

Reproductive Biology Section

The effect of blastomere number on embryo survival upon freezing/thawing

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Summary

Purpose: To determine if the blastomere number of embryos at the time of freezing is related to its quality post-thaw. **Methods:** A retrospective cohort analysis of frozen/thawed embryos. Only multi-cell embryos were used for this study. If an embryo was of good quality it would either be transferred or re-frozen. **Results:** There did not appear to be any trend for a lower percentage of good quality embryos with fewer numbers of blastomeres. **Conclusions:** Though 4-cell embryos have a markedly lower implantation potential upon fresh embryo transfer compared to 6-8-cell embryos, this is not reflected in their ability to survive freeze-thawing.

Key words: Cryopreservation; Blastomeres; Survival rate.

Table 1. — Effect of the number of blastomeres at the time of freezing on the percentage of good quality embryos deemed transferable upon thawing.

	4	5	6	Cell Stage 7	8	≥ 9	Morula	Day 5 Blast
# embryos thawed	1403	599	555	441	430	151	17	48
# embryos survived	1218	461	443	372	376	132	14	34
% survived	86.8	77.0	79.8	84.4	87.4	87.4	82.4	70.8
# transferred/refrozen	912	359	223	281	274	97	11	27
% transferred/refrozen	65.0	59.9	40.2	63.7	63.7	64.2	64.7	56.3

Introduction

Previous evidence indicates a 6-7-fold increase in pregnancy rates following transfer of embryos with six to eight blastomeres versus 4-5-cell embryos [1].

The current study was conducted to determine the survival rate and likelihood of cleaving to an embryo worthy of transfer based on number of blastomeres present at time of freezing.

Materials and Methods

A retrospective cohort analysis was performed. Embryos were frozen using a biocool freezer and a one-step removal of the cryoprotectant 1, 2 propanediol [2].

The percentage of surviving embryos and those able to be transferred or refrozen was evaluated based on the number of blastomeres from 4-cell to blastocyst at the time of freezing. This study did not include embryos frozen at the 2 pronuclear state.

Results

The effect of blastomere number at freezing time on survival and normal cleavage following thawing is given in Table 1. Although there seems to be a trend for a lower percentage of embryos transferred or refrozen at six cells

this seems fortuitous since the highest percentage was four cells.

Though there were only 48 blastocysts thawed, the simplified freezing protocol with a one-step removal of the cryoprotectant described also seems to be effective for blastocysts [2].

Discussion

The transferability rate was the same for both 4-cell and 7-9 cell embryos. Blastomere number of the embryo seems to be related to its implantation potential (based on previous data) rather than its ability to survive freeze-thawing [1].

References

- [1] Check J.H., Summers-Chase D., Yuan W., Horwath D., Wilson C.: "Effect of embryo quality on pregnancy outcome following single embryo transfer in women with a diminished egg reserve". *Fertil. Steril.*, 2007, 87, 749.
- [2] Baker A.F., Check J.H., Hourani C.L.: "Survival and pregnancy rates of pronuclear stage human embryos cryopreserved and thawed using a single step addition and removal of cryoprotectants". *Hum. Reprod. Update* 2, (CD-ROM), 1997.

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Revised manuscript accepted for publication September 22, 2008