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How to Reduce the Potential Harmful Effects of Light on Blastocyst Development during IVF

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Abstract

Purpose: Earlier findings revealed the damaging effect of visible light on zygotes and gametes. The aim of our study is to eliminate or significantly reduce the potentially harmful effects of light exposure during in vitro fertilization (IVF) or intracytoplasmic sperm injection (ICSI) and to investigate the effect of light protection on embryo development and implantation.

Materials and methods: To protect sperm cells, oocytes, and embryos from the potential harmful effects of light exposure during laboratory procedures, we created a dark environment for the cells and applied red filters on laboratory lamps and UV or infrared filters in the microscopes in order to eliminate white light exposure of the cells throughout all work stages.

Results: The fertilization rate was significantly ($p = 0.011$) higher in light-protected ICSI cycles. Blastocyst development rates (blastocyst/embryo) were significantly ($p < 0.001$) higher in light-protected embryos than in those manipulated in conventional light conditions both in IVF (20.9% difference) and ICSI (38.6% difference). Numbers of clinical pregnancies/transfers of ICSI fertilized day 5 blastocysts were also significantly ($p = 0.040$) higher in light-protected conditions.

Conclusions: These data show that light protection has a positive effect on fertilization rate and increases the blastocyst development as well as the number of clinical pregnancies/transfers. Implementation of this light protection method in IVF centers may improve the success rate while maintaining maximal embryo safety.

Keywords: Blastocyst development; IVF; Intracytoplasmic sperm injection; Light protection.

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