Pre-synopsis Seminar on Monday, 12th January 2025 at 2.30 pm
at Dr. Shanta Rao Auditorium

Unravelling the Redox Status and Glucose Metabolism Dynamics in Oocyte Microenvironment in Women with PCOS

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Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in women of reproductive age characterized by oligo/anovulation, hyperandrogenism and polycystic ovaries is also associated with other co-morbidities like insulin resistance, obesity, increased cardiovascular risk etc. Due to the combination of endocrine and metabolic anomalies these women need to elect for assisted reproduction techniques (ART) to conceive. Outcome of ART is known to be poor in these women which can be attributed to the suboptimal oocyte/embryo quality in PCOS. The oocyte/embryo quality is governed by the oocyte microenvironment which is composed of follicular fluid (FF) and granulosa cells (GCs). GCs are the companion somatic cells and metabolic engine of the oocyte, as oocyte itself cannot utilize glucose properly. FF is the milieu of hormones, growth factors, metabolites, antioxidants etc. which nourishes the oocyte and serves as the media for cross talk between oocyte and GCs.

Our earlier multi-omics studies in FF and GCs from women with PCOS and controls has revealed altered methylation status and expression of genes involved in redox homeostasis and glucose metabolism dynamics. Hence, we wanted to dissect the redox status and glucose metabolism dynamics in the oocyte microenvironment to ascertain if they could contribute towards the compromised oocyte/embryo quality in PCOS.

The redox status in oocyte microenvironment was comprehensively analysing by investigating the redox markers in FF and GCs from women with PCOS. Our data showed that redox homeostasis in follicular microenvironment of women with PCOS is compromised and, few markers correlated with oocyte/embryo quality parameters. In addition, our data indicates, GCs may have fair role in maintaining redox balance in follicle. We also looked at redox markers in FF by sub-grouping the study participants based on BMI and insulin resistance.

In the second arm of our study, the glucose metabolism dynamics in the follicle of women with PCOS were investigated by measuring glucose uptake, GLUT4 expression, transcript levels of genes encoding glucose metabolism enzymes and connexin in GCs. Moreover, we measured pyruvate levels in FF and GCs and also performed the comprehensive seahorse real-time glycolytic stress assay. Our data indicates metabolic reprogramming and inherent defects in the glucose uptake in PCOS follicle which may alter the pool of metabolites available for oocyte and may lead to metabolic inadequacy, contributing towards suboptimal oocyte/embryo quality in PCOS women.

The details results will be discussed in the seminar.