Abstract Details

Session title: Embryology
Session type: Poster viewing
Presentation number: P-164

Abstract title:

Assessment of embryo implantation potential with a cloud-based automatic software

L. Alegre[1], R. Del Gallego[1], L. Bori[1], N. Basile[2], K. Loewke[3], M. Mahnaz[3], B. Aparicio-Ruiz[1], A. Palma-Govea[4], J. Marcos[5], M. Meseguer[1].
[1]IVIRMA Valencia, In Vitro Fertilization, Valencia, Spain.
[2]IVIRMA Madrid, In Vitro Fertilization, Madrid, Spain.
[3]Cellogy, Research, California, U.S.A..
[4]IVIRMA Panama, In Vitro Fertilization, Panama, Panama.
[5]IVIRMA Murcia, In Vitro Fertilization, Murcia, Spain.

Study question:

¿Does the embryo selection made by the DANA system correlate with a good implantation rate in patients undergoing IVF treatments?

Summary answer:
DANA system selects embryos with high implantation potential from an automatically parameter (UAD) based on the morphokinetic characteristics of those embryos that have implanted.

What is known already:
Selecting the best embryo for transfer is crucial to achieve the final goal of in vitro fertilization treatments. Time-lapse technology has made possible to perform a deep and accurate analysis for optimal embryo selection. The usefulness of time-lapse monitoring greatly depends on the creation of predictive algorithms that could be effective in different clinical settings and after distinct IVF procedures.

Study design, size, duration:
This is a multi-centred retrospective study designed in three phases for the validation of the DANA system. The patients were recruited from July 2015 to January 2018 in three IVI Clinic's centres. A total of 1312 IVF cycles and 5343 analysed embryos were included in this three-phase trial. A new parameter was developed to estimate embryo score: the average distance of each embryo to the centre of the cloud of KID embryos (UAD).

Participants/materials, setting, methods:
Phase 1: Creation of the data cloud of KID (Known Implantation Data) embryos from 1676 transferred embryos. Timings of embryo cleavage and cell cycle lengths up to the 5-cell stage were included in the DANA software; Phase 2: embryo selection based on the DANA system and confronted with the embryologist manual annotations (389 transferred embryos); Phase 3: Validation of DANA automatic embryo selection, without embryologist's intervention (147 transferred embryos).

Main results and the role of chance:
The implantation rate of the 1021 KID embryos from phase 1 were distributed as follows: grade A 34%, grade B 25%, grade C 24%, and grade D 19%. In phase 2, a classification ranking according to the unit average distance (UAD) values was established: High (UAD < 0.447), Medium (UAD = 0.447 – 0.998) and Low (UAD > 0.998) implantation potential. The pregnancy rates for these groups were 55%, 45%, and 33%, respectively ($p < 0.001$). In phase 3, the 147 transferred embryos were classified according to their UAD values as grade A (UAD < 0.50), grade B (UAD = 0.50 – 0.66), grade C (UAD = 0.67 – 1.03), and grade D (UAD > 1.03); most implanted embryos were found in Groups A, B, and C (UAD ≤ 1.03), whereas the implantation rate in Group D (UAD > 1.03) was significantly lower: 46% vs. 25%, respectively ($P = 0.037$).

Limitations, reasons for caution:
External and prospective validations are required to confirm the reproducibility and generalizability of this automated system.

Wider implications of the findings:
The model can analyse data obtained in different settings, and therefore is supposedly applicable to any clinic, standardizing the interpretation of embryo development. The great innovation of DANA is that the system learns as the database grows with each new patient cycle, becoming more and more accurate (machine learning).

Trial registration number:
not applicable

Keywords:
Time-lapse technology
Data Cloud
Embryo selection software
Implantation potential
Machine learning