

Curriculum Vitae

Name: Subhrajit Bhattacharya
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Personal Statement

My personal interest in neuroscience stems from the belief that only a fraction of the “brain story” has been read so far. A plethora of scientific discoveries are needed to get a better understanding of complex neural networks specifically in the field of synaptic plasticity and how it helps memories to be formed and stored. Supported by a strong training in molecular neuroscience in my masters, this interest grew into a long-term goal to become a neuroscientist and study how receptors in neurons play a major role in memory processing. The doctoral project I worked on fits into my long-term objectives, and dealt with how fear memories are reconsolidated through Glutamate receptor trafficking. We opined that reconsolidation and Glutamate receptor waves in neurons are mediated by dissociation between LTP and LTD post-retrieval. My training under Dr. Vishnu Suppiramaniam’s supervision in electrophysiology combined with behavioral neuropsychology with Dr. Martha Escobar, has given me the opportunities to integrate two fields with common roots. My long-term career goal is to pursue active research and teaching as a faculty. I see myself in future as a neuroscientist and pharmacologist working for the betterment of science and technology in this “yet-to-be- elucidated” field. My experience from post-doctoral program at Dr. Traynelis’s laboratory at Emory University includes extensive training in the field of synaptic mechanisms of Glutamate receptor subtype mediated activities and intense electrophysiology aided drug development of NMDAR subtype selective compounds. Besides working on NMDARs, I have worked on multiple other projects involving AMPAR and its novel auxiliary units, signaling in different parts of the thalamus in Parkinsonian models, rare human mutations affecting pediatric epilepsy and chanelopathies. This intense postdoctoral training at Dr. Traynelis’s lab will help me further cement my grip and grow critical aspects of understanding neuroscience at a higher level.

Education

01/2016- Present Emory University, Postdoctoral Fellow, Neuropharmacology, Department of Pharmacology
Projects: Novel protein interaction with AMPARs, GluN2B subtype selective drug design in knock out animals, NMDAR activity in Subthalamic nuclei/Cerebellum, TMD mutations of NMDARs

08/2011-12/2015 Auburn University, AL, Ph.D.; Major: Pharmacology, Department of Drug Discovery and Development, **Thesis Title:** “Role of Glutamatergic Receptor Mediated LTP and LTD in Reconsolidation and Updating of Fear Memory”, GPA: 4.0/4.0

08/2009-08/2011 Butler University, IN, M.S.; Major: Pharmaceutical Sciences
Thesis Title: “Ser146/147 Mutation on Dopamine 2 Receptor-IC2 Changes Beta Arrestin Binding and Receptor Signaling through ERK1/2 but not cAMP”, GPA: 3.98/4.0

06/2005-06/2009 West Bengal University of Health Sciences, Calcutta, India B. Pharm, GPA: 4.0/4.0 (89/100, **Gold Medalist, State First Rank Holder, 2009**)

06/1992-06/2005 South Point High School, Calcutta, India (Among Top 3 Science Schools in South Asia)

Honors, Awards and Memberships

- 2016** Invited Guest Speaker, Session on Insulin Resistance and Beta Cell Biology, World Congress of Diabetes, Kaohsiung, Taiwan
- 2015** Merriwether Award nominee, Auburn University
- 2015** Invited Guest Speaker, Session on Insulin Resistance and Beta Cell Biology, World Congress of Diabetes, Kaohsiung, Taiwan
- 2014** Three Minutes Thesis Competition, University of Queensland, Australia
- 2014** Graduate Travel Scholarship, Auburn University, AL
- 2013-15** Graduate Dissertation Project Award (5000\$), Graduate School, Auburn University, AL
- 2014** Graduate Poster Competition (top posters in science), Graduate School, Auburn University, AL
- 2013-2015** Student Representative, Graduate Program Committee, Harrison School of Pharmacy, AL
- 2012-2014** Senator, Graduate Student Council, Auburn University, AL
- 2013** Don Tillery Award, Harrison School of Pharmacy, AL
- 2012-present** Member, Society for Neuroscience
- 2018** Member, American Epilepsy Society
- 2009-10** Outstanding Graduate Student Award and Fellowship, Butler University, IN
- 2009** Gold Medalist and State First Rank Holder, M. N. Dey Memorial Award (first among 2.5 million competitors), Calcutta, West Bengal, India
- 2008** Best Young Scientist Award, Indian Science Congress, 2008, India

Publications

- 1. Bhattacharya S**, Roy Pradhan S, Khandaker S, Chowdhury S, **(2010)** Quantitative Structure Activity Relationship Study of Some Flavonoids by Fujita-Ban Method, International Journal of Research in Pharmaceutical and Biomedical Sciences
- Parameshwaran K, Buabeid MA, **Bhattacharya S**, Uthayathas S, Kariharan T, Dhanasekaran M, Suppiramaniam V, **(2013)** Long Term Alterations in Synaptic Physiology, Expression of β 2 Nicotinic Receptors and ERK1/2 Signaling in the Hippocampus of Rats with Prenatal Nicotine Exposure, Neurobiol Learn Mem.
- Suppiramaniam V, Buabeid M, **Bhattacharya S**, Parameshwaran K, **(2014)** Ion Channels, Toxicology
- Bloemer J*, **Bhattacharya S***, Amin R, Suppiramaniam V, **(2014)** Impaired Insulin Signaling and Mechanisms of Memory Loss, Progress in Molecular Biology and Translational Science, 121:81-94 (* **co-first authors**)
- Katz DP, Bhattacharya D, **Bhattacharya S**, Deruiter J, Clark CR, Suppiramaniam V, Dhanasekaran M, **(2014)** Synthetic Cathinones: "A Khat and Mouse Game", Tox Letters.
- Bhattacharya D, Dunnaway E, **Bhattacharya S**, Escobar M, Dhanasekaran M, Suppiramaniam V, **(2015)** Impaired ILK function is associated with hippocampal based memory and synaptic plasticity deficits in FASD rat model, Plos One
- Suppiramaniam V, Bloemer J, Reed M and **Bhattacharya S**, **(2016)** Neurotransmitter Receptors. In: Charlene A. McQueen, Comprehensive Toxicology, Jan 2016, Oxford Academic Press
- Suppiramaniam V, Bloemer J, Reed M and **Bhattacharya S**, **(2016)** Ion Channels, Toxicology
- Katz DP, Bhattacharya D, **Bhattacharya S**, Deruiter J, Clark CR, Suppiramaniam V, Dhanasekaran M, **(2016)** Benzylpiperazine: "A Messy Drug", Drug and Alcohol Dependence

10. **Bhattacharya S**, Kimble W, Buabeid M, Bhattacharya D, Bloemer J, Alhowail A, Reed M, Dhanasekaran M, Escobar M, Suppiramaniam V, **(2016)** Altered AMPA Receptor Expression Plays an Important Role in Inducing Bidirectional Synaptic Plasticity During Contextual Fear Memory Reconsolidation, *Neurobiol Learn Mem*.
11. Alhowail A*, **Bhattacharya S***, Bloemer J, Bhattacharya D, Suppiramaniam V, Chemobrain Induced Memory Loss is Mediated by GluR1/2 Signaling Impairment (submitted, **Cell Mol Life Sci**, Provisional Patent on PAESE compound)
12. Kerscher P, Kaczmarek AJ, Head S, Brazel M, Seeto W, **Bhattacharya S**, Kim J, Suppiramaniam V, Lipke AE, **(2016)** Direct Production of Human Cardiac Tissues by Pluripotent Stem Cell Encapsulation in Gelatin Methacryloyl, *ACS Biomaterial Science & Engineering*.
13. Buabeid M*, **Bhattacharya S***, Wieckowski T, Escobar M, Dhanasekaran M, Parameshwaran K, Suppiramaniam V, Glutamatergic and Cholinergic Interplay Mediates Loss of Memory in Prenatal Nicotine Exposure (submitted)
14. Swanger SA, Chen W, Wells G, Burger PB, Tankovic A, **Bhattacharya S**, Strong KL, Hu C, Kusumoto H, Zhang J, Adams DR, Millichap JJ, Traynelis SF, Yuan H, **(2016)** Mechanistic Insight into Receptor Dysregulation by Disease-associated Rare Variants in the GluN2A and GluN2B Agonist Binding Domains, *American Journal of Human Genetics*, **Cell Press**
15. Ogden KK, Chen W, Swanger SA, McDaniel MJ, Hu C, Tankovic A, Kusumoto H, Kosobucki GJ, Schulien AJ, Su Z, Pecha J, **Bhattacharya S**, Petrovski S, Aizenman E, Traynelis SF, Yuan H, **(2017)** Molecular Mechanism of Disease-Associated Mutations in the Pre-M1 Helix of NMDA Receptors and Potential Rescue Pharmacology, *PLOS Genetics*
16. Katz D, Majrashi M, Ramesh S, Bhattacharya D, **Bhattacharya S**, Shalgum A, Bradford C, Deruiter J, Clark RC, Suppiramaniam V, Dhanasekaran M, **(2018)** Comparing the Dopaminergic Neurotoxic Effects of Piperazine Derivatives, *Toxicology Mechanisms and Methods*
17. Bhattacharya D, Majrashi M, Ramesh S, Govindarajulu M, Bloemer J, Fujihashi A, Crump BR, Hightower H, **Bhattacharya S**, Moore T, Suppiramaniam V, Dhanasekaran M, **(2018)** Assessment of the cerebellar neurotoxic effects of nicotine in prenatal alcohol exposure in rats. *Life Sciences*
18. Kaiser TM, Kell SA, Kusumoto H, Shaulsky G, **Bhattacharya S**, Epplin MP, Strong KL, Miller EJ, Cox BD, Menaldino DS, Liotta DC, Traynelis SF and Burger PB, **(2018)** The bioactive protein-ligand conformation of GluN2C-selective positive allosteric modulators bound to the NMDA receptor, *Molecular Pharmacology*
19. **Bhattacharya S**, **(2018)** Understanding Memory Reconsolidation, *Journal of Cognitive Neuropsychology*, 1:1-2
20. **Bhattacharya S**, Ma Y, Dunn AR, Bradner JM, Scimemi A, Miller GW, et al., **(2018)** NMDA receptor blockade ameliorates abnormalities of spike firing of subthalamic nucleus neurons in a parkinsonian nonhuman primate, *Journal of neuroscience research*
21. **Bhattacharya S***, Khatri AK*, Swanger SA, DiRaddo JO, Yi F, Hansen KB, Yuan H, Traynelis SF, **(2018)** Triheteromeric GluN1/GluN2A/GluN2C NMDARs with unique single channel properties are the dominant receptor population in cerebellar granule cells, (*equal contribution), **Neuron**

Conference Presentations

1. **Bhattacharya S**, Buabeid M, Parameshwaran K, Abdel Rahman E, Dhanasekaran M, Suppiramaniam V, Developmental Nicotine Exposure Leads to Impaired N-Methyl-D-Aspartate Receptor Function and

Expression, *Society for Neuroscience, New Orleans, LA, 2012*

2. Buabeid M, **Bhattacharya S**, Parameshwaran K, Suppiramaniam V, Prenatal Nicotine Exposure and Mechanism of Memory Impairment in Offsprings, *Society for Neuroscience, New Orleans, LA, 2012*

3. **Bhattacharya S**, Buabeid M, Parameshwaran K, Suppiramaniam V, Effect of Nicotine on Integrin Linked Kinase Mediated Insulin Signaling, *Society of Toxicology, San Antonio, TX, 2013*

4. **Bhattacharya S**, Escobar M, Dhanasekaran M, Suppiramaniam V, Molecular Mechanism of Memory Reconsolidation and Extinction, *Society for Neuroscience, San Diego, CA, 2013*

5. Bhattacharya D, Bloemer J, **Bhattacharya S**, Escobar M, Suppiramaniam V, Dhanasekaran M, Prenatal Alcohol Impairs Synaptic Plasticity and Memory Through ILK Pathway in FASD Rat Model, *Graduate Scholar Forum, Auburn, AL, 2014*

6. **Bhattacharya S**, Escobar M, Dhanasekaran M, Suppiramaniam V, Memory Reconsolidation: Manipulating the Second Avatar, *Graduate Scholar Forum, Auburn, AL, 2014*

7. **Bhattacharya S**, Escobar M, Dhanasekaran M, Suppiramaniam V, GluR2 Mediated Amelioration of Synaptic Plasticity Changes in Fear Associated Memories, *Society for Neuroscience, DC, 2014*

8. Bhattacharya D, Bloemer J, **Bhattacharya S**, Escobar M, Suppiramaniam V, Dysregulation of ILK is Associated with Hippocampal Based Memory and Synaptic Plasticity in FASD Rat Model, *Society for Neuroscience, DC, 2014*

9. **Bhattacharya S**, Escobar M, Dhanasekaran M, Suppiramaniam V, Role of GluR2 in Synaptic Plasticity Changes in Fear Memory Updating, *Graduate Scholar Forum, Auburn, AL, 2015*

10. Haering, SC, **Bhattacharya S**, Aslam M, Strasdeit T, von Engelhardt, J, Traynelis S, Hollmann M, Claudins: An Unexpected Source for More Tetraspanning Proteins Acting as Transmembrane AMPA Receptor Modulatory Proteins, *Society for Neuroscience, San Diego, CA, 2016*

11. **Bhattacharya S**, Swanger SA, Chen W, Strong KL, Burger P, Wells G, Tankovic A, Hu C, Kusumoto H, Millichap JJ, Traynelis SF, Yuan H, Mechanistic insights into agonist binding domain mutations in NMDA receptors underlying neurodevelopmental disorders, *Society for Neuroscience, San Diego, CA, 2016*

12. McDaniel MJ, Ogden KK, Chen W, Swanger SA, Hu C, Tankovic A, Kusumoto H, Kosobucki GJ, Schulien AJ, Su Z, Pecha J, **Bhattacharya S**, Petrovski S, Aizenman E, Traynelis SF, Yuan H, Evaluation of NMDA receptor human mutations suggests a role for pre-M1 helix in gating, *Society for Neuroscience, San Diego, CA, 2016*

13. Strasdeit T, Haering SC, **Bhattacharya S**, Aslam M, von Engelhardt J, Traynelis S, Hollmann M, Claudins: An Unexpected Source for More Tetraspanning Proteins Acting as Transmembrane AMPA Receptor Modulatory Proteins, International Fall Meeting of the German Society for Biochemistry and Molecular Biology, Bochum, Germany, 2017

14. Bhattacharya S, Khatri A, Swanger SA, Hansen KB, Yuan H, Traynelis SF, Triheteromeric GluN1/GluN2A/GluN2C NMDA receptors have unique pharmacological properties, *Society for Neuroscience, Washington D.C., 2017*

15. Traynelis SF, Khatri A, Swanger SA, Bhattacharya S, Hansen KB, Yuan H, Single channel properties of triheteromeric GluN1/GluN2A/GluN2C NMDA receptors are distinct from diheteromeric GluN1/GluN2A and GluN1/GluN2C, *Society for Neuroscience, Washington D.C.*, 2017

16. Bhattacharya S, Ma Y, Dunn AR, Bradner JM, Scimemi A, Miller GW, et al., NMDA receptor blockade ameliorates abnormalities of spike firing of subthalamic nucleus neurons in a parkinsonian nonhuman primate, Parkinson's Disease Foundation meet, Emory University Brain Health Center, Atlanta, GA, 2018

Specialized Approaches

Electrophysiology: Field recording (Dentate Gyrus, Schaffer Collateral, Basolateral Amygdala), Patch Clamp recording (Hippocampal Pyramidal Cells, Sub-thalamic Nucleus, Cerebellum, HEK cell, single channel from synaptosomes), Oocyte recording, Multi-Electrode Array slice recording, cardiac iPSC on Multi-Electrode Array, cardiac MEA_

Behavior/Rodent handling: Operant conditioning (Contextual/cued, Extinction Manipulation), Foot Shock (Threat Conditioning), Morris water maze, Y-maze; Oral Gavaging, Tail Vein and I.P./S.C. injections, generalized rodent husbandry

Animal Surgeries: Osmotic Mini-pump and cannula implantation (Alzet) and cranial drug delivery

Biochemistry/Imaging: Western, Electrophoresis, Membrane Fractionation, q-PCR, Immunoprecipitation, Synaptosomal Fractionation, Mutagenesis, Inverted Fluorescent Imaging, Gradient Separation of DNA, Radio-ligand studies (cAMP assay, receptor isotherms)

Cell Culture: Transfection, Stable line development, receptor counting (Radio-isotherms), Competitive Radio-ligand binding assays, cells handled- ATT-20, CHO, HEK-t-293, H19-IGFR, HELA

Statistical/Analytical Software: Channel Lab, Graph Pad 5.0, Origene 9.0, Win LTP 2.0, Clampfit 9.0, pClamp 9.0, QUB Express Biophysics Pack, MCS-MEA package, SPSS and Sigma Plot

Grants Awarded

AURIC Graduate Student Research Fellowship Grant, 2014

Graduate School Thesis Fellowship Award Grant, 2013-15 (Role: Ph.D. Researcher, **Awarded**)

"Investigating Role of Glutamate Receptor in Memory Reconsolidation", 2015, IGP-Auburn University (Role: Lead Researcher, 1 year) **Awarded:** 5000\$

"Investigating Role of Glutamate Receptor in Memory Updating", 2015, PhD-NSF-EPSCoR RII Award (**Awarded**, 7500\$ + GRA, 3 months)

"Role of GRIN2A mutations in epileptic encephalopathy", 2018, American Epilepsy Society Postdoctoral Fellowship, (**Awarded**, 52,500, 1 year)

Teaching Experience

Auburn University (Pharm. D.): Fall 2012-2015 Teaching and grading (Drug Development, Formulation, Dosage and Manufacturing Labs, 3 years)

Auburn University (Pharmacology-I-III PYPS 8000 graduate series for Pharm D and Masters/PhD Student): Fall 2013-2016, Teaching, Setting exam questions and grading (CNS Pharmacology and Autonomic System Pharmacology, Receptor Pharmacology, Autocrine and Endocrine Systems, Brain Development, Neuronal Response I-IV, CNS Control of Different Organs, HPA Axis and Fear, Neurobiology of Stress and Trauma, Neurodegenerative Diseases I-III, Experimental Neuroscience, Partial load of Cardio Vascular Systems, and Brain Oncology, 4 years)