New 3D imaging method offers promise of better IVF outcomes

July 8 2024

Credit: Pixabay/CC0 Public Domain

Innovative research, presented today at the ESHRE 40th Annual Meeting in Amsterdam, has introduced a novel 3D imaging model designed to identify features of blastocysts—the early stage of development for an implanted embryo—associated with successful pregnancies. This new approach could transform current blastocyst selection methods, and open avenues for increased pregnancy rates.

The shape and structure of blastocysts can predict the success of a pregnancy, aiding blastocyst selection for in vitro fertilization (IVF). However, selecting the right embryo or blastocyst remains a significant challenge within IVF.

"Traditionally, the quality of blastocysts is assessed using 2D methods that lack depth and comprehensive indicators," says Dr. Bo Huang, lead author of the study. "Although some 3D methods exist, they aren't practical or safe for clinical use. This study bridges that gap by introducing a clinically applicable 3D evaluation method and reveals previously unrecognized spatial features of blastocysts indicative of outcomes."

The study included women under 40 years old with a uterine lining (endometrial thickness) of 7-16mm and no more than one previous embryo transfer failure. Using a device called EmbryoScope+, researchers took detailed images of 2,141 frozen-thaw single blastocysts.

Advanced technology was used to create 3D models of these blastocysts, capturing detailed information about their outer layer (trophectoderm) and inner cell mass. These models were further analyzed to find new blastocyst features and determine how these features relate to successful pregnancies.

The study tested the model by comparing it with fluorescence imaging of human blastocysts and achieved over 90% accuracy. Key measurements identified capture the blastocyst's size, shape and cell characteristics.

Parameters related to size, such as overall volume, cavity volume, and surface area were found to be linked to higher pregnancy rates, and specific features of the inner cell mass and outer layer were also strongly associated with better pregnancy outcomes.

Dr. Huang comments, "These results match what we see in clinical outcomes, but we couldn't previously measure these. This study shows that the 3D shape of the blastocyst's inner cell mass, its position, and how the surrounding cells are arranged can be important indicators of success, which we didn't know before."

Moving forward, the research team plans to collaborate with multiple centers to further validate these findings and invites reproductive centers worldwide to join these efforts. The ultimate goal is to make the 3D evaluation of blastocysts a standard part of clinical practice, bringing new hope to people undergoing IVF.

Professor Dr. Anis Feki, Chair-Elect of ESHRE, states, "While the new 3D imaging model for blastocyst evaluation shows great promise in improving embryo selection for IVF, it is essential to validate these findings through further studies and collaborations. This method could potentially enhance IVF outcomes, but its clinical application should be approached with careful consideration."

The study abstract will be published today in *Human Reproduction*.

More information: Huang, B. et al, The spatial conformational features of blastocysts can serve as a new basis for selection, *Human Reproduction* (2024). academic.oup.com/humrep/issue/39/Supplement_1

Provided by European Society of Human Reproduction and Embryology