

COMPARISON OF VITRIFICATION DEVICES FOR HUMAN EMBRYOS BETWEEN OPEN AND CLOSED SYSTEM

Satoshi MIZUNO, Aisaku FUKUDA, Yoshiharu MORIMOTO

【Objective】 Vitrification is a freezing method that is applied in almost every IVF clinic in Japan. In our clinic, human embryos are vitrified by Cryotop method in which the solution containing embryos is directly exposed to liquid nitrogen. This method does not completely eliminate the risk of cross-contamination during their storage. Therefore, the closed vitrification device, Rapid-i, has been developed to solve this problem. In the present study, survival rate and subsequent development of warmed embryos were compared between Cryotop and Rapid-i, to evaluate if embryos can be safely cryopreserved by Rapid-i without sacrificing their potential after warming.

【Design】 Prospective study.

【Materials and Methods】 The preliminary study was performed, using zygotes previously vitrified at pronuclear stage (n=78) and day 3 (n=36). They were warmed once, randomly allocated to either of the two vitrification methods, Cryotop or Rapid-i and then revitrified. Post-warming survival rate and subsequent development at day 5 and 6 were compared between the two vitrification methods. The present study was clinically performed, using 962 blastocysts. They were randomly allocated either Cryotop (n=768) or Rapid-i (n=194) and vitrified-warmed. Survival rates and pregnancy rates of single blastocyst transfer were compared. In evaluation of pregnancy rate, over 39-year old patients were excluded.

【Result】 The preliminary study showed all 2PNs and day 3 embryos survived after warming in both methods. Blastocyst rate from 2PN after warming was not significantly different between Cryotop and Rapid-i (day 5: 6/35, 17.1% vs. 6/43, 14.0%, day 6: 9/35, 25.7% vs. 11/43, 25.6%, respectively). The evaluation of development to blastocyst from day 3 embryos after warming also showed similar results between Cryotop and Rapid-i (day 5: 5/18, 27.0% vs. 9/18, 50.0%, day 6: 10/18, 55.6% vs. 12/18, 66.7%, respectively). In the present study, there were no differences in survival rates (752/768, 97.9% vs. 190/194, 97.9%) and pregnancy rates (268/488, 54.9% vs. 57/109, 52.3 %) between Cryotop and Rapid-i.

【Conclusion】 The present study demonstrates that a newly developed device, Rapid-i, does not impair not only developmental potential of 2PN, day 3 embryo and blastocyst after warming, but also subsequent pregnancy rate compared to a conventional Cryotop method. Therefore, it is concluded that Rapid-i which does not expose human embryos directly to liquid nitrogen is a favorable device for storage without the risk of cross-contamination.