Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Comprehensive Seminar

Chemogenetic control of microglial phagocytosis

Payal Chaubey

TIFR, Hyderabad

Microglia are the central nervous system (CNS) resident innate immune cells that play a vital role in maintaining brain homeostasis. Their role includes refining neuronal networks through synaptic pruning and clearing cellular debris via phagocytosis. The regulation of neuronal phagocytosis by microglia depends on a delicate balance between "eat-me" and "don't eat-me" signals presented by neurons. This equilibrium plays a crucial role in CNS homeostasis and the proper functioning of the brain. Perturbations in this balance have been implicated in various neurological and neurodevelopmental disorders, highlighting the significance of understanding the mechanisms governing the display and recognition of these signals and developing strategies to manipulate microglial phagocytosis. Here, we aim to develop a platform technology for controlling the phagocytic ability of microglia in the brain through cellular engineering. We aim to generate: a) microglia that sense and respond to synthetic small-molecule-based "eat me" and "don't eat-me" signals with boosted phagocytosis capacity; and b) microglia with impeded phagocytosis by expressing designer phagocytic receptors on their cell surface. We plan to utilise the microglia with boosted phagocytosis for neuronal circuit remodelling and the microglia with impeded phagocytosis for protecting unwanted neuronal elimination observed in the neuropathology of diseases.

Thursday, Aug 3rd 2023

10:00 AM (Tea / Coffee 09.45 AM)

Seminar Hall, TIFR-H