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TITLE:

OVUM DONATION IN AN ERA OF PREIMPLANTATION GENETIC TESTING: HOW SHOULD WE COUNSEL PATIENTS?

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OBJECTIVE:

With remarkable speed and accuracy, next-generation sequencing (NGS) of embryos provides in-depth analysis of the embryonic genome. Given the high age-related incidence of aneuploidy, patients undergoing autologous IVF today routinely use NGS to identify euploid embryos for transfer. For those utilizing donated oocytes, little data exists informing them of the risks and benefits of screening embryos for chromosomal abnormalities prior to implantation. This study sought to evaluate the rate of aneuploidy in a donor oocyte population and to understand the impact of comprehensive chromosomal embryo screening on recipient cycle outcome.

DESIGN:

Retrospective cohort analysis

MATERIALS AND METHODS:

This study included donor oocyte recipients undergoing single, euploid frozen embryo transfer (FET) (n=105) vs. a single, unscreened FET (n=292) from 2012 to 2017. Aneuploidy screening was performed using quantitative polymerase chain reaction (qPCR) and targeted next generation sequencing (NGS). Baseline demographics, cycle characteristics and outcomes were compared among cohorts. Continuous variables were compared using two-sided Student's t-test

and categorical variables were compared using chi-square test. Binary logistic regression was used to determine whether the use of PGT modified the odds of implantation, ongoing clinical pregnancy and early pregnancy loss (EPL). Implantation was defined as the presence of a gestational sac, while ongoing pregnancy was defined as the presence of a fetal heartbeat at discharge.

RESULTS:

A total of 105 screened FET cycles and 292 unscreened FET cycles were analyzed. The rate of aneuploidy in donor-derived blastocysts was 25.8%. Baseline demographics and cycle characteristics are shown in Table 1. Recipients who utilized PGT had significantly lower BMI (23.6 +/- 4.4 vs. 25.0 +/- 5.0, p=0.02) and used oocytes from donors with significantly increased age (27.5 +/- 3.2 vs. 26.6 +/- 3.3, p=0.02). Recipients of euploid blastocysts had similar clinical outcomes as those who underwent transfer of unscreened blastocysts. After controlling for donor oocyte age, recipient age, BMI, endometrial thickness at transfer, and embryo age at time of transfer, the use of PGT did not significantly modify the odds of implantation (OR 0.9 [95% CI 0.5-1.6], p=0.7), ongoing clinical pregnancy (OR 0.97 [95% CI 0.6-1.7], p=0.9) or EPL (OR 0.6 [95% CI 0.3-1.3], p=0.2).

CONCLUSION:

Despite the fact that 25.8% of donor oocyte derived embryos were detected as aneuploid, clinical outcome was not significantly impacted by chromosomal screening. Due to the relatively young age of oocyte donors, recipients can expect a high yield of blastocyst stage embryos. Morphologic selection of embryos is successful in achieving good implantation rates, enabling the clinician to confidently transfer a single embryo into a recipient. As cost of NGS decreases and availability increases, more patients will be able to access embryo screening. Though our study did not achieve statistical significance, we demonstrated a strong trend towards increased implantation rates and ongoing pregnancy rates in recipients who used NGS to assist in embryo selection.

Table 1:

Single, Vitrified-Thawed, Screened vs. Unscreened Donor-Oocyte-Derived Blastocyst Cycles

	PGT (n=105)	Non-PGT (n=292)	P-value
Recipient Age	44.4 +/- 4.2	44.5 +/- 4.7	NS
Donor Age	27.5 +/- 3.2	26.6 +/- 3.3	0.02
Recipient BMI	23.6 +/- 4.4	25.0 +/- 5.0	0.02
Recipient Endometrial thickness at transfer	8.8 +/- 1.8	9.0 +/- 2.0	NS

Proportion of ETs with morphology >=4BC	93.3% (98/105)	89.0% (260/292)	NS
Aneuploidy rate	25.8% (207/803)	N/A	--
Implantation Rate	55.2% (53/96)	46.4% (134/289)	NS
Ongoing pregnancy Rate	49.0% (47/96)	42.9% (124/289)	NS
Early Pregnancy Loss Rate	5.7% (6/105)	3.4% (10/292)	NS