

Erin Rutherford Hascup, Ph.D.

Current Position: Assistant Professor
Departments of Neurology and Pharmacology
Neuroscience Institute
Center for Alzheimer's Disease and Related Disorders
Center for Integrated Research in Cognitive and Neural Sciences

Southern Illinois University School of Medicine
P.O. Box 19628
Springfield, IL 62794-9628

AREAS OF RESEARCH

- Neurotransmitter regulation in Alzheimer's disease
- Normal and abnormal cognitive aging
- Diabetes and Alzheimer's disease
- Disease-related circadian disruption
- Early intervention in Alzheimer's disease

EDUCATION

Undergraduate and Graduate

- 2002-2007** **Ph.D.** Anatomy and Neurobiology
University of Kentucky College of Medicine; Lexington, KY.
- 1997-2001** **B.S.** Chemistry: concentration in Biochemistry (Honors)
Hobart and William Smith Colleges; Geneva, NY.

Postgraduate

- 2009-2011** **Post Doctoral Fellow / McGill University**
Department of Psychiatry / Montréal, Québec, Canada
- Mentor: Alain A. Gratton, Ph.D.
- 2008-2009** **Junior Faculty / Karolinska Institute**
Department of Physiology and Pharmacology / Stockholm, Sweden
- Mentors: Jan Kehr, Ph.D., Per Svenningsson, Ph.D., Aleksander Mathé

HONORS, FELLOWSHIPS, and AWARDS

- 2015** Selected for oral presentation: “Soluble amyloid- β_{42} activates $\alpha 7nAChR$ *in vivo* and alters glutamatergic neurotransmission in A β pp/PS1 mice.” 45th Society for Neuroscience Annual Meeting. Chicago, IL.
- 2015** Accepted into the Early Career Reviewer program at the Center for Scientific Review, National Institutes of Health.
- 2015** Selected for oral presentation: “Soluble amyloid- β_{42} activates $\alpha 7nAChR$ *in vivo* and alters glutamatergic neurotransmission prior to cognitive decline in A β pp/PS1 mice.” Alzheimer’s Association International Conference. Washington, DC.
- 2014** Selected for oral presentation: “Glutamate neurotransmission is altered prior to cognitive decline in APP/PS1 mice, a mouse model of Alzheimer’s disease.” 44th Society for Neuroscience Annual Meeting. Washington, DC.
- 2014** Selected for oral presentation: “Local application of β -amyloid₁₋₄₂ elicits hippocampal sub-region specific glutamate release in C57BL/6 mice.” 44th Society for Neuroscience Annual Meeting. Washington, DC.
- 2009** Travel Award to attend/present at the European College of Neuropsychopharmacology Young Scientist Conference in Nice, France.
- 2007** Honorable mention at the University of Kentucky Postdoc Poster Session. Lexington, KY.
- 2007** Outstanding poster presentation at the annual Neuroscience Day hosted by the Bluegrass Chapter of the Society for Neuroscience. Lexington, KY.
- 2006** Outstanding graduate poster presentation at the 11th International Conference on *In vivo* Methods: Monitoring Molecules in Neuroscience.
- 2006** Outstanding graduate poster presentation at the annual Neuroscience Day hosted by the Bluegrass Chapter of the Society for Neuroscience. Lexington, KY.
- 2005** Outstanding graduate poster presentation at the annual Neuroscience Day hosted by the Bluegrass Chapter of the Society for Neuroscience. Lexington, KY.
- 2001** Graduated with Honors for outstanding original undergraduate research in Chemistry with a concentration in Biochemistry. Hobart and William Smith Colleges. Geneva, NY.

PROFESSIONAL EXPERIENCE

Faculty Appointments

Southern Illinois University School of Medicine, Springfield Illinois

2013- Assistant Professor, Departments of Neurology and Pharmacology, Neuroscience Institute, Center for Alzheimer's Disease and Related Disorders (CADRD), Center for Integrated Research in Cognitive and Neural Sciences (CIR-CNS)

Research Appointments

Southern Illinois University School of Medicine, Springfield Illinois

2012-2013 Research Associate, Department of Neurology and the Center for Alzheimer's Disease and Related Disorders
Advisors: Andrzej Bartke, Ph.D. and Greg Brewer, Ph.D.

- Project: Examining the metabolic theory and inflammation in Alzheimer's disease.
- Translational Implication: Therapeutic strategies for Alzheimer's disease and aging
- Technical Competence: Tissue dissection, ELISA, RT-PCR, mitochondria and synaptosome isolation and stress test.

McGill University, Montreal Canada

2009-2011 Postdoctoral Fellow, Department of Psychiatry

- Advisor: Alain A. Gratton, Ph.D.
- Project: Subregional differences in the rat nucleus accumbens glutamate reward response using enzyme-coated biosensors.
- Translational Implication: Therapeutic strategies for drug addiction.
- Technical Competence: Goal directed behavioral paradigms.

Karolinska Institute, Stockholm Sweden

2008-2009 Postdoctoral Fellow, Department of Physiology and Pharmacology

- Advisors: Jan Kehr, Ph.D. & Per Svenningsson, Ph.D.
- Project: Glutamatergic neurotransmission in Flinders Sensitive Line rat – a rodent model of depression.
- Translational Implication: Therapeutic strategies for depression.
- Technical Competence: Microdialysis, HPLC-EC.

Pfizer Inc. & Quanteon, L.L.C.

2008-2009 Contract Employee

- Advisors: Eva Hajos-Korcsok, Ph.D. & Greg A. Gerhardt, Ph.D.
- Project: Anxiolytic effects of metabotropic glutamate receptor agonists

and allosteric modulators on glutamate release in awake, freely moving rats.

- Translational Implication: Therapeutic strategies for anxiety and mood disorders.
- Technical Competence: Dose-response pharmacology.

University of Kentucky, Lexington Kentucky

2003-2007 Ph.D. Thesis Research, Department of Anatomy and Neurobiology

- Advisor: Greg A. Gerhardt, Ph.D.
- Projects: 1) Development and characterization of an enzyme-coated biosensor for studying neurotransmitter regulation in freely-moving rats. 2) Explored novel GDNF-based pharmacological treatments to protect dopaminergic cells in a rodent model of Parkinson's disease. 3) Evaluated experimental compounds for the treatment of Parkinson's disease, depression, and anxiety in conjunction with Amgen, Eli Lilly, and Johnson & Johnson.
- Translational Implications: Therapeutic strategies for neurodegenerative disorders including Parkinson's disease, Alzheimer's disease, depression, and anxiety.
- Technical Competence: Biological engineering, systems neurobiology, *in vivo* electrochemistry, rodent neurosurgery, intracranial drug delivery, immunohistochemistry.

2002-2003 Ph.D. Laboratory Rotations, Departments of Anatomy and Neurobiology, Biochemistry

- Advisors: Greg A. Gerhardt, Ph.D., Paul E.A. Glaser, M.D., Ph.D., and Rebecca Dutch, Ph.D.

Los Alamos National Laboratory, Los Alamos New Mexico

2001-2002 Post Baccalaureate Scientist, Bioscience Division

- Advisor: Theresa Ruscetti, Ph.D.
- Project: DNA repair mechanisms in yeast ribosomal DNA.
- Translational Implications: Therapeutic strategies for ageing and cancer.
- Technical Competence: Plasmid construction and transfection, flow cytometry, Southern and Western blots, RT-PCR.

Hobart and William Smith Colleges, Geneva New York

2000-2001 Undergraduate Research, Biology and Biochemistry Departments/Geneva, New York

- Advisor: Paul S. Pyenta, Ph.D. and Joel Kerlan, Ph.D.
- Projects: 1) Investigate the distance between antigen combining sites of

- IgE. 2) Effects of elevated testosterone in male Japanese Quail.
- Translational Implications: 1) Screening and therapeutic strategies for allergens. 2) Environmental effects on avian mating.
 - Technical Competence: Fluorescence resonance energy transfer (FRET), avian surgery.

Other Appointments

RateMyPI.com, Cincinnati Ohio
2011- Co-Founder

TEACHING

Courses

Southern Illinois University School of Medicine, Springfield Illinois

2016- Research in Neuroscience / Neurology, medical student elective (course director)

2014- Neuroscience, resident - level (course director and lecturer)

2013-2014 Neuroscience, resident - level (lecturer)

University of Kentucky, Lexington Kentucky

2004-2007 Center for Microelectrode Technology Training Course, graduate- and postgraduate- level (annual). Demonstrated and taught electrochemical theory and recording techniques to worldwide course participants. Electrochemical measures in several neurobiological systems of anesthetized and freely moving rodents were taught.

2004 Anatomy 209: Principle of Human Anatomy, undergraduate-level (teaching assistant and lecturer)

Multiple Sites, International

2004-2011 Fast Analytical Sensing Technology (FAST) Training and Installation, graduate- and postgraduate- level (as needed). A technique designed for subsecond *in vivo*, *in vitro*, and *ex vivo* electrochemical monitoring of central nervous system neurotransmitters utilizing enzyme-coated biosensors. Representatives from Eicom Corporation, Kyoto, Japan; Karolinska Institutet and Umeå University, Sweden; University of Groningen, Netherlands; McGill University; University of Montréal, Montréal, Québec, Canada and Ohio State University, USA were instructed how to successfully design, implement, and analyze experiments for real time neurotransmitter recordings.

SCHOLARSHIP

Grants and Contracts

Current

1. *Effects of circadian clock disruption on cognitive decline in a mouse model of Alzheimer's disease*

SIU Foundation Award Tischkau (PI) 2017

The goal of this application is to expand the understanding of Alzheimer's disease neuropathology by exploring how rest/activity patterns contribute to cognitive deficits and neuropathology.

Role: Co-PI

2. *Mechanisms underlying early glutamate dysregulation in Alzheimer's disease.*

SIU School of Medicine Near-Miss Grant Hascup (PI) 2016-2017

The goal of this study is to purchase and establish a breeding colony of a novel knock-in mouse model of Alzheimer's disease, *APP^{NL-F/NL-F}* mice, and to generate preliminary data for external grant applications. This research focuses on $A\beta_{42}$ -specific changes in neurotransmission, neurochemistry, and brain protein content in prodromal to mild Alzheimer's disease.

Role: PI

3. *Can riluzole restore glutamate function and cognition in a mouse model of Alzheimer's disease?*

Illinois Health Improvement Association Hascup (PI) 2016-2017

Currently in "no cost extension".

The goal of this study is to gather preliminary data regarding the effectiveness of riluzole as an early treatment for Alzheimer's disease.

Role: PI

Completed Research Support

1. *Restoring glutamate function as an early intervention for Alzheimer's disease*

Illinois Department of Public Health Hascup (PI) 2015-2016
63282003D 0.10 FTE

The goal of this study was to evaluate the mGluR Group II agonist, LY379268, as an early intervention for the treatment of Alzheimer's disease.

Role: PI

2. *Training in Drug Abuse Related Research*

NIH National Institute on Drug Abuse L. Hersch (PI) 2006-2007
T32 DA016176-03

The goal of this training program was to prepare promising graduate students and postdoctoral fellows for successful careers in drug abuse research. Broad-based training in modern concepts of drug abuse research will emphasize: (i) cellular and molecular studies of receptors involved in the response to drugs (ii) development of ligands which interact with these receptors as potential pharmacotherapies for drug abuse and (iii) cellular and molecular

aspects of neuroAIDS. The unifying focus of the training faculty is our interest in understanding basic mechanisms related to drug abuse at the molecular level.

Role: Fellow

Publications

Peer-reviewed

1. K.N. Hascup, M.K. Lynn, P. Fitzgerald, S. Randall, J.J. Kopchick, H.A. Boger, A. Bartke, **E.R. Hascup**. (2017) Enhanced Cognition and Hypoglutamatergic Signaling in a Growth Hormone Receptor Knockout Mouse Model of Successful Aging. *Journal of Gerontology: Biological Sciences*. 72(3): 329-337. PMID 27208894.
2. K.N. Hascup and **E.R. Hascup**. (2016) Soluble Amyloid- β 42 Stimulates Glutamate Release through Activation of the α 7 Nicotinic Acetylcholine Receptor. *Journal of Alzheimer's Disease*. 53(1): 337-347. PMID 27163813.
3. **E.R. Hascup**, F. Wang, J.J. Kopchick, A. Bartke. (2016) Inflammatory and Glutamatergic Homeostasis are Involved in Successful Aging. *Journal of Gerontology: Biological Sciences*. 71(3): 281-289. PMID 25711529.
4. K.N. Hascup and **E.R. Hascup**. (2015) Altered Neurotransmission Prior to Cognitive Decline in A β PP/PS1 Mice, a Model of Alzheimer's Disease. *Journal of Alzheimer's Disease*. 44(3): 771-776. PMID 25374106.
5. K.N. Hascup and **E.R. Hascup**. (2014) Electrochemical Techniques for Sub-second Neurotransmitter Detection in Live Animals. *Comparative Medicine*. 64(4): 249-255. PMID 25296011. PMCID 4170089.
6. O.M. Littrell, J.F. Fuqua, A.D. Richardson, J. Turchan-Cholewo, **E.R. Hascup**, P. Huettl, F. Pomerleau, L.H. Bradley, D.M. Gash, G.A. Gerhardt. (2013) A synthetic five amino acid propeptide increases dopamine neuron differentiation and neurochemical function. *Neuropeptides*. 47(1): 43-49. PMID 22981157. PMCID 3558608. NIHMS 407897.
7. T.M. Eriksson, A. Alvarsson, T.L. Stan, X. Zhang, K.N. Hascup, **E.R. Hascup**, J. Kehr, G.A. Gerhardt, J. Warner-Schmidt, M. Arango-Lievano, M.G. Kaplitt, S.O. Ogren, P. Greengard, P. Svenningsson. (2013) Bidirectional regulation of emotional memory by 5-HT(1B) receptors involves hippocampal p11. *Molecular Psychiatry*. 18(10): 1096-1105. PMID 23032875. PMCID 3781317. NIHMS 460628.
8. **E.R. Hascup**, K.N. Hascup, F. Pomerleau, P. Huettl, E. Hajos-Korcsok, J. Kehr, G.A. Gerhardt. (2012) An Allosteric Modulator of Metabotropic Glutamate Receptors (mGluR₂), (+)-TFMPIP, Inhibits Restraint Stress-Induced Phasic Glutamate Release in Rat Prefrontal Cortex. *J. Neurochem*. 122: 619-627. PMID 22578190. PMCID 3970435. NIHMS 560766.
9. K.N. Hascup, **E.R. Hascup**, M. Stephens, P.E.A. Glaser, T. Yoshitake, A. Mathé, G.A. Gerhardt, J. Kehr. (2011) Resting Glutamate Levels and Rapid Bursts of Glutamate Release in the Prefrontal Cortex of the Flinders Sensitive Line Rat—A Genetic Rodent Model of Depression. *Neuropsychopharm*. 36: 1769-1777. PMID 21525860. PMCID 3138656.

10. K.A. Kelps, J. Turchan-Cholewo, **E.R. Hascup**, T.L. Taylor, D.M. Gash, G.A. Gerhardt, and L.H. Bradley. (2011) Evaluation of the Physical and *In Vitro* Protective Activity of Three Synthetic Peptides Derived from the Pro- and Mature GDNF Sequence. *Neuropeptides*. 45: 213-218. PMID 21507484. PMCID 3091812. NIHMS 286232.
11. K.N. Hascup, X. Bao, **E.R. Hascup**, D. Hui, W. Xu, F. Pomerleau, P. Huettl, F. Pomerleau, M.L. Michaelis, E.K. Michaelis, G.A. Gerhardt. (2011) Differential Levels of Glutamate Dehydrogenase 1 (GLUD1) in BALB/c and C57BL/6 and the Effects of Over-expression of *Glud1* Gene on Glutamate Release in Striatum. *American Society for Neurochemistry Neuro*. 3(2): 99-108. PMID 21446915. PMCID 3086280.
12. **E.R. Hascup**, K.N. Hascup, M. Stephens, F. Pomerleau, P. Huettl, A. Gratton, and G.A. Gerhardt. (2010) Rapid microelectrode measurements and the origin and regulation of extracellular glutamate in rat prefrontal cortex. *J. Neurochem*. 115: 1608-1620. PMID 20969570. PMCID 2996468. NIHMS 247588.
13. **E.R. Hascup**, S. af Bjerkén, K.N. Hascup, F. Pomerleau, P. Huettl, I. Strömberg, and G.A. Gerhardt. (2009) Histological Studies of the Effects of Chronic Implantation of Ceramic-Based Microelectrode Arrays and Microdialysis Probes in Rat Prefrontal Cortex. *Brain Research* 1291: 12-20. PMID 19577548. PMCID 2980830. NIHMS 139988.
14. K.N. Hascup, **E.R. Hascup**, F. Pomerleau, P. Huettl., G.A. Gerhardt. (2008) Chronic Second-By-Second Measures of L-glutamate in the CNS of Conscious, Freely Moving Mice. *J. Pharm. and Exp. Therap*. 324(2): 725-731. PMID 18024788. PMCID 3404456. NIHMS 390173
15. T.C. Thomas , P.J. Kruzich, B.M. Joyce, C.R. Gash, K.L. Suchland, **E.C. Rutherford**, S.P. Surgener, D.K. Grandy, G.A. Gerhardt, P.E.A. Glaser (2007) Dopamine D4 Receptor Knockout Mice Exhibit Behavioral and Neurochemical Changes Consistent with Decreased Dopamine Release. *J. Neurosci. Meth*. 166: 306-314. PMID 17449106. PMCID 2699616. NIHMS 34501.
16. **E.C. Rutherford**, F. Pomerleau, P. Huettl, I. Strömberg, G.A. Gerhardt (2007) Chronic Second-by-Second Measures of L-Glutamate in the Central Nervous System of Freely Moving Rats. *J. Neurochem*. 102 (3), 712-722. PMID 17630982. PMCID 3482110. NIHMS 390177.

Chapters

1. J.J. Burmeister, **E.R. Hascup**, K.N. Hascup, V. Davis, S.R. Batton, F. Pomerleau, J.E. Quintero, P. Huettl, P.M. Talauliker, I. Strömberg, G.A. Gerhardt. Real-Time In Vivo Neurotransmitter Measurements Using Enzyme-Based Ceramic Microelectrode Arrays: What we have Learned about Glutamate Signaling. Chapter 5 of Compendium of In Vivo Monitoring in Real-Time Molecular Neuroscience: Volume 1: Fundamentals and Applications. Eds. George S. Wilson and Adrian C. Michael. World Scientific Publishing Company. 2015. ISBN-10: 9814619760.
2. **E.R. Hascup**, K.N. Hascup, P.M. Talauliker, D.A. Price, F. Pomerleau, J.E. Quintero, P. Huettl, A. Gratton, I. Strömberg, G.A. Gerhardt. Sub-Second Measurements of Neurotransmitter signaling using Enzyme-Based Microelectrode Arrays. Chapter 15 of

Microelectrode Biosensors. Eds. Stephan Marinesco and Nicholas Dale. Humana Press. 2013. ISBN-10: 1627033696.

3. K.N. Hascup, **E.R. Hascup**, O.M. Littrell, J.M. Hinzman, C.E. Werner, V.A. Davis, J.J. Burmeister, F. Pomerleau, J.E. Quintero, P. Huettl, G.A. Gerhardt. Microelectrode Array Fabrication and Optimization for Selective Neurochemical Detection. Chapter 2 of Microelectrode Biosensors. Eds. Stephan Marinesco and Nicholas Dale. Humana Press. 2013. ISBN-10: 1627033696.
4. M.L. Stephens, D.D. Spencer, I. Cavus, M. Hsiao, D. Song, S.H. Courellis, S.A. Deadwyler, R.E. Hampson, D. Putz, J.E. Quintero, M.K. Bensalem-Owen, K.N. Hascup, **E.C. Rutherford**, B.K. Day, J.R. Nickell, F. Pomerleau, P. Huettl, J.J. Burmeister, P.M. Talauliker, V.Z. Marmarelis, J.J. Granacki, T. Berger and G.A. Gerhardt. Microelectrode Based Epilepsy Therapy: A Hybrid Neural Prosthesis Incorporating Seizure Prediction and Intervention with Biomimetic Maintenance of Normal Hippocampal Function. Chapter 33 of Computational Neuroscience in Epilepsy. Eds. Ivan Soltesz and Kevin Staley. Academic Press pp 559-586, 2008. ISBN-10: 0123736498.
5. K.N. Hascup, **E.C. Rutherford**, J.E. Quintero, B.K. Day, J.R. Nickell, F. Pomerleau, P. Huettl, J.J. Burmeister, G.A. Gerhardt. Second-by-Second Measures of L-Glutamate and Other Neurotransmitters Using Enzyme-Based Microelectrode Arrays. Chapter 19 of Electrochemical Methods for Neuroscience. Eds. Adrian C. Michael and Laura M. Borland. CRC Press. Boca Raton, FL. pp 407-450, 2006. PMID: 21204381. ISBN-10: 0849340756

Abstracts

1. J. Britz, M.C. Cleveland, K.N. Hascup, **E.R. Hascup**, S. Tischkau. Activity Monitoring and Metabolic Measures in Pre-Symptomatic APP/PS1 Alzheimer's Disease Model. Midwest Chronobiology Seminar. Champaign, IL, September, 2016.
2. K.N. Hascup, S.O. Broderick, **E.R. Hascup**. Can Alzheimer's-Related Cognitive Decline be Delayed through Prodromal Treatment? Evidence from a Mouse Model of Alzheimer's Disease. Alzheimer's Association International Conference. Toronto, Canada, July, 2016. Published: *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*. 12 (7), P1017.
3. K.N. Hascup, S.O. Broderick, **E.R. Hascup**. Diet-Induced Obesity Causes Glutamatergic Dysregulation and Exacerbates Memory Impairment in A β pp/PS1 Mice. Alzheimer's Association International Conference. Toronto, Canada, July, 2016. Published: *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*. 12 (7), P339.
4. K.N. Hascup, P.J. Fitzgerald, S.O. Broderick, S. Randall, J.J. Kopchick, A. Bartke, **E.R. Hascup**. Conserved Memory and Hippocampal Glutamate in a Growth Hormone Receptor Knockout Model of Extended Life Span. Society for Neuroscience Annual Meeting. Chicago, IL, October 2015.
5. **E.R. Hascup**, S.O. Broderick, K.N. Hascup. Soluble Amyloid- β_{42} Activates $\alpha 7nAChR$ *In Vivo* and Alters Glutamatergic Neurotransmission in A β pp/PS1 Mice. Society for Neuroscience Annual Meeting. Chicago, IL, October 2015.

6. S.O. Broderick, K.N. Hascup, **E.R. Hascup**. Hippocampal Glutamate and Cognition is Altered in Normal Aging C57BL/6J Mice. Society for Neuroscience Annual Meeting. Chicago, IL, October 2015.
7. K.N. Hascup, S.O. Broderick, **E.R. Hascup**. Soluble Amyloid- β_{42} Activates $\alpha 7nAChR$ *In Vivo* and Alters Glutamatergic Neurotransmission Prior to Cognitive Decline in A β pp/PS1 Mice. Alzheimer's Association International Conference. Washington D.C., July 2015. Published: *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*. 11 (7), P202.
8. K.N. Hascup, S. Pehlman-Reeter, **E.R. Hascup**. Glutamate neurotransmission is altered prior to cognitive decline in APP/PS1 mice, a mouse model of Alzheimer's disease. Society for Neuroscience Annual Meeting. Washington D.C., November 2014.
9. K.N. Hascup and **E.R. Hascup**. Local application of β -amyloid $_{1-42}$ elicits hippocampal sub-region specific glutamate release in C57Bl/6 mice. Society for Neuroscience Annual Meeting. Washington D.C., November 2014.
10. **E.R. Hascup**, F. Wang, J.J. Kopchick, A. Bartke. Inflammatory and glutamatergic markers maintain homeostasis with age in the brain of genetically long-lived mice compared to age-matched control mice. American Aging Association Annual Meeting. San Antonio, Texas, May-June 2014.
11. **E.R. Hascup** and G.J. Brewer. Bioenergetic function is altered prior to disease pathology in a mouse model of Alzheimer's disease. Alzheimer's Association International Conference. Boston, Massachusetts, July 2013. Published: *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*. 9 (4), P348.
12. A. Alvarsson, T.M. Eriksson, T. Stan, K.N. Hascup, **E.R. Hascup**, G.A. Gerhardt, P. Svenningsson. The effects of 5-HT $_{1B}$ receptor modulation on glutamatergic neurotransmission *in vivo*. 24th ENCP Congress. Paris, France, September 2011.
13. G.A. Gerhardt, V. Parikh, **E.R. Hascup**. A Hitchhiker's Guide to the Phasic Brain: Sub-Second Measures of Glutamate and Acetylcholine Neurotransmission. 44th Winter Conference on Brain Research. Keystone, Colorado, January 2011.
14. **E.R. Hascup**, K.N. Hascup, J. Jackson, G.A. Gerhardt, A. Gratton. Glutamate and Neuronal Activity are Preferentially Elevated in Nucleus Accumbens Shell Over Core During Conditioned Stimulus Reward: A Study in Freely Behaving Long Evans Rats. 44th Winter Conference on Brain Research. Keystone, Colorado, January 2011.
15. P.F. Huettl, M. Stephens, V. Davis, J. Quintero, F. Pomerleau, J. Burmeister, K.N. Hascup, **E.R. Hascup**, G.A. Gerhardt. Ceramic-Based Microelectrode Array vs. Microdialysis Probe Measurements in the CNS of awake animals: It's about time. 44th Winter Conference on Brain Research. Keystone, Colorado, January 2011.
16. K.N. Hascup, **E.R. Hascup**, P.E.A Glaser, A.A. Mathé, G.A. Gerhardt, J. Kehr. Resting Glutamate Levels and Rapid Bursts of Glutamate Release in the Prefrontal Cortex of the Flinders Sensitive Line Rat - A Genetic Rodent Model of Depression. 49th Annual Meeting of the American College of Neuropsychopharmacology, Miami Beach, FL. December 2010.

17. P. Huettl, **E.R. Hascup**, G.A. Gerhardt. Removable and Reusable Ceramic-Based Microelectrode Arrays for Second-By-Second Measurements of Neurotransmitters in the CNS of Awake Animals. *Monitoring Molecules in Neuroscience*. 13th International Conference *In Vivo Methods*. Brussels, Belgium, September 2010.
18. K.N. Hascup, **E.R. Hascup**, G.A. Gerhardt, A.A. Mathe, J. Kehr. Neuropeptide Y Modulation of the Glutamatergic System in the Flinders Sensitive Line Rats: A Rat Model of Depression. European College of Neuropsychopharmacology Workshop on Neuropsychopharmacology for Young Scientist in Europe. Nice, France. March 2009.
19. **E.R. Hascup**, K.N. Hascup, F. Pomerleau, P. Huettl, G.A. Gerhardt, J. Kehr. The Source of Resting and Physiologically Evoked L-Glutamate Levels in Prefrontal Cortex in Awake Rats. European College of Neuropsychopharmacology Workshop on Neuropsychopharmacology for Young Scientist in Europe. Nice, France, March 2009.
20. P. Huettl, **E.R. Hascup**, K.N. Hascup, M. Lundblad, M. Stephens, G. Quintero, F. Pomerleau, and G.A. Gerhardt. Understanding Resting Neurotransmitter Levels in the CNS: Second-by-Second Measurements using Microelectrode Arrays. 42nd Winter Conference on Brain Research. Copper Mountain, Colorado, January 2009.
21. K.N. Hascup, **E.R. Hascup**, F. Pomerleau, P. Huettl, G.A. Gerhardt, and J. Kehr. L-glutamate Regulation and the Prefrontal Cortex and Striatum of Awake, Freely Moving C57BL/6 Mice. *Monitoring Molecules in Neuroscience: 12th International Conference on In Vivo Methods*. Vancouver, Canada, May 2008.
22. **E.R. Hascup**, K.N. Hascup, J.M. Hinzman, F. Pomerleau, P. Huettl, K.W. Johnson, I. Strömberg, G.A. Gerhardt, and J. Kehr. Determining the source of resting and physiologically-evoked L-glutamate levels using enzyme-based microelectrode arrays in awake rats. *Monitoring Molecules in Neuroscience: 12th International Conference on In Vivo Methods*. Vancouver, Canada, May 2008.
23. O.M. Littrell, J.L. Fuqua, A. Richardson, **E.R. Hascup**, F. Pomerleau, P. Huettl, D.M. Gash, G.A. Gerhardt. Characterization of the effects of Dopamine Neuron Stimulating Peptide (DNSP-11) on Dopamine Neuron Function. *Monitoring Molecules in Neuroscience*. 12th International Conference *In Vivo Methods*. Vancouver, British Columbia, Canada, May 2008.
24. F. Pomerleau, P. Huettl, **E.R. Hascup**, K.N. Hascup, J.J. Burmeister, and G.A. Gerhardt. Second-by-second measurements of glutamate and other neurotransmitters in awake, animals using microelectrode arrays. *Monitoring Molecules in Neuroscience: 12th International Conference on In Vivo Methods*. Vancouver, Canada, May 2008.
25. G.A. Gerhardt, F. Pomerleau, P. Huettl, **E.R. Hascup**, K.N. Hascup, J.E. Quintero, M.L. Stephens, P.M. Talauliker, and J.J. Burmeister. Real-time (2 Hz) measurements of neurotransmission *in vivo* using enzyme-based microelectrode arrays. *Monitoring Molecules in Neuroscience: 12th International Conference on In Vivo Methods*. Vancouver, Canada, May 2008.
26. O.M. Littrell, J.L. Fuqua, **E.R. Hascup**, P. Huettl, F. Pomerleau, G.A. Gerhardt. *In Vivo Effects of D- and L- Isomers of a Novel Dopamine Neuron Stimulating Peptide (DNSP-11)*. Bluegrass Chapter Neuroscience Poster Session. Lexington, Kentucky March 2008.

27. P. Huettl, **E.R. Hascup**, K.N. Hascup, F. Pomerleau, K.W. Johnson, G.A. Gerhardt. What Affects Resting Glutamate Levels in the Striatum and Prefrontal Cortex of Awake Rats and Mice? 41st Winter Conference on Brain Research. Snowbird, Utah January 2008.
28. **E.R. Hascup**, K.N. Hascup, F. Pomerleau, P. Huettl, K.W. Johnson, G.A. Gerhardt. The Source of Resting Glutamate Levels in Prefrontal Cortex of Awake Rats. University of Kentucky Postdoc Poster Session. Lexington, KY December 2007.
29. M.L. Stephens, **E.C. Rutherford**, J.E. Quintero, F. Pomerleau, P. Huettl, I. Strömberg, G.A. Gerhardt. Subregional Comparisons of Second-by-second Glutamate Clearance in the Rat Hippocampus During Aging. 14th Annual Meeting of the American Society for Neural Therapy and Repair, Clearwater Beach, FL, May, 2007.
30. **E.C. Rutherford**, F. Pomerleau, P. Huettl, I. Strömberg, K.W. Johnson, G.A. Gerhardt. Second-by-Second Enzyme-Based Amperometric Recordings of L-Glutamate in Awake Rats. 12th Institute of Biological Engineering Meeting. St. Louis, Missouri, March, 2007.
31. K.N. Hascup, **E.C. Rutherford**, F. Pomerleau, P. Huettl, G.A. Gerhardt. Second-by-Second Measures of L-glutamate Resting Levels Using Enzyme-Based Microelectrode Arrays in the CNS of Conscious Freely Moving Mice. 12th Institute of Biological Engineering Meeting. St. Louis, Missouri, March 2007.
32. G.A. Gerhardt, **E. Rutherford**, K.N. Hascup, J.E. Quintero, P. Talauliker, T. Currier Thomas, M.L. Stephens, J. Fuqua. T. Coates. J.J. Burmeister, F. Pomerleau, P. Huettl. Second-by-Second Measurements of L-glutamate and Other Neurochemicals in the CNS of Animal Models and Humans. 12th Institute of Biological Engineering Meeting. St. Louis, Missouri, March 2007.
33. P.M. Talauliker, F. Pomerleau, **E. Rutherford**, P. Huettl, J.T. Hastings, G.A. Gerhardt. Evaluation of Ceramic-based Microelectrode Arrays for In Vivo Recordings. 12th Institute of Biological Engineering Meeting. St. Louis, Missouri, March, 2007.
34. P. Huettl, G. E. Quintero, **E.C. Rutherford**, F. Pomerleau, K.W. Johnson, D.D. Schoepp G.A. Gerhardt. Pharmacological Studies of mGlu_{2/3} Drugs on Glutamate Release Utilizing Ceramic-Based Microelectrode Arrays. 40th Winter Conference on Brain Research. Snowmass, Colorado, January 2007.
35. **E.C. Rutherford**, F. Pomerleau, P. Huettl, I. Strömberg, K.W. Johnson, G.A. Gerhardt. Second-by-Second Enzyme-Based Microelectrode Recordings of Basal L-Glutamate in the Prefrontal Cortex of Awake Rats. Monitoring Molecules in Neuroscience: 11th International Conference on *In Vivo* Methods. Villasimius-Cagliari, Italy, May, 2006.
36. K.N. Hascup, **E.C. Rutherford**, F. Pomerleau, P. Huettl, G.A. Gerhardt. Second-By-Second Measures of L-Glutamate Using Enzyme-Based Microelectrodes in the CNS of Conscious, Freely Moving Mice. Monitoring Molecules in Neuroscience: 11th International Conference on *In Vivo* Methods. Villasimius-Cagliari, Italy, May 2006.
37. G.A. Gerhardt, F. Pomerleau, P. Huettl, J. Nickell, **E. Rutherford**, K.N. Hascup, J.E. Quintero, B.K. Day, T. Currier Thomas, M.L. Stephens, J.J. Burmeister, Ceramic Enzyme-Based Microelectrode Arrays for Second-by-Second Measurements of L-glutamate and

Other Neurochemicals in the CNS. Monitoring Molecules in Neuroscience: 11th International Conference on *In Vivo* Methods. Villasimius-Cagliari, Italy, May 2006.

38. P.M. Talauliker, **E.C. Rutherford**, F. Pomerleau, P. Huettl, M.L. Stephens, J.T. Hastings, G.A. Gerhardt. Multisite Microelectrode Array Studies of L-Glutamate Dynamics in the Rodent Hippocampus. Monitoring Molecules in Neuroscience: 11th International Conference on *In Vivo* Methods. Villasimius-Cagliari, Italy, May 2006.
39. **E. Rutherford**, F.P. Pomerleau, G.A. Gerhardt. Second-by-Second Recordings of Stress Induced L-Glutamate Release in the Striatum and Prefrontal Cortex of Unanesthetized Rats: Strain Differences. Society for Neuroscience Annual Meeting. Washington D.C., November 2005.
40. F.P. Pomerleau, **E. Rutherford**, P. Huettl, R.E. Hampson, S.E. Deadwyler, I. Strömberg, G.A. Gerhardt. Histopathology Studies of Long-Term Implantation of Ceramic-Based Microelectrodes in the rat Prefrontal Cortex. Society for Neuroscience Annual Meeting. Washington D.C., November 2005.
41. K.N. Hascup, **E.C. Rutherford**, F. Pomerleau, G.A. Gerhardt. Real Time (Second-By-Second) Measures of L-Glutamate in the CNS of Conscious, Freely Moving Mice. Society for Neuroscience Annual Meeting. Washington, D.C., November 2005.
42. P.M. Talauliker, **E. Rutherford**, F. Pomerleau, P. Huettl, J.T. Hastings, G.A. Gerhardt. Surface analysis of chronically implanted ceramic based microelectrode arrays using scanning electron microscopy. Society for Neuroscience Annual Meeting. Washington D.C., November 2005.
43. J. Allen, **E. Rutherford**, J.J. Burmeister, P.F. Huettl, F.P. Pomerleau, G.A. Gerhardt. Basal glutamate measures using m-phenylenediamine coated vs. Nafion[®] coated ceramic microelectrode arrays. Society for Neuroscience Annual Meeting. Washington D.C., November 2005.
44. **E. Rutherford**, F.P. Pomerleau, I Stromberg, K.W. Johnson, G.A. Gerhardt. Second-by-second recordings of L-glutamate due to stress in the striatum and prefrontal cortex of unanesthetized rats. 5th International mGluR Meeting. Taormina-Sicily, Italy, September 2005.
45. F.P. Pomerleau, **E. Rutherford**, G.A. Gerhardt. Improvements in real time (second-by-second) *in vivo* measures of L-glutamate in the striatum of conscious, freely moving rats: Effects of stress. Society for Neuroscience Annual Meeting. San Diego, CA, October 2004.
46. **E. Rutherford**, C.R. Gash, B.M. Joyce, S. Surgener, T.D. Currier, D. Grandy, G.A. Gerhardt, P.E.A. Glaser. Dopamine Neuron Dynamics are Altered in the Nucleus Accumbens of Mice Lacking the D4 Dopamine Receptor. Society for Neuroscience Annual Meeting. New Orleans, LA, November 2003.
47. F.P. Pomerleau, **E.C. Rutherford**, G.A. Gerhardt. Real Time (second-by-second) *in vivo* Measures of L-Glutamate in the CNS of Conscious, Freely Moving Rats Using Multisite Microelectrode Arrays. Society for Neuroscience Annual Meeting. New Orleans, LA, November 2003.

48. J.C. Martin, J. Parsons, **E. Rutherford**, T. Ruscetti and W.P. Ambrose. Development of an Imaging Flow Cytometer. International Society for Analytical Cytology (ISAC) Conference. San Diego, CA, May 2002.
49. **E. Rutherford**, T. Max, J.A. Nickoloff, and T. Ruscetti. Strict Regulation of Ribosomal DNA Homologous Recombination. Radiation Research Society Meeting. Reno, NV, April 2002.
50. **E. Rutherford** and T. Ruscetti. Aging Process Linked to Homologous Recombination in Specific DNA Sequence. Symposium 2001—Championing Scientific Careers. Santa Fe, NM, August 2001.

Oral Presentations

Invited

1. Glutamate Neurotransmission and Cognition in Health and Disease: Evidence from Mouse Models. Neurology Grand Rounds. SIU School of Medicine, Springfield, Illinois. April, 2016.
2. Glutamate Neurotransmission in Mouse Models of Cognitive Health and Disease. Southern Illinois University, Carbondale, Illinois. December, 2014.
3. Using Enzyme-Based Microelectrode Arrays to Measure Neurotransmitters *In Vivo*. Pharmacology Seminar Series. SIU School of Medicine, Springfield, Illinois. April, 2013.
4. Get Excited: Glutamate in Neurological Diseases and Disorders. Neurology Grand Rounds. SIU School of Medicine, Springfield, Illinois. February, 2013
5. Extracellular L-Glutamate Regulation: Pharmacological and Ethological Studies in the Awake Rat. Uppsala University, Uppsala, Sweden. January, 2009.
6. Interface Technology: Histopathological Studies of the Effects of MEAs on Brain Tissue. University of Southern California, Los Angeles, California. May, 2007.
7. L-Glutamate Dynamics in the Brains of Freely Moving Rats. University of Texas MD Anderson Cancer Center, Houston, Texas. May, 2007.

International

1. Soluble Amyloid- β_{42} Activates $\alpha 7$ nAChR *In Vivo* and Alters Glutamatergic Neurotransmission in A β pp/PS1 Mice. Society for Neuroscience Annual Meeting. Chicago, IL, October 2015.
2. Local application of β -amyloid $_{1-42}$ elicits hippocampal sub-region specific glutamate release in C57Bl/6 mice. Society for Neuroscience Annual Meeting. Washington D.C. November, 2014.
3. Exciting Possibilities: Tonic and Phasic Glutamate in the Awake Behaving Rat Focusing on Depression and Reward. 44th Annual Winter Conference on Brain Research. Keystone, Colorado. January, 2011.
4. Exciting Possibilities: A Novel Approach for Measuring L-glutamate in the Awake

Behaving Rat. Douglas Mental Health University Institute, Montreal, Quebec, Canada. September, 2009.

National

1. Second-by-Second Enzyme-Based Amperometric Recordings of L-Glutamate in Awake Rats. 12th Institute of Biological Engineering Meeting. St. Louis, Missouri. March, 2007.
2. Aging Process Linked to Homologous Recombination in Specific DNA Sequence. Symposium 2001 Meeting. Santa Fe, New Mexico. August 2001.

State, Regional and Local

1. Basic Science Research at the Center for Alzheimer's Disease and Related Disorders: Past, Present, and Future. Memory and Aging Network Meeting. SIU School of Medicine, Springfield, Illinois. September, 2013.
2. Microelectrode array recordings of L-glutamate dynamics in the brain of freely moving rats. Ph.D. Dissertation Defense Seminar, University of Kentucky, Lexington, Kentucky. March, 2007.
3. Second-by-Second Measures of L-Glutamate Dynamics in Awake Rats. University of Kentucky Department of Anatomy and Neurobiology Seminar Series, Lexington, KY. May 2006.
4. Second-by-Second Glutamate Measures in Behaving Rats: New Answers to Drug Abuse Questions. University of Kentucky NIDA Training Grant Symposium, Lexington, Kentucky. October 2005.
5. Second-by-Second Recordings of L-glutamate in the Striatum and Prefrontal Cortex of Unanesthetized Rats. University of Kentucky Department of Anatomy and Neurobiology Seminar Series, Lexington, Kentucky. March 2005.
6. Second-by-Second Recordings of L-glutamate in the Striatum of Unanesthetized Rats. University of Kentucky Department of Anatomy and Neurobiology Seminar Series, Lexington, Kentucky. May 2004.
7. Investigation of the Relative Distance between Antigen Combining Sites of IgE. Hobart and William Smith Student Research Symposium, Geneva, New York. April 2001.

SERVICE

Membership and Activities in Professional Societies – International

International Society to Advance Alzheimer's Research and Treatment (ISTAART)
2013- Member

Society for Neuroscience (SfN)

2004- Member

2016- Find A Neuroscience (FAN) Program Member

International Behavioral Neuroscience Society (IBNS)

2009-2012 Member

European College of Neuropsychopharmacology (ENCP)

2009-2012 Member

Membership and Activities in Professional Societies – National and Local

Center for Integrated Research in Cognitive and Neural Sciences (CIR-CNS)

2014- Member

American Aging Association

2013- Member

Federation of American Societies for Experimental Biology (FASEB)

2001-2002 Member

American Chemical Society (ACS)

2000-2001 Member

University Committees and Review Work

Southern Illinois University School of Medicine

2016- Vice Chair and Reviewer, Grant Review Committee
2016- Member, Department of Neurology Promotion and Appointment Committee
2015-2016 Member, Research Strategic Planning Committee
2014-2016 Member and Reviewer, Grant Review Committee
2014- Medical Student Admissions Interviewer
2014-2015 New Faculty Applicant Interviewer
2014-2015 Member, CADRD Director Search Committee
2014 Non-GRC member, Reviewer for Research Seed Grants
2013- Member, Laboratory Animal Care & Use Committee
2013- Member, Infection Control & Safety Committee

University Relations

Southern Illinois University School of Medicine

2017 Research presentation to Healthcare Explorers of Central Illinois
2016 Laboratory tour/demonstration for Illinois Neurological Institute (OSF)
2015 Laboratory tour/demonstration for SIUSOM alumni and family
2015 Laboratory tour/demonstration for Illinois House Representative Tim Butler
2014 Illinois Math and Science Academy (Blessed Sacrament) Presentation
2014 4H Medical Special Interest Group Presentation

2014 UIS PreHealth Society Presentation
2013 Take Your Child to Work Day Presentation

Granting Agency Review Work

2016 Collaborative Cancer Disparities Research Program Reviewer
2016 NIH Chronic Dysfunction and Integrative Neurodegeneration (CDIN) Study
 Section Early Career Reviewer (Cycle I)
2016- Caryl Towsley Moy, PhD Endowed Fund for Collaborative Research Review
 Panel Member
2013- Alzheimer's Association Grant Review Panel
Multiple years Illinois Dept. of Public Health Alzheimer's Disease Research Fund Peer
 Review Panel Member (2013, 2016, 2017)

Editorial and Ad Hoc Review Activities

Editorial Boards

2015, 2017 Associate Editor, Journal of Alzheimer's Disease
2017- Chapter Editor, StatPearls

Ad Hoc Manuscript Review

Aging Cell, American Journal of Physiology, Brain Research, Comparative Medicine,
Gerontology, Journal of Biomolecular Screening, Journal of Neuroscience Methods,
Neurochemistry International, Physiology and Behavior.

PROFESSIONAL DEVELOPMENT

2015 Lean Six Sigma Executive White Belt Certified
2014 Write Winning Grant Proposals Workshop, Grant Writers' Seminars and
 Workshops
2014 Early Career Women Faculty Professional Development Seminar, American
 Association of Medical Colleges.
2013 Professional Grant Development Workshop, Grant Training Center.
2013 NIH Grant Writing Workshop, Grant Training Center.