



ABSTRACT SUBMISSION ACKNOWLEDGEMENT

Thank you for submitting your abstract for the Fertility Conference 2021

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Has ethics committee approval been sought, or animal legislation if required?	No
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Abstract Title:

Independent assessment of an artificial intelligence-based image analysis tool to predict fertilisation and blastocyst utilisation potential of oocytes, and comparison with ten expert embryologists

Abstract text:

Background: Oocyte morphological features are not considered to prognosticate developmental competence and no common grading system exists. Embryologists may observe oocyte irregularities but practice is inconsistent and clinical relevance is questionable. Deep learning promises to provide automation and standardisation of IVF practices, including assessment of gametes and embryos. Several studies have demonstrated the effective use of machine learning in embryo grading and selection. Methods: VIOLET (Future Fertility, Canada) was created as a convolutional neural network trained on a retrospective dataset of 18,190 oocyte images and was demonstrated to predict fertilisation and blastocyst development with 91.2% and 63% accuracy respectively in an unbalanced dataset. Here, VIOLET was assessed using an outcome-blinded test set of 300 oocyte images selected randomly from over 200,000 oocyte images with known fertilisation (2PN or not 2PN) and known blastocyst fate (transferred/cryopreserved or not utilized for prediction of fertilisation and blastocyst utilisation. Results were compared with manual predictions by ten experienced embryologists from ten clinics in the UK/Ireland. Results: VIOLET outperformed 9/10 embryologists in accurately predicting fertilization (76.7% vs mean 68.4% +/- 6.6%; $p < 0.01$) and all 10 embryologists for usable blastocyst rate (62.1% vs mean 52.8; +/- 3.4%; $p < 0.001$). A relative increased accuracy of 12 and 18% respectively. None of the embryologists demonstrated correlation between recordings of their confidence and accuracy. Conclusions: The application of AI image analysis of oocytes can provide insights not detected by the human eye, and may offer improved information, expectation setting and treatment personalisation for patients. VIOLET could add value in predicting oocyte potential for fertility preservation; help distribute oocytes evenly in shared donor cases; or offer insights into the oocytes' contribution to poor IVF outcomes. Reproducibility of the embryologists' assessment was not tested although previous studies have confirmed the superiority of VIOLET, and AI generally, over manual assessment.¹

References

Nayot D, Meriano J, Casper R, Alex K. An oocyte assessment tool using machine learning; Predicting blastocyst development based on a single image of an oocyte. In HUMAN REPRODUCTION 2020 Jul 1 (Vol. 35, pp. 129-130). GREAT CLARENDON ST, OXFORD OX2 6DP, ENGLAND: OXFORD UNIV PRESS.

Category

Oocytes and ovary

Presentation Format:

Either oral or poster

Authors of the Abstract

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