Artificial Intelligence (AI) To Select Embryos With Maximum Potential For Pregnancy

"Can Artificial Intelligence Reliably Predict Embryo Quality?"

Introduction: Embryologists are presently manually assessing embryos based on the physical appearance by using standard grading systems in conjunction with digital time lapse imagery or without to select the best embryo to transfer. Innovation in embryo grading is taking the form of artificial intelligence systems that can grade embryos and accurately predict ART outcomes.

Summary: Australian and US groups presented new research at ASRM's Scientific Congress(2018). A team in the US[1] has modelled a convolutional neural network to accurately predict the morphological quality of blastocysts based on time lapse images. The study utilized 50,392 images of 10,148 blastocysts. The blastocysts were assigned quality grades- good, fair, or poor- based on statistically different implantation outcomes. 18,000 of these images were used to train the Inception IV algorithm, then it was tested using the remaining images. The algorithm was 97.52% accurate in discriminating between poor and good blastocysts.

Meanwhile in Australia, Tran et al[2] have developed an artificial intelligence system that 93% of the time correctly predicts that a particular embryo will progress to fetal heartbeat. The fully automated system analyzes time lapse video sequences and requires no human input, and thus is not subject to embryologist variability. The AI was trained to use time lapse videos sequences on thousands of embryos to analyze the development of embryos and predict by identifying spatial temporal features, independent of maternal age, whether an embryo would result in a pregnancy with a fetal heartbeat.

Conclusion: AI can be a useful pre-screening noninvasive and less expensive tool that would allow us to identify and genetically test only those embryos which are viable, with a low likelihood of genetic defect and has the potential to improve pregnancy success.

Expert Opinion: Amy Sparks,President-Elect of the Society for Assisted Reproductive Technology, SART, commented, "Artificial Intelligence as applied to analysing embryo quality and potential holds great promise for improving patients' chances of achieving a successful pregnancy sooner rather than later."

References:

1. *O-209 N.Zaninovic et al, Assessing Human Blastocyst Quality Using Artificial Intelligence (AI) Convolutional Neural Network (CNN).*
2. *O-265 A. Tran et al, Artificial Intelligence as a Novel Approach for Embryo Selection.*
3. *PegahKhosravi, EhsanKazemi, QianshengZhan, NikicaZaninovic et al. Robust Automated Assessment of Human Blastocyst Quality using Deep Learningbio Rxiv394882; doi:* **https://doi.org/10.1101/394882.**

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