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Title:

DEGREE OF RE-EXPANSION FOLLOWING VITRIFICATION/REWARMING OF EUPLOID BLASTOCYSTS IS INVERSELY CORRELATED WITH IMPLANTATION AND ONGOING PREGNANCY/LIVE BIRTH RATES

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Objective:

Routine implementation of blastocyst culture, preimplantation genetic testing, and freeze-all cycles has resulted in supernumerary cryopreserved euploid blastocysts available for frozen embryo transfer (FET). Often faced with a selection of chromosomally normal embryos, embryologists and clinicians turn to embryo morphology, morphokinetics, and timing of blastulation and cavitation to develop prognostic criteria. A recent study showed that re-expansion of vitrified/rewarmed blastocysts strongly correlated with implantation compared to blastocysts that did not re-expand.¹ Yet, that study did not incorporate PGT-A and was limited by small sample size. Thus, our objective was to evaluate the association between degree of re-expansion prior to FET and clinical outcomes among euploid blastocysts.

Design:

Retrospective, cohort study

Materials and Methods:



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The study included patients at an academic center who underwent single euploid FET cycle(s) from 2012-2019. Embryo vitrification/rewarming were performed with the Cryotop method (Kitazato). Embryos were classified into 3 groups: (1) fully re-expanded, (2) partially re-expanded, and (3) not re-expanded. Images of embryos recorded as not re-expanded after 3-4 hours post-warming were manually compared to the image taken immediately post-warming to determine whether partial re-expansion had occurred during the culture period. Primary outcome was ongoing pregnancy/live birth (OP/LB) rate. Secondary outcomes were rates of clinical pregnancy (CP) and early pregnancy loss (EPL). Data were evaluated with T-tests, chi-square tests, and generalized estimating equations.

Results:

The study included 4440 single euploid FET cycles from 2968 patients. There were 118 cycles (2.7%) where embryos were not fully re-expanded 3-4 hours post-warming. Of these, 58 had partially re-expanded and 59 did not re-expand prior to FET. There was a higher proportion of day 7 embryos (27.1%) in the not re-expanded compared to the fully re-expanded cohort (2.6%). After controlling for confounders, blastocysts that did not re-expand after 3-4 hours were associated with a significant decrease in OP/LB (OR 0.19 [95% CI 0.09-0.40], $p < 0.0001$) and CP (OR 0.19 [95% CI 0.10-0.35], $p < 0.0001$), compared to fully re-expanded blastocysts. There was no significant difference in OP/LB or CP rates between partially and fully re-expanded groups. There was no difference in EPL rate between the 3 groups.

Conclusion:

In this study assessing the contribution of embryo re-expansion after vitrification/warming in a single euploid FET model, we showed reduced CP and OP/LB rates in embryos that did not re-expand. Our findings are consistent with Coello et al. who found a lower implantation rate for embryos that did not fully re-expand at FET compared to those that did.¹ Though transfer of blastocysts that did not re-expand resulted in a 76% decrease in OP/LB rate, our study also found no difference in EPL. Patients can therefore be reassured that once implantation has been achieved, there is no demonstrable increase in EPL.