The Role of Cytokine-Cytokine Receptor Interactions in Endometrioma-Related Infertility from In Vivo Transcriptomic Analysis

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Introduction/Background

Ovarian endometrioma (OMA) is a common complication of endometriosis, frequently resulting in infertility. Understanding the molecular mechanisms underlying OMA-related infertility and its impact on ovarian function is essential for developing effective treatments to enhance reproductive outcomes. Addressing these mechanisms may lead to targeted therapeutic strategies for affected individuals.

Materials and Methods

Mouse model of ovarian endometrioma (OMA) was established for RNA sequencing to analyze differentially expressed genes (DEGs), pathways, and potential therapeutic targets by comparing ovaries with endometriotic lesions from OMA and control ovaries (n=5 each, $P<0.05$). Enrichment analysis of DEGs was conducted using KEGG and GO analyses, supplemented by a literature review of gene functions. Validation of the selected targets was performed through western blotting and qRT-PCR.

Results

The OMA mouse model was successfully established and validated morphologically and histologically. RNA sequencing identified significant upregulation of Chemokine Ligand 17 (Cxcl17) and Interleukin-36 (Il1F6) in the OMA group, which are involved in cytokine-cytokine receptor interactions and activate NF-kappa-B and MAPK signalling pathways, leading to inflammatory responses ($P < 0.05$). To explore the roles of these DEGs during folliculogenesis, oocytes and granulosa cells (GCs) were collected from OMA mice after superovulation. Expression levels of Cxcl17 and Il1F6 were significantly elevated in GCs, while a non-significant upward trend was observed in oocytes.

Conclusion

The upregulation of the cytokine-cytokine receptor signalling pathway may play a significant role in infertility associated with OMA, highlighting potential cytokine-targeted therapies for improving reproductive outcomes in affected individuals in further research.

Key words

Endometrioma, Infertility, Cytokine