Proteomic analysis of follicular fluid in polycystic ovary syndrome

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Objectives: Polycystic ovary syndrome (PCOS) is a complex and common endocrine disorder which afflicts women of reproductive age. Ovulatory dysfunction is recognized as a primary factor contributing to infertility of PCOS. However, patients with PCOS have a reduced potential to produce high-quality oocytes and embryos. In this study, we used a quantitative proteomics analysis based on mass spectrometry to investigate the differences in proteomics profiles for follicular fluid obtained from patients with or without PCOS to identify the potential markers associated with oocyte quality.

Material and methods: Follicular fluid samples were collected from infertile patients with (n=10) or without (n=10) PCOS during IVF cycle. Total protein was extracted and analyzed with a label-free quantitative proteomics using liquid chromatography-mass spectrometry (LC-MS). An in-depth understanding of the differentially expressed proteins (DEPs) and their networks was achieved by using a bioinformatics analysis including the protein annotation, unsupervised hierarchical clustering, functional classification, functional enrichment and clustering, and protein-protein interaction analysis. Selected DEPs were confirmed by ELISA, and correlation analysis was performed between these DEPs and the clinical characteristics.

Results: In this study, we have identified 612 proteins, including 29 DEPs (11 upregulated proteins, and 18 downregulated proteins in follicular fluid from PCOS patients compared with women without PCOS). GO enrichment analyses revealed that aminoglycan catabolic process, cytokine secretion, and extracellular matrix organization were the top three biological processes between women with PCOS and controls. The localization of DEPs showed high enrichment in catenin

complex indicated by cellular component terms between PCOS patients and controls. Based on ELISA results, PLTP and HYOU1 were differentially expressed between patients with and without PCOS. Follicular PLTP showed a positive correlation with embryo quality.

Conclusions: Our study identified 29 DEPs in the follicular fluid of patients with PCOS compared with controls. PLTP and HYOU1 were deregulated in PCOS, which may play an essential role in the pathogenesis of infertility of PCOS.

Key words: polycystic ovary syndrome, follicular fluid, proteomics, cholesterol metabolism, endoplasmic reticulum stress