Deepanjali Dwivedi

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Nationality: Indian

Upi Lab, NCBS,
GKVK Campus, Bellary Road, Bangalore,
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PhD scholar with expertise in whole cell patch clamp technique and data analysis methods in MATLAB.

Education

National Centre for Biological Sciences
Integrated PhD research scholar
2014 - Present
Electrophysiological Characterization of Neurodevelopment disorders
Dr. Upinder Bhalla & Dr. Sumantra Chattarji

University of Lucknow
Bachelors in Science
2010 - 2013

Technical Skills

- Whole cell patch clamping
  (Embryos at E15, pups at P0-3 to 16 month old animals)
- Molecular Biology techniques such as PCR & Gel Electrophoresis
- Confocal Imaging
- Immunohistochemistry
- MATLAB

Academic Achievements

- Department of Biotechnology
  Travel Award 2018
- JNU Life Science Entrance Exam 2013
  National Rank 5
- Combined Entrance Examination for Biotechnology 2013
  National Rank 1
- IIT Joint Admission Test MSc in Biotechnology
  National Rank 49
- National Eligibility Test 2013
  Council of Scientific and Industrial Research
  National Rank 30

Research Projects

Impaired reliability and precision of spiking in adults but not juveniles in a mouse model of Fragile X Syndrome

Fragile X Syndrome (FXS) is an autism spectrum disorder. In recent years a number of in-vivo hippocampal recording studies have demonstrated poor correlation of spiking activity between cells in FXS mice. Synchronicity is an emergent property of a network depending on both network connectivity and intrinsic properties. Specifically, potassium conductances have been shown to have significant effects on spike precision and multiple studies have shown that many of these potassium channels are transcription hits for FMRP. This leads to the hypothesis that in FXS may alter the functioning of one or multiple potassium channels, leading to effects on spike precision. In this study we found that individual neurons with this mutation exhibit increased variability in their activity patterns. Importantly, this effect emerges after six weeks of age in mice. We have shown that a specific ion channel protein, SK channel, is partially responsible for this effect, and blockage of these channels leads to a partial restoration of cellular activity. Furthermore, we have found differential effect of FMRP KO in different sub sections of the hippocampus where it causes an increased spiking in CA3 in juveniles and reduced spiking in CA1 in adults.

Electrophysiological Characterization of Lhx2 deficient/mutant subplate neurons

Collaboration with Dr. Shubha Tole, TIFR, Mumbai

The project involves electrophysiological characterization of subplate neurons in Lhx2 Knock Out (KO) vs Wild Type (WT) embryos (E15) and pups. Lhx2 is a transcription factor which has a crucial role to play in cortical development. We found that in a Lhx2 KO mice, barrel cortex formation did not occur and subplate neurons were found to be responsible for the phenotype. Using whole cell patch clamping we found that subplate neurons were electrically immature in mutants when compared to WT. They also had a delayed development from E15 to P3 stage, highlighting the importance of Lhx2 in functioning of these neurons and thereby in cortex formation.

Role of a bHLH-I transcription factor TCF4 in cell intrinsic and network activity

Collaboration with Dr. Hiyaa Ghosh, NCBS, Bangalore

bHLH-I transcription factor, also known as TCF4/E2-2 is known to play a role during embryonic development however not much is known about its role in the adult mammalian brain. To understand its potential function at both network and cellular level we used single cell electrophysiology recordings in an inducible Cre-LoxP system to delete the gene at adult stages of mice. We observed significant changes at intrinsic cell level and network level in these mice.

Publications

- Impaired reliability and precision of spiking in adults but not juveniles in a mouse model of Fragile X Syndrome
  Deepanjali Dwivedi, Sumantra Chattarji and Upinder S. Bhalla
  doi: 10.1523/ENEURO.0217-19.2019 eNeuro

- Genetic mechanisms mediated by transcription factor Lhx2 in earliest cortical progenitors control thalamic innervations in the somatosensory cortex
  Suranjana Pal,**Deepanjali Dwivedi***, Tuli Pramanik*, Geeta Godbole, Upinder S. Bhalla and Shobha Tole
  Manuscript in preparation

- Role of TCF4 in mature neuronal maintenance
  Mohammad Shariq, Dipannita Sarkar, **Deepanjali Dwivedi**, Upinder S. Bhalla and Hiyaa S. Ghosh
  Manuscript in preparation

- Effect of mGLuR and FMRP on spontaneous and evoked neurotransmitter release in hippocampal neurons
  Rohini Subrahmanyam, **Deepanjali Dwivedi**, Mike Cousin and Sumantra Chattarji
  Manuscript in preparation

Talks

- Impaired reliability and precision of spiking in adults but not juveniles in a mouse model of Fragile X Syndrome
  Cold Spring Harbor Asia (CSHA) conference on Autism & Neurodevelopment Disorders – from Genetic Discoveries to Interventions.
  Suzhou, China September 2018

Posters

- Impaired reliability and precision of spiking in adults but not juveniles in a mouse model of Fragile X Syndrome
  Society for Neuroscience (SfN) meeting
  Chicago, USA October 2019

- Impaired reliability and precision of spiking in adults but not juveniles in a mouse model of Fragile X Syndrome
  EMBO workshop on Molecular Neuroscience: From genes to circuits in health and disease.
  NCBS, Bangalore February 2019

- Impaired reliability and precision of spiking in adults but not juveniles in a mouse model of Fragile X Syndrome
  No Garland Neuroscience (NGN) meeting
  IISER, Pune, India October 2017

Meetings and Conferences

- Society for Neuroscience (SfN)
  Chicago, USA October 2019

- EMBO workshop on Molecular Neuroscience
  From genes to circuits in health and disease
  NCBS, Bangalore, India February 2019

- Cold Spring Harbor Asia (CSHA) conference on Autism & Neurodevelopment Disorder
  From Genetic Discoveries to Interventions
  Suzhou, China September 2018

- No Garland Neuroscience (NGN) meeting
  IISER, Pune, India October 2017

- Conference on Neuroscience across scales
  NCBS, Bangalore, India July 2017

- Bangalore Microscopy Course (BMC)
  Teaching Assistant
  NCBS, Bangalore, India September 2015

- Benny Shilo course on Developmental Biology
  NCBS, Bangalore, India December 2014

References

Dr. Upinder S. Bhalla	Dr. Sumantra Chattarji	Dr. Hiyaa Ghosh
Professor	Professor	Assistant Professor
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