

REDUCTION OF LACTATE CONCENTRATION IN EMBRYO CULTURE MEDIA. ARE THERE BENEFITS?

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Objective: To determine potential benefits of utilizing a culture media containing a decreased concentration of lactate (1mM).

Design: Retrospective study in a private in vitro fertilization laboratory.

Materials and Methods: Following standard ovarian stimulation protocols, mature oocytes were fertilized by ICSI and diploid zygotes from each consenting patient were randomly allocated to a control or study group. The control group media (C6) consisted of 6mM lactate in Continuous Single Culture Medium (Irvine Scientific) while the study group (S1) was identical apart from 1mM lactate. Control and study group sibling embryos were cultured in 6% CO₂, 6% O₂ in air and without media renewal for 7 days. Embryo development was assessed on Day 3, 5, 6, and 7. Suitable blastocysts in each group were either vitrified or selected for chromosomal screening through PGS by NextGen Sequencing. Embryo transfers were performed using suitable embryos that developed to the blastocyst stage and/or were chromosomally normal. This study is IRB approved NCT02846012.

Results: 27 patients (average age 36.9 yrs) consented to participate in this study which resulted in 239 2PN zygotes. 123 zygotes were included in the S1 group and 119 were included in the C6 group. The blastocyst utilization rate of all patients combined in both groups was 41% (50/123) and 42% (50/119) respectively. For an averaged percentage of a normalized blastocyst rate, the blastocyst rate for S1 was normalized to C6 for each patient in the study. These values were then averaged. The average normalized blastocyst rate for S1 was 122% compared to 100% for C6. A total of 13 embryo transfers have occurred in which, 9 (69%) were from S1, and 4 (31%) were from C6. 66% (6/9) of embryos cultured in S1 and 50% (2/4) embryos cultured in C6 were transferred and resulted in a pregnancy as determined by +βhCG>50 mIU/ml.

Conclusion: Lactate concentrations of most commercial human embryo culture media formulations range from 6-10mM. The lactate concentration in human tubal fluid may be significantly lower^{1,2}. Although numbers are small, our data trend supports a beneficial effect of 1mm lactate in culture medium compared to the commonly used concentration of 6mM. A greater number of blastocysts from S1 were selected for embryo transfer based on morphology and/or ploidy status resulting in a higher pregnancy success. Current studies to determine if lower levels of lactate in culture media may have an indirect role in establishing the ploidy status of the embryo is ongoing. Preliminary PGS data supports that these embryos have a higher euploid rate per patient compared to embryos grown in 6mM lactate. This potentially important observation further supports the need for more epigenetic and genetic analysis of embryos cultured in media specific for human ART/IVF.

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References:

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