THE DISTINCT EFFECTS OF TROPHECTODERM QUALITY AND INNER CELL MASS QUALITY ON OUTCOMES OF THAWED BLASTOCYST TRANSFERS

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Background

It is established that trophectoderm (TE) grade and inner cell mass (ICM) grade are highly relevant to success following blastocyst transfer. However, their specific effects on initial pregnancy, early pregnancy loss, and live birth have yet not been statistically differentiated.

The objective of this study was to define the relative roles of the TE and ICM quality in achieving success following transfer of single thawed blastocysts.

Methods

Single thawed blastocysts were transferred in programmed cycles using exogenous estradiol and progesterone. Vitrified-warmed blastocysts were graded and measured prior to transfer.

Rising serum hCG titers defined pregnancy and serial ultrasounds were used to assess pregnancy location and viability.

Early pregnancy loss was defined as the loss of a pregnancy before 10 weeks gestation.

Logistic regression was used to determine which variables were significant in achieving pregnancy, live birth, or in pregnancy loss. A P-value <0.05 was considered significant.

Results

1,350 thawed single blastocyst transfers were available for this IRB-approved retrospective study, 95 of which were excluded due to missing measurements, 1255 were included in the analysis, 793 of which used pre-implantation genetic testing (PGT). A total of 965 achieved pregnancy (+hCG), 230 had early pregnancy loss, 28 had miscarriage, and 707 had live birth.

Among all transfers, initial pregnancy (rising hCG) was associated with the use of PGT (P=0.0031), TE grade (P=0.0160) and younger patient age at oocyte retrieval (P=0.0483). Among pregnancies, early pregnancy loss was associated with absence of PGT (P<0.0001), poor ICM grade (P=0.0088), patient age at retrieval (P=0.0336). Live birth was associated with the use of PGT (P<0.0001), good ICM grade (P=0.0001) and younger patient age at retrieval (P=0.0069).

When only the cycles with PGT were considered, then live birth was predicted only by ICM grade (P=0.0002).

When only the non-PGT cycles were considered, then live birth was predicted by ICM grade (P=0.0260) and age at retrieval (0.0051).

	Pregnancy rate (%)	Early loss rate (%)	Live birth rate (%)
PGT cycles			
ICM grade A	83.5	13.7	71.2
ICM grade B/C	77.7	23.8	57.3
TE grade A	84.5	18.9	67.6
TE grade B/C	77.6	21.3	59.1
Non-PGT cycles			
ICM grade A	78.9	26.7	55.1
ICM grade B/C	68.2	32.3	42.6
TE grade A	78.0	33.1	49.5
TE grade B/C	68.8	27.4	46.4
All transfers			
ICM grade A	81.5	19.2	64.1
ICM grade B/C	74.6	26.4	52.4
TE grade A	81.5	25.2	59.1
TE grade B/C	74.8	23.1	55.0

Note: Early pregnancy loss rate is calculated among pregnancies only.

Conclusions

The quality of the trophectoderm was important in achieving pregnancy.

The quality of the ICM was important in avoiding early pregnancy loss and sustaining pregnancy to live birth, regardless of the use of PGT.

The use of PGT and the age of the patient at oocyte retrieval were relevant to pregnancy, pregnancy loss, and live birth. These results suggest distinct biological roles of the TE and ICM in establishing pregnancy and sustaining pregnancy, respectively.

The well-known role of embryo ploidy was evidenced by the relevance of PGT and maternal age at retrieval.