American Society for Reproductive Medicine 2020 Virtual Congress

October 17-21, 2020

DOES SHIPPING IMPACT CRYO-SURVIVAL OR USABLE EMBRYO RATES DERIVED FROM VITRIFIED DONOR OOCYTES?

Jenna Friedenthal, MD[1], Joseph A. Lee, BA[2], Wayne Caswell, MS[3], Melissa O Stratton, BA[4], Christine Briton-Jones, PhD, HCLD[2] and Alan B Copperman, MD[1]

1. Obstetrics, Gynecology and Reproductive Science, Icahn School of Medicine at Mount Sinai, Klingenstein Pavilion 1176 Fifth Avenue 9th Floor New York, New York, United States, 10029.
2. Reproductive Medicine Associates of New York, 635 Madison Ave 10th Floor New York, New York, United States, 10022
3. Donor Egg Bank, USA, Rockville, MD
4. Donor Egg Bank, USA, Rockville, NY

OBJECTIVE:

Over the last decade, there have been significant advancements in oocyte cryopreservation (OC) and increased utilization of vitrified oocytes (VOs) within modern assisted reproduction technology (ART). While donated oocytes (DOs) have for decades been utilized to treat patients who cannot produce viable oocytes, access was limited by local availability. However, with the expansion of DO banks nationwide resulting from improvement in OC technology, women may now select DOs from across the country. The advantages of a nationwide DO bank rely upon shipping VOs between centers. Concern has been raised regarding the potential impact of temperature fluctuations in the process of shipping on VOs [1], with evidence suggesting that temperature fluctuations may be detrimental to the spindle complex and oocyte integrity [2, 3]. The objective of this study was to evaluate the impact of shipment on the clinical potential of donated VOs.

DESIGN:

Retrospective cohort study

MATERIALS AND METHODS:

The study included VOs from a DO bank network from 2012-2019. Following oocyte retrieval, oocytes were vitrified and allotted into cohorts of 6 or 7 eggs (oocyte lots). VOs were

categorized as Internal or External. Internal: warmed and utilized in the same laboratory. External: transported to a second location where warming, fertilization, embryo culture, embryo transfer and embryo vitrification occurred. Internal oocytes were stored in standard liquid nitrogen storage dewars at -196 ^{o}C until warming; external oocytes underwent 1-2 days of shipping, held in vapor-based dry shippers and monitored to alert if temperatures rose above -150^{o}C until they were transferred into standard liquid nitrogen dewars at recipient laboratory. Baseline demographics were obtained: donor age, number of oocytes retrieved, and number of metaphase II (MII) oocytes retrieved. The primary outcome was oocyte thaw survival rate (OTSR). Secondary outcomes were fertilization rate (FR), total number of usable embryos (UEs), and usable embryo rate (UER). UEs were defined as embryos available for transfer or cryopreservation based on developmental stage and a given fertility center's standard operating procedure. Data were analyzed using t-tests and Wilcoxon signed-rank test, with $P<0.05$ considered significant.

RESULTS:

248 internal oocyte lots and 5,202 external lots were thawed during the study time and were included in analysis. No significant differences were observed in donor age, number of oocytes retrieved, number of MII oocytes retrieved, or maturation rate. There was no difference in OTSR between Internal and External cohorts (91.41% vs 89.72%, P=0.12). There were also no differences in FR, the total number of UE, or UER.

CONCLUSIONS:

Shipping of donated VOs does not adversely affect oocyte cryo-survival. Additionally, we found that shipping had no impact on either FR or the number of UEs. Our results indicate that vapor-based dry shippers maintain VOs in a comparable state to liquid nitrogen for the period they are in transit. Future studies should aim to investigate the impact of transport on precise molecular markers for oocyte integrity.

References:

1. McDonald, C.A., et al., *Nitrogen vapor shipment of vitrified oocytes: time for caution.* Fertil Steril, 2011. **95**(8): p. 2628-30.
2. Almeida, P.A. and V.N. Bolton, *The effect of temperature fluctuations on the cytoskeletal organisation and chromosomal constitution of the human oocyte.* Zygote, 1995. **3**(4): p. 357-65.
3. Zenzes, M.T., et al., *Effects of chilling to 0°C on the morphology of meiotic spindles in human metaphase II oocytes.* Fertility and Sterility, 2001. **75**(4): p. 769-777.