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Effectiveness of the closed vitrification device in frozen-thawed embryo transfer

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[Objectives]
To avoid the risk of contamination, we compared the developmental competence of human embryos vitrified with an open vitrification system (OVS) and with a closed vitrification system (CVS).
[Materials and Methods]
Embryos were exposed to 7.5% ethylene glycol (EG) and 7.5% DMSO solution for 10 minutes and then transferred to 15% EG and 15% DMSO solution containing 0.5 M sucrose. The embryo and small amount of vitrification solution were loaded into the 50-nl hole of Rapid-i™ (Vitro-life) for CVS and were loaded on CryoTop™ (KITAZATO Co.,Ltd) for OVS within 1 minute. The CVS device was then transferred into a super-cooled straw which was hold in liquid nitrogen (LN_2) and the straw was sealed. The OVS device was immersed into LN_2 directly. Both devices were cryopreserved in LN_2.
1) Vitrified and warmed pronucler stage embryos were re-vitrified using OVS or CVS. After warming, these embryos were cultured for 120 h. The survival rate after re-vitrification, blastocyst development rate after 96 h and 120 h culture, and the cell number of blastocysts at 120 h were examined.
2) High grade blastocysts (> & = 3BB) were randomly divided into two groups and were vitrified using OVS and CVS. After warming, SET was performed.
[Results]
1) There were no differences in the survival rate (OVS: 97% vs. CVS: 100%), the blastulation rates at 96 h (OVS: 50% vs. CVS: 50 %) and at 120 h (OVS: 56% vs. CVS: 68%), and the cell number of blastocyst (OVS: 138 cells vs. CVS: 137 cells) between both groups.
2) The implantation rate of blastocyst which was vitrified using CVS (73%) was the same level as that using OVS (54%).
[Conclusion]

The advent of closed-system would circumvent the majority of the problems associated with direct liquid nitrogen contact without impairing the developmental competence.