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Effect of granulocyte-macrophage colony-stimulating factor (GM-CSF) on pregnancy rates in patients with multiple unsuccessful IVF attempts

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Abstract

Study question Is the inclusion of GM-CSF in embryo culture media associated with increased clinical pregnancy rates (presence of embryonic sac with positive heart beat at 7 weeks of gestation) in patients with multiple unsuccessful IVF attempts?

Summary answer The inclusion of GM-CSF in embryo culture media appears to improve clinical pregnancy rates in patients with multiple unsuccessful IVF attempts, although statistical significance was not achieved in this pilot study.

What is known already GM-CSF has been shown to promote blastocyst formation, to reduce inner cell mass apoptosis, as well as to play a vital role in placental development and fetal growth. It is reported that inclusion of GM-CSF in embryo culture media significantly increases ongoing implantation rates in women who have previously experienced miscarriage. However, it is still unclear whether multiple unsuccessful IVF attempts should be another indication for the use of GM-CSF.

Study design, size, duration Prospective observational study of 79 patients with at least two previous unsuccessful IVF attempts, in which a clinical pregnancy was not established. The study was conducted from February 2012 until December 2012, at Eugonia private IVF Unit, Athens.

Participants/materials, setting, methods Oocytes were fertilized, cultured and transferred in EmbryoGen medium (Origio) containing 2 ng/ml GM-CSF (EmbryoGen group; n = 37 patients). In the control group (n = 42 patients), oocytes were cultured in Universal-IVF/ISM1/BlastAssist media (Origio). In both groups, embryo transfer (ET) was performed either on Day 2 or Day 3.

Main results and the role of chance Thirty-four patients underwent ET in Embryogen group, compared to thirty-five patients in the control group. Age (38.0 ± 4.4 vs 39.5 ± 3.3 years), duration of infertility (2.6 ± 2.3 vs 2.9 ± 1.9 years), previous unsuccessful IVF attempts (4.5 ± 3.6 vs 4.3 ± 3.6), oocytes retrieved (7.4 ± 6.0 vs 8.9 ± 10.7), mature oocytes (4.6 ± 4.1 vs 4.0 ± 4.7), fertilization rate (61.7 ± 29.3% vs 51.8 ± 50.8%), embryos transferred (2.3 ± 1.0 vs 2.4 ± 1.0), embryos cryopreserved (4.3 ± 1.3 vs 4.7 ± 2.0), and good morphology embryos (2.6 ± 2.0 vs 2.8 ± 3.8) were comparable in EmbryoGen and control group, respectively. Clinical pregnancy rates [12/34 (35.3%) vs 8/35 (22.9%)], positive hCG test [16/34 (47.1%) vs 10/35 (28.6%)], and implantation rates (17.4 ± 30.6% vs 11.4 ± 25.2%) were higher in EmbryoGen group compared to control, but these differences did not reach statistical significance.

Limitations, reason for caution This is an observational study with limited number of patients, offering preliminary evidence for the efficiency of GM-CSF in embryo culture in patients with multiple unsuccessful IVF attempts. However, randomized controlled trials (RCT) with more participants are required to verify a significant beneficial effect of GM-CSF.

Wider implications of the findings The present data suggest that inclusion of GM-CSF in embryo culture media may improve pregnancy and implantation rates in patients with multiple unsuccessful IVF attempts. Conducting a RCT evaluating the benefit of using GM-CSF in this population appears to be of value.

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