

**Brandi J. Mattson, Ph.D.**  
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Human Neuroimaging Laboratory  
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### **Research Interests**

My primary interest is to investigate neural activity within dopaminergic systems in the brain during learning decision-making. Specifically, I aim to elucidate the neural substrates mediating choice among reinforcing stimuli, how these processes are perturbed during psychiatric and neurological disorders, and how they lead to the production and maintenance of altered behavioral patterns.

### **Education**

Southwestern University, 1991-1993

University of Colorado, 1994-1996

\*advanced undergraduate/graduate level neuroscience coursework

University of Southern Colorado, 1996-1997, Bachelor of Arts, summa cum laude

Major: Psychology - behavioral neuroscience and clinical psychology tracks

Minors: Mathematics and Sociology

Senior Thesis: under the supervision of Paul Kulkosky, Ph.D.

The effect of 8-OH-DPAT on CCK-induced satiety of ethanol intake

Rutgers University, Center for Molecular and Behavioral Neuroscience, 1997-2002

Ph.D. Behavioral and Neural Sciences, summa cum laude

Research Project: under the supervision of Elizabeth Abercrombie, Ph.D., James Tepper, Ph.D.

Substantia nigra dopaminergic neuronal burst firing pattern increases striatal dopamine efflux measured by in vivo microdialysis

Candidacy Exam Project: under the supervision of James Tepper, Ph.D.

Differential effects of glutamatergic antagonists on GABA<sub>A</sub> antagonist induced burst firing of substantia nigra dopaminergic neurons in vivo

Dissertation: advisors Joan Morrell, Ph.D. and Jay Rosenblatt, Ph.D.

Competing appetitive processes in the lactating, maternal rodent: Natural and pharmacological stimuli

### **Post-Graduate Employment**

National Institute on Drug Abuse, National Institutes of Health, June 2002 – February 2005

Post-Doctoral Research Scientist

Advisors: Bruce T. Hope, Ph.D., Carl Lupica, Ph.D.

Project: Investigate the behavioral, molecular, and cellular mechanisms that underlie context-dependent cocaine and amphetamine reward in the dorsal and ventral striatum

Responsibilities: design and implement experimental protocols, advising and supervising post-baccalaureate students, writing scientific protocols for institutional review board

Brain Mind Institute, École Polytechnique Fédérale de Lausanne, March 2005 – April 2006

Group Leader, Microcircuit Structure and Function, Laboratory of Neural Microcircuitry

Advisor: Henry Markram, Ph.D.

Projects: characterize the electrophysiology and morphology of layer 1 neocortical neurons, consultant for various projects investigating cortical deficits in the sodium valproic rat model of autism, consultant for Blue Brain Project

Responsibilities: laboratory liaison on animal facility committee and undergraduate laboratory exposure, writing animal research protocols and licenses for state institutional review board, assisted in the development and scientific advisement of a patent application for possible therapeutic treatments of autism; training and advising technicians, undergraduate students, graduate students and post-doctoral fellows

Assistant Scientific Editor, *Neuron*, May 2006 – present

Supervisor: Katja Brose, Ph.D.

Responsibilities: handling primary manuscripts (all disciplines) from initial submission through final decision, commissioning and editing reviews, coordinating with public relations and production departments, consulting editor for *Cell* on neuroscience topics, organize SfN satellite meeting, attend conferences and local seminars on a variety of topics, coordinate, select, edit book reviews

Baylor College of Medicine, December 2007 – present

Postdoctoral Associate

Advisors: Read Montague

Projects: elucidate neural substrates underlying higher order cognitive function in multiple sclerosis and Parkinson's Disease using fMRI, characterize dopaminergic signaling in rodent models of decision-making behavioral tasks using voltametry and electrophysiology

Responsibilities: design and implement experimental protocols, writing scientific protocols for institutional review board, set up rodent voltametry laboratory

## **Publications**

**Mattson BJ**, Koya E, Simmons DE, Mitchell TB, Berkow A, Crombag HS, Hope BT. (2008) Context-specific sensitization of cocaine-induced locomotor activity and associated neuronal ensembles in rat nucleus accumbens. *European Journal of Neuroscience*, 27, 202-12. Epub 2007 Dec 17.

**Mattson BJ**, Simmons D, Kreuter JD, Crombag HS, Morales M, Hope BT. (2007) Repeated administrations of amphetamine in a novel, but not home cage, environment enhances Fos expression in enkephalinergic neurons of rat nucleus accumbens, *Behavioral Brain Research*, 185, 88-98. Epub 2007 Jul 21.

Hope BT, Simmons DE, Mitchell TB, Kreuter JD, **Mattson BJ** (2006) Cocaine-induced locomotor activity and Fos expression in nucleus accumbens are sensitized for 6 months after repeated cocaine administration outside the home cage. *European Journal of Neuroscience*, 24, 867-75.

**Mattson BJ**, Bossert JM, Simmons DE, Nozaki N, Kreuter JD, and Hope BT (2005) Cocaine-induced CREB phosphorylation in nucleus accumbens of cocaine-sensitized rats is enabled by enhanced activation of ERK, but not PKA, *Journal of Neurochemistry*, 95, 1481-94.

**Mattson BJ** and Morrell JI (2005) Preference for cocaine- versus pup-associated cues differentially engages neurons expressing either Fos or CART in lactating, maternal rodent, *Neuroscience*, 135, 315-328.

Kreuter JD, **Mattson BJ**, Wang B, You Z-B, Hope BT (2004) Cocaine-induced Fos expression in rat striatum is blocked by chloral hydrate or urethane. *Neuroscience*, 127, 233-42.

**Mattson BJ**, Williams S, Rosenblatt JS, Morrell JI (2003) Preferences for cocaine- or pup-associated chambers differentiates otherwise behaviorally identical postpartum maternal rats. *Psychopharmacology (Berl)*, 167(1), 1-8.

**Mattson BJ**, Williams S, Rosenblatt JS, Morrell JI (2001) Comparison of two positive reinforcing stimuli: Pups and cocaine. *Behavioral Neuroscience*, 135, 683-694.

Kulkosky PJ, Allison CT, **Mattson BJ** (2000) Thyrotropin releasing hormone decreases alcohol intake and preference in water restricted rats. Alcohol, 20, 87-91.

Kulkosky PJ, Allison CT, Allison TG, Marquez LM, **Mattson BJ** (1998) Interaction of CCK and 8-OH-DPAT in the satiation of alcohol intake. Alcohol, 16, 305-309.

### **Works Submitted**

Koya E, Bossert J, Berkow A, Simmons DE, Mitchell TB, **Mattson BJ**, Uejima J, Shaham Y, Hope BT. Cell-specific lesioning of neuronal ensembles activated during cocaine-induced behavior, in revision for Nature.

### **Platform and Poster Presentations** (\* presenting author)

Koya E\*, Simmons DE, Bossert JM, Uejima JL, Berkow A, Mitchell T, Farquhar D, **Mattson BJ**, Shaham Y, Hope BT (2007) Daun02 mediated lesioning of activated neuronal ensembles in rat nucleus accumbens following context-specific sensitization to cocaine. To be presented at the Society for Neuroscience annual meeting, San Diego, CA.

**Mattson BJ**, Ueno Y\*, Markram H (2006) Electrophysiological and morphological characterization of layer 1 neocortical somatosensory neurons. Forum of European Neuroscience biannual meeting, Vienna, Austria.

\***Mattson BJ**, Kulangara K, Rinaldi T, Antonello K, Hirling H, Markram H (2005) Characterization of intracellular signal transduction pathways in an animal model of autism. Society for Neuroscience annual meeting, Washington, D.C.

\*Garcia S, **Mattson BJ**, Rinaldi T, Buhl DL, Markram H (2005) Quantification of neocortical neuronal subpopulations in an animal model of autism. Society for Neuroscience annual meeting, Washington, D.C.

\*Morrell JI, **Mattson BJ**, Wansaw MP, Smith KS, Seip KM (2005) Medial Preoptic Area (MPOA) is a neural hot spot involved in the motivation to perform maternal behavior. Society for Neuroscience annual meeting, Washington, D.C.

\*Hope BT, **Mattson BJ**, Simmons DE, Lupica CR (2004) Activation of nucleus accumbens neurons in cfos-lacZ transgenic rats following acute and repeated cocaine administration. Society for Neuroscience annual meeting, San Diego, CA.

\***Mattson BJ**, Bossert JM, Hope BT (2004) Sensitized ERK signaling mediates sensitized CREB phosphorylation in the nucleus accumbens following cocaine sensitization. Society for Neuroscience annual meeting, San Diego, CA.

Kreuter JD, **Mattson BJ**, Crombag HS, Morales M, \*Hope BT (2003) Repeated amphetamine administration in a novel environment increases acute amphetamine-induced Fos expression in the accumbens, but not the caudate, in rats. Society for Neuroscience annual meeting, New Orleans, LA.

\***Mattson BJ**, Thiriet N, Simmons DE, Kreuter JD, Hope BT (2003) Identification of environmentally selected striatal neurons during cocaine sensitization in the rat using Fos-B, c-fos, and egr-1 double-labeling. Society for Neuroscience annual meeting, New Orleans, LA.

\***Mattson BJ** and Hope BT (2003) Sensitization of CREB signaling pathway in the caudate and accumbens mediating cocaine locomotor sensitization in rats. Presented at the 2<sup>nd</sup> annual meeting of the Molecular and Cellular Cognition Society, New Orleans, LA.

\*Hope BT, Crombag HS, Kreuter JD, **Mattson BJ** (2003) Fos as a marker of sensitized neurons in the rat accumbens following behavioral sensitization to cocaine or amphetamine. Winter Conference on Brain Research, Snowbird, UT.

\*Smith KS, **Mattson BJ**, Morrell JI (2002) A quantitative analysis of neural substrates engaged in the motivation to perform maternal behavior. Society for Neuroscience annual meeting, Orlando, FL.

\***Mattson BJ** and Morrell JI (2001) Neuronal Fos expression in dams with preferences for cocaine-or pup-conditioned contexts. Society for Neuroscience annual meeting, San Diego, CA.

\***Mattson BJ**, Norstrom O, Williams S, Guo XX, Rosenblatt JS, Morrell JI (2000) Do dams prefer pups or cocaine Society for Neuroscience annual meeting, New Orleans, LA.

\***Mattson BJ**, Norstrom O, Williams S, Guo XX, Rosenblatt JS, Morrell JI (2000) Are the reinforcing properties of cocaine or pups greater to maternal dams? Platform Presentation, College on Problems of Drug Dependence meeting, San Juan, Puerto Rico.

\*Kulkosky PJ, Allison CT, **Mattson BJ** (1998) Thyrotropin releasing hormone decreases alcohol intake and preference. Platform presentation at SWARM Division of AAAS meeting Grand Junction, CO.

\*Kulkosky PJ, Marquez LM, Allison CT, **Mattson BJ** (1997) Leptin reduces alcohol drinking and associated food intake. Platform presentation at SWARM Division of AAAS meeting, College Station, TX.

\***Mattson BJ**, Marquez LM, Kulkosky PJ (1997) Effects of mianserin and 8-OH-DPAT on CCK-induced satiation of alcohol intake. SWARM Division of AAAS., College Station, TX.

## **Honors and Awards**

### Graduate Honors and Awards

- Ralph J. Bunche Fellowship, Rutgers University. 1997-1998; university-wide competitive fellowship for minority graduate students, nominated by György Buzsáki, Ph.D.
- Minority Biomedical Research Support Program Scholar, Rutgers University program directors Barry Komisaruk, Ph.D., Ann Cali, Ph.D.
- American Psychological Association Minority Neuroscience Fellowship
- Society for Neuroscience, Conference Fellowship for Minority Neuroscientists, 2001-2004
- Dean's Dissertation Award, 2002

### Undergraduate Honors and Awards

- Presidential Scholar, Southwestern University, 1991-1993
- Who's Who Among Students in American Colleges and Universities, 1992
- Dean's List, 1992 - 1997
- Minority Biomedical Research Support Program Scholar, 1996-1997, University of Southern Colorado, program director Sandra Bonetti, Ph.D.
- All-American Scholar

## **Professional affiliations and contributions**

### Organizations

- Psi Chi
- Phi Kappa Phi
- Society for Neuroscience, 2000 to present
- Molecular and Cellular Cognition Society, 2002 to present

Reviewer: Neuroscience, Endocrinology

Conference Organizer:

- Graduate Symposium, Rutgers University
- Neuron Satellite Meetings for Society for Neuroscience
- Various large scale events for University Alumni Relations as undergraduate

### **Teaching and advising experience**

Teaching Assistant

- Physiological Psychology (advanced undergraduate/graduate course)
- Physiological Psychology (undergraduate course)
- General Psychology (undergraduate course)
- Empirical Research Methods and Statistics (undergraduate course)
- Foundations of Neuroscience (graduate course)

Research Advisor

- Undergraduate Research Internship Program Coordinator for Neuroscience Research, Rutgers University
- Supervise high school research assistant, undergraduate research assistants, and junior graduate students: data collection, experimental procedures, experimental design, data analysis, Rutgers University
- Post-Baccalaureate Intramural Research Training Assistant, Behavioral Neuroscience Branch, National Institute on Drug Abuse/National Institutes of Health: train technicians with animal handling, injections, and stereo-taxic surgery, immunohistochemistry, behavioral assays, histological methods, data collection and analysis, literature searches, experimental design
- Advisor for minority summer research interns
- Group Leader, EPFL: train and supervise technicians, visiting students, graduate students, and post-doctoral fellows
- Scientific advisor for a patent application for therapeutic targets for the treatment of autism and pervasive developmental disorders

Tutor

- Psychology
- Statistics
- Foundations of Neuroscience

**List of technical repertoire and small animal training available upon request**

**References available upon request**