

EMBRYO CULTURE IN G-SERIES RESULTS IN SIGNIFICANTLY HIGHER CELL NUMBERS AND IMPLANTATION RATES COMPARED TO CULTURE IN HTF

A study by Kleijkers show that besides cell numbers and implantations rates, gene expression and certain pathways in preimplantation embryos are also affected by culture medium.

Material and methods

In a multicenter trial, data on embryonic development were collected from 1527 embryos cultured in two different media (G-Series and HTF) with the primary aim to compare live birth rates after embryo transfer (day 2 or 3). Additionally, in a single center study, embryos not used for IVF or cryopreservation were cultured until Day 6, in either G-Series medium or HTF. Twenty blastocysts (10 in each medium group) were matched based on blastocyst quality, fertilisation method and maternal age (see Figure 1), and selected for microarray analysis.

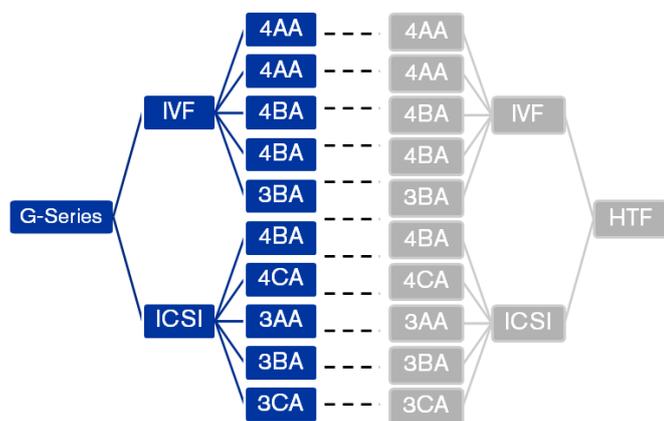


Figure 1. Blastocysts in the G-Series and HTF groups were matched based on fertilisation method and blastocyst quality (scored according to the Gardner grading system). Maximal difference in maternal age within pairs was 2.8 years.

Result

The microarray analysis showed that the expression of 951 genes (of 17 692 genes detected) differed significantly between embryos that had been cultured in G-Series or HTF medium. 57% of the differentially expressed genes (DEGs) were significantly up-regulated and 43% down-regulated in the G-Series group, and 89% of all DEGs showed a change in the same direction (up and down) in at least 8 of the 10 matched pairs.

Pathway analysis identified 18 biological pathways with over-representation of DEGs including apoptosis, cell-cycle regulation, protein degradation and

metabolism. Specifically, DEGs involved in DNA replication, G1 to S cell-cycle control, and oxidative phosphorylation pathways were all up-regulated in the G-Series group compared to the HTF group. To further investigate whether these genes were related to morphological differences, data from the multicenter trial ON embryo development and implantation rates were collected. Interestingly, embryos cultured in G-Series medium consisted of significantly more cells on Day 2 and Day 3 compared with the HTF group.

Furthermore, implantation rates were significantly higher in the G-Series (27% vs. 15%) compared with the HTF group (Figure 2).

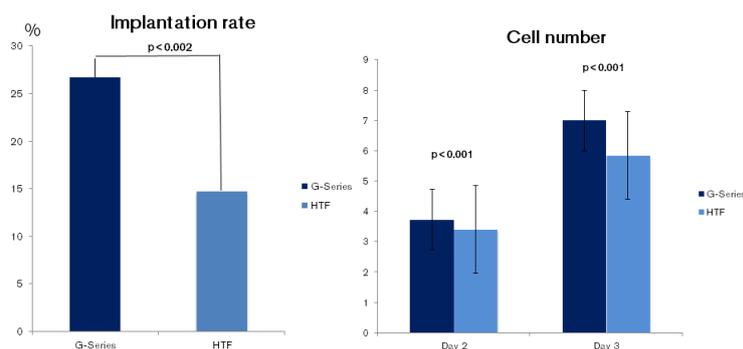


Figure 2. Implantation rates were significantly higher in the G-Series group compared with the HTF group. Cell number of embryos cultured in G-Series was significantly higher compared with culture in HTF.

Conclusion

Pathway analysis revealed an overrepresentation of up-regulated DEGs in certain pathways indicating increased cell proliferation for embryos in the G-Series group compared to the HTF group. This finding is in line with the morphological assessment that showed that embryos cultured in culture media from Vitrolife consisted of more cells on Day 2/3 compared to embryos cultured in HTF.

Additionally, the implantation rates were significantly higher in the G-Series compared to the HTF group.

REF

Kleijkers, S. H. M., et al. Differences in gene expression profiles between preimplantation embryos cultured in two different IVF culture media. Human Reproduction 2015 Oct;30(10):2303-11.