

# Donor-recipient pairs to evaluate the effect of day 3 embryos having at least six blastomeres on pregnancy outcome

**J.H. Check, C. Dietterich, B. Katsoff, J.K. Choe, J. Amui**

*The University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School at Camden,  
Cooper Hospital/University Medical Center, Department of Obstetrics and Gynecology,  
Division of Reproductive Endocrinology & Infertility, Camden, NJ (USA)*

## Summary

**Purpose:** To determine if having all embryos transferred with at least six blastomeres improves pregnancy rates compared to women having an embryo transfer with at least one embryo with less than six cells. **Methods:** Donor-recipient pairs were used to help remove the confounding effect of egg quality. Four donor-recipient pair types were evaluated: 1) both donor and recipient had all embryos with at least six cells, 2) neither donor nor recipient had all embryos with  $\geq 6$  cells, 3) donor but not recipient had all  $\geq 6$  cell embryos, 4) recipient but not donor had all embryos with  $\geq 6$  cells. Combining donor and recipients there was a significantly higher pregnancy rate per transfer when all embryos had at least six blastomeres (50/92 or 54.3%) vs the group with at least one embryo with  $< 6$  cells (46/121 or 38.8%). Similarly the implantation rate was significantly higher (37.8% vs 20.3%). **Conclusions:** These data corroborate conclusions made by evaluating single embryo transfer in women with diminished egg reserve that the presence of at least six blastomeres is associated with a better chance of a given embryo to implant

**Key words:** Blastomere number; Implantation rate; Donor egg.

## Introduction

Previous studies found improved outcome when at least one embryo in a multiple embryo transfer (ET) had six to eight blastomeres [1, 2]. Single ET may be the best way to determine which embryos have the highest implantation potential. Studies of the outcome of single ET have demonstrated that embryos with six to eight blastomeres on day 3 are more likely to implant compared to embryos with four to five blastomeres [3].

The objective of the present study was to determine if having 100% of the embryos transferred with at least six blastomeres vs at least one embryo with less than six cells has any impact on delivered pregnancy and implantation rates by comparing donor recipient pairs. The source of eggs from donors was chosen to eliminate the potential for egg quality to be a confounding variable.

## Materials and Methods

A retrospective review from 1/1/97 to 7/31/06 was performed on all fresh ET cycles in our shared donor program in which both the donor and oocyte recipients were trying to conceive. Donors and recipients were each divided into four groups according to whether all embryos transferred had at least six blastomeres (Type I) vs at least one embryo with less than six cells (Type II). There were four pair groups established: Group 1 – both donors and recipients had Type I embryos transferred, Group 2 – both donors and recipients had Type II embryos transferred, Group 3 – donors had Type I, recipients had Type II, Group 4 – donors had Type II, recipients had Type I.

All women had a normal uterine cavity by hysterosalpingogram or saline infusion sonography. All pairs had ET on the same calendar date and by the same physician. All embryos were three days old at the time of ET. Luteal phase progesterone support was given to all women.

Clinical (ultrasound evidence of pregnancy at 8 weeks), and live delivery rates and implantation rates were compared in the four groups. Chi-square analysis was used to assess the comparisons with a p value of .05 to determine significance.

## Results

There were 151 donor-recipient pairs who fulfilled the criteria. Distributions by group, pregnancy and implantation rates are seen in Table 1.

More women in the study (92/151 (60.9%) for donors and 89/151 (58.9%) for recipients) had ETs with all embryos having six or more blastomeres. There was no difference in delivered pregnancy rates (PR) for donors, 47.7% (72/151) and recipients, 48.3% (73/151).

No differences in PR were observed when both donor and recipient had the same Type ET; Type I – donor PR 54.3% (50/92) vs recipient PR 55.1% (49/89) and Type II – donor PR 37.2% (22/59) vs recipient 38.7% (24/92). The implantation rate was higher in recipients at 33.4% (154/461) than in donors at 27.3% (116/424) but the difference was not significant.

The PR and implantation rates for donors that had Type I embryo transfers showed a trend for higher pregnancy rates than those for recipients with Type II embryos but the difference was not significant. Statistical differences for PR and implantation rates were observed when donors had Type II ET and recipients had Type I ET.

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Table 1. — Comparison of pregnancy rates (PR) and implantation rates (IR) in donors vs recipients according to whether all embryos transferred had at least six blastomeres (Type I) or not (Type II).

Group	Variable	Donor	Recipient
Both Type I (n = 68 pairs)	Average no. of blastomeres	7.76 ± .81	7.87 ± .82
	Deliveries	52.5% (36/68)	50.0% (34/68)
	Implantation rate	31.5% (59/187)	38.0% (73/192)
		<i>p</i> = NS, donors vs recipients in group 1	
Both Type II (n = 38 pairs)	Average no. of blastomeres	5.10 ± 1.1	5.16 ± .97
	Deliveries	36.8% (14/38)	34.2% (13/38)
	Implantation rate	18.3% (21/115)	20.1% (26/129)
		<i>p</i> = NS, donors vs recipients in group 2	
Donor Type I Recipient Type II (n = 24 pairs)	Average no. of blastomeres	7.48 ± .96	5.89 ± .66
	Deliveries	58.3% (14/24)	45.8% (11/24)
	Implantation rate	36.5% (23/63)	22.5% (18/80)
		<i>p</i> = NS for PR and <i>p</i> < .07 for IR	
Donor Type II Recipient Type I (n = 21 pairs)	Average no. of blastomeres	5.89 ± 1.07	7.38 ± .84
	Deliveries	38.1% (8/21)	71.4% (15/21)
	Implantation rate	22.0% (13/59)	45.0% (27/60)
		<i>p</i> = .03 for PR and <i>p</i> = .008 for IR	

NS = non significant.

Overall, when combining donors and recipients, the pregnancy rate was 54.7% (99/181) in Type I ET and 38.0% in Type II ET (46/121) (*p* = .0049). The overall implantation rate was 37.8% (182/320) for Type I ET and 20.3% (78/385) for Type II ET (*p* = .0001).

## Conclusions

PRs are lowered when not all of the embryos transferred have six or more blastomeres even though there is a least one with six blastomeres. There is a greater impact on implantation rates than on PRs when lesser quality embryos are transferred. These data support conclusions reached by the evaluation of single ET embryo transfers in women with diminished egg reserve [3].

## References

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Address reprint requests to:

J.H. CHECK, M.D., Ph.D.

7447 Old York Road

Melrose Park, PA 19027 (USA)

e-mail: laurie@ccivf.com