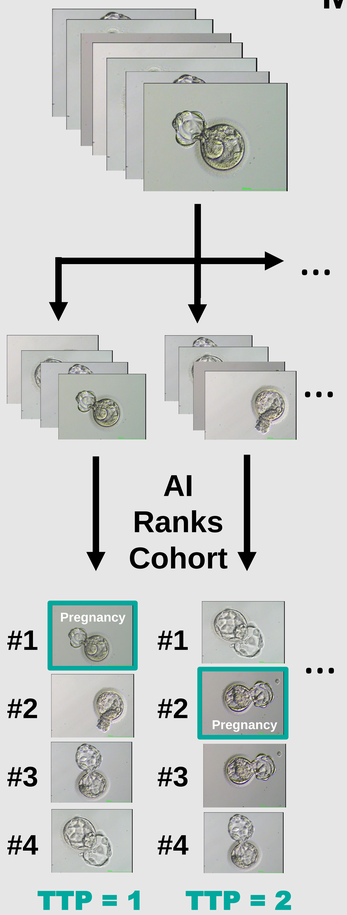
OBJECTIVE

To establish evidence for superior ranking of blastocysts using artificial intelligence (AI) that assesses viability based on Day 5 embryo images. A study was performed to evaluate effect on Time-to-Pregnancy (TTP) using simulated embryo cohorts representing individual patient IVF ‘cycles’. AI was used to rank embryos in each cohort then TTP determined by evaluating how many transfers would be needed for a successful clinical pregnancy to occur.

METHOD



2739 training/validation images and 1,161 blind test images of transferred (retrospective) Day 5 embryos with known pregnancy outcomes were sourced from 16 clinics across 5 countries.

Embryo images from different patients were randomized 1,000 times into 116 simulated ‘cohorts’, with an average of 8 embryos each (based on actual clinical distribution). The entire set of cohorts were used to provide a bootstrapped statistical analysis.

TTP is the position of the first embryo in each ranked cohort to give a positive pregnancy outcome. Mean TTP value from AI ranking was compared to the result using random chance as a proxy for embryologists’ ranking, since all embryos in the dataset were already chosen by an embryologist and transferred.

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EVIDENCE FOR SUPERIOR BLASTOCYST COHORT RANKING USING ARTIFICIAL INTELLIGENCE BASED ON RETROSPECTIVE CLINICAL PREGNANCY RESULTS

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tfc Texas Fertility Center

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RESULTS

13.8%
P<0.001

Reduction in the Time-To-Pregnancy (TTP) when using AI to rank embryos for viability compared with embryologists’ current ranking approach.

TTP for AI Ranking = 1.506 ± 0.003
TTP for Embryologist Ranking = 1.746 ± 0.004

The differences in mean TTP distribution were modeled as an asymmetric Laplace distribution.

Out-of-pocket expenses for IVF are estimated at $19,000 for the first cycle and $7,000 for each additional cycle. Benefits of reduced TTP using AI:

$1,200 Average cost savings for patients through fewer cycles.

$4,600 Average revenue increase for clinics by servicing a greater number of high-value first cycle patients.

CONCLUSION

An AI model trained on clinical pregnancy data showed superior ranking ability and a shorter TTP compared with embryologists’ ranking (random chance), for simulated cohorts of transferred embryos.

In the USA with 300,000 annual IVF cycles, AI could achieve total patient savings of $360M, and $1.38B increase in revenue for IVF clinics. Globally with over 2.5M cycles, AI could achieve global patient savings of $3B and $13.8B increase in revenue for IVF clinics