WHEN SHOULD WE PRIORITIZE DAY 7 EMBRYOS? A COMPARISON OF EUPLOID DAY 5 AND 6 EMBRYOS WITH POOR MORPHOLOGIC GRADING VERSUS DAY 7 EMBRYOS WITH GOOD MORPHOLOGIC GRADING

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Background: Priority for transfer of euploid blastocysts is generally based on embryo morphology and day of trophectoderm biopsy. However, published algorithms only include embryos that underwent trophectoderm biopsy on day 5 and 6. Since 2019, there has been an increased interest in transfer of day 7 euploid embryos based on confirmation of their reproductive potential to produce normal, healthy pregnancies (1,2). It is not known at what point embryo morphology may play a larger role than day of trophectoderm biopsy.

Objective: The purpose of this study is to investigate how the reproductive potential of day 7 euploid embryos with good morphology compares to that of day 5 or 6 euploid embryos with poor morphology, to determine if these embryos should be prioritized for transfer.

Materials and Methods: This is a retrospective cohort study of all single euploid frozen embryo transfers (FETs) performed at two HRC Fertility sites from January 2018 to September 2024. Gardner scoring was reviewed, and embryos were classified into two study groups: day 5 or 6 poor morphology (defined by a C grading for either the inner cell mass or the trophectoderm) and day 7 good morphology embryos (defined by A or B grades for both the inner cell mass and trophectoderm). Scoring was performed prior to trophectoderm biopsy. The primary outcomes assessed were positive hCG ($\geq$ 5mIU/mL), clinical and ongoing pregnancy rate per embryo transfer, and miscarriage rate per embryo transfer (including biochemical and clinical spontaneous abortions per positive hCG). Secondary outcomes included the incidence of monozygotic twinning per transfer. The chi-squared test was used for analysis of primary and secondary outcomes. Sensitivity analyses were performed using logistic regression for binary outcomes to adjust for patient age, degree of embryo expansion, use of a gestational carrier, and IVF lab. An additional sensitivity analysis was performed separating day 5 and 6 embryos.

Results: 853 single euploid FETs were included; 133 were good morphology day 7 blastocysts and 720 were poor morphology day 5 and 6 blastocysts. Primary outcomes are shown in Table 1. There was no statistically significant difference in positive hCG or clinical pregnancy rates, however the miscarriage rate was higher for poor morphology day 5 or 6 blastocysts as compared to good morphology day 7 blastocysts. When miscarriage rates were separated into biochemical and clinical losses, the results did not reach statistical significance. Sensitivity analysis did not differ from results as presented.

	Poor Morphology D5 or D6 (N=720)	Good Morphology D7 (N=133)	p-value
hCG Positive Test Rate (per transfer)	53.8%	54.1%	0.506
Clinical Pregnancy Rate (per transfer)	44.2%	46.6%	0.334
Ongoing Pregnancy Rate (per transfer)	36.7%	42.9%	0.105
Miscarriage Rate (per positive hCG)	31.8%	20.8%	**0.040**
Biochemical pregnancy	18.1%	13.9%	0.246
Clinical pregnancy loss	13.7%	6.9%	0.076
Monozygotic Twinning Rate	0.4%	0.8%	0.493

Conclusions: Good morphology day 7 euploid embryos demonstrated favorable pregnancy outcomes in this analysis. While there were no differences in pregnancy rates, a lower miscarriage rate was observed after FET of good morphology day 7 embryos as compared to poor morphology day 5 or 6 embryos. These results suggest that when there are no good morphology day 5 or 6 embryos for transfer, day 7 embryos with a good morphologic grade may be prioritized above poor morphology day 5 or 6 embryos. Further investigation with higher sample size is warranted to clarify these findings and assist in counseling patients without conventional top-quality embryos.

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References

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