American Society for Reproductive Medicine 2016 Scientific Congress & Expo
October 15 to 19, 2016 ● Salt Lake City, UT, USA

Title:
Sexual Dimorphism and Implantation Potential: Is There a Difference?

Authors:
L. Sekhon,1,2 J. Rodriguez-Purata,1 J. A. Lee,1 C. Briton-Jones,1 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:
Male offspring tend to weigh more than female offspring, perhaps the result of endogenous androgen-driven in utero development. Whether embryonic sex influences differences in late pregnancy or are a continuation of the pre- and post-implantation period or a completely separate phenomenon altogether is not known. Our ability to assess embryo development between implantation and sonographic detection of a fetal pole is limited. While HCG is not a direct measurement of embryonic growth, it represents the trophoblastic cell mass and is a measure of pregnancy progression. Women carrying female fetuses have been reported to have higher HCG levels than those with a male fetus, with demonstration of this phenomenon confined to the late first, second and third trimester of pregnancy. This study sought to determine if there are embryonic sex-related differences in the establishment and progression of early pregnancy.

Design:
Retrospective cohort study

Materials and Methods:
Patients who underwent single, euploid, frozen blastocyst transfers (FET) from July 2011 to March 2016 were included. Blastocysts, derived from both autologous and donor oocytes, underwent trophectoderm biopsy and comprehensive chromosomal screening (CCS). FETs of male and female embryos were compared according to patient demographics, cycle characteristics and clinical outcome. Maternal serum HCG levels measured 9 and 11 days post-FET were analyzed to determine sex-related differences in embryonic implantation and early dynamics of trophoblast progression as measured by hCG production. Data was analyzed using student's T test, chi square and binary logistic regression.

Results:

Of 1108 FET cycles, a total of 561 female and 547 male embryos were transferred. Patient demographics and cycle characteristics were similar in patients who had female vs. male embryos transferred (Table 1). Embryonic sex did not significantly influence the odds of implantation (OR 0.9 [95% CI 0.7-1.2], p=0.45), clinical pregnancy (OR 0.9 [95% CI 0.7-1.1], p=0.34) or early pregnancy loss (OR 1.2 [95% CI 0.7-2.1], p=0.53). Implanted female embryos exhibited a significantly increased rise in HCG from day 9 to 11 post-FET (OR 1.5 [95% CI 1.04-2.0], p=0.02).

Conclusions:

IVF with CCS enables accurate evaluation of sex-related differences in embryonic competence and early development. Controlling for ploidy status, the number of embryos transferred, and the endometrial environment, male and female blastocysts implant and progress at similar rates. Female fetuses demonstrated a significantly increased rise in serum HCG in the early implantation period, prior to the establishment of of the fetal hypothalamic-pituitary-gonadal axis. Therefore, the differential HCG production is more likely mediated by sex chromosomes of the trophoblast, whereby some genes on the X chromosome that escape inactivation may be overexpressed by the placenta in the presence of a female fetus. Validation of this theory could be provided by an analysis of gene expression within female and male placentas.

Support:

None

Table 1:

	Female blastocysts	Male blastocysts	P value
Total cycles	561	547	
Patient age	36.9 ± 4.2	36.6 ± 4.3	NS
Oocyte age	36.0 ± 4.1	35.6 ± 4.3	NS
BMI	23.2 ± 4.0	23.3 ± 4.2	NS
Peak Estradiol	544.1 ± 463.4	517.6 ± 446.8	NS
Day 3 FSH	6.1 ± 3.4	6.3 ± 3.2	NS
Endometrial thickness at transfer (mm)	9.0 ± 2.0	9.2 ± 2.1	NS
Implantation rate	58.6% (329/561)	60.9% (333/547)	NS
Clinical pregnancy rate	53.7% (301/561)	56.5% (309/547)	NS
Early pregnancy loss rate	5.0% (28/561)	4.4% (24/547)	NS
Serum HCG 9 days post ET	96.9 ± 100.1	108.9 ± 108.5	NS
Serum HCG rise from day 9 to 11 post ET	163.0 ± 0.6 %	152.0 ± 4.7 %	<0.05