

Mahima Bose

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EDUCATION

PhD in Developmental Neuroscience

Tata Institute of Fundamental Research, Mumbai, India

August 2017–April 2024

Dissertation: “Mechanisms regulating cell fate and morphology in the mammalian cerebral cortex.”

BSc (with Honours) Biomedical Science

Acharya Narendra Dev College, University of Delhi, India

July 2014–June 2017

RESEARCH EXPERIENCE

Tata Institute of Fundamental Research, Mumbai, India

Research Associate

Research Scholar; Advisor: Prof. Shubha Tole

December 2023–Present

August 2017–November 2023

Projects:

- Thesis Project I: Elucidating the role of transcription factor FOXG1 in regulating neuron-glia cell fate decisions in the developing mouse neocortex and hippocampus.
- Thesis Project II: Elucidating the role of transcription factor LHX2 in regulating morphometry and synaptogenesis of the neocortical superficial layer neurons.
- Collaborative Project: Creating a comprehensive single-cell multiomics atlas for the developing mouse hippocampus.

Ludwig-Maximilian University/ Helmholtz Pioneer Campus, Munich, Germany

Visiting Research Fellow; Advisor: Dr Boyan Bonev

May–August 2022

Collaborative Project:

- Elucidating 3D genome dynamics by LHX2:LDB1 transcriptional regulator complex in the developing mouse neocortex and hippocampus using Hi-C and multiomics.

FELLOWSHIPS AND AWARDS

EMBO Short-Term Scientific Exchange Fellowship

May 2022

Received Fellowship for a collaborative project with Dr Boyan Bonev at the Helmholtz Pioneer Campus, Germany, to “Elucidate 3D genome dynamics mediated by LHX2:LDB1 in the developing mouse hippocampus and neocortex”.

Short-Term Travelling Fellowship by the Company of Biologists

April 2021

Received Fellowship for a collaborative project with Dr Boyan Bonev at the Helmholtz Pioneer Campus, Germany to “Elucidate 3D genome dynamics mediated by LHX2:LDB1 in the developing mouse hippocampus and neocortex”.

Travel award by Elsevier Publishing Group

May 2018

Received a travel award by Elsevier Publishing Group dedicated to meritorious graduate students for travelling to Japan to attend the International Society for Developmental Neuroscience 2018 (ISDN 2018) conference.

SKILLS

Molecular Biology: Quantitative PCR, Gel Electrophoresis, Molecular Cloning, CRISPR-Cas9, Immunohistochemistry

Genomics: ATAC-Seq, ChIP-Seq, CUT&RUN, RNA-Seq

Single-cell genomics: Seurat, Signac, Monocle3, Velocyto
Programming: Shell/Bash scripting, R, Python
Microscopy: Confocal microscopy, Fluorescence microscopy
Cell culture: Cell culture, Tissue culture, Explant culture
Animal handling: *in utero* electroporation, Mouse behavioral analysis

INVITED TALKS

Deep Bioinformatics Bootcamp, CSIR-IHBT, Palampur, Himachal Pradesh, India August 2023
Invited speaker and trainer on 3D Genome, ChIP-Seq, RNA-Seq analysis

No Garland Neuroscience Conference, Pune, India Feb 2023
Selected speaker

CONFERENCES AND SCIENTIFIC TRAINING

Global Young Scientists Summit, Singapore January 2024
Poster presentation

Cortical Development, Milazzo, Sicily, Italy May 2022
Poster presentation

International Society for Developmental Neuroscience, Nara, Japan May 2018
Poster presentation

CERTIFICATE COURSES AND PROFESSIONAL TRAINING

Hands-on training workshop on CRISPR-Cas9 technology. April 2019
 CSIR-IGIB, New Delhi, India
Gained knowledge and hands-on experience in CRISPR-Cas9 technology for applications in my dissertation project.

Bioinformatics and *in silico* drug discovery course Jan–Dec 2016
 The University of Delhi, New Delhi, India
Gained hands-on experience in Genomics, Proteomics, and Big-Data analysis using bioinformatics tools and programming languages R and Python.

TEACHING EXPERIENCE

Advanced Neuroscience, Tata Institute of Fundamental Research, Mumbai Dec 2019–Feb 2020
Taught first-year graduate students about the latest advances and research in Developmental Neuroscience.

PUBLICATIONS AND PREPRINTS

Preprints

Dual role of FOXG1 in regulating gliogenesis in the developing neocortex via the FGF signalling pathway.
M. Bose, V. Suresh, U. Mishra, I. Talwar, A. Yadav, S. Biswas, S. Hippenmeyer, #S. Tole, *BioRxiv* (2023),
[doi:10.1101/2023.11.30.569337](https://doi.org/10.1101/2023.11.30.569337).

LHX2 regulates dendritic morphogenesis in layer II/III of the neocortex via distinct pathways in progenitors and postmitotic neurons.

***M. Bose**, *S. Ravindran, S. Kumari, A. Iyer, B. Vedak, A. Srivastava, I. Talwar, R. Narayanan, #S. Tole.
BioRxiv, (2024). doi.org/10.1101/2024.01.30.577728.

Publications

Regulation of chromatin accessibility and gene expression in the developing hippocampal primordium by LIM-HD transcription factor LHX2.

*V. Suresh, *B. Muralidharan, *S. J. Pradhan, **M. Bose**, L. D'Souza, A. Parichha, P. C. Reddy, #S. Galande, #S. Tole. *PLoS Genetics*, 19 (8) (2023), e1010874. doi.org/10.1371/journal.pgen.1010874.

PRDM16 co-operates with LHX2 to shape the human brain.

*V. Suresh, *B. Bhattacharya, *R.Y. Tshuva, M.D. Gotthold, T. Olender, **M. Bose**, S.J. Pradhan, B.B. Zeev, R.S. Smith, S. Tole, S. Galande, C. Harwell, #J.-M. Baizabal, #O. Reiner. *Oxford Open Neuroscience*, (2024). doi.org/10.1093/oons/kvae001.

Manuscript in preparation

Corpus callosum crossing is regulated by β -catenin function in the *Lmx1a* lineage-derived midline glial population. #A. Parichha, D.Datta, I. Talwar, A. Singh, **M. Bose**, V. Suresh, N. Žakelj, D. Gosar, Š. Mirošević, D. Osredkar, #S. Tole

**equal contributors; #corresponding author*

REFERENCES

Professor Shubha Tole – PhD Advisor – shubhatole@gmail.com

Professor Sandhya Koushika Thesis Committee Member – spkoushika@tifr.res.in