

SCIENTIFIC PUBLICATIONS ABOUT OOCYTE VITRIFICATION WITH HSV KIT - CRYO BIO SYSTEM

Porcu et al, 2021 : High-security closed devices are efficient and safe to protect human oocytes from potential risk of viral contamination during vitrification and storage especially in the COVID-19 pandemic

Abstract : The main purpose and research question of the study are to compare the efficacy of high-security closed versus open devices for human oocytes' vitrification. **Methods:** A prospective randomized study was conducted. A total of 737 patients attending the Infertility and IVF Unit at S.Orsola University Hospital (Italy) between October 2015 and April 2020 were randomly assigned to two groups. A total of 368 patients were assigned to group 1 (High-Security Vitrification™ - HSV) and 369 to group 2 (Cryotop® open system). Oocyte survival, fertilization, cleavage, pregnancy, implantation, and miscarriage rate were compared between the two groups. **Results:** No statistically significant differences were observed on survival rate (70.3% vs. 73.3%), fertilization rate (70.8% vs. 74.9%), cleavage rate (90.6% vs. 90.3%), pregnancy/transfer ratio (32.0% vs. 31.8%), implantation rate (19.7% vs. 19.9%), nor miscarriage rates (22.1% vs. 21.5%) between the two groups. Women's mean age in group 1 (36.18 ± 3.92) and group 2 (35.88 ± 3.88) was not significantly different ($P = .297$). A total of 4029 oocytes were vitrified (1980 and 2049 in groups 1 and 2 respectively). A total of 2564 were warmed (1469 and 1095 in groups 1 and 2 respectively). A total of 1386 morphologically eligible oocytes were inseminated by intracytoplasmic sperm injection (792 and 594 respectively, $P = .304$). **Conclusions:** **The present study shows that the replacement of the open vitrification system by a closed one has no impact on in vitro and in vivo survival, development, pregnancy and implantation rate.** Furthermore, to ensure safety, especially during the current COVID-19 pandemic, **the use of the closed device eliminates the potential samples' contamination during vitrification and storage.**

Pantos et al, 2024 : The Effect of Open and Closed Oocyte Vitrification Systems on Embryo Development: A Systematic Review and Network Meta-Analysis

Abstract: Open and closed vitrification systems are commonly employed in oocyte cryopreservation; however, there is limited evidence regarding a comparison of their separate impact on oocyte competence. This study uniquely brings to the literature, data on the effect of open versus closed vitrification systems on laboratory and clinical outcomes, and the effect of cooling and warming rates. **Methods:** A systematic search of the literature was performed using the databases PubMed/MEDLINE and the Cochrane Central Library, limited to articles published in English up to January 2023. A network meta-analysis was conducted comparing each vitrification system versus fresh oocytes. **Results:** Twenty-three studies were included. When compared to fresh oocytes, both vitrification devices resulted in lower fertilization rates per MII oocyte retrieved. **When comparing the two systems in terms of survival rates, no statistically significant difference was observed. However, interestingly open systems resulted in lower cleavage and blastocyst formation rates per 2 pronuclear (2PN) oocytes compared to fresh controls, while at the same time no statistically significant difference was detected when comparing closed devices with fresh oocytes.** **Conclusions:** In conclusion, closed vitrification systems appear to exert a less detrimental impact on the oocytes' competence, which is reflected in the blastocyst formation rates. Proof of superiority of one system versus the other may lead to standardization, helping to ultimately determine optimal practice in oocyte vitrification.

De Munck et al, 2016 : Closed oocyte vitrification and storage in an oocyte donation programme: obstetric and neonatal outcome

Study question: Does closed oocyte vitrification in an oocyte donation programme have an impact on obstetric and neonatal outcome? **Summary answer:** **Obstetric and neonatal outcomes after closed system vitrification of donor oocytes appear to be reassuring.** **What is known already:** The use of fresh oocytes has not been proved to be superior to the use of vitrified donor oocytes in terms of survival, embryo development and clinical pregnancies. Those studies used open devices to prove the non-superiority. Very limited information is available on the comparison of open and closed devices, and the results for survival, embryo development and pregnancy outcomes are conflicting. Data on obstetric and neonatal outcome from vitrified oocytes are scarce. Only one large report is available after the use of donor oocytes vitrified with an open device.

Study design, size, duration: Retrospective observational study performed at the Centre for Reproductive Medicine, UZ Brussel, Belgium. All 117 oocyte recipient cycles between March 2010 and August 2014 with the use of a closed vitrification device and leading to a pregnancy beyond 20 weeks were included in this study. **Participants/materials, setting, methods:** All recipient warming cycles with a pregnancy beyond 20 weeks from vitrified donor oocytes: results from the fresh embryo transfers. **Main results and the role of chance:** For 117 recipient cycles, a total of 793 oocytes were warmed of which 657 (82.8%) survived and 499 (76.0%) were fertilized. Nineteen single and 98 double embryo transfers led to 95 singleton and 22 twin pregnancies. Hypertensive disorders, haemorrhages and gestational diabetes were reported in 22/112 (19.6%), 30/112 (26.8%) and 13/112 (11.6%) of the pregnancies, respectively. No major adverse neonatal outcomes were observed. Congenital malformations were observed in 11 out of 139 children; for one an elective termination was performed at 25 weeks. **Limitations, reasons for caution:** Since March 2010, almost all oocytes for donation are vitrified in our centre. Therefore, no recent data are available to control the outcomes of fresh

oocyte donations. Wider implications of the findings: **The reassuring results obtained in the current study show that closed system vitrification devices for donor oocytes may be used as an alternative to open devices which have been linked to possible cross-contamination issues.**

Loreti et al, 2024 : A 10-year follow-up of reproductive outcomes in women attempting motherhood after elective oocyte cryopreservation

STUDY QUESTION: Which reproductive treatment outcomes are observed in women who underwent elective oocyte cryopreservation (EOC) and who returned to the clinic with a desire for a child? SUMMARY ANSWER: Whether to warm oocytes or to first use fresh own oocytes for ART depends on age upon returning, but both strategies result in favourable reproductive outcomes. STUDY DESIGN, SIZE, DURATION: This retrospective observational single-centre study encompasses 843 women who had elective oocyte vitrification between 2009 and 2019 at our fertility clinic. Women who underwent fertility preservation for medical or oncological reasons were excluded. This study describes the outcomes of the diverse reproductive treatment strategies performed until May 2022 in women returning to our clinic to attempt motherhood. PARTICIPANTS/MATERIALS, SETTING, METHODS: Using descriptive statistics, patient characteristics and data of ovarian stimulation (OS) of EOC cycles were analysed, as well as data related to OS and laboratory data of ART in women who pursued fertility treatment with and/or without using their cryopreserved oocytes. The primary outcome was live birth rate (LBR) per patient after oocyte warming and after ART using fresh oocytes. Secondary outcomes were return rate, utilization rate of the cryopreserved oocytes, laboratory outcomes upon return, and LBR per embryo transfer. A multivariable regression model was developed to identify factors associated with the decision to thaw oocytes as the primary strategy and factors associated with ongoing pregnancy upon return to the clinic. MAIN RESULTS AND THE ROLE OF CHANCE: A total of 1353 EOC cycles (mean \pm SD, 1.6 ± 0.9 per patient) were performed. At the time of EOC, the mean age was 36.5 ± 2.8 years, mean anti-Müllerian hormone (AMH) was 2.3 ± 2.0 ng/ml, and 174 (20.6%) women had a partner. On average, 13.9 ± 9.2 mature oocytes were cryopreserved. Two hundred thirty-one (27.4%) women returned to the clinic, an average of 39.9 ± 23.4 months after EOC. Upon returning, their mean age was 40.4 ± 3.1 years, mean AMH was 1.5 ± 1.5 ng/ml, and 158/231 (68.3%) patients had a partner. As a primary approach, 110/231 (47.6%) past EOC users embarked on oocyte warming, 50/231 (21.6%) had intrauterine insemination, and 71/231 (30.7%) had ART using fresh own oocytes. **Cumulative LBR (CLBR) was 45.9% (106/231)** notwithstanding a miscarriage rate (MR) of 30.7% (51/166) in the entire cohort. In total, 141 women performed oocyte warming at some stage in their treatment trajectory. A subset of 90/231 (39.0%) patients exclusively had oocyte warming (41.6 ± 3.0 years, with 10.0 ± 5.2 oocytes warmed per patient). 52/231 (22.5%) patients exclusively had ART using fresh own oocytes (mean age of 39.0 ± 2.8 years, with 9.9 ± 7.4 mature oocytes retrieved per patient). **CLBR was 37/90 (41.1%) in the oocyte warming-only group and 25/52 (48.1%) in the OS-only group. MR/transfer was 25.0% and 29.3% in the oocyte warming-only group and the OS-only group, respectively.** LIMITATIONS, REASONS FOR CAUTION: Both sample size and the retrospective design are limitations of this study. The decision to embark on a specific reproductive treatment strategy was based on patient preference, after counselling on their treatment options. This precludes direct comparison of the efficiency of reproductive treatment options in past EOC users in this study;

De Munck et al, 2015 : Open versus closed oocyte vitrification in an oocyte donation programme: a prospective randomized sibling oocyte study

Study question: Is the survival of donor oocytes with the CryotopSC device superior to the survival with the closed CBSvit device? Summary answer: The CryotopSC device and the CBSvit device showed similar survival rates. What is known already: Health authorities are cautious about possible cross contamination during liquid nitrogen storage or handling when working with open vitrification devices. At present, the use of open devices is still allowed since little information is available on the efficiency of closed devices. Study design, Size, Duration: A prospective randomized sibling oocyte study was performed in the Centre for Reproductive Medicine (UZ Brussel) between January 2014 and July 2015. The survival after warming and the embryological outcome of donor oocytes vitrified using two devices was compared: the CBSvit device (closed vitrification and closed storage) and the CryotopSC device (open vitrification and closed storage). A difference of 10% was defined to prove the superiority of the CryotopSC device. In total, 250 warmed oocytes were needed in each arm. Participants/Materials, Setting, Methods : Oocytes from 48 donors were included in the study: 253 vitrified with the CBSvit device and 257 with the CryotopSC device. Equal numbers of oocytes from both devices and originated from the same donor cycle were allocated to each of 78 recipients, in order to exclude donor and recipient (male factor) effects. Main results and the role of chance: There were no differences found between the CBSvit and the CryotopSC in terms of survival after warming (93.7 versus 89.9%) or fertilization per injected oocyte (74.3 versus 81.4%). The degeneration rate after ICSI was significantly higher for the CBSvit device: 11.4 versus 6.1% ($P \leq 0.041$). A significantly higher number of zygotes in the CryotopSC group finished their first mitosis 25–27 h post-injection (34.1 versus 52.1%, $P \leq 0.001$). On Day 3, the overall embryo quality distribution did not vary between groups, but a significantly higher cell number was obtained in the CryotopSC device: 6.8 ± 2.8 versus 7.6 ± 2.8 ($P \leq 0.01$). The utilization rate per mature oocyte, per surviving oocyte or per fertilized oocyte did not differ. The embryos with the highest quality were selected for transfer on Day 3. The clinical pregnancy rate per transfer cycle was 36.5%. Limitations, reasons for caution: The results of this study should not be extrapolated to other female groups, since oocytes from young fertile donors were used in this study. Wider implications of the findings: In many countries, the use of open devices is still allowed due to the limited reports on the efficiency of closed devices. Knowing the caution of health authorities about the use of open devices, there is an urgent need for efficiency studies with closed devices. **The results obtained in the current study shows the efficiency of a safe closed vitrification device, leaving behind any concern about possible cross contamination during handling or storage.**