Baseline characteristics and adjusted odds ratio (aOR) for ectopic pregnancy(EP)

	Group A (EP: n=88)	Group B (Intrauterine Pregnancy: n=753), including 103 miscarriages	aOR for EP (95% CI, P value)
Maternal age (y.o.)	31.8±4.3	31.7±4.4	1.01 (0.95 - 1.08. 0.67)
Parity (multipara / primipara)	18 / 70	347 / 406	0.27 (0.15 - 0.48, <0.001*) / 1.00 (reference)
Chromosomal abnormality (yes / no)	3 / 85	76 / 677	0.18 (0.04 - 0.55, <0.01*) / 1.00
Risk factors for EP (yes / no)	48 / 40	117 / 636	6.93 (4.27 - 11.36, <0.001*) / 1.00
ART pregnancy (yes / no)	14 / 74	61 / 692	1.46 (0.67 - 3.04, 0.32) / 1.00
Sex chromosome (male / female)	46 / 42	368 / 385	1.08 (0.67 - 1.75, 0.76) / 1.00

[Note of the table: Data are mean±SD or number of subjects. Odds ratios were all adjusted for maternal age and parity. *P<0.05 was considered statistically significant.]

purpose of this study is to compare the frequencies of chromosomal abnormality of EP conceptus with those of intrauterine pregnancies, to identify variables that might affect the incidence of EP, and to assess their roles on the etiology of EP.

DESIGN: Retrospective case control study.

MATERIALS AND METHODS: We have had 88 operation-treated EP for 8 years since 2007. All chorionic villous samples obtained during surgical treatment could be successfully analyzed for cytogenetic study using direct and culture method (Group A). As controls, we chose consecutive 753 singleton intrauterine pregnancies in the first half of 2014, including 103 miscarriages (Group B). In the cases of miscarriage, intrauterine fetal death, and fetal/neonatal anomaly were all examined by karyotype analysis of chorionic villi or placenta. Our laboratory did not apply PGD/PGS to ART cases. Intrauterine pregnancies delivering a healthy neonate with normal appearance were assumed to be normal karyotyped subjects. Demographic information defining our study population were all collected from medical records, including maternal age, parity, risk factors for EP, method of conception, and neonatal sex. The odds ratios of variables of interest (with 95% confidence interval) for EP were calculated using multivariate logistic regression.

RESULTS: The results of our study are shown in the table below. In Group A, only 3 cases (3.4%: 3/88) showed abnormal chromosomal composition. On the other hand, 76 cases in Group B were identified as having chromosomal abnormalities (10.1%: 76/753). The rate of abnormal karyotype in Group A was statistically lower than in Group B (P<0.05). One or more risk factors for EP were identified in 48 cases of Group A (54.5%: 48/88), and 117 cases of Group B (15.5%, 117/ 753), also indicating a statistically significant difference (P<0.001).

CONCLUSIONS: 1) Embryos with abnormal karyotype and multipara might possess some defensive mechanisms against EP. 2) Maternal age, ART pregnancy, and sex of conceptus did not affect the occurrence of EP. 3) Widely known risk factors for EP were confirmed to be a more plausible explanation for the etiology of EP than embryo-associated factors.

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THE IMPACT OF THE DAY OF EMBRYO TRANSFER AND TYPE OF TRANSFER CYCLE ON THE INCIDENCE OF ECTOPIC PREGNANCY FOLLOWING IVF.

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OBJECTIVE: Tubal disease and history of pelvic infection have been shown to increase the incidence of ectopic pregnancy (EP) following IVF. However, there is inconsistent data on the impact of the day of embryo transfer and type of transfer cycle (fresh versus frozen) on the EP rate. Therefore, we aim to compare the EP rate between fresh and frozen cycles and between day 3 and day 5 transfers.

DESIGN: Retrospective cohort study.

MATERIALS AND METHODS: Patients who achieved pregnancy following autologous fresh or frozen-thawed embryo transfer (FET) cycles between January 2004 and December 2015 were included. EP rate was compared between fresh and frozen cycles and between day 3 and day 5 transfers. χ^2 test and Fisher's exact test were used as appropriate. Odds ratio (OR) with 95% confidence intervals (CI) were calculated and adjusted for confounders.

RESULTS: A total of 12,841 fresh and 3,997 FET cycles were included. The transfer of $\geq$ 2 embryos was associated with a significantly higher EP rate compared to the transfer of one embryo (1.5% vs. 0.7%, respectively; p=0.001). Fresh cycles were associated with a significantly higher EP rate compared to FET cycle (1.6% vs. 0.7%; p<0.001). The odds ratio remained significant after controlling for the number transferred embryos and history of tubal disease (aOR = 2; 95% CI = 1.3-3.1). Within fresh cycles, day 3 and day 5 transfers were associated with comparable EP rate (1.7% vs 1.3%, respectively; p=0.2). Likewise, within FET cycles, there was no significant difference between day 3 and day 5 transfers (1.2% vs. 0.6%, respectively; p=0.2). Among the four groups, EP rate following day 5 FET (0.6%) was significantly lower than day 3 fresh (1.7%, p<0.001) and day 5 fresh (1.3%, p=0.005) transfers.

CONCLUSIONS: Day 5 FET is associated with a lower EP rate compared to day 3 and day 5 fresh embryo transfer cycles in patients undergoing IVF. Additionally, the transfer of a higher number of embryos is associated with greater incidence of EP.

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EXAMINING THE LUTEAL PLACENTAL SHIFT IN PREGNANCY AFTER FROZEN EMBRYO TRANSFER.

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OBJECTIVE: The purpose of this study is to attempt to define the timing of the luteal-placental shift using pregnancies resulting from frozen embryo transfer (FET) as a model.

DESIGN: Retrospective chart review.

MATERIALS AND METHODS: We identified 262 women who conceived following FET between December, 2013-December, 2016. Patients received oral estradiol (E2) for endometrial stimulation. Once the endometrial thickness exceeded 7mm, they started vaginal progesterone (P4), and blastocyst FET occurred on the 6th day of progesterone. An hCG (human chorionic gonadotropin) level was performed 9 days after FET, and serum E2 and P4 levels were monitored weekly until patients were weaned off of supplementation based on the serum levels. E2 and P4 values for all patients were combined and evaluated in 3 day blocks (ranging from 4 weeks to 16 weeks gestation) to determine the timing of a significant increase in E2 and P4 using a multilevel model for change. The proportion of patients who reached a progesterone level >15 ng/mL, indicating that the luteal-placental shift had occurred, was evaluated for each gestational week.

RESULTS: A significant increase in serum P4 level occurred between 6 and 7 weeks' gestation, such that by 7 weeks' gestation, 80% of patients had a serum P4 level over 15. All patients exhibited a serum P4 > 15 ng/mL by 10 weeks' gestation. A similar significant increase in serum E2 occurred between weeks 6 and 7. The average progesterone levels were

Results

Week Gestation	% of patients with P4 > 15 ng/mL	Average E2 level per week gestation (pg/mL)
Week 4	40%	381.8
Week 5	47%	461.6
Week 6	56%	614.7
Week 7	80%	918.5
Week 8	91%	1075.8
Week 9	97%	1200.7
Week 10	100%	1331.0

also plotted by gestational week to determine a significant increase in levels which would suggest the luteo-placental shift has occurred. The graphical interpretation shows the steepest slope between weeks 5-6 (m=4.54) followed by weeks 6-7 (m=4.34). The average estrogen levels were also graphically evaluated with the greatest rise between week 6-7 (m=303.8).

CONCLUSIONS: Frozen embryo transfer provides an excellent model for the assessment of the luteal-placental shift, as pregnant patients produce essentially no endogenous E2 or P4 until that time. By evaluating both absolute E2 and P4 levels as well as the rate of rise, we can surmise the timing of the actual shift. These data suggest that the actual shift occurs around 7 weeks' gestation, and that patients undergoing FET should continue to receive estradiol replacement until at least 7 weeks' gestational age and progesterone replacement until at least 8-9 weeks' gestational age.

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UTILITY OF CYCLE DAY 28 ESTRADIOL AND HCG IN PREDICTING LIVE BIRTH OUTCOMES IN SINGLE BLASTOCYST TRANSFER CYCLES. C. Mostisser,[a] N. Pereira,[b] A. C. Petrini,[a] A. P. Melnick,[b] J. Lekovich,[b] S. D. Spandorfer,[b] Z. Rosenwaks.[b] [a]Obstetrics and Gynecology, Weill Cornell Medical College, New York, NY; [b]The Ronald O. Perelman and Claudia Cohen Center for Reproductive Medicine, New York, NY.

OBJECTIVE: Previous studies have examined the use of estradiol (E_2) levels in addition to hCG to determine the outcomes of IVF cycles. Its predictive value, however, remains debated. In this study, we investigate the utility of cycle day (CD) 28 E_2 levels in addition to CD 28 hCG levels in predicting live birth in patients undergoing single blastocyst transfer cycles.

DESIGN: Case-control study.

MATERIALS AND METHODS: Patients <40 years undergoing IVF with fresh single day-5 embryo transfer (ET) at our center between 2008 and 2014 were included. Patients with vanishing twins, multiple gestations, or those undergoing genetic testing of embryos or IVF with donor oocytes were excluded. Live singleton birth was considered the primary outcome. In addition to baseline demographics and ovarian stimulation parameters, serum E_2 and hCG levels on CD 28 i.e., the first pregnancy test, were compared between patients with live singleton births (cases) and negative pregnancy tests (controls). Receiver operating characteristic (ROC) curves and corresponding area-under-the-curve (AUCs) were generated for the relationship between live birth and CD 28 hCG level alone, and live birth and the combination of CD 28 E_2 and hCG levels. Hormonal measurements were performed in our laboratory using the IMMULITE 2000 Immunoassay System (Siemens, Berlin, Germany).

RESULTS: A total of 659 patients were included, of which 272 (41.3%) patients had live births. There was no difference in the mean age (32.9 vs. 33.3 years), stimulation duration (9.6 vs. 9.6), gonadotropins administered (2236.7 vs. 2225.8 IU), peak E_2 level (2141.4 vs. 2225.8 pg/mL), peak endometrial thickness (10.6 vs. 10.8 mm) or number of oocytes between cases and controls (13.4 vs. 13.2). CD 28 hCG level was predictive of live birth (AUC=0.90, 95% CI 0.88-0.93). Based on this ROC, hCG of 49.2 mIU/mL was associated with a sensitivity=93.7% and specificity=83.0%. The combination of CD 28 E_2 and hCG levels strongly predicted live birth (AUC=0.97, 95% CI 0.95-0.98). Using this ROC, hCG of 49.2 mIU/mL with E_2 of 181 pg/mL increased the sensitivity and specificity to 98.3% and 88.5%, respectively. The AUC for combined CD 28 E_2 and hCG levels over hCG levels alone was statistically significant ($P<0.001$).

Comparison of baseline demographics and ovarian stimulation parameters of the study cohort (n=659)

Parameter	Live Birth (n=272)	Negative Pregnancy Test (n=387)	P
Age (years)	32.9 (±3.7)	33.3 (±3.8)	NS
BMI (kg/m^2)	22.8 (±4.7)	22.5 (±5.6)	NS
Duration of stimulation (days)	9.6 (±1.8)	9.6 (±1.8)	NS
Total gonadotropins (IU)	2236.7 (±1141.2)	2259.5 (±1389.6)	NS
Peak E_2 level (pg/mL)	2141.4 (±847.6)	2225.8 (±1236.6)	NS
Number of oocytes	13.4 (±5.7)	13.2 (±6.2)	NS
Excess blastocysts frozen	4.6 (±3.1)	4.5 (±3.3)	NS

CONCLUSIONS: A combination of CD 28 E_2 and hCG is superior than CD 28 hCG level alone in predicting live singleton births in patients undergoing single blastocyst transfer cycles.

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MATERNAL 17-β-ESTRADIOL AND PROGESTERONE REMAIN ELEVATED INTO THE LATE FIRST TRIMESTER IN PREGNANCIES CONCEIVED WITH *IN-VITRO* FERTILIZATION (IVF) DESPITE DISCONTINUATION OF SUPPLEMENTAL THERAPY. B. Lee,[a] R. Buttle,[a] K. Castellano,[a] T. L. Gonzalez,[a] T. Sun,[a] L. W. Sundheimer,[a,b] E. T. Wang,[a,b] J. Williams,[a,b] M. D. Pisarska.[a,b] [a]Department of Obstetrics and Gynecology, Cedars-Sinai Medical Center, Los Angeles, CA; [b]UCLA School of Medicine, Los Angeles, CA.

OBJECTIVE: Pregnancies resulting from fresh IVF cycles exposed to supra-physiologic levels of estrogen and progesterone have been associated with higher rates of low birth weight and small for gestational age babies. To investigate whether the elevated levels of estrogen and progesterone found in IVF pregnancies have an impact on the first trimester placental hormonal milieu, we examined the levels of estrogen and progesterone in the maternal plasma of IVF, non-IVF fertility treatment (NIFT), and spontaneous pregnancies at the time of chorionic villus sampling (CVS).

DESIGN: A prospective cohort study.

MATERIALS AND METHODS: Plasma of patients undergoing CVS at 11-13 gestational weeks at Cedars-Sinai Prenatal Diagnostic Center were collected and flash-frozen until processing. Maternal plasma of IVF (n=52), NIFT (n=58), and spontaneous (n=93) pregnancies were thawed. Enzyme-linked immunosorbent assay (ELISA) was performed for 17-β-estradiol and progesterone. The mean 17-β-estradiol and progesterone levels in maternal plasma of IVF, NIFT, and spontaneous pregnancies were compared using analysis of variance (ANOVA) with the statistical significance set at $p < 0.05$.

RESULTS: 17-β-estradiol was significantly higher in IVF compared to spontaneous pregnancies ($p = 0.024$). Progesterone was also significantly higher in IVF versus spontaneous pregnancies ($p < 0.001$). There was no significant difference in 17-β-estradiol and progesterone in spontaneous versus NIFT or NIFT versus IVF pregnancies.

CONCLUSIONS: Circulating 17-β-estradiol and progesterone remains persistently elevated in the late first trimester in mothers of pregnancies conceived with IVF compared to those who conceived spontaneously even after discontinuation of hormone supplementation, possibly due to placental reprogramming leading to elevated hormone production.

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DOES MORPHOLOGIC GRADING OF EMBRYONIC TROPHECTODERM CORRELATE WITH QUALITY OF PLACENTATION AND PERINATAL OUTCOME?. N. Herlihy,[a] L. Sekhon,[b] T. G. Nazem,[b] C. A. Hernandez-Nieto,[c] M. Oliva,[a] J. A. Lee,[b] B. Sandler,[d] T. Mukherjee,[b] A. B. Copperman.[e] [a]Obstetrics, Gynecology and Reproductive Science, Icahn School of Medicine at Mount Sinai, New York, NY; [b]Reproductive Medicine Associates of New York, New York, NY; [c]Reproductive Endocrinology and Infertility, RMA of NY, New York, NY; [d]Reproductive Medicine Associates of New York, New York City, NY; [e]Obstetrics and Gynecology, RMANY-Mount Sinai, New York, NY.

OBJECTIVE: Implantation is a synchronized process between the embryo and uterus. Embryo morphology correlates with the likelihood of implantation. A healthy trophoblast is necessary for migration through the uterine wall. Data is limited on whether TE grade translates into downstream effects on placentation and perinatal outcomes. The study sought to compare the rate of perinatal complications and abnormal placental pathology in singleton live births of single embryo transfer (SET) with varying TE grade.

DESIGN: Retrospective analysis.

MATERIALS AND METHODS: The study included patients with obstetric and placental pathology records from 2010-2015 after a live singleton birth from a fresh/frozen SET. Blastocyst morphology was assessed using Gardner's scoring system, and the incidence of low birthweight, preterm birth, preeclampsia and abnormal placental pathology was analyzed with respect to TE grade. Abnormal placental histology was categorized: thrombotic (villous ischemia, infarcts, mural thrombi), inflammatory (chorioamnionitis, villitis), structural (choriangiosis, abnormal cord insertions, single