The role of granulosa cell gene expression in fertility: Insights from art and hormonal treatments.

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Introduction

Granulosa cells (GCs) play a pivotal role in ovarian function and fertility, particularly in the regulation of folliculogenesis and oocyte maturation [1]. These somatic cells are integral to the development of the oocyte, providing the necessary hormonal and molecular signals for its maturation [2]. Gene expression in granulosa cells is crucial for maintaining optimal ovarian function, and understanding how these genes are regulated can offer valuable insights into fertility, especially in the context of assisted reproductive technology (ART) and hormonal treatments [3].

These hormones regulate the expression of genes involved in steroidogenesis, cell proliferation, and apoptosis, which are key processes for follicular development and ovulation [4]. Dysregulation in granulosa cell gene expression can lead to impaired oocyte quality, anovulation, and infertility [5]. In ART, particularly in in vitro fertilization (IVF), the manipulation of granulosa cell gene expression through controlled ovarian hyperstimulation has shown to enhance follicular development and oocyte quality [6].

Studies also indicate that hormonal treatments, such as the use of gonadotropins, GnRH analogs, and exogenous steroids, can significantly alter granulosa cell gene expression, impacting fertility outcomes [7, 8]. For instance, elevated levels of FSH during controlled ovarian stimulation can increase the expression of genes related to steroidogenesis, improving ovarian response in ART procedures [9]. Conversely, inappropriate hormonal regulation can lead to conditions such as ovarian hyperstimulation syndrome (OHSS) or poor ovarian response [10].

Conclusion

Granulosa cell gene expression is a key factor in fertility, influencing oocyte development and ovarian function. Both ART and hormonal treatments modulate these genes, highlighting the potential for targeted therapies to improve fertility outcomes. Understanding these molecular mechanisms provides an avenue for optimizing treatment strategies and enhancing success rates in ART and hormonal interventions.

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