

## **Comprehensive Seminar**

### **Mechanochemical Interactions in Placode Formation: Insights from Otic-Epidermal Organoids**

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During embryonic development, biochemical and biophysical cues guide developmental trajectories, tissue fate, and the functional form of organs. The interplay between tissue-scale mechanics, spatiotemporally controlled biochemical signalling, and collective cellular dynamics has recently been recognised as fundamental to development and morphogenesis. However, in the context of non-neural ectoderm morphogenesis and placode formation, the interplay and role of these factors remain largely unexplored. Previous studies have predominantly focused on the genetic and signalling aspects of tissue formation, often relying on fixed time-point imaging. To overcome challenges such as real-time in-utero observations of embryos, we utilise mouse embryonic stem cell (ESC)-derived otic-epidermal organoid models. These models give rise to the otic-epibranchial placode domain (OEPD) from the peripheral non-neural ectoderm, the progenitor epithelial layer of inner ear structures, and stratifying epidermis. The emergence of ectodermal populations is studied using microscopy, single-cell and spatial transcriptomics to understand how cells transition through different states and how they are spatially positioned. By integrating these advanced techniques with real-time imaging, we aim to elucidate how biophysical cues interact with biochemical signalling to determine cellular fates in space and time. Our goal is to uncover universal physical determinants of tissue morphogenesis and provide a comprehensive understanding of placode formation.

***Monday, Jul 29<sup>th</sup> 2024***

***13:15 Hrs (Tea / Coffee 13:00 Hrs)***

***Auditorium, TIFR-H***