

The potential role of granulosa cells in the maturation rate of immature human oocytes and embryo development: A co-culture study

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Abstract

Objective

In order to increase the number of mature oocytes usable for intracytoplasmic sperm injection (ICSI), we aimed to investigate the effect of co-culturing granulosa cells (GCs) on human oocyte maturation *in vitro*, the fertilization rate, and embryo development.

Methods

A total of 133 immature oocytes were retrieved and were randomly divided into two groups; oocytes that were cultured with GCs (group A) and oocytes that were cultured without GCs (group B). After *in vitro* maturation, only oocytes that displayed metaphase II (MII) underwent the ICSI procedure. The maturation and fertilization rates were analyzed, as well as the frequency of embryo development.

Results

The mean age of the patients, their basal levels of follicle-stimulating hormone, and the number of oocytes recovered from the patients were all comparable between the two study groups. The number of oocytes that reached MII (mature oocytes) was 59 out of 70 (84.28%) in group A, compared to 41 out of 63 (65.07%) in group B ($p=0.011$). No significant difference between fertilization rates was found between the two study groups ($p=0.702$). The embryo development rate was higher in group A (33/59, 75%) than in group B (12/41, 42.85%; $p=0.006$). The proportion of highest-quality embryos and the blastocyst formation rate were significantly lower in group B than in group A ($p=0.003$ and $p<0.001$, respectively).

Conclusion

The findings of the current study demonstrate that culturing immature human oocytes with GCs prior to ICSI improves the maturation rate and the likelihood of embryo development.

Keywords: Fertilization, Granulosa cells, Intracytoplasmic sperm injection, *In vitro* oocyte maturation techniques, Oocytes