited)

- Barnes, C.A. Symposium Moderator: Molecular Cellular and Circuit Contributions to Cognitive Decline in Normal Aging, Federation of European Neurosciences Annual Meeting, Geneva, Switzerland, July 2008. (Invited)
- Vega, J.N., Insel, N. and Barnes, C.A. The role of the anterior cingulate in decision conflict in the rat using cellular compartment analysis of temporal activity by fluorescence in situ hybridization (catFISH), 16th Annual California McNair Scholars Symposium, Berkeley, California, August 2008. (Abstract)
- Barnes, C.A. Plasticity in aging, International Conference on 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. The potential for normal functions in the aging brain and its synaptic networks, International Forum on Memory and Memory Disorders and Dedication, Blanchette Rockefeller Neurosciences Institute, Morgantown, WV, October 2008. (Invited)
- Vega, J.N., Insel, N. and Barnes, C.A. The role of the anterior cingulate in decision conflict in the rat using cellular compartment analysis of temporal activity by fluorescence in situ hybridization (catFISH). Annual Biomedical Research Conference for Minority Students, Orlando, Florida, November 2008. (Abstract)
- Huerta, D., Plange, K., Burke, S.N. and Barnes, C.A. Control of response selection by reinforcer value in young and aged bonnet macaques, Annual Biomedical Research Conference for Minority Students. Orlando, Florida, November 2008. (Abstract).
- Vega, J.N., Insel, N. and Barnes, C.A. The role of the anterior cingulate in decision conflict in the rat using cellular compartment analysis of temporal activity by fluorescent in-situ hybridization (catFISH). Southern California Conference for Undergraduate Research 2008. Pomona, California, November 2008. (Abstract)
- Barnes, C.A. Memory and hippocampal networks: The impact of aging. Presidential Special Lecture, 2008 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. Parahippocampal white matter changes in healthy older individuals. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- 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. Cerebral blood volume magnetic resonance imaging reveals localized correlates of age-associated cognitive decline in rhesus monkeys. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Plange, K., Burke, S.N. and Barnes, C.A. Control of response selection by reinforcer value in young and aged bonnet macaques. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Burke, S., Maurer, A.P., Nematollahi, S.N., Uprety, A., Wallace, J.L. and Barnes, C.A. The effect of aging and novelty on the single-unit activity of perirhinal cortical neurons. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- 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. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Nematollahi, S., Burke, S.N., Uprety, A., Wallace, J.L. and Barnes, C.A. The effect of age and context on object recognition. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)

- Insel, N.E., Szweczyk, D., Samson, R.D., Patron, L. and Barnes, C.A. Aged rats show intact learning in a cross-modal switching task. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Schimanski, L.A., Broersma, B.M., Harley, C.W., Fisher, M.G., Bohanick, J.D., Lipa, P., McNaughton, B.L. and Barnes, C.A. A spatial twist on classical eyeblink conditioning. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Buzzetti, R., Penner, M.R., Worley, P.F. and Barnes, C.A. Reduced *Arc* transcription in CA1 pyramidal cells of aged, memory-impaired rats. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Penner, M.R., Hoang, L.T., Roth, T.L., Roth, E.D., Sweatt, J.D and Barnes, C.A. DNA methylation of *Arc* in the hippocampus of memory-impaired aged rats. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Hoang, L.T., Fellous, J.-M. and Barnes, C.A. Expression of the immediate-early gene *Arc* in ventral tegmental neurons during aging. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Tsai, C.L., Lister, J.P., Al-Kofahi, Y., McNaughton, B.L., Roysam, B., and Barnes, C.A. Automatic 3-dimensional joint montage synthesis from arrays of confocal images and neuronal layer identification by associative image analysis. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Lister, J.P., Seymour, E. and Barnes, C.A. 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. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Chawla, M.K., Olson, K., Lister, J.P., Buzzetti, R., McNaughton, B.L. and Barnes, C.A. Sparse behavior-induced expression of the immediate-early gene *Arc* in the rat ventral hippocampus. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Miyashita, T., Marrone, D.F., Bohanick, J.D, Schaner, M.J., McNaughton, B.L., Barnes, C.A. and Guzowski, J.F. Activation of immediate-early gene transcription in hippocampus and neocortex during REM sleep. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Maurer, A.P., Burke, S.N., Barnes, C.A. and McNaughton, B.L. Temporal compression in processing neuronal ensembles increases with running speed. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- 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. 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Alme, C., Leutgeb, J.K., Tashiro, A., Leutgeb, S., Barnes, C.A., Moser, M.-B., Moser, E.I. and McNaughton, B.L. Does the dentate gyrus support temporal tagging of memories? 2008 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2008. (Abstract)
- Broersma, B.M., Schimanski, L.A., Harley, C.W., Lipa, P., and Barnes, C.A. A spatial version of classical eyeblink conditioning in the young and aged rat. Twentieth Annual Undergraduate Biology Research Program, January 2009. (Abstract)
- Egurrola, A., Euston, D.R., Tatsuno, M. and McNaughton, B.L. Prefrontal cortex leads hippocampus during reactivation: Further evidence for an orchestrating role of mPFC in retrieval of consolidated memory. Twentieth Annual Undergraduate Biology Research Program, January 2009. (Abstract)
- Murata, A., Lister, J.P., Seymour, E. and Barnes, C.A. Hippocampal expression of the immediate early gene *Arc* during running on a fixed wheel occurs in equivalent proportions to exploring larger environments. Twentieth Annual Undergraduate Biology Research Program, January 2009. (Abstract)

- Nematollahi, S., Burke, S.N., Maurer, A.P., Uprety, A., Wallace, J.L. and Barnes, C.A. The effect of aging and novelty on the single-unit activity of perirhinal cortical neurons. Twentieth Annual Undergraduate Biology Research Program, January 2009. (Abstract)
- Patron, L.A., Insel, N. and Barnes, C.A. Effects of aging on the retrieval of reward localization strategies. Twentieth Annual Undergraduate Biology Research Program, January 2009. (Abstract)
- Huerta, D., Plange, K., Burke, S.N. and Barnes, C.A. Control of response selection by reinforcer value in young and aged bonnet macaques. Twentieth Annual Undergraduate Biology Research Program, January 2009. (Abstract)
- Uprety, A., Hoang, L.T., Fellous, J.-M., and Barnes, C.A. Expression of the immediate-early gene *Arc* in ventral tegmental neurons during aging. Twentieth Annual Undergraduate Biology Research Program, January 2009. (Abstract)
- Vega, J.N., Insel, N. and Barnes, C.A. The role of the anterior cingulate in decision conflict in the rat using cellular compartment analysis of temporal activity by fluorescence in situ hybridization (catFISH). Twentieth Annual Undergraduate Biology Research Program, January 2009. (Abstract)
- Wagner, Z., Takehara-Nishiuchi, K., Barnes, C.A. and McNaughton, B.L. Quantitative analysis of size of hippocampal damage and its correlations with behavior. Twentieth Annual Undergraduate Biology Research Program, January 2009. (Abstract)
- Barnes, C.A. Age-related changes in object recognition and “object fields” in perirhinal cortical cells, Centre for the Biology of Memory, Norwegian University of Science and Technology, January 2009 (Invited)
- Barnes, C.A. Memory and the aged hippocampal circuit dynamics, Hungarian Neuroscience Meeting, January 2009. (Invited)
- Barnes, C.A. Memory changes in normal aging: Neural correlates in rats and monkeys, 19<sup>th</sup> Annual Rotman Research Institute Conference, Toronto, Ontario, Canada, March 2009. (Invited)
- Barnes, C.A. New and exciting discoveries at the Arizona Evelyn F. McKnight Brain Institute, Evelyn F. McKnight Inter-Institutional Meeting, University of Alabama at Birmingham, April 2009. (Invited)
- Barnes, C.A. Altered hippocampal networks that result in age-related changes in memory, *Frontiers in Medical Research Series*, University of Arizona, May 2009 (Invited)
- Barnes, C.A. Brain and behavioral aging: Molecules, maps and memory, M.R. Bauer Colloquium Series Speaker, Brandeis University, May 2009. (Invited)
- Barnes, C.A. Looking under the street light: Surely the hippocampus isn't the only contributor to age related memory deficits, Brandeis University, May 2009. (Invited)
- Barnes, C.A. Cognitive changes in aging: Neural correlates in rats and monkeys. Keynote Speaker, Ohio Miami Valley Chapter, Society for Neuroscience Meeting, Miami University, Oxford, Ohio, June 2009. (Invited)
- Barnes, C.A. Neural correlates of memory change in normal aging, Biomedical Institute, Bergen, Norway, June 2009. (Invited)
- Barnes, C.A. Effects of aging on memory and temporal lobe cell ensembles, Neural Correlates of Normal Age-Related Memory Decline Symposium, Spring Hippocampal Research Conference, Verona, Italy, June 2009. (Invited)
- Barnes, C.A. Age-related changes in hippocampal circuits: disrupted sequence patterning. RIKEN Brain Science Institute Forum on Hippocampus, RIKEN, Japan, September 2009. (Invited)
- Barnes, C.A. Weakening of replay of temporal patterns may result in memory consolidation failures in older animal. The Awake and Sleeping Brain - Processing of Sequential Information and Memory Consolidation Symposium, 32<sup>nd</sup> Annual Meeting of the Japan Neuroscience Society, Nagoya, Japan, September 2009. (Invited)
- Barnes, C.A. Aging and *Arc* expression in the hippocampus: Unique changes in pyramidal versus granule cells. Eighth Annual Meeting of the International Molecular and Cellular Cognition Society, Chicago, Illinois, October 2009. (Invited)

- Insel, N.E., Patron, L.A., Vega, J.N., Takehara-Nishiuchi, K. and Barnes, C.A. Neuron population activity in the rat anterior cingulate cortex tracks the advancement through a trial during a decision-making task. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Maurer, A.P., Burke, S.N., Lipa, P. and Barnes, C.A. Hippocampal sequence compression increases with increasing velocity. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Glattig, A.F., Schimanski, L.A., Broersma, B.M., and Barnes, C.A. Pre-activation of hippocampal CA1 activity patterns is reduced in old rats. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Schimanski, L.A., Broersma, B.M., Lipa, P. and Barnes, C.A. Hippocampal CA1 place representations stabilize as young and old rats gain experience in a novel environment. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Nematollahi, S., Burke, S.N., Maurer, A.P., Wallace, J.L., Uprety, A. and Barnes, C.A. CA1 pyramidal cell activity characteristics are modulated by 3-dimensional objects. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Burke, S.N., Maurer, A.P., Nematollahi, S., Wallace, J.L., Uprety, A. and Barnes, C.A. Age effects on neuronal activity in the perirhinal cortex. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Uprety, A.R., Hoang, L.T., Lipa, P., Egorola, A.E., Thome, A. and Barnes, C.A. Electrophysiological responses of rostral versus caudal ventral tegmental neurons. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Hoang, L.T., Wann, E.G., Fellous, J.M. and Barnes, C.A. Characterization of behaviorally-induced Arc expression in ventral tegmental neurons during aging. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Lister, J.P., Inglis, A., Anand, K., Cruz, L., Barnes, C.A. and Rosene, D.L. Statistical analysis of microcolumn structure in the rodent neocortex. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Penner, M.R., Roth, T.L., Lubin, F.D., Roth, E.D., Hoang, L.T., Sweatt, J.D. and Barnes, C.A. DNA methylation of zif268 is not dynamically regulated within the aged hippocampus following spatial behavior. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Buzzetti, R., Penner, M.R., Hoang, L.T., Lister, J.P. and Barnes, C.A. Arc transcriptional responses are modulated by degree of context familiarity. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Chawla, M.K., Penner, M.R., Olson, K. and Barnes, C.A. Maximal electro-convulsive shock induced *c-fos* mRNA expression is reduced in the hippocampus of aged rats. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Angulo, A., Chawla, M.K., Rosi, S., Barnes, C.A. and Ramirez-Amaya, V. Effect of actinomycin D on the sustained transcription of Arc in the rat hippocampal granule cells. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Samson, R.D., Lipa, P. and Barnes, C.A. Age differences in performance of appetitive instrumental tasks. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Plange, K., Burke, S.N., Nematollahi, S., Huerta, D., Gazzaley, A. and Barnes, C.A. The effects of distraction and interruption forms of interference on delayed-nonmatching to sample task performance. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)
- Takehara-Nishiuchi, K., Wagner, Z., Insel, N., Chawla, M.K., Olson, K., Burke, S.N., Barnes, C.A. and McNaughton, B.L. Spatial context sensitivity partially explains differences in episodic encoding between deep and superficial neocortical layers. 2009 Annual Meeting of the Society for Neuroscience, Chicago, IL, October 2009. (Abstract)

- Barnes, C.A. Research in Memory and Aging: From Rodents to Primates. University Animal Care Department Seminar, October 2009. (Invited)
- Barnes, C.A. Effects of aging on memory and temporal lobe networks, Department of Psychology Colloquium Series, University of Pennsylvania, Pittsburgh, November 2009. (Invited)
- Barnes, C.A. Normative decline in memory and function in the aging brain, 23<sup>rd</sup> Annual Roland Pinkham Basic Science Conference, Swedish Medical Center, Seattle, WA, November 2009. (Invited)
- Barnes, C.A. Neural correlates of memory decline in aging, 9<sup>th</sup> International SONA Conference, Sharm El Sheikh, Egypt, December 2009 (Invited).
- Bandekar, N., Chawla, M.K., Olson, K. and Barnes, C.A. Maximal electro-convulsive shock induced *c-fos* mRNA expression is reduced in the hippocampus of aged rats, Twenty-First Annual Undergraduate Biology Research Program, January 2010. (Abstract)
- Clasen, S.J., Lister, J.P. and Barnes, C.A. Expression of the immediate-early gene Arc in the entorhinal cortex of behaving rats, Twenty-First Annual Undergraduate Biology Research Program, January 2010. (Abstract)
- Egurrola, A.M., Uprety, A.R., Hoang, L.T., Lipa, P., Thome, A. and Barnes, C.A. Electrophysiological responses of rostral versus caudal ventral tegmental neurons, Twenty-First Annual Undergraduate Biology Research Program, January 2010. (Abstract)
- Murata, A.A., Lister, J.P. and Barnes, C.A. Expression of the immediate-early gene Arc in the hippocampus of wheel-running rats, Twenty-First Annual Undergraduate Biology Research Program, January 2010. (Abstract)
- Wagner, Z., Insel, N. and Barnes, C.A. The spatial distribution of gamma fluctuations within the rat cortex, Twenty-First Annual Undergraduate Biology Research Program, January 2010. (Abstract)
- Barnes, C.A. Memory and the hippocampus, Adler Symposium on Biomarkers, Neural Networks and Plasticity in Health and Dementia, The Salk Institute, February 2010. (Invited)
- Barnes, C.A. Neural correlates of age-related memory deficits in rats and monkeys, Center for Neuroscience Colloquium Series, UC Davis, Sacramento, CA, March 2010. (Invited)
- Barnes, C.A. Memory and the aging brain, NIH Lecture Series, Bethesda, MD, March 2010. (Invited)
- Barnes, C.A. The impact of aging on temporal lobe circuits critical for memory, Francis Crick Symposium on Neuroscience, Suzhou, China, April 2010. (Invited)
- Barnes, C.A. Understanding circuits critical for normal memory function: Impact of aging, New Concepts in Neuroscience Meeting, Bergen, Norway, May 2010. (Invited)
- Barnes, C.A. Inflammation, aging of the immune system and age-related disease, Plenary Session, 39<sup>th</sup> Annual Meeting of the American Aging Association, Portland, Oregon, June 2010. (Invited)
- Barnes, C.A. Cognitive consequences of aging neural networks, First Gordon Conference on the Neurobiology of Cognition, Waterville Valley Resort, NH, August, 2010. (Invited)
- Barnes, C.A. Impact of aging on hippocampal circuits, Neurobiology of Aging Seminar Series, University of California, San Diego, California, September 2010. (Invited)
- Zelikowsky, M., Chawla, M., Barnes, C.A. and Fanselow, M.S. Visualizing contextual fear: differential activation of neuronal and medial prefrontal cortex, The Pavlovian Society Annual Meeting, Baltimore, MD, September 2010. (Abstract)
- Barnes, C.A. Cognitive aging: What do we know? What's next? Plenary Speaker, Cognitive Aging Summit. Washington DC, October 2010. (Invited)
- Stoub, T.R., Shah, R.C., Barnes, C.A. and deToledo-Morrell, L. Age-related changes in cortical thinning. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Plange, K., Burke, S.N., Nematollahi, S., Huerta, D., Lind, K. and Barnes, C.A. Use of Lego objects to create perceptual ambiguity on the object discrimination task: Testing for perceptual changes across the life span of bonnet macaques. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)

- Hartzell, A., Wallace, J.L., Burke, S.N., and Barnes, C.A. The effect of perceptual difficulty and age on spontaneous object recognition. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Schimanski, L.A., Broersma, B.M., Lipa, P. and Barnes, C.A. Hippocampal CA1 firing rates vary with spatial training and place field stability in young and old rats. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Thome, A., Schimanski, L.A., Lipa, P. and Barnes, C.A. Weakening of slow gamma/theta coupling strength in CA1 of senescent rats. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Insel, N., Patron, L., Wagner, Z., Vega, J. and Barnes, C.A. Micro-scale coupling, macro-scale antagonism between excitation and inhibition during a decision-making task. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Maurer, A.P., Burke, S.N., Wallace, J.L. and Barnes, C.A. A characterization of perirhinal cortical interneurons in quiet rest and active exploration. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Burke, S.N., Hartzell, A., Hoang, L.T., Wallace, J.L., Maurer, A.P., Chawla, M.K. and Barnes, C.A. Transcription of the immediate-early gene *Arc* in the perirhinal cortex does not show a response decrement following repeated exposures to novel objects. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Lister, J.P., Clasen, S.J. and Barnes, C.A. Changing objects encountered during track running alters expression patterns of the immediate early gene *Arc* in the lateral entorhinal cortex of the rat. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Inglis, A., Lister, J.P., Anand, K., Richards, C., Cruz, L.R., Barnes, C.A. and Rosene, D.L. Quantification of microcolumn structure in the frontal, parietal, and occipital cortices of the Fischer 344 rat. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November, 2010 (Abstract)
- Penner, M.R., Hoang, L.T., Thome, A., Lister, J.P., Wann, E.G. and Barnes, C.A. Age-related changes in the plasticity of the *Arc* transcriptional response. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Hoang, L.T., Egurrola, A.M., Wann, E.G., Uprety, A.R., Fellous, J.M. and Barnes, C.A. Characterization of *Arc*-expression in GABAergic neurons of the ventral tegmental area during aging. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Chawla, M.K., Bello-Medina, P.C., Sandoval, J., Ramirez-Amaya, V. and Barnes, C.A. Location of *Arc* mRNA expressing granule cells following spatial exploration in the rat dentate gyrus. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Marrone, D.F., Sandoval, J., Schaner, M.J., Ramirez-Amaya, V. and Barnes, C.A. Functional neurogenesis in the senescent fascia dentata. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Henriksen, E.J., Barnes, C.A., Witter, M.P., Moser, M.-B. and Moser, E.I. Spatial representation along the proximo-distal axis of CA1. 2010 Annual Meeting of the Society for Neuroscience, San Diego CA, November 2010. (Abstract)
- Hartzell, A., Burke, S.N., Hoang, L.T., Wallace, J.L., Maurer, A.P., Chawla, M.K. and Barnes, C.A. Transcription of the immediate-early gene *Arc* in the perirhinal cortex does not show a response decrement following repeated exposures to novel objects, Twenty-second Annual Undergraduate Biology Research Program, January 2011. (Abstract)
- Barnes, C.A. What we "thought we knew" about aging, the temporal lobe and beyond. Society for Neuroscience Trondheim Chapter Seminar, Norwegian University of Science and Technology, Trondheim, Norway, January 2011. (Invited)
- Barnes, C.A. Neurobiological mechanisms of memory decline in normal aging. Basic Medical Sciences Seminar Series, College of Medicine Phoenix Campus, Phoenix, AZ, February 2011. (Invited)

- Barnes, C.A. Age-related memory decline and methylation of the Arc gene, Winter Conference on Neural Plasticity 23<sup>rd</sup> Annual Meeting, Moorea, Tahiti, February 2011. (Invited)
- Barnes, C.A. Input to lateral entorhinal cortex from perirhinal cortex: changes with aging, Winter Conference on Neural Plasticity 23<sup>rd</sup> Annual Meeting, Moorea, Tahiti, February 2011. (Invited)
- Barnes, C.A. The neural mechanisms of memory and the aging brain, Osher Lifetime Learning Institute Seminar Series, University of Arizona, February 2011. (Invited)
- Barnes, C.A., What can we learn from animals about successful aging?, Forum on the Aging Brain: How to Age Successfully, Pima Community College Performing Arts Center, Green Valley, AZ, March, 2011. (Invited)
- Barnes, C.A. A Cross-Species Consensus on the Neurobiology of Normal Aging: From Single Unit Activity to Behavioral Output, Symposium Moderator, Spring Brain Conference, Tucson, Arizona, March 2011. (Invited)
- Barnes, C.A. Neural correlates of age-related memory deficits in rats and monkeys. Biology of Aging Workshop Seminar, Oregon Primate National Research Center, Beaverton, OR, March, 2011. (Invited)
- Barnes, C.A. Memory and aging: Myth vs. fact, Adults Night Out, Arizona Science Center, Phoenix, April 2011. (Invited)
- Barnes, C.A. Impact of Aging on Circuits Critical for Memory, Brains and Behavior Distinguished Lecture Series, Brains and Behavior Program, Georgia State University, Atlanta, GA, April 2011. (Invited)
- Barnes, C.A. Effect of aging on object recognition and perirhinal cell ensembles. Symposium: That 'Other' Part of the Temporal Lobe Involved in Perception and Memory, Spring Hippocampal Research Conference, Verona, Italy, May 2011. (Invited)
- Barnes, C.A. Brain changes underlying changes in information processing and memory during late ontogeny (senescence), Healthy Brain 2011 - Aging and Brain Disease Conference, Oslo, Norway, June 2011. (Invited)
- Barnes, C.A. Brain mechanisms of memory: changes during normal aging, Annual Meeting of the Society for Psychophysiological Research, Boston, MA, September 2011. (Invited)
- Barnes, C.A. Cognitive consequences of aging neural circuits, Behavioral Neuroscience Symposium, Gladstone Institute, San Francisco, CA, September 2011. (Invited)
- Barnes, C.A. Brain mechanisms of learning and memory in aging: What is "normal"? Notter Lecture, Department of Neurobiology and Anatomy, University of Rochester, Rochester, NY, October 2011. (Invited)
- Zelikowsky, M., Chawla, M.K., Hast, T., Bennet, R., Barnes, C.A. and Fanselow, M.S. Unique neuronal ensembles in the infralimbic and prelimbic cortices represent fearful environments. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Hartzell, A.L., Burke, S.N., Hoang, L.T., Lister, J.P., Rodriguez, C. and Barnes, C.A. Transcription of the immediate-early gene Arc in the hippocampus reveals activity differences along the transverse axis of the CA1 subregion. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Lister, J.P., Clasen, S.J., Hartzell, A.L., Burke, S.N. and Barnes, C.A. Aging affects the pattern of Arc expression in lateral entorhinal cortex during object exploration. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Allen, A.N., Chawla, M.K., Corneveaux, J.J., Reiman, E.M., Rose, H.E., Barnes, C.A. and Huentelman, M.J. Next generation RNA sequencing identifies novel dendritic mRNA species in the hippocampus. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Maurer, A.P., Hoang, L.T., Burke, S.N., Hindley, T., Marsh, R. and Barnes, C.A. Back to the future: Dissociation of head direction and motion alters CA1 place fields. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Hoang, L.T., Richards, A., Allen, A.N., Biber, L.A., Alexander, G.E., Hale, T.M., Mitchell, K.D., Huentelman, M.J. and Barnes, C.A. Cognitive consequences of the gradual induction of hypertension in middle age

- using Cyp1a1-Ren2 transgenic rats. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Alexander, G.E., Lin, L., Yoshimaru, E., Hoang, L.T., Bergfield, B.L., Lister, J.P., Chen, K., Moeller, J.R., Barnes, C.A. and Trouard, T.P. Regional network pattern of MRI gray matter in the aged rat. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Plange, K., Burke, S.N., Nematollahi, S., Gazzaley, A. and Barnes, C.A. The effects of distraction and interruption forms of interference on recognition memory in young and aged bonnet macaques. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Thome, A., Lipa, P., Erickson, C.A. and Barnes, C.A. Experience-dependent modification of temporal correlations between cortical neurons in awake behaving rhesus macaques. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Schimanski, L.A., Lipa, P. and Barnes, C.A. Direction-dependent context discrimination is deficient in aged rats. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Insel, N. and Barnes, C.A. Uncertainty is associated with changes in the dorsal medial frontal cortex related to movement and the expectation of future movement. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Lester, A.W., Samson, R.D., Lipa, P., Schimanski, L.A. and Barnes, C.A. Ensemble correlates of reward uncertainty in the amygdala. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Samson, R.D., Patel, D.H., Venkatesh, A., Lipa, P. and Barnes, C.A. Altered threshold for contingency degradation in aged F344 rats. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Venkatesh, A., Samson, R.D., Weinstein, A.T., Lipa, P. and Barnes, C.A. Aged F344 rats opt for the safe yet disadvantageous option, in a risk-based decision making task. 2011 Annual Meeting of the Society for Neuroscience, Washington, DC, November 2011. (Abstract)
- Barnes, C.A. Learning and memory in aging: What is "normal", Notable Neuroscientist Lecture Series (Scientific Presentation), West Virginia University, Morgantown, WV, December 2011. (Invited)
- Barnes, C.A. Memory and aging: Myth vs. fact, Notable Neuroscientist Lecture Series, Notable Neuroscientist Lecture Series (General Audience Presentation), West Virginia University, Morgantown, WV, December 2011. (Invited)
- Barnes, CA. Several recent findings and several beginning projects on memory and brain aging, Kavli Institute, Norwegian University of Science and Technology, Trondheim, Norway, January 2012. (Invited)
- Barnes, C.A. Society for Neuroscience as a global force in brain science: What are SfN's actual constituencies? Keynote Speaker, Winter Conference on Brain Research, Snowbird, Utah, January 2012. (Invited)
- Ferng, J.J., Burke, S.N., Hartzell, A.L., Friel, J.M. and Barnes, C.A. The influence of advanced age on novelty detection. Twenty-third Annual Undergraduate Biology Research Program, January 2012. (Abstract)
- Friel, J., Burke, S.N., Plange, K., Gazzaley, A. and Barnes, C.A. The effects of interrupting and distracting stimuli on working memory. Twenty-third Annual Undergraduate Biology Research Program, January 2012. (Abstract)
- Xiong, M., Lister, J.P. and Barnes, C.A. Quantitative analysis of columnarity in the cerebral cortex of aged Fisher F-344 rats: Correlations between brain structure and performance of cognitive tasks. Twenty-third Annual Undergraduate Biology Research Program, January 2012. (Abstract)
- Barnes, C.A. Aging of the brain, Living Beyond 100 Lecture Series, University of Arizona, Tucson, AZ, February 2012. (Invited)
- Barnes, C.A. Effects of aging on behavior and temporal lobe circuits. Integrative Center for Learning and Memory Inaugural Symposium, University of California at Los Angeles, March 2012. (Invited)

- Barnes, C.A. Impact of aging on neural circuits critical for memory, *The Neurobiology of Aging and Alzheimer's Disease: Walking Down the Same Road?* XXXIVth International Symposium of the GRSNC, Montreal, Canada, May 2012. (Invited)
- Barnes, C.A. Temporal lobe correlates of memory decline in normal aging, *The Rise and Fall of Memory Across the Lifespan*, University College London, May 2012. (Invited)
- Barnes, C.A. The aging hippocampal formation in animal models, *Cold Spring Harbor Workshop on Cognitive Aging*, Cold Spring Harbor, NY, June 2012. (Invited)
- Barnes, C.A. Surprising lessons from aging temporal lobe circuits, *Centre for the Biology of Memory Advisory Board Meeting*, Norwegian University of Science and Technology, Runde, Norway, June 2012. (Invited)
- Hoang, L.T., Maurer, A.P., Burke, S.N., Hindley, T.R., Marsh, R.N., Richards, A.M. and Barnes, C.A. (2012) Retro rat: The effects of backward movement on CA1 place fields, 8th FENS Forum of Neuroscience, Barcelona, Spain, July 2012. (Abstract)
- Lister, J.P., Clasen, S.J., Hartzell, A.L., Burke, S.N. and Barnes, C.A. Identity of objects is insufficient to alter Arc expression in lateral entorhinal cortex of young and old rats, 8th FENS Forum of Neuroscience, Barcelona, Spain, July 2012. (Abstract)
- Engle, J.R., Machado, C.J., Maurer, A.P., Permenter, M., Vogt, J. and Barnes, C.A. Mapping the spatial navigation network: A positron emission tomography study of young and aged rhesus macaque monkeys, 8th FENS Forum of Neuroscience, Barcelona, Spain, July 2012. (Abstract)
- Fitzhugh, M.C., Totenhagen, J.W., Yoshimaru, E.S., Richards, A., Hoang, L.T., Allen, A.N., Turk, M., Krate, J., Biwer, L.A., Hale, T.M., Chen, K., Moeller, J.R., Mitchell, K.D., Huentelman, M.J., Barnes, C.A., Trouard, T.P. and Alexander, G.E. Regional brain network of MRI gray matter with gradual induction of hypertension in the Cypla1-Ren2 transgenic rat. 2012 Annual Meeting of the Society for Neuroscience, San Diego CA, October 2012. (Abstract)
- Smith, K.E., Barnes, C.A., Corenblum, M.J. and Madhavan, L. Changing characteristics of neural stem cells across the lifespan during aging. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Liang, J., Lister, J.P. and Barnes, C.A. Aging does not affect the proportion of dorsal medial entorhinal cortex cells active during track running behavior. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Lister, J.P., Clasen, S.J., Hartzell, A.L., Burke, S.N. and Barnes, C.A. Effect of aging on the activity pattern of Arc expression in the deep layers of lateral entorhinal cortex. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Burke, S.N., Hartzell, A.L., Lister, J.P., Hoang, L.T., and Barnes, C.A. The effects of age and environmental change on Arc transcription in perirhinal cortical ensembles following object exploration. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Friel, J., Ferng, J.J., Hartzell, A.L., Burke, S.N. and Barnes, C.A. The influence of advanced age on noradrenergic-dependent novelty detection. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Hartzell, A.L., Barrientos, R.M., Hoang, L.T., Lister, J.P., Maier, S.F. and Barnes, C.A. The effect of peripheral E. coli infection on behaviorally-induced Arc expression patterns in hippocampal granule cells. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Schimanski, L.A., Lipa, P. and Barnes, C.A. Diminished place field density and direction-dependent learning in the aged rat. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Insel, N. and Barnes, C.A. Spiking of theta-firing neurons in medial prefrontal cortex precedes population activity during behavior and rest. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)

- Plange, K., Burke, S.N., Thome, A., Engle, J.R., Trouard, T.P., Gothard, K.M. and Barnes, C.A. Grey matter volume in the orbital prefrontal cortex correlates with reinforcer devaluation but not reversal learning performance in bonnet macaques. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Thome, A., Lipa, P., Erickson, C.A. and Barnes, C.A. Senescence modifies the structure of information encoding in the medial temporal lobe. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Engle, J.R., Machado, C.J., Maurer, A.P., Permenter, M., Vogt, J. and Barnes, C.A. Mapping the spatial navigation network of young and aged rhesus macaque monkeys: A positron emission tomography study. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Lu, L., Leutgeb, J.K., Henriksen, E.J., Tsao, A., Leutgeb, S., Barnes, C.A., Witter, M.P., Moser, E.I. and Moser, M.-B. The lateral entorhinal cortex and rate coding in the hippocampus. 2012 Annual Meeting of the Society for Neuroscience, New Orleans, LA, October 2012. (Abstract)
- Barnes, C.A. Impact of aging on circuit critical for memory, Epilepsy Grand Rounds, Case Western Reserve University, Cleveland, Ohio, October 2012. (Invited)
- Barnes, C.A. From aging rats to aging monkeys: New finding, new approaches, Centre for Biology of Memory, Kavli Institute, Norwegian University of Science and Technology, Trondheim, Norway, January 2013. (Invited)
- Espinoza, A.I., Uprety, A., Thome and A., Barnes, C.A. Rescuing age-related behavioral slowing via pharmacological enhancement of cortical gamma oscillations. Twenty-Fourth Annual Undergraduate Biology Research Program, January 2013. (Abstract)
- Ferng, J.J., Burke, S.N. and Barnes, C.A. Hippocampal place field activity in rats trained to walk forward and backwards. Twenty-fourth Annual Undergraduate Biology Research Program, January 2013. (Abstract)
- Liang, J., Lister, J.P. and Barnes, C.A. Aging does not affect the proportion of dorsal medial entorhinal cortex cells active during track running behavior. Twenty-fourth Annual Undergraduate Biology Research Program, January 2013. (Abstract)
- Salt, I., Kumar, S., Lister, J.P. Expression of the immediate early gene Arc while running on a wheel is similar to when exploring a spatial environment. Twenty-Fourth Annual Undergraduate Biology Research Program, January 2013. (Abstract)
- Veeravelli, S., Yoshimaru, E., Hoang, L.T., Valdez, M., Alvarez, A., Barnes, C.A. and Trouard, T.P. Magnetic resonance imaging of the neurological effects of hypertension. Twenty-fourth Annual Undergraduate Biology Research Program, January 2013. (Abstract)
- Xiong, M., Lister, T.P. and Barnes, C.A. Columnarity measurements and changes in cognitive performance in the aging brain. Twenty-fourth Annual Undergraduate Biology Research Program, January 2013. (Abstract)
- Barnes, C.A. Memory and the aging brain, Canyon Ranch Brain Camp: An Integrative Approach to Brain & Body Wellness, Canyon Ranch, Tucson, AZ, January 2013. (Invited)
- Barnes, C.A. Closing the healthspan/lifespan gap: Scientific contributions from UA faculty, Annual Conference on Successful Aging, University of Arizona, Tucson, AZ, January 2013. (Invited)
- Barnes, C.A. Hippocampal state: Contributions from motor and sensory inputs. Twenty-fifth Winter Conference on Neural Plasticity, Curacao, Netherland Antilles, February 2013. (Invited)
- Barnes, C.A. Neural circuits that contribute to age-related cognitive decline. Keynote Lecture, 2013 meeting of The Milwaukee Chapter of the Society for Neuroscience, May 2013. (Invited)
- Barnes, C.A. Age-Related Changes in Brain Plasticity: Principles Derived from Medial Temporal Lobe Memory and Perceptual Systems – Are They Relevant for Understanding the Auditory System? Keynote speaker, NIA Workshop on Auditory Plasticity and Aging, Bethesda, MD, August 2013. (Invited)

- Barnes, C.A. Normal brain aging: Impact on circuits critical for memory. Colloquium series speaker, Institute of Science and Technology Austria, Klosterneuburg, Austria, September 2013. (Invited)
- Barnes, C.A. Some unexpected findings, and new approaches. Systems Neuroscience lab meeting, Institute of Science and Technology Austria, Klosterneuburg, Austria, September 2013. (Invited)
- Engle, J.R., Archibeque, M.J., Permenter, M.R., Vogt, J.A., Dugger, B.N., Beach, T.G. and Barnes, C.A. Cerebral amyloid deposition and phosphorylated tau: relationships between age and cognitive status in the rhesus macaque. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Plange, K., Engle, J.R., Burke, S.N., Gray, D.T. and Barnes, C.A. Changes in sensory function are correlated with cognitive impairments in bonnet monkeys. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Thome, A., Chawla, M.K., Ramirez-Amaya, V., Marrone, D.F., Lipa, P., Ellmore, T.M., McNaughton, B.L. and Barnes, C.A. Large scale molecular imaging of hippocampal network activity during real and virtual navigation in freely behaving primates. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Maurer, A.P., Thome, A., Bohne, K.M., Archibeque, M.J., Permenter, M.R., Vogt, J.A., Sprawka, K., Engle, J.R. and Barnes, C.A. Telemetric recordings from temporal lobe of a freely moving primate. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Chance, F.S., Maurer, A.P., Burke, S.N. and Barnes, C.A. Dual input component models of CA1 activity in young and aged rats. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Lester, A.W., Maurer, A.P., Burke, S.N., Hoang, L.T. and Barnes, C.A. Preserved neural dynamics during reverse locomotion. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Burke, S.N., Maurer, A.P., Cowen, S.L. and Barnes, C.A. Perirhinal cortical interneurons exhibit reduced firing rate with advanced age. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Uprety, A.R., Lipa, P., Thome, A., Espinoza, A.I., Hindley, T.R. and Barnes, C.A. Frontal cortical gamma frequency slowing in aging: Can C6 rescue cortical synchrony and decision speed? 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Xiong, M., Morrison, W., Lister, J.P., Barnes, C.A., Cruz, L.R. and Rosene, D.L. Effect of aging on the microcolumnar structure of entorhinal cortex: correlation with performance on the spatial Morris water maze test. 2013 Neuroscience Meeting Planner. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Lister, J.P., Liang, J. and Barnes, C.A. Effect of age and changing odors on population activity in the medial entorhinal cortex during track running behavior. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Chawla, M.K., Sekhadia, N., Olson, K., Alme, C.B., Moser, E.I., Moser, M.-B., McNaughton, B.L. and Barnes, C.A. Mass trial induced under-expression of Arc mRNA in rat hippocampal neurons. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA. (Abstract)
- Hay, M., Constantopoulos, E., Uprety, A.R., Samareh-Jahani, F., Barnes, C.A. and Konhilas, J.P. Cognitive dysfunction in heart failure and a protective role for angiotensin (1-7). 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Lu, L., Leutgeb, J.K., Tsao, A., Henriksen, E.J., Leutgeb, S., Barnes, C.A., Witter, M.P., Moser, V.-B. and Moser, E.I. Impaired hippocampal rate remapping following lesions in the lateral entorhinal cortex. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Siniard, A.L., Corneveaux, J.J., Allen, A.N., Chawla, M.K., Turk, M.N., Reiman, R.A., Rose, H.E. Barnes, C.A. and Huentelman, M.J. Activity regulated transcript identification in the hippocampus and the

- genetic association with AD. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Abstract)
- Barnes, C.A. Cognitive aging across species. Symposium: Brain, Cognition, and Genetics in Healthy Aging. 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Invited)
- Barnes, C.A. The evolving face of neuroscience: Role of women and globalization. Celebration of Women in Neuroscience Keynote Speaker, 2013 Annual Meeting of the Society for Neuroscience, San Diego, CA, November 2013. (Invited)
- Barnes, C.A. Effects of aging on behavior and temporal lobe circuits. Neuroscience Seminar Series, Pfizer Inc., Cambridge, MA, November 2013. (Invited)
- Barnes, C.A. Effect of aging on brain circuits and behavior, Keynote Speaker, ASU UA Cognitive Science Conclave, Windmill Suites in St. Philips Plaza, Tucson, AZ, December 2013. (Invited)
- Richards, A., Uprety, A.R., Alexander, G.E., Trouard, T.P., Mitchell, K.D. and Barnes, C.A. Cognitive and physiological changes that occur with gradual induction of hypertension in a Cyp1a1-Ren2 middle age transgenic rodent model. Twenty-fifth Annual Undergraduate Biology Research Program, January 2014. (Abstract)
- Espinoza, A.I., Uprety, A.R., Lipa, P., Thome, A., Hindley, T.R. and Barnes, C.A. Frontal cortical gamma frequency slowing in aging: Can C6 rescue cortical synchrony and decision speed? Twenty-fifth Annual Undergraduate Biology Research Program, January 2014. (Abstract)

## RESEARCH INTERESTS

My work has focused on how memory changes with age, and what brain changes occur that may be responsible for these memory changes. The overall rationale for this type of basic animal work stems from the idea that if we can understand the biological mechanisms of memory in the normal aging process, as a backdrop to how memory is altered in disease states associated with aging, then we will have a better chance of developing therapeutic approaches that will be effective treatments. The long-term goal of this work, then, is a more complete understanding of the biological basis for the deterioration of cognitive function known to occur in the elderly, using state-of-the-art electrophysiological and molecular biological methods combined with behavioral analyses.

## GRANTS RECEIVED

Principal Investigator, N.I.H. Grant 1 R01 AG03376 Neurobehavioral Relationships in Senescent Hippocampus	May 1982 - April 1985 Direct Costs \$258,012
Principal Investigator, N.I.H. Grant 3 R01 AG03376-02S1 Supplement, Neurobehavioral Relationships in Senescent Hippocampus	May 1983 - April 1984 Direct Costs: \$15,168
Biomedical Research Support Grant (BRSG), University of Colorado Data Acquisition System Upgrade	1985/1986 Total Award: \$10,000
Principal Investigator, N.I.H. Grant 1 K04 AG00243 Neurochemical Investigations of Senescent Hippocampus	Sept 1984 - August 1989 Direct Costs: \$220,902
Principal Investigator, N.I.H. Grant 2 R01 AG03376 Neurobehavioral Relations in Senescent Hippocampus	May 1985 - April 1988 Direct Costs: \$921,748
Sponsor for E. Green, N.I.H. Grant 1 F32 AG05345 Physiology of Aging	May 1985 - May 1988 Direct Costs: \$61,244
Sponsor for S. J. Y. Mizumori, N.I.H. Grant 1 F32 AG05375-01 Psychobiology of Aging	Feb 1986 - Feb 1989 Direct Costs: \$63,996
Co-Principal Investigator, Sigma-Tau Corp., Rome, Italy Effects of Acetyl-L-carnitine on Behavioral Performance of Aged Rats	July 1987-June 1988 Direct Costs: \$17,826
Principal Investigator, American Federation for Aging Research Effects of Aging on Sensory-Motor Information Processing Capabilities of Mammalian Association Cortex	August 1987-July 1988 Direct Costs: \$23,850
Sponsor for E. Markus, Nat Science & Engineering Res Council of Canada The Contribution of the Subiculum to the Cognitive Changes Apparent in Normal Aging	Dec 1988-Dec 1990 Direct Costs: \$40,000
Principal Investigator, N.I.H. Grant 2 R01 AG03376 Neurobehavioral Relations in Senescent Hippocampus	May 1988 - April 1993 Direct Costs: \$870,161
Principal Investigator, N.I.H. Grant 1 K02 MH00817 Neural Mechanisms of Cognitive Decline in Senescence	Sept 1989 - August 1994 Direct Costs: \$268,875
Sponsor for D. L. Korol, N.I.H. Grant 1 F32 AG95540 Aging Process	Jan 1991 - Dec 1993 Direct Costs: \$69,000

Principal Investigator (Co-PI Worley), N.I.H. Grant 1 R01AG09219 Transcription Factor Genes, Neuronal Plasticity and Aging	June 1991 - May 1995 Direct Costs: \$619,229
Co-Investigator, Searle Effects of the NMDA-Glycine Allosteric Site Modulator Cycloserine on the Induction and Maintenance of Both Stimulus-Induced and Naturally-Occurring Synaptic Enhancement in the Hippocampal Formation of Conscious Animals	Feb 1992 - Jan 1993 Direct Costs: \$4,091
Principal Investigator, N.I.H. Grant 1 RO1 MH48824 Spatial Memory and Experience-Dependent Synaptic Change	August 1992 - July 1995 Direct Costs: \$213,832
Co-Investigator. Human Frontiers in Science How the Hippocampus Operates in Memory	Sept 1992 - August 1995 Direct Costs: \$60,477
Principal Investigator, N.I.H. Grant 3 R01AG03376 Supplement to Neurobehavioral Relations in Senescent Hippocampus	Sept 1993 - May 1994 Direct Costs: \$141,960
Co-Investigator, ASU Subcontract No. 95-1053SG (Flinn Foundation) Brain Imaging/Behavioral Neurosciences Project	Jan 1994 - Dec 1998 Direct Costs: \$194,860
Principal Investigator, N.I.H. Grant 1 RO1AG12609 Cell Assemblies, Pattern Completion, and the Aging Brain	April 1994 - March 1999 Direct Costs: \$507,409
Principal Investigator, N.I.H. Grant 1 KO5 MH01227 Memory and the Aging Brain: From Synapses to Behavior	Sept 1994 - August 1999 Direct Costs: \$420,992
Principal Investigator, N.I.H. Grant 2 RO1 AG03376 Neurobehavioral Relations in Senescent Hippocampus	October 1994 - April 1997 Direct Costs: \$297,464
Principal Investigator (co-PI Worley) N.I.H. Grant 5 RO1 AG09219 Transcription Factor Genes, Neuronal Plasticity and Aging	June 1995 – May 200- Direct Costs: \$1,238,438
Sponsor for A.D. Redish, N.I.H. Grant 1 F32 AG05805 Aging and Multiple Maps in the Hippocampus	Nov 1997 - Oct 2000 Direct Costs: \$79,312
Principal Investigator, N.I.H. Grant 2 RO1 AG03376 Neurobehavioral Relations in Senescent Hippocampus	Dec 1997 - Nov 2002 Direct Costs: \$839,644
Principal Investigator, N.I.H. Grant 1 RO1 AG12609 Cell Assemblies, Pattern Completion, and the Aging Brain	August 1999 – July 2004 Direct Costs: \$930,736
Principal Investigator (co-PI: Worley), N.I.H. Grant 2 RO1 AG09219 Transcription Factor Genes, Neuronal Plasticity and Aging	August 2000 – June 2005 Direct Costs: \$817,651
Principal Investigator (co-PI: Roysam), N.I.H. Grant 1 RO1 AG18230 Functional Brain Imaging with RNA Redistribution Analysis	Sept 2000 – August 2003 Direct Costs: \$568,753
Principal Investigator, N.I.H. Grant 1 R21 AG18890 Mechanisms of Associative Memory Impairment in Aging	March 2001 – February 2003 Direct Costs: \$200,000
Co-investigator, N.I.H. Grant 1 P30 AG19610 Arizona Alzheimer's Disease Core Center	October 2001 – June 2006 Direct Costs: \$62,389

Co-investigator, Human Frontier Science Program RGP0127/2001-B102 Communication between Neural Assemblies in Connected Brain Areas During Learning and Memory Consolidation	Dec 2001 – Nov 2004 Direct Costs: \$233,640
Co-investigator, D.H.S. Grant 211003 (HB 2595) Arizona Alzheimer's Research Center	July 2002 – June 2004 Direct Costs: \$55,000
Sponsor for A. Vazdarjanova, N.I.H. Grant 1 F32 MH64357 Amygdala Modulation of Hippocampal Arc Expression	August 2002 – July 2005 Direct Costs: \$138,543
Sponsor for V. Ramirez-Amaya, HFSP LT00112/2002-C Cellular and synaptic networks of hippocampal-dependent behaviors across the lifespan.	Jan 2002 – Dec 2004 Direct Costs: \$137,800
Principal Investigator, N.I.H. Grant 2 RO1 AG003376 Neurobehavioral Relations in Senescent Hippocampus	Feb 2003 – Jan 2008 Direct Costs: \$2,569,155
Principal Investigator, N.I.H. Grant 1 RO1 AG023309 Genetic Mapping of Functional Neural Networks & Circuits	May 2004 – April 2007 Direct Costs: \$1,055,074
Principal Investigator, N.I.H. Grant 5 RO1 AG012609 Cell Assemblies, Pattern Completion and the Aging Brain	July 2004 – June 2009 Direct Costs: \$1,062,500
Sponsor for D. Marrone, NSERC #PDF – 301315 – 2004 Neuronal ensemble dynamics in non-human primates	Nov 2004 – Nov 2006 Direct Costs: 80,000 CAD
Sponsor for L. Schimanski, CIHR #200502SIB-150293-109016 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.	Dec 2005 – Nov 2008 Direct Costs: 150,000 CAD
Sponsor for L. Schimanski, AHFMR #2004 01472 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.	Dec 2005 – Nov 2008 Direct Costs: 30,000 CAD
Role in Project: Co-investigator, D.H.S. Grant #211002 Arizona Alzheimer's Research Center	Dec 2005 – Nov 2010 Direct Costs: \$126,691
Sponsor for S. Burke, N.I.H. 1 F31 NS054465-01 Aging and Neural Ensembles in the Perirhinal Cortex.	Jan 2006 – Dec 2008 Direct Costs: \$102,205
Co-investigator. N.I.H. 1 P30 AG019610 Arizona Alzheimer's Disease Core Center	July 2006 – June 2011 Direct Costs: \$65,250
Co-investigator. D.H.S. Grant #211002 AARC – Evelyn F. McKnight Brain Institute	July 2006 – June 2011 Direct Costs: \$932,793
Principal Investigator and Director, McKnight Brain Research Foundation Gift to establish Evelyn F. McKnight Chair for Learning and Memory in Aging and Evelyn F. McKnight Brain Institute	October 2006 – June 2011 Direct Costs: \$5,000,000

Principal Investigator and Director, McKnight Brain Research Foundation Institutional Match	October 2006 – June 2011 Direct Costs: \$5,000,000
Co-Sponsor for H. Chen, N.I.H. 1 F32 AG031671-01 Contribution of emotional memory to social cognition in aging	October 2007 – Sept 2008 Direct Costs: \$46,826
Sponsor for R. Samson. CIHR #200710S1B-183370-171357 Age-related changes in network activity of the amygdala during emotional learning	July 2008 – June 2011 Direct Costs: 150,000 CAD
Principal Investigator, N.I.H. Grant 4 R37 AG012609 Cell Assemblies, Pattern Completion and the Aging Brain	July 2009 – June 2014 Direct Costs: \$1,025,000
Principal Investigator, N.I.H. Grant 2 R56 AG003376 Neurobehavioral Relations in Senescent Hippocampus	August 2009 – June 2010 Direct Costs: \$333,333
Sponsor for J. Lister, N.I.H. Grant 1 F32 AG033460 Age effects on grid cell and scene recognition systems of entorhinal cortex	Sept 2009 – August 2012 Direct Costs: \$101,764
Principal Investigator. N.I.H. Grant 1 RC1 AG036053 Functional Activity Mapping of Brain Network	Sept 2009 – August 2011 Direct Costs: \$649,456
Co-Sponsor for B. Jones., NIH Grant Predoctoral Fellowship A Novel Paradigm to Investigate Memory Reconsolidation in Adults and Aging Rats	August 2009 – August 2012 Direct Costs: \$134,722
Principal Investigator, N.I.H. Grant 2 RO1 AG003376 Neurobehavioral Relations in Senescent Hippocampus	May 2010 – April 2015 Direct Costs: \$3,339,369
Co-investigator, N.I.H. R44 AG035446 (SBIR to DMetrix) Whole-brain fluorescence and brightfield imaging at single cell level	April 1, 2011 – July 31, 2016 Direct Costs: \$109,652
Sponsor for D. Maurer, N.I.H. Grant 1 F32 NS070464 Hippocampal ensemble dynamics during active ambulation, passive movement & rest	July 2011 – June 2014 Direct Costs: \$156,438
Co-investigator, Arizona Alzheimer's Research Center Evelyn F. McKnight Brain Institute	July 2011 – June 2014 Direct Costs: \$69,322
Co-investigator. 2 P30 AG019610 Arizona Alzheimer's Disease Core Center	August 2011 – June 2016 Direct Costs: \$67,665

### **COURSES TAUGHT SINCE FACULTY APPOINTMENT**

Advanced Physiological Psychology (Undergraduate)  
 Gerontology: A Multidisciplinary Perspective (Undergraduate/Graduate)  
 Seminar in Behavioral Neuroscience (Graduate)  
 Mammalian Neurophysiology (Graduate)  
 Research Methods in Mammalian Neurophysiology (Graduate)

## GRADUATE AND POSTDOCTORAL TRAINING

### Graduate Students

Kathryn Yagel (M.A. Advisor - Graduated May 1985)  
 Marilyn Rasmussen (Ph.D. Advisor - Graduated May 1988)  
 Brian Leonard (Ph.D. Advisor - Graduated August 1990)  
 Gail Perez (M.Sc. Advisor - Graduated December 1990)  
 Cynthia Erickson (Ph.D. Advisor - Graduated December 1993)  
 Jiemin Shen (Ph.D. Advisor - Graduated December 1996)  
 Tariq Abdulaziz (M.Sc. Advisor - Graduated May 1995)  
 Jason Gerrard (Ph.D. Advisor – Graduated May 2002)  
 Ephron Rosenzweig (Ph.D. Advisor – Graduated May 2002)  
 Galya Orr (Ph.D. Advisor – Graduated May 2002)  
 Alex Terrazas (Ph.D. Advisor – Graduated August 2003)  
 Zhiyong Yang (Ph.D. Advisor – Graduated August 2004)  
 Maria Louisa Ruiz Luna (M.Sc. – December 2006)  
 Marsha Penner (Ph.D. – Graduated May 2008)  
 Sara Burke (Ph.D. – Graduated May 2009)  
 Alaina Glatting (M.Sc. Advisor – Graduated May 2010)  
 Thabelo Khoboko (M.Sc. Advisor – Graduated June 2010)  
 Lan Hoang (M.Sc. Advisor – Graduated June 2010)  
 Nathan Insel (Ph.D. – Graduated December 2010)  
 Alex Thome (Ph.D. Advisor – Graduated May 2012)  
 Andrew Busch (M.Sc. Advisor – Graduated August 2013)  
 Adam Lester (Ph.D. Advisor)  
 Daniel Gray (Ph.D. Advisor)

### Postdoctoral Fellows

Ed Green (1985-1989) [1997, Associate Professor, University of Miami]  
 Sheri Mizumori (1985-1989) [Professor and Head, University of Washington]  
 Etan Markus (1988-1994) [Professor & Assoc Dept Head, University of Connecticut]  
 Donna Korol (1991-1993) [Associate Professor, Syracuse University]  
 Jiemin Shen (1997) [Postdoc, New York University – no longer in Neuroscience]  
 Gina Poe (1995 - 1998), [Associate Professor, University of Michigan]  
 David Redish (1997-2000) [Associate Professor, University of Minnesota]  
 Michael Krause (1999-2000) [Research Physicist, University of California, Santa Cruz]  
 Victor Ramirez-Amaya (2002 – 2005) [Associate Professor, Univ. of Mexico]  
 Vicki Sutherland (2003 – 2005) [Research Investigator, Bristol, Myers & Squibb]  
 Almira Vazdarjanova (2002 – 2005) [Asst Prof, Medical College of Georgia]  
 Susanna Rosi (2005 – 2006) [Associate Professor, Univ. of California, San Francisco]  
 Yoshiaki Miyamoto (2005 – 2006) [Showa Pharmaceutical Univ.]  
 Monica Chawla (1998-2006) [Asst. Res. Scientist, Univ. Arizona]  
 Diano Marrone (2004 – 2007) [Asst. Prof., Wilfred Laurier University, Canada]  
 Haiyin Chen (2007 – 2008)  
 Marsha Penner (2008 – 2009) [Postdoc, University of Washington]  
 Lesley Schimanski (2005 – 2012) [Faculty Member, Glendale College]  
 James Lister (2007 – 2012) [Assistant Professor, UCLA]  
 Sara Burke (2009 – 2013) [Assistant Professor, University of Florida]

Rachel Samson (2007 – present)  
 Drew Maurer (2008 – present)  
 James Engle (2011 – present)

## **SERVICE**

### **Outside of the University**

Medical and Scientific Advisory Council, Alzheimer's Disease Association  
 National Science Advisory Council, American Federation for Aging Research  
 Behavioral Science Track Award for Rapid Transition Reviewer Pool, NIMH, 1995-present  
 Chair, Internal Scientific Advisory Committee of the Arizona Alzheimer's Disease Consortium, 2001 – present  
 Executive Committee, Dana Alliance for Brain Initiatives, 2007-present  
 Member, Neuroscience Prize Selection Committee, Peter and Patricia Gruber Foundation, 2007-2010  
 Chair, Society for Neuroscience International Affairs Committee – US National Committee, 2008-2011  
 (Incoming Chair, 2007-2008)  
 Member, IBRO Executive Committee, 2008-2011  
 Member, SfN/FENS Working Group Committee 2008-2011  
 Member, World Women in Neuroscience Committee, 2008-2011  
 Organizing Committee and Keynote Address, Cognitive Aging Summit, Washington, DC, 2010  
 Vice Chair, Gordon Research Conference on Neurobiology of Cognition, 2010 (Chair 2012)  
 Chair, Gruber Foundation Neuroscience Prize Advisory Board, 2010-2014  
 Steering Program Committee, Winter Conference on Neural Plasticity, 2010-present  
 Member, National Institute on Aging Search Committee for Director of Neuroscience, 2010-2011  
 Member, Scientific Program Advisory Group, Spring Hippocampal Research Conference, 2011-present  
 Member, Neurobiology of Aging Review Committee, NIA Division of Neuroscience Program, 2012-2013  
 Chair, Cognitive and Affective Neuroscience Review Committee, NIA Division of Neuroscience Program, 2012-2013  
 Member, Section of Neurobiology of Learning and Memory Review Committee, NIMH Board of Scientific Counselors, 2013-2014  
 Ad hoc reviewer, NIMH Section of Neurobiology of Learning and Memory (Dr. Elizabeth Murray), 2013-2014  
 External Advisory Boards: Gladstone Institute of Neurological Disease, UCSF; Friedman Brain Institute, Mt Sinai School of Medicine; Center for the Biology of Memory, NTNU  
 Ad Hoc Grant Reviews for (past 5 years to present):  
 National Institutes of Health; Veterans Administration Medical Center, Los Angeles, California, Medical Research Council, Great Britain, Medical Research Council, Canada, Medical Research Council, New Zealand, Air Force Office of Scientific Research  
 Editorial Boards (past 5 years to present):  
 Behavioral Neuroscience, Hippocampus, Learning and Memory, Neural Plasticity  
 Reviews on an ad hoc basis for other journals (past 5 years to present):  
 Science, Nature, The Journal of Neuroscience, Proceedings of the National Academy of Sciences, Journal of Neurophysiology, Cell, Neuron, Experimental Neurology, Behavioral Brain Research, The European Journal of Neuroscience, Cerebral Cortex

### **Inside the University**

Co-Chair, AHSC Neuroscience Advisory Council (2013 - 2014)  
 Senior Vice President for Research Search Advisory Committee (2013 - 2014)  
 Research Development Director Search Committee (2013)  
 Psychology Development Committee (2013 – present)  
 2014 College of Science Lecture Series (Mapping the Brain) Committee (2013 - 2014)  
 University Distinguished Outreach Faculty Committee (2013)

University Animal Care Veterinarian Search Committee (2011)  
Five year review committee for the Vice President of Research, Dr. Leslie Tolbert (2011)  
Chair, CTSI Neuroscience Search Committee (2010 – present)  
Neuroscience SWOT Committee (2008 - 2009)  
Provost Advisory Council for the Strategic Advancement (2008 – 2009)  
University Committee on Interdisciplinary Programs (1999 – 2001)  
University Committee on Ethics and Commitment (1998 – 2000)  
Executive Committee, Program in Neuroscience (1997 – 2003)  
Psychology Department Executive Advisory Committee (1995 – 2000)  
Psychology Department Standing Committee on Promotion and Tenure (1994 – 2005)  
Bi-Semester Organizer, Neuroscience Community Data Blitz (1992 – present)