American Society for Reproductive Medicine 2017 Scientific Congress & Expo
October 28 to November 1, 2017 • San Antonio, TX, USA

Title:
DOES MORPHOLOGIC GRADING OF EMBRYONIC TROPHECTODERM CORRELATE WITH QUALITY OF PLACENTATION AND PERINATAL OUTCOME?

Authors:
N. Herlihy, 1,2 L. Sekhon,1,2 J. A. Lee,1 T. Mukherjee,1,2 A. B. Copperman1,2

Affiliations:
1. Reproductive Medicine Associates of New York, 635 Madison Ave 10th Floor New York, New York, United States, 10022

2. Obstetrics, Gynecology and Reproductive Science, Mount Sinai School of Medicine, Klingenstein Pavilion 1176 Fifth Avenue 9th Floor New York, New York, United States, 10029.

Objective:
The human implantation process involves complex and synchronized cellular and molecular events between the implanting embryo and the receptive uterus. Embryo morphology is known to correlate with the likelihood of successful implantation, and in particular, a healthy trophoblast is necessary for migration through the uterine wall. Data on whether differences in TE grade translate into downstream effects on the quality of placentation and subsequent perinatal outcome remains limited. The study sought to compare the incidence of perinatal complications and abnormal placental pathology findings in singleton live births after embryo(s) transfer (ET) of varying TE grade.

Design:
Retrospective cohort analysis

Materials and Methods:
The study included patients with complete obstetric and placental pathology records who achieved a live singleton birth from fresh and frozen single embryo transfers (SET) from 2010 to 2015. Blastocyst morphology was assessed using the modified Gardner classification system, and the incidence of low birthweight (LBW), preterm birth (PTB), preeclampsia and abnormal placental pathology was analyzed with respect to included TE grade (A-C). A grade of D was excluded due to no patient receiving this scoring prior to ET. Abnormal histological findings were categorized into 5 groups: thrombotic (villous ischemia, infarcts, mural thrombi), inflammatory (chorioamnionitis, umbilical phlebitis, villitis), structural (choriangiosis, abnormal cord insertions, single umbilical artery), hemorrhagic (retroplacental hematoma, intervillous hemorrhage), and morbidly adherent (accreta). Chi square, fisher's exact test and ANOVA were used for statistical analysis.

Results:
A total of 380 live births derived from fresh (n=128) and frozen (n=252) SETs were included. Perinatal outcomes and placental pathology findings stratified by trophectoderm grade and whether fresh or frozen ET (FET) was performed are shown in Table 1. In both fresh and FET cohorts, there were no significant differences in birthweight, placental weight, or the incidence of perinatal complications among patients that underwent transfer of embryos with a trophectoderm grade of A, B or C. Embryos with a trophectoderm grade of C demonstrated a non-significant trend towards a higher incidence of thrombotic placental changes in FET cycles and a significantly increased incidence of morbidly adherent placenta after fresh transfer.

Conclusions:
TE quality was not correlated with major adverse perinatal outcomes or placental weight. However, a low TE morphology score appears to correlate with recognizable, abnormal histological changes in placentas collected at time of live birth. While clinicians can be reassured that transferring embryos with suboptimal TE grade does not appear to impact downstream perinatal outcome, the clinical significance of placental histologic changes is less clear. Future research should aim at analyzing the subset of pregnancies derived from embryos with C and D grade TEs. Molecular studies should work towards analyzing the transcriptome and methylome of placentas from IVF pregnancies to better understand the molecular mechanisms related to differing TE morphology and placental histology.

Support:
None

Table 1:

	Grade A Fresh ET (n=82) FET (n=94)	Grade B Fresh ET (n=34) FET (n=120)	Grade C Fresh ET (n=12) FET (n=38)	P value
Mean placental weight (g) Fresh ET: // FET:	 466.1 +/- 112.3 // 449.7 +/- 114.4	 420.6 +/- 160.8 // 456.2 +/- 129.8	 437.2 +/- 185.3 // 474.5 +/- 216.2	 NS // NS
Birthweight (g) Fresh ET: // FET:	 3183.1 +/- 681.8 // 3339.3 +/- 510.3	 3045.2 +/- 502.7 // 3328.3 +/- 642.8	 3259.5 +/- 516.3 // 3442.0 +/- 506.8	 NS // NS
Low birthweight (<2500g) Fresh ET: // FET:	 6.1% (5/82) // 3.2% (3/94)	 5.9% (2/34) // 8.3% (10/120)	 8.3% (1/12) // 5.3% (2/38)	 NS // NS
Preterm delivery Fresh ET: // FET:	 8.5% (7/82) // 8.5% (8/94)	 11.8% (4/34) // 7.5% (9/120)	 0.0% (0/12) // 7.9% (3/38)	 NS // NS
Preeclampsia				

Fresh ET: // FET:	4.9% (4/82) // 5.3% (5/94)	8.8% (3/34) // 5.8% (7/120)	8.3% (1/12) // 2.6% (1/38)	NS // NS
Placental Pathology Findings Fresh ET: // FET:	n=26 // n=20	n=10 // n=32	n=5 // n=6	-- // --
Thrombotic changes Fresh ET: // FET:	46.2% (12/26) // 45.0% (9/20)	40.0% (4/10) // 40.6% (13/32)*	60.0% (3/5) // 83.3% (5/6)*	NS // *P=0.054
Inflammatory changes Fresh ET: // FET:	50.0% (13/26) // 60.0% (12/20)	50.0% (5/10) // 46.9% (15/32)	80.0% (4/5) // 33.3% (2/6)	NS // NS
Structural changes Fresh ET: // FET:	26.9% (7/26) // 20.0% (4/20)	10.0% (1/10) // 37.5% (12/32)	20.0% (1/5) // 0.0% (0/6)	NS // NS
Hemorrhagic changes Fresh ET: // FET:	26.9% (7/26) // 20.0% (4/20)	20.0% (2/10) // 15.6% (5/32)	20.0% (1/5) // 16.7% (1/6)	NS // NS
Morbidly adherent Fresh ET: // FET:	3.8% (1/26)* // 5.0% (1/20)	0.0% (0/10)$^{+}$ // 6.3% (2/32)	40.0% (2/5) *$^{+}$ // 0.0% (0/6)	*$^{+}$P<0.05 // NS