Oocyte Cryopreservation: microSecure Vitrification (µS-VTF) No Worse Than the Rest, But is it an Experimental Procedure?

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Objective: When vitrified human oocytes yield viable blastocysts, live birth success is comparable to fresh oocytes. However, despite ASRM classifying oocyte cryopreservation as "non-experimental" in 2012, little progress has been made to understand developmental inconsistencies associated with some egg batches. Our aim was to contrast developmental incompetence of oocytes vitrified by µS-VTF in a DMSO-free solution compared to other conventional open VTF/EG-DMSO systems.

Design: Based on our limited clinical experience, we performed a retrospective analysis of our 2014 – 2018 oocyte warming-ET cycles. VTF oocytes (n=416) from 28 patients were grouped according to VTF system: open device(n=87; outside Lab source) or closed µS VTF devices (n=329; Lab control), vitrified in EG/DMSO or EG only (Innovative Cryo Enterprises, NJ) cryoprotective solutions, respectively. Differences in fertilization, cleavage, blastocyst and pregnancy rates were statistically compared between groups. In particular, we aimed to assess differences in developmental issues.

Materials and Methods: All human oocytes were vitrified and warmed using standardized, published protocols. All oocytes were ICSI'ed 2-3h post-warming and cultured in Life Global medium + protein supplementation under tri-gas, humidified incubation (37ºC) conditions up to Day 7. Blastocysts underwent ET, biopsy/PGS and/or µS-VTF/VFET.

Results: Developmental delay and reduced mean blastocyst production is common in vitrified-warmed oocytes compared to fresh oocytes (50-65%), independent of VTF method. Yet, when blastocysts are produced normal pregnancy outcomes occurred. Development incompetence between batches however, independent device-solution treatments, continues to be a serious problem (see Table results).

VTF device by Solution	Open Device DMSO/EG	µS-VTF EG+Ficoll
# Patients / # PGS cycles	7 / 4	21 / 17
# VTF oocytes	87	329
Survival Rate: #ICSI'ed (%)	61 (70%)	289 (88%)*
Fertilization Rate: #2PN (%)	43 (70%)	201 (70%)
Cleavage Rate-Day 3: #>3-cell (%)	41 (95%)	189 (94%)
Blastocyst Rate-Day 5-7: # (%)	18 (42%)	62 (31%)
Ongoing Pregnancy/LB Rate: # (%)	1/2 (50%)	7/11 (64%)
Patients without blastocysts: : # (%)	1 (14%)	4 (19%)

*Indicates significant difference between row values, X^2 ($p<0.05$); which we attribute to low #'s.

Conclusion: Delayed and compromised blastocyst development with cryopreserved oocytes continues to be a batch-to-batch problem ignored in most publications. Little experimental progress in the IVF industry is or will be made unless we initiate an ongoing scientific dialog. Ethically speaking, patients should be properly informed and consented prior to elective freeze preservation.

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