

## **DST INSPIRE Faculty Fellow uncovers regulatory role of proteins in neuronal development, paving way for modifying treatment protocols**

Priyanka Dutta, Inspire Faculty Fellow, has recently uncovered the mechanism by which a protein called Formin-2 disrupts neural connectivity and could result in developmental defects associated with intellectual disability and deficits in learning and memory.

Establishment of a functional neuronal circuit is essential for proper functioning of the nervous system. To understand the neuronal coordination of an organism, it is important to comprehend how the underlying cytoskeleton or the complex network of interlinking protein filaments in the cytoplasm of cells assemble and function assisted by its regulatory proteins. The errors in neuronal connectivity are central to genetic mutations of these proteins, which lead to detrimental developmental defects.

Dr. Dutta from the National Centre for Cell Science, Pune, a recipient of the INSPIRE Faculty fellowship instituted by the Department of Science & Technology, GoI, focuses on understanding the mechanical function of the cytoskeletal proteins involved in neurodevelopmental disorder. This understanding of neurobiological mechanism of the disorder can help to modify the treatment protocol to minimise the symptoms of the disease.

Her recent study has tracked the role of Formin-2 in regulating how the microtubules or actin filaments in the cytoskeleton that are responsible for cellular reorganization and chromosome separation dynamically organize themselves. The team has identified that Formin-2 cross-links actin-microtubule to form polymers in neurons with the help of its C-terminal FSI tail. This mechanism might have important implications for understanding underlying neurodevelopmental conditions, such as intellectual disability, that have been linked to mutations in Formin-2. This research has been published in the '*Journal of Cell Science*'.

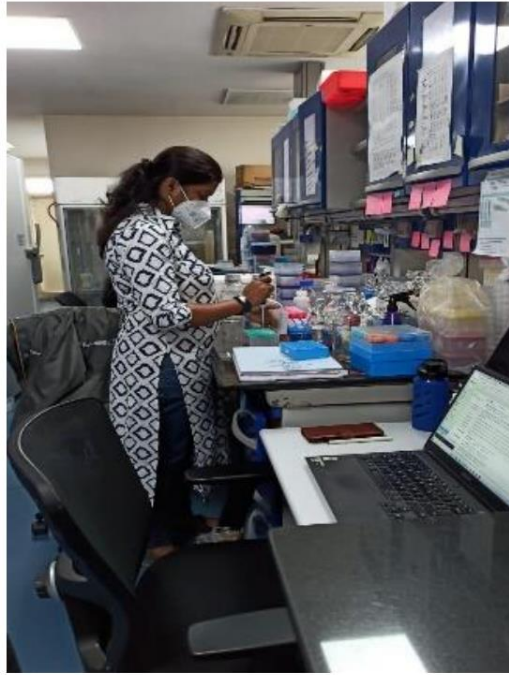
Priyanka Dutta explained that her proposed project as an INSPIRE Faculty fellow involves understanding the regulatory roles of Formin-2 in neuronal development. The output from this project will be a bedrock for prospective research which will explore how cytoskeleton regulators communicate with other signaling molecules along with actin and microtubule to distinguish between the normal and abnormal states before the onset of neuronal diseases.

### **Publication details:**

Kundu T\*, Dutta P\*, Nagar D, Maiti S, Ghose A. (2021). Coupling of dynamic microtubules to F-actin by Fmn2 regulates chemotaxis of neuronal growth cones. [\*equal contribution] *J Cell Sci*, 10.1242/jcs.252916 (biorxiv: doi: <https://doi.org/10.1101/2020.01.18.911131>).

Burada AP, Vinnakota R, Bharti P, Dutta P, Dubey N, Kumar J. (2020). Emerging Insights into the Structure and Function of Ionotropic GluD Receptors. Review Article. *British Journal of Pharmacology*. <https://doi.org/10.1111/bph.15313>

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*Fig: Priyanka Dutta working in her lab*