

# Improving Success in Vitrified-Warmed Blastocyst Transfers: Embryo Morphology to Choose the Best Single Blastocyst

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## DESCRIPTION

In the field of Assisted Reproductive Technology (ART), the selection of the most viable embryo for transfer is an important determinant of success. With advancements in cryopreservation techniques, particularly vitrification, the ability to freeze and thaw embryos effectively has significantly enhanced the flexibility and outcomes of ART cycles. One pertinent area of research focuses on understanding the influence of early embryo development, specifically day 3 embryo morphology, on the success of vitrified-warmed blastocyst transfer cycles.

#### Blastocyst morphology

Blastocyst morphology is assessed through a combination of factors

**Expansion stage**: Blastocysts are categorized based on their expansion and hatching status. A fully expanded or hatching blastocyst generally has a higher potential for implantation compared to earlier stages.

**Inner Cell Mass** (ICM): The ICM should be large, cohesive, and centrally located. A higher grade ICM typically indicates better developmental potential.

**Trophectoderm** (TE): The TE layer should be well-developed with a smooth, uniform appearance. A higher grade TE suggests better support for implantation and embryonic development.

**Blastocyst quality score**: A commonly used scoring system rates the blastocyst on a scale, considering the size and appearance of the ICM and TE

#### The significance of blastocyst transfer

Blastocyst transfer, which involves the transfer of embryos that have developed for approximately five to six days after fertilization, offers several advantages over earlier-stage embryo transfers. These advantages include improved implantation rates, better synchronization with the uterine environment, and a higher likelihood of achieving a successful pregnancy. Vitrification has enabled blastocysts to be preserved with high post-thaw survival rates, making it feasible to transfer them at optimal times during the recipient's cycle.

#### Day 3 embryo morphology as a predictor

Day 3 embryo morphology assessment has long been used as a predictor of embryo viability and implantation potential. Characteristics such as cell number, symmetry, fragmentation, and uniformity of blastomeres at this stage have been correlated with subsequent embryo development and pregnancy outcomes. While day 3 morphology alone may not determine the ultimate success of an ART cycle, it provides valuable insights into embryo quality that can guide clinicians in selecting embryos for transfer or cryopreservation.

#### Research findings and clinical implications

Recent studies have delved into the relationship between day 3 embryo morphology and outcomes in vitrified-warmed blastocyst transfer cycles. Findings suggest that certain morphological features observed at day 3, such as even cell division and minimal fragmentation, are associated with higher chances of blastocyst formation and subsequent implantation post-thaw. This underscores the importance of meticulous embryo evaluation and selection protocols to optimize outcomes in ART.

#### Additional factors

**Embryo development history**: Consider the developmental history of the blastocyst, including the day of blastocyst formation and previous culture conditions.

**Patient-specific factors:** Account for patient-specific factors such as uterine lining quality, hormonal profile, and previous ART history, as these can influence implantation success.

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**Cryopreservation protocol:** Ensure the vitrification and warming protocols are optimized, as suboptimal cryopreservation can affect blastocyst quality.

#### Practical considerations in clinical practice

In light of these findings, clinics are increasingly adopting comprehensive embryo grading systems that integrate both earlystage morphology assessment and blastocyst characteristics. By combining these evaluations, clinicians can better predict which embryos are most likely to develop into viable blastocysts postthaw and result in successful pregnancies. Furthermore, advancements in time-lapse imaging and artificial intelligence algorithms offer potential avenues to enhance the objectivity and predictive accuracy of embryo evaluation.

### CONCLUSION

The integration of day 3 embryo morphology assessment into the selection process for vitrified-warmed blastocyst transfer cycles represents a critical step towards optimizing ART outcomes. While blastocyst transfer offers numerous benefits, including higher implantation rates and reduced multiple gestation risks, the initial quality of embryos at day 3 remains a fundamental determinant of success. Continued research and refinement of embryo evaluation techniques will further enhance our ability to maximize pregnancy rates and improve the overall patient experience in assisted reproductive treatments.