Pre-Synopsis Presentation of Ms. Snehal Bhingardeve

Title: Exploring the Epigenetic Alterations Regulating miRNA Expression in Women with Polycystic Ovary Syndrome

Date & Time: 18th March 2026, 11.00 AM

Venue: Dr. Shanta Rao Auditorium

Guide: Dr. Srabani Mukherjee, Dept. of Molecular Endocrinology

Polycystic Ovary Syndrome (PCOS), a complex endocrinopathy and a leading cause of anovulatory infertility, lacks a unifying genetic signature, suggesting a critical role of epigenetic and epitranscriptomic alterations in its pathogenesis. Our research delineates an integrative, multi-level epi-regulatory cascade underpinning PCOS pathophysiology by focusing on granulosa cells (GCs) a robust model for studying epigenetic mechanisms central to oocyte quality and ovarian function.

We demonstrate that DNA-methylation-mediated dysregulation of microRNAs (miRNAs) orchestrates aberrant gene expression in PCOS. Several miRNAs were also found to target DNMT and TETs, enzymes of the epigenetic machinery, indicating a potential epigenetic feedback loop.

To further elucidate molecular mechanisms underlying PCOS, we performed an integrated in-silico analysis combining GC transcriptomic datasets with a curated list of miRNAs reported to be differentially expressed in PCOS. Pathway enrichment and network analyses were applied to identify key dysregulated pathways, hub genes, and their miRNA–mRNA regulatory interactions.

In addition to epigenetic and post-transcriptional regulation, gene expression is also influenced by epitranscriptomic mechanisms, particularly N6-methyladenosine (m6A) RNA methylation. We investigated global m6A levels and expression profiles of the m6A-regulatory genes and their interacting miRNAs, in GCs of women with PCOS.

Collectively, these findings define a multi-level regulatory cascade driving PCOS molecular heterogeneity and highlight potential epigenetic and epitranscriptomic modifications underlying ovarian dysfunction in PCOS.

Work done and results obtained will be discussed in detail during the presentation.