Christa K. McIntyre: Curriculum Vitae

Educational History:

B.A. (1994) American University, Washington, D.C.

Thesis: A psychopharmacological comparison of cholecystokinin and morphine Advisor: Anthony Riley

Ph.D. (2000) University of Virginia, Charlottesville, VA, Psychobiology

Dissertation Title: Competition and Cooperation of Multiple Memory Systems, Advisor: Paul E. Gold

Postdoctoral Fellow (2000-2006) University of California, Irvine, CA

Neurobiology of Memory and Emotion Advisor: James L. McGaugh

Employment History – principal positions since the Bachelor's degree:

Graduate Researcher, Psychobiology (1994-1999), University of Virginia, Charlottesville, VA

Teaching Assistant, Psychobiology Lab (1994-1998), University of Virginia, Charlottesville, VA

Postdoctoral Researcher, Center for the Neurobiology of Learning and Memory, (1999-2006), University of California, Irvine, Irvine, CA.

Editor, Write Science Right: www.writescienceright.com (2003-2006), Irvine, CA.

Instructor, Graduate level Psychopharmacology (Fall, 2005), Chapman University, Orange, CA.

Assistant Professor, Behavioral and Brain Sciences (2006-present), University of Texas at Dallas, Richardson, TX.

Professional recognitions and honors (study, teaching, research, service):

Dissertation Fellowship (1998-1999), University of Virginia

Ralph W. Gerard Fellowship (1999-2000), Center for the Neurobiology of Learning and Memory, University of California, Irvine.

Roger Russell Award for scholarship and Collegiality (2002), Center for the Neurobiology of Learning and Memory, University of California, Irvine.

Award for "Best Data Blitz Presentation" (2005), Center for the Neurobiology of Learning and Memory, University of California, Irvine.

Postdoctoral Travel Award (2005), Society for Neuroscience, Washington, DC.

Professional memberships:

Society for Neuroscience (1995-present)

Cellular and Molecular Cognition Society (2007-present)

International Behavioral Neuroscience Society (2010)

Articles in refereed journals:

- 1. McIntyre, C.K., Ragozzino, M.E., and Gold, P.E. Intra-amygdala infusions of scopolamine impair performance on a conditioned place preference task but not a spatial radial maze task. *Behavioural Brain Research* (1998) 95(2):219-226.
- 2. McIntyre, C.K., Pal, S.N., Marriott, L.K., and Gold, P.E. Acetylcholine output in the hippocampus correlates negatively with good performance on an amygdala-dependent memory task *Journal of Neuroscience* (2002) 22(3):1171-1176.
- **3.** McIntyre, C.K., Hatfield, T., and McGaugh, J.L. Amygdala norepinephrine levels following learning predict long-term memory. *European Journal of Neuroscience* (2002) 16:1-6.
- 4. McGaugh, J.L., McIntyre, C.K., and Power, A.E. Amygdala modulation of memory consolidation: Interaction with other brain systems. *Neurobiology of Learning and Memory* (2002) 78:539-552
- 5. McIntyre, C.K., Marriott L.K., and Gold, P.E. Patterns of brain acetylcholine release predict individual differences in preferred learning strategies in rats. *Neurobiology of Learning and Memory* (2003) 79:177-183.
- 6. McIntyre, C.K., Marriott, L.K., and Gold, P.E. Cooperation between memory systems: Acetylcholine release in the amygdala correlates positively with performance on a hippocampus-dependent task. *Behavioral Neuroscience* (2003) 117:320-326.
- 7. McIntyre, C.K., Power, A.E., Roozendaal, B. and McGaugh, J.L. Role of the basolateral amygdala in memory consolidation. *Annals of the New York Academy of Sciences* (2003) 985:273-293.
- **8.** Power, A.E., **McIntyre, C.K**., Litmanovich, A., and McGaugh, J.L. Memory enhancement by cholinergic activation in the basolateral amygdala involves activation of both M1 and M2 receptors. *Behavioral Pharmacology* (2003) 14:207-213.
- **9.** McIntyre, C.K., Miyashita, T., Setlow, B., Guzowski, J.G., Marjon, K.D., Steward, O., Guzowski, J.F. and McGaugh, J.L. Memory-influencing intra-basolateral amygdala drug infusions modulate Arc expression in the hippocampus. *Proceedings of the National Academy of Science*, USA (2005) 102:10718-10723.
- Roozendaal, B., McReynolds, J.R.; Van der Zee, E.; Lee, S.; McGaugh, J.L.; and McIntyre, C.K Glucocorticoids effects on memory consolidation depend on functional interactions between medial prefrontal cortex and basolateral amygdala. *Journal of Neuroscience*, (2009) 29:14299-308.

- **11.** McReynolds, J.R.; Donowho, K.M., Abdi, A.; McGaugh, J.L., Roozendaal, B., and **McIntyre, C.K.** Glucocorticoids enhance long-term memory consolidation and local translation of Arc protein in the hippocampus. *Neurobiology of Learning and Memory*, (2010) 93:312-21.
- **12.** Holloway, C.M. and **McIntyre, C.K.** Post-training disruption of Arc protein expression in the anterior cingulate cortex impairs long-term memory for inhibitory avoidance training. *Neurobiology of Learning and Memory*, (2011) Feb. 17, Epub ahead of print.

Chapters in edited volumes:

- Gold, P.E., McIntyre, C., McNay, E., Stefani, M.R., and Korol, D.L. From memory consolidation to modulation: Referees of dueling memory systems. In: P.E.Gold and W.T. Greenough (Eds), <u>Forty Years of Memories: A</u> <u>Festschrift for James L. McGaugh</u>, APA Publishers, Washington, D.C. (2001).
- 2. McIntyre, C.K., and Roozendaal, B. Glucocorticoid interaction with arousal-induced noradrenergic activity in influencing consolidation of emotional memories. In: F. Bermudez-Rattoni (Ed.), <u>Neuroplasticity and Memory:</u> From Genes to Brain Imaging, CRC Press (2007).

Manuscripts in preparation:

- 1. Pena D.F. and McIntyre, C.K. Vagus nerve stimulation enhances extinction of fear conditioning (to be submitted May, 2011).
- 2. Holloway, C.M. and McIntyre, C.K. Memory-influencing intra-basolateral amygdala drug infusions modulate Arc expression in the hippocampus (to be submitted May, 2011).
- **3.** McIntyre, C.K. Stress effect on memory and synapses. Invited review for Frontiers in Behavioral Neuroscience, *Due July*, 2011.
- 4. McIntyre, C.K., McGaugh, J.L., Williams, C.L. Interacting Brain Systems Modulate Memory Consolidation. Invited review for Neuroscience and Biobehavioral Reviews, *Due July*, 2011.
- 5. McReynolds, J.R., Holloway, C.M., Parmer, T. and McIntyre, C.K. Memory-enhancing glucocorticoid treatment increases synaptic expression of the immediate early gene Arc in the medial prefrontal cortex (to be submitted August, 2011).
- **6.** Holloway, C.M., McReynolds, J.R. and **McIntyre, C.K.** Memory-enhancing glucocorticoid treatment increases synaptic expression of the immediate early gene Arc in the anterior cingulate cortex (to be submitted August, 2011).

Patents submitted:

Title: *Systems, Methods and Devices for Paired Plasticity* **Inventors:** Michael Kilgard, Lawrence Cauller, Navzer Engineer, **Christa McIntyre**, and Will Rosellini

Title: *Timing Control for Paired Plasticity* **Inventors:** Michael Kilgard, Lawrence Cauller, Navzer Engineer, **Christa McIntyre**, and Will Rosellini

Service:

Panelist and ad-hoc grant reviewer for:

National Science Foundation *Panelist* October, 2009 National Institute of Mental Health *Panelist* July, 2010

Reviewed manuscripts for:

- 1. Journal of Neuroscience
- 2. European Journal of Neuroscience
- **3.** European Journal of Pharmacology
- 4. Hippocampus
- 5. Brain Research
- 6. Behavioural Brain Research
- 7. Neuroscience
- 8. Neurobiology of Learning and Memory
- 9. Neuroscience Letters
- 10. Pharmacology, Biochemistry and Behavior
- 11. Physiology and Behavior
- 12. Proceedings of the National Academy of Sciences

Professional activities:

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- Co-organizer of annual winter conference on the neurobiology of learning and memory (Jan., 2010)
 - Co-organizer of Dallas Area Conference on the Neuroscience of Stress and Memory (May, 2011)
- Review editor for the journal Frontiers in Behavioral Neuroscience

Invited or refereed presentations in professional meetings and seminar or colloquia assemblies:

- 1. The Brain California State, Fullerton, Fullerton CA (summer, 2002)
- 2. Roger Russell Award, Center for the Neurobiology of Learning and Memory, Irvine, CA (fall, 2002)
- 3. Brain system interactions in the consolidation of memory, Dartmouth College, Hanover, NH (spring, 2004)
- 4. Brain system interactions in the consolidation of memory, Texas A& M, College Station, TX (spring, 2005)
- **5.** Brain system interactions in the consolidation of memory, Florida Atlantic University, Boca Raton, FL (spring, 2005)
- 6. Brain system interactions in the consolidation of memory, University of Texas at Dallas (fall, 2005)
- **7.** Brain system interactions in the consolidation of memory, University of Vermont, Burlington, VT. (spring, 2006)
- **8.** Brain system interactions in the consolidation of memory, University of California, Santa Barbara, CA. (spring, 2006)
- 9. The Brain, Plano East High School, Plano, TX. (fall, 2006)
- **10.** Intra-medial prefrontal cortex glucocorticoid infusions enhance memory consolidation and increase phosphorylation of Erk I/II in the amygdala, Annual Learning and Memory Winter Conference, Park City, UT. (January, 2007)
- **11. Neurobiology of Memory and Emotion**, Psychological and Cognitive Sciences Brown Bag lecture series, University of Texas at Dallas, Richardson, TX (spring, 2009).
- 12. Anxiety and posttraumatic stress disorder, Microtransponder, Inc., Richardson, TX: (August, 2008).
- **13. Emotionally arousing experiences leave a mark on the brain**, Association for Psychological Sciences, San Francisco, CA. (May, 2009)
- **14. Vagus nerve stimulation as adjunct therapy in the treatment of anxiety disorders**, DARPA Enabling Stress Resistance Workshop, San Diego, CA. (June, 2009)
- **15. Does synaptic protein translation underlie memory consolidation?** Annual Neurobiology of Learning and Memory meeting, Park City, UT (January, 2010)

- **16. Emotional modulation of the synapse** Annual Conference of the International Behavioral Neuroscience Society, Sardinia, Italy (June, 2010)
- **17. Stress effects on memory and the synapse** Annual Conference of the American Psychological Association. San Diego, CA (August, 2010)
- **18.** Stress effects on memory and the synapse Colloquium presentation, Institute of Neurobiology, Universidad Nacional Autónoma de México (UNAM), Querétaro, Mexico (September, 2010)

Contributed (unrefereed) abstracts and/or oral presentations at professional meetings:

The following are presentations made at the annual meeting of the Society for Neuroscience since 2006:

- 1. Memory-enhancing intra-basolateral amygdala clenbuterol treatment increases dendritic Arc protein in the dorsal hippocampus, C.K. McIntyre, A. Abdinezhad, T. Miyashita, J. Tu, D. Ibrahim, J.F. Guzowski, J.L. McGaugh 2006-A-143861-Society for Neuroscience, Atlanta, GA.
- 2. Glucocorticoid receptor activation in the basolateral amygdala after inhibitory avoidance training increases medial prefrontal cortex phosphorylation of Erk I/II but decreases expression of Arc protein C.K. McIntyre, J.R. McReynolds, and B. Roozendaal *Society for Neuroscience Annual Meeting* San Diego, CA: (November 2007); Society for Neuroscience (2007) Online
- **3.** Glucocorticoid receptor activation in the medial prefrontal cortex induces parallel effects on hippocampal Arc protein expression and memory J.R. McReynolds, B. Roozendaal, and C.K. McIntyre *Society for Neuroscience Annual Meeting* San Diego, CA: (November 2007); Society for Neuroscience (2007) Online
- 4. Memory enhancing corticosterone treatment increases Arc protein expression in hippocampal synaptic fractions J.R. McReynolds, K. Donowho, B. Roozendaal, and C.K. McIntyre *Society for Neuroscience Annual Meeting* Washington, DC: (November, 2008); Society for Neuroscience (2008) Online
- **5.** Training induced Arc protein expression in the rat anterior cingulate cortex C.M. Holloway, J.R. McReynolds, and C.K. McIntyre *Society for Neuroscience Annual Meeting* Washington, DC: (November, 2008); Society for Neuroscience (2008) Online
- 6. Environmentally induced modification of the long term consolidation process of contextual fear memory D.F. Pena, M. Kilgard, and C.K. McIntyre *Society for Neuroscience Annual Meeting* Washington, DC: (November, 2008); Society for Neuroscience (2008) Online
- 7. Plasticity in excitability of CA1 and CA3 pyramidal cells after conditioned avoidance learning G. E. Farmer, C.K. McIntyre, K. M. Bruckmann, and L.T. Thompson *Society for Neuroscience Annual Meeting* Washington, DC: (November, 2008); Society for Neuroscience (2008) Online

The following abstracts are published online and will be presented at the annual meeting of the Society for Neuroscience in 2009:

- 1. Arc protein expression in the anterior cingulate cortex is critically involved in long-term memory of inhibitory avoidance training. C.M. Holloway, J.R. McReynolds, and C.K. McIntyre, *Society for Neuroscience Annual Meeting* Chicago (2009).
- 2. Posttraining intra-basolateral amygdala infusions of clenbuterol enhance memory for conditioned cue preference. M.B. Carriera, J.R. McReynolds, and C.K. McIntyre, *Society for Neuroscience Annual Meeting* Chicago (2009).

- 3. Intra-basolateral amygdala infusions of propranolol attenuate glucocorticoid effects on hippocampal Arc protein. K.M. Donowho, J.R. McReynolds, B. Roozendaal and C.K. McIntyre, *Society for Neuroscience Annual Meeting* Chicago (2009).
- **4. Posttraining intra-basolateral amygdala infusions of clenbuterol enhance object recognition memory**. K.M. Bruckmann, J.R. McReynolds, and C.K. McIntyre, *Society for Neuroscience Annual Meeting* Chicago (2009).
- **5.** The role of the vagus nerve in consolidation of extinction memory. D.F. Pena, T. Jasti, and C.K. McIntyre, *Society for Neuroscience Annual Meeting* Chicago (2009).
- 6. Memory enhancing corticosterone treatment increases Arc protein expression in medial prefrontal synaptic fractions. J.R. McReynolds, K.M. Donowho, C.M. Holloway, B. Roozendaal, and C.K. McIntyre, *Society for Neuroscience Annual Meeting* Chicago (2009).
- 7. Plasticity in amygdala pyramidal cell excitability after conditioned avoidance learning. G.E. Farmer, K.M. Bruckmann, A. Lovitz, C.K. McIntyre, and L.T. Thompson, *Society for Neuroscience Annual Meeting* Chicago (2009).

The following abstracts are published online and will be presented at the annual meeting of the Society for Neuroscience in 2010:

- 1. Arc protein expression in the anterior cingulate cortex is modulated by the basolateral complex of the amygdala. C.M. Holloway, I.A. Villalobos, A.E. Montana, C.K. McIntyre, *Society for Neuroscience Annual Meeting*, San Diego, CA (2010)
- 2. Posttraining blockade of basolateral amygdala norepinephrine attenuates corticosterone-induced Arc expression in prefrontal cortical synaptic fractions. J.R. McReynolds, C.M. Holloway, T.U. Parmar, C.K. McIntyre, *Society for Neuroscience Annual Meeting*, San Diego, CA (2010)
- **3.** Posttraining infusions of lidocaine into the basolateral complex of the amygdala impair novel object recognition memory and decrease Arc protein expression in the dorsal hippocampus. K.M. Prewitt, J.R. McReynolds, N.M. Vu, C.K. McIntyre, *Society for Neuroscience Annual Meeting*, San Diego, CA (2010)
- **4.** Vagus nerve stimulation enhances extinction of auditory fear conditioning.D.F. Pena, S. McAfee, C.K. McIntyre, *Society for Neuroscience Annual Meeting*, San Diego, CA (2010)

External funding for original investigations:

Grants/contracts awarded:

Amygdala Modulation of Multiple Neural Systems of Memory PI, Christa McIntyre USPHS – NIH Mental Health <u>National Research Service Award</u> (2001-2003)

Enhancing Fear Extinction Using Vagus Nerve Stimulation PI, Christa McIntyre Microtransponder Inc. contract (2008-2009) \$21,593.00 total direct and indirect

A mechanism for long-term storage of emotional memories PI, Christa McIntyre School of Behavioral and Brain Sciences Research Initiative(Fiscal year 2009)\$3,500.00 total direct cost

Use of vagal nerve stimulation as a method to enhance fear extinction

PI, Christa K. McIntyre and MicroTransponder Inc (Navzer Engineer, P.I.) 1R43MH086960-01A1 - National Institute of Health, SBIR (7/1/2010 – 6/30/2010) \$198,899 direct and indirect

Enhancing fear extinction using vagus nerve stimulation

Christa K. McIntyre Microtransponder, Inc., (9/1/2009- 5/31/2011) \$36,000 direct and indirect

Research Enhancement Fund

Christa K. McIntyre (8/1/2010) \$15,277

Summer Research Instruction

Clark Foundation; undetermined time; \$2,000.

Proposals submitted:

Enhancing fear extinction using vagus nerve stimulation (July, 2009 resubmission)

PIs, Navzer Engineer, Christa McIntyre NIH Small Business Innovation Research Award (RO1) (2009-2010) \$211,638.00, total direct and indirect

Biological targets for modulating stress effects on brain and behavior

PIs, Paul Gold, Cheryl Conrad, Ronald Hammer, Sungjin Hong, Donna Korol, Christa McIntyre and Ewan McNay DARPA (Dec. 2010 - June 2012) \$670,893.00 total direct (McIntyre lab) and indirect (UTD) \$5,000,000.00 all PIs combined Submitted

Mechanisms for the long-term storage of emotional memories

P.I., Christa McIntyre Whitehall Foundation (2007 – 2009) \$225,000.00, total direct

Vagus nerve stimulation therapy for blast-related traumatic brain injury

PI, Michael KilgardDepartment of Defense(2009-2014)\$2,939,208.00, total direct and indirect

Vagus nerve stimulation as adjunct to exposure therapy in treatment of PTSD

PI, Christa McIntyre NCTCTSI Pilot Award (2009-2010) \$34,000.00, total direct

Circuitry and cellular mechanisms of encoding emotional valence

PI, Jayme McReynolds USPHS – NIH Mental Health <u>National Research Service Award</u> (2009-2012) \$40,932.00, total direct and indirect

Teaching:

Doctoral student mentor:

- 1. Jayme McReynolds
 - Defended first year project, Spring 2008
 - Defended dissertation proposal, Fall 2008
 - Submitted NRSA, December, 2008
- 2. Crystal Holloway
 - Defended first year project, Spring 2008
 - Pre-proposal accepted, Spring 2009
 - Defended dissertation proposal, Fall 2009
 - Submitted NRSA, December, 2009

3. David Pena

- Defended first year project, Fall 2010
- Dissertation committee selected, Fall 2010
- 4. Kyle Donowho
 - Defended first year project, Fall 2010
 - Dissertation committee meeting, Fall 2010

Master's student mentor:

- 1. Rosemary Wright
 - Graduated 2007
 - Medical school
- 2. Carrie Williamson
 - Graduated 2008
- 3. Kyle Donowho
 - Graduated 2008
 - Ph.D. program at UTD
- 4. Maria Carriera
 - Graduated 2009

- Ph.D. program at UTSW
- 5. Isabel Villalobos
 - Presently engaged in research in my laboratory
- 6. Sibby Spurgeon
 - Presently engaged in research in my laboratory

Undergraduate student mentor:

Former:

- 1. Sonal Goswami
 - Graduated 2007
 - Ph.D. program at Rutgers (Denise Pare's lab)
- 2. Rodrigo Neely-Recuero
- 3. Patricia Granowski
- 4. Maria Carriera
 - Joined Fast track program at UTD (2008)
 - Gradated 2009
 - Ph.D. program at UT Southwestern
- 5. Kyle Donowho
 - Master's degree at UTD (2007)
 - Ph.D. program at UTD
- 6. Tara Jasti
 - Graduated 2009
 - Master's program at UTD
- 7. Kelly Bruckmann
 - Won undergraduate research award 2008
 - Graduated 2009
 - Researcher at UTSW
- 8. Stu McAfee
- 9. Ryan Louis
- 10. Ashley Vanderburg
 - Won undergraduate research award 2009
 - Graduated 2010
 - Researcher at Vanderbilt University

Present:

- 1. Amy Wong
- 2. Ann Nguyen
- 3. Nhu-Mai
- 4. Shadi Lavasani

- 5. Sharon Wu
- 6. Clifford Hsieh
- 7. Eno Inyang
- 8. Alyssa Montana
- 9. Holly McCoy
- **10.** Kirk Huynh
- 11. Mohammed Mahmud
- 12. Tulja Parmer
 - a. Won undergraduate research award 2010

Member of Doctoral Committees:

- 1. Vikram Jakkamsetti
- 2. George Farmer
- **3.** Ben Porter
- 4. Lu Dinh
- **5.** Justin Nichols
- 6. Jai Shetake

Classroom teaching:

1.	Fall, 2006	HCS7372.002	Neurobiology of Memory and Emotion
2.	Spring, 2007	HCS6336.001	Principles of Developmental Neuroscience*
3.	Fall, 2007	NSC 4357.001	Brain and Memory
4.	Fall, 2007	NSC 4353.001	Neuroscience Laboratory Methods*
5.	Spring, 2008	ACN 6346/HCS 6346	Systems Neuroscience *
6.	Spring, 2008	NSC 4353.001	Neuroscience Laboratory Methods*
7.	Fall, 2008	NSC 4353.001	Neuroscience Laboratory Methods*
8.	Fall, 2008	NSC 4353.002	Neuroscience Laboratory Methods*
9.	Spring, 2009	NSC 4353.001	Neuroscience Laboratory Methods*
10.	Spring, 2009	NSC 4353.002	Neuroscience Laboratory Methods*
11.	Fall, 2009	NSC 4353.002	Neuroscience Laboratory Methods*
12.	Spring, 2011	NSC 4353.002	Neuroscience Laboratory Methods*
13.	Spring, 2011	NSC 4353.003	Neuroscience Laboratory Methods *

*indicates core course