

P-758 The efficacy, safety and proven security of microSecure vitrification offers “peace of mind” and reliability during a global pandemic

M.C. Schiewe¹, K. Emeny-Smith¹, N. Nugent¹, S. Zozula¹, K. Wozniak¹, C. Zeffiro¹, E. Baer¹, T. Lee², I. Hatch³, R. Anderson⁴

¹Ovation Fertility, Lab, Newport Beach, U.S.A. ;

²FCARE, Fertility Clinic, Brea, U.S.A. ;

³FCSC, Fertility Clinic, Irvine, U.S.A. ;

⁴SCCRM, Fertility Clinic, Newport Beach, U.S.A.

Study question: Under deadly pandemic conditions involving the novel SARS-CoV-2 corona virus, could biopsied blastocysts be safely cryopreserved, stored and utilized for subsequent warming cycles?

Summary answer: Blastocysts were securely stored, effectively warmed and safely transferred to yield normal pregnancy outcomes under uncertain laboratory conditions subject to unprecedented policy changes.

What is known already: By April 2020, every IVF lab worldwide was implementing deep cleaning/disinfecting procedures in their laboratory and patient-contact areas, thorough hand-washing policies and mandatory PPE to reduce the chance of contact transmission and spread of the potentially deadly SARS-CoV-2 coronavirus. Furthermore, we know that safeguards like oil overlay culture dishes and pipetting dilution factors provide insurance against possible contamination. However, knowing that the trophectoderm of blastocysts possessed the ACE-2 binding receptor, potential concern existed regarding the continuation of laser zona opening and biopsy procedures that could possibly expose cryopreserved embryos to the coronavirus in liquid nitrogen storage (vapor or liquid).

Study design, size, duration: Between March 8 and December 22, 2020, 508 patients performed FET cycles involving the use of single (n=490) or dual (n=18) euploid microSecure vitrified blastocysts. In this retrospective analysis, we compared clinical pregnancy outcomes to a 5 year dataset (2015-2019) encompassing 2768 single and 272 dual embryo transfer FET cycles. All blastocysts were vitrified using a closed microSecure system and Innovative Cryoenterprise (ICE; NJ, USA) non-DMSO, glycerol-EG solutions. Differences were assessed by Chi-square analysis (p<0.05).

Participants/materials, setting, methods: Deep cleaning was performed with Simple Green Pro3+ Virucide in non-lab areas (e.g., ET rooms, waiting room) and 6% H₂O₂ & OoSafe solutions to disinfect lab surfaces and equipment. Group embryo cultures were performed in MCO-5M humidified incubators under low oxygen tri-gas conditions with varying CO₂ levels (5.3-6.0%; pH=7.3-7.35) using 25µl droplets of LifeGlobal medium+7.5%LGPS+1% sodium hyaluronate, before changing to 10µl droplet/GPS dishes post-biopsy. FET cycles involved 4-step sucrose dilutions and transvaginal ultrasound-guided embryo transfers.

Main results and the role of chance: While ICSI fertilization rates were unchanged in 2020 (79.4% 2PN vs 77.3%), blastocyst utilization rates tended to be slightly lower than past years (56.4% vs 59.9%) but within an acceptable range. Of 529 blastocysts warmed, 527 (99.7%) survived completely for transfer, being comparable to the 99.4% experienced over 5 years. Furthermore, there was no differences detected in single embryo transfer pregnancy outcomes. The implantation and ongoing clinical pregnancy/live birth rates were 69% and 66.53% compared to 70.4% and 65.1%, respectively. Under pandemic conditions we did not observe an increase in biochemical pregnancies (10.3%) nor spontaneous miscarriage rates (7.8%). Although it is possible that our rigorous disinfection practices could have attributed to lower blastocyst production, the viability of those embryos was not compromised. Importantly, we were able to feel comfortable performing micromanipulation and cryopreservation procedures throughout the year knowing that we were effectively eliminating possible vertical transmission of coronavirus to an exposed trophectoderm layer in cryostorage by applying microSecure vitrification. Post-FET clinical check-ups revealed no patient reporting any fever or other Covid-19 symptoms in the weeks following their transfers. We are fortunate to say that our Lab staff, physicians and patients have remained healthy throughout 2020.

Limitations, reasons for caution: Blastocyst survival and viability are independent of possible viral exposure. Previously, the risk of disease transmission via liquid nitrogen or vapor exposure was considered highly unlikely (Pomeroy et al., 2010), but that was at a time when embryos were primarily zona-enclosed. Today's ART standards have us re-evaluating safer approaches.

Wider implications of the findings: We have effectively mitigated avoiding performing zona opening procedures by employing our standard practice of aseptic, closed vitrification. In combination with standard preventative measures (PPE, hand hygiene, distance awareness) and routine deep cleaning practices, we sustained a contamination-free environment and healthy patients, capable of sustaining high levels of pregnancy success.

Trial registration number: Not Applicable