Life Whisperer™, an AI-based algorithm to select non invasively best quality blastocysts for transfer: A multicenter analysis

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Is the Artificial Intelligence (AI)-based LW tool, suitable to evaluate blastocysts quality and predict clinical pregnancy (CP) in couples undergoing ICSI cycles?

LW blastocyst score is comparable to the scores of other classification methods. This AI model showed high sensitivity and a comparable specificity for CP.

INTRODUCTION

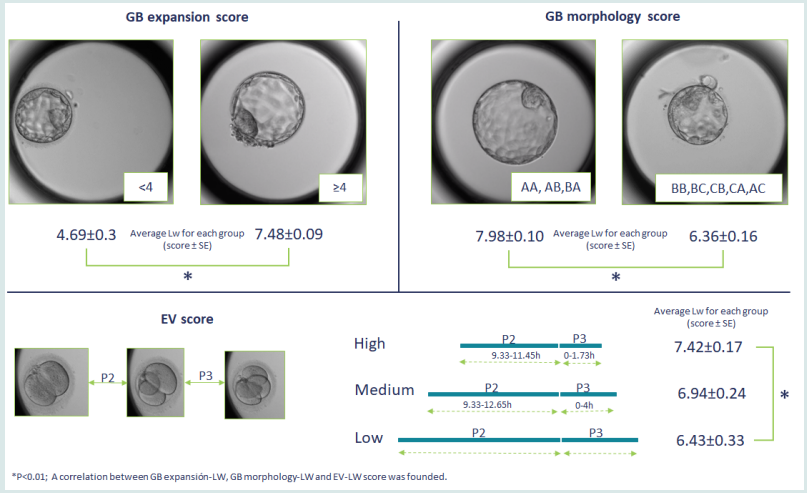
Morphology grading is the most widely used method for embryos selection in clinical practice. However, this evaluation entails intervariability and intravariability decision among the embryologists. Recently, research has been focused on new embryo selection systems based on computer-assisted evaluation that allow the recognition of objective parameters of the embryo morphology. The implementation of these technologies requires substantial investments that are not available for all clinics. LW is a new embryo selection method based on AI, where specific hardware is not needed.

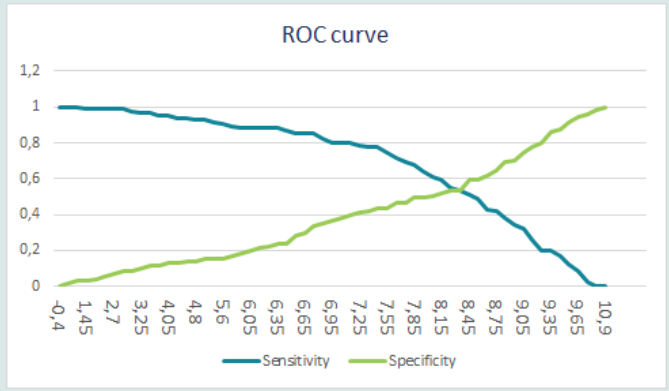
STUDY DESIGN/ MATERIAL AND METHODS

A total of 513 Day-5 blastocysts from 134 oocyte donation cycles from three different clinics, between 2017-2020, were evaluated with three classification methods: Gardner's blastocyst grade (GB), the computer derived-output Eeva (EV) and LW AI-supported system.

The GB grade was divided in two categories: expansion (1-6) and Inner Cell Mass/Throphoectoderm quality (A-C). EV analyses the cell division timing P2 (2 cells stage duration) and P3 (3 cells stage duration) differentiating three categories: High, Medium and Low (VerMilyea et al., 2014). LW scores ranked 1-10 from a single Day-5 blastocyst HR Image performed on inverted microscope, with a threshold >5 for defining a viable blastocyst. T-test was used to compare GB (expansion and morphology) and EV score versus LW scores. The sensitivity and specificity of LW was assessed, using a ROC curve, to validate this system as a CP predictor.

RESULTS





The analysis of LW score for transferred embryos (N=156), using ROC curve, showed a high sensitivity (0,928) but a low specificity (0,154) with a threshold of 5. Regarding our data, ROC curve shows that a threshold of 8,46 could enhance the prediction of CP because in this point the specificity value is higher than 0.5.

LIMITATIONS

The LW score validation, compared to GB and EV methodology, was carried out on a small number of embryos. Additionally, not all embryos were transferred at the time of the analysis. Thus to enhance the accuracy of these data and the specificity of the clinical prediction, a higher sample size is needed.

WIDER IMPLICATIONS

Blastocyst selection looks equivalent between all systems, but the LW tool is more objective and faster, saving time and costs significantly, without needing substantial hardware investments.

The LW system shows almost the highest sensibility and may also improve the specificity by self-learning feeding the AI-system, thus tailoring predictions to each laboratory unique environment.

Gardner DK, Schoolcraft WB. Culture and transfer of human blastocysts. Curr Opin Obstet Gynecol . 1999 ;11:307–11.

VerMilyea MD, Tan L, Anthony JT, Conaghan J, Ivani K, Gvakharia M, et al. Computer-automated time-lapse analysis results correlate with embryo implantation and clinical pregnancy: a blinded, multi-centre study. Reprod Biomed Online . 2014;29:729–36.