

# When Algorithms Choose Life: Role of AI in Embryo Selection



► *Sanchita Sakhare & Prathmesh Ghag*

# INTRODUCTION

- Infertility affects 1 in 6 individuals globally
- IVF has been a groundbreaking advancement in ART since the birth of “test-tube baby” in 1978
- IVF live birth rate is **30–50%** per cycle.
- Embryo selection is critical for success.

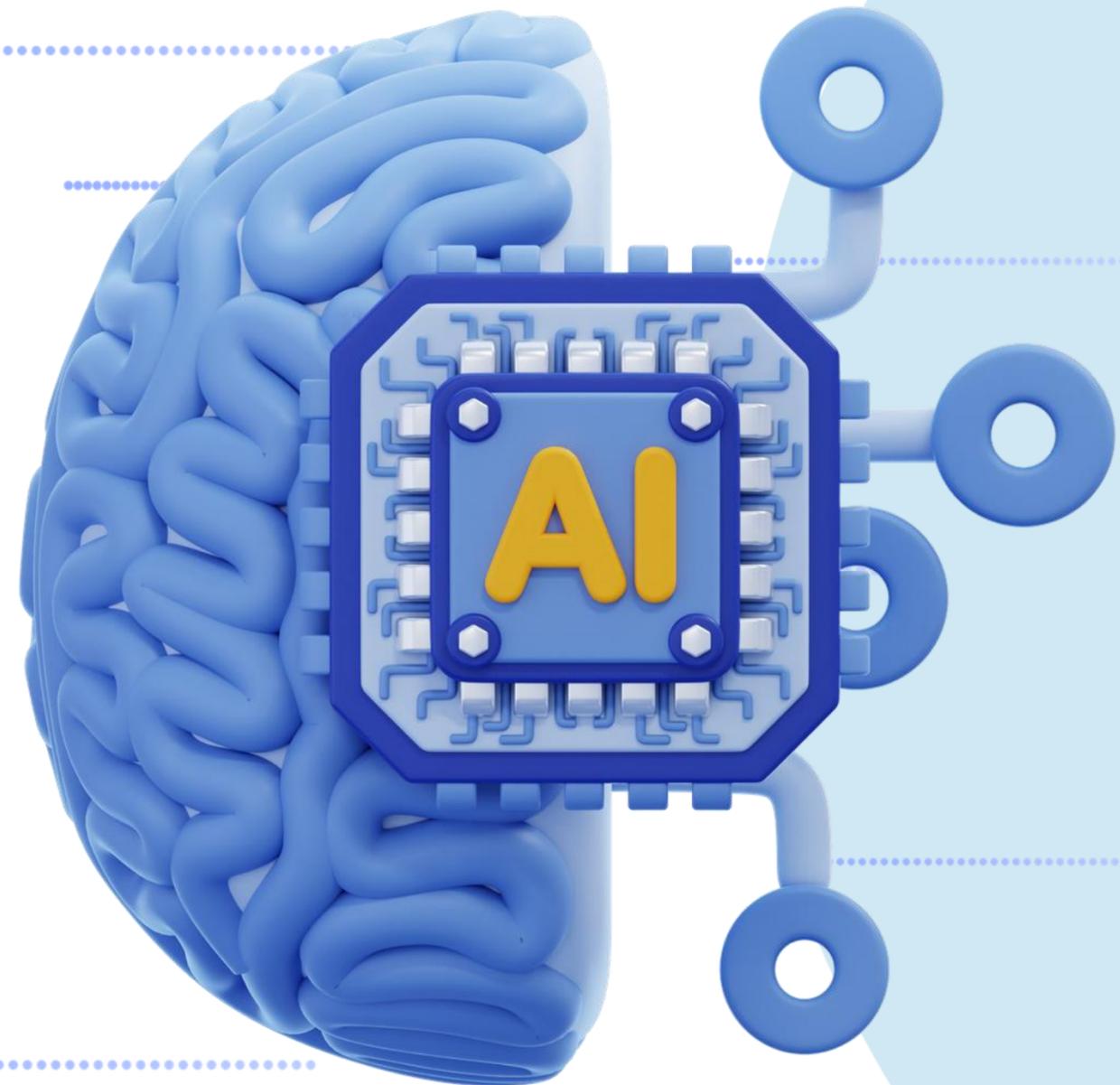


Louise Joy Brown, the first baby conceived through In-Vitro-Fertilisation (IVF), born in the year 1978 in Oldham, England.

*Image source: Tech 2 news staff, 2019*

# RESEARCH GAP

- Success rates remains optimal.
- Subjective Visual Embryo Assessment
- Inter-observer variability
- Lack of standardized predictive system





**AIM**

“To evaluate existing research on the Diagnostic Performance and Clinical Applicability of Artificial Intelligence in Embryo Selection in IVF”

# AI FRAMEWORK

- Input: Time-Lapse Embryo Imaging

- Processing: Deep Learning Models

- Output: Implantation Prediction Score

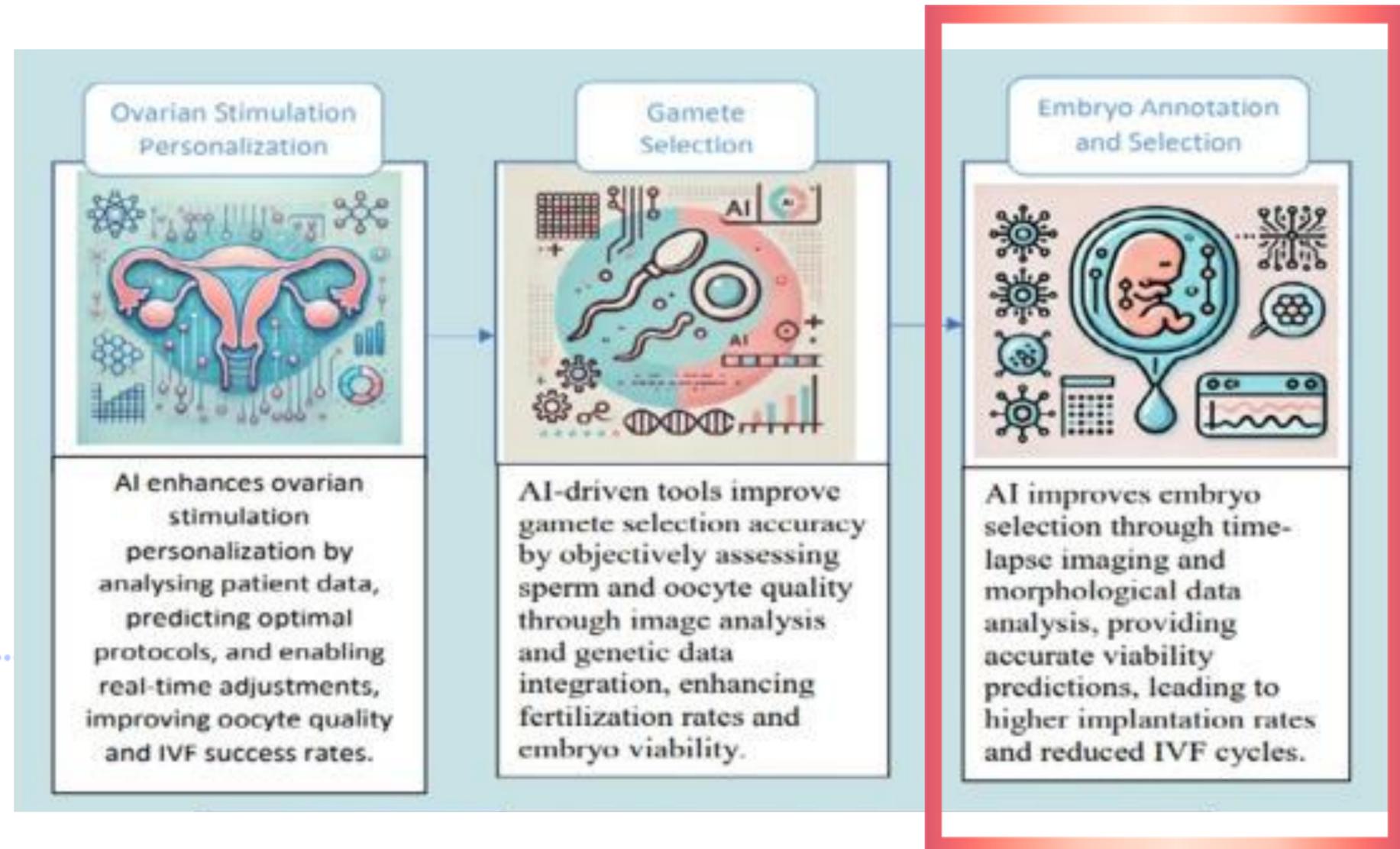
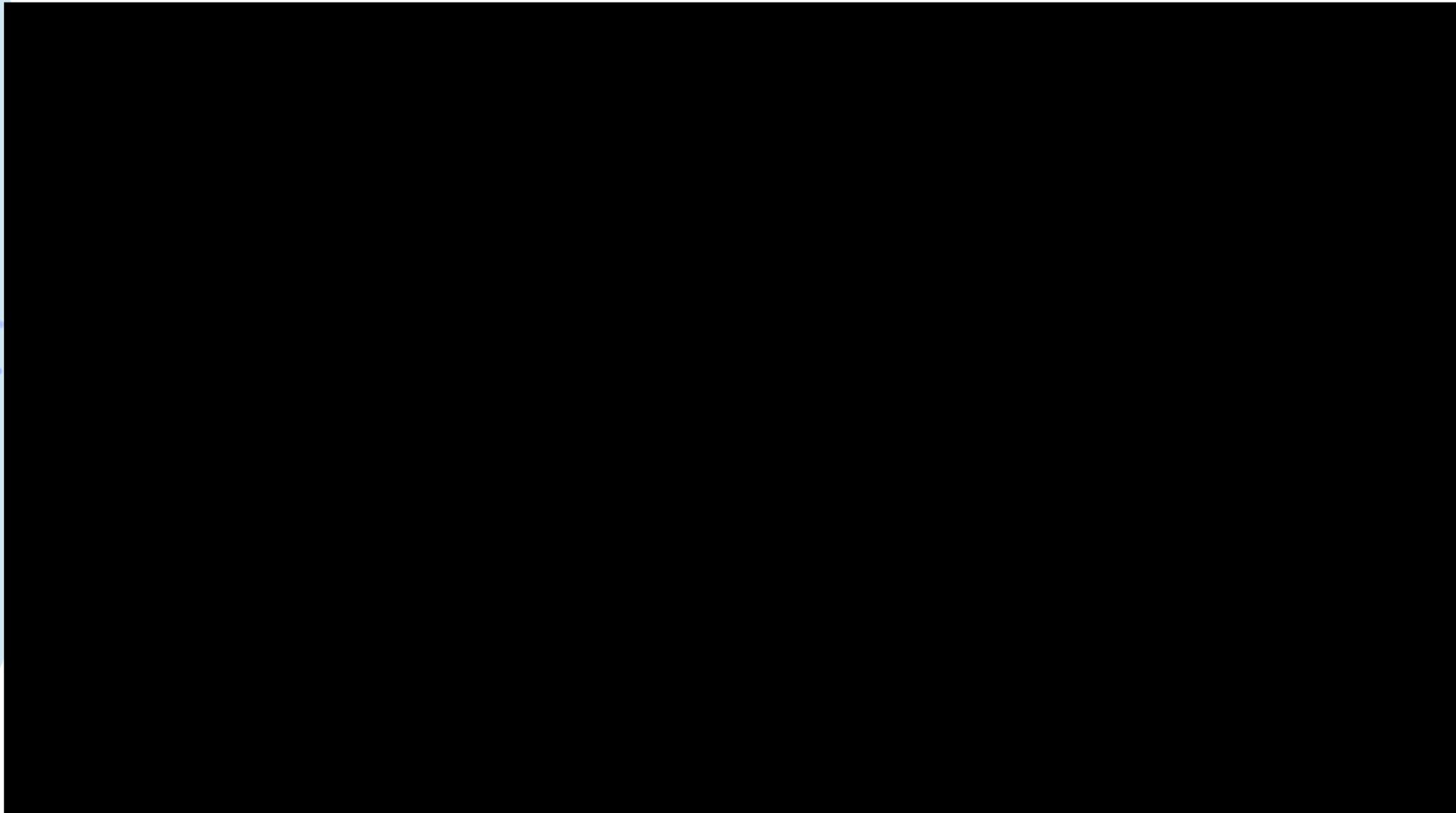


Image source: David-Olawade, A. et al, Artificial intelligence in in-vitro fertilization (IVF): A new era of precision and personalization in fertility treatments, 2025

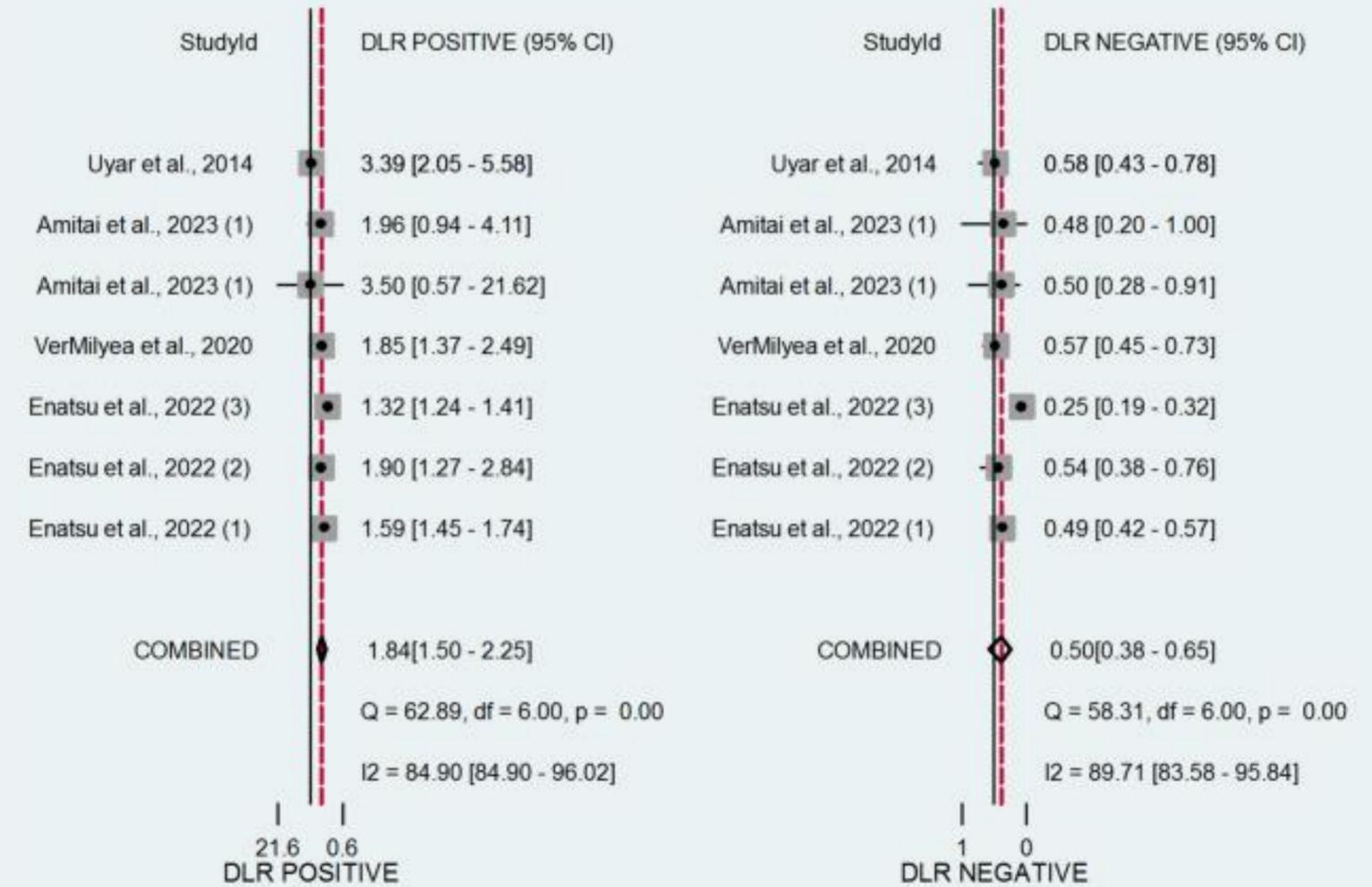
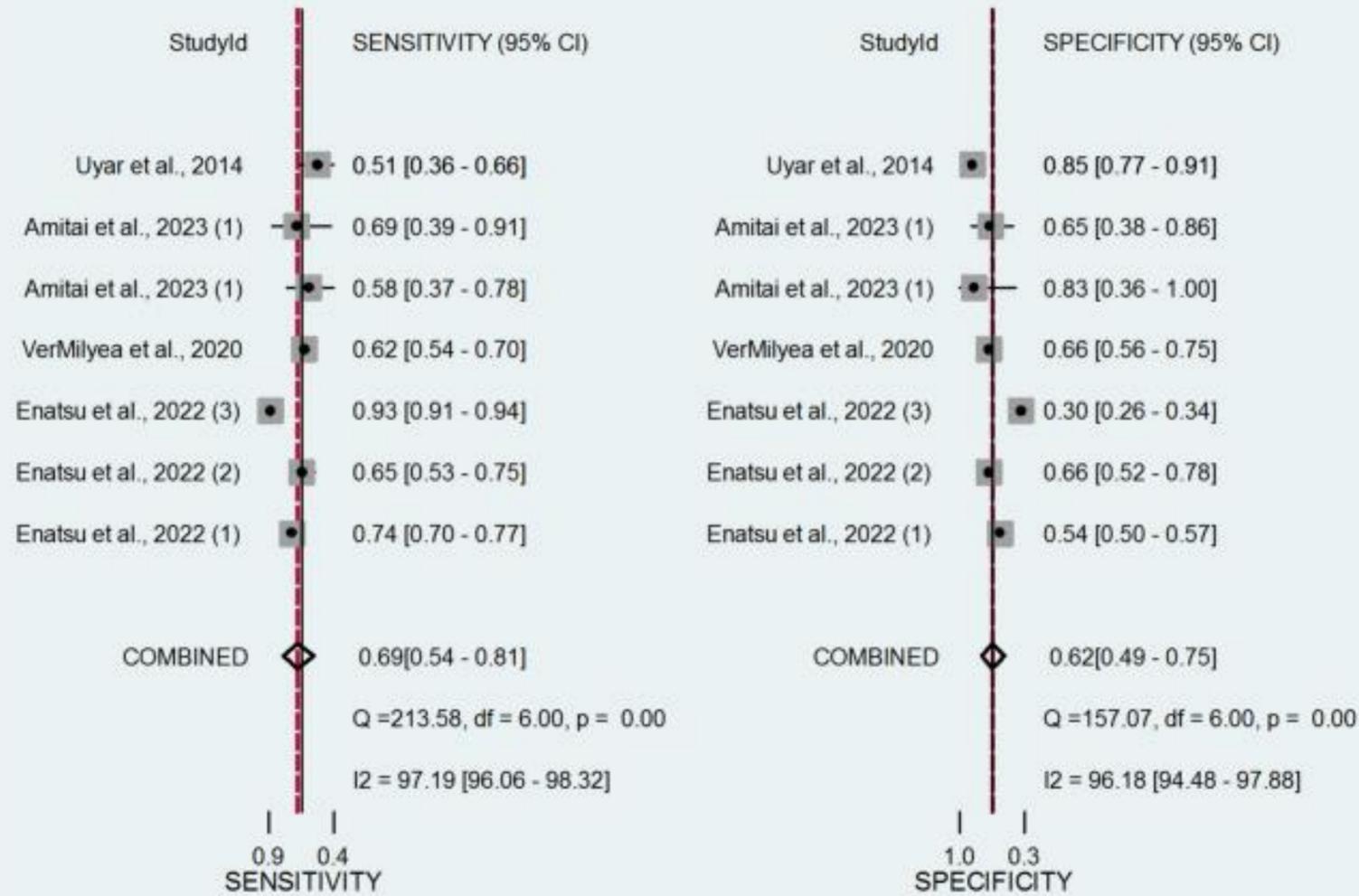


# TIME-LAPSE IMAGING MODEL



*Video: PRAGA MEDICA (2024)*

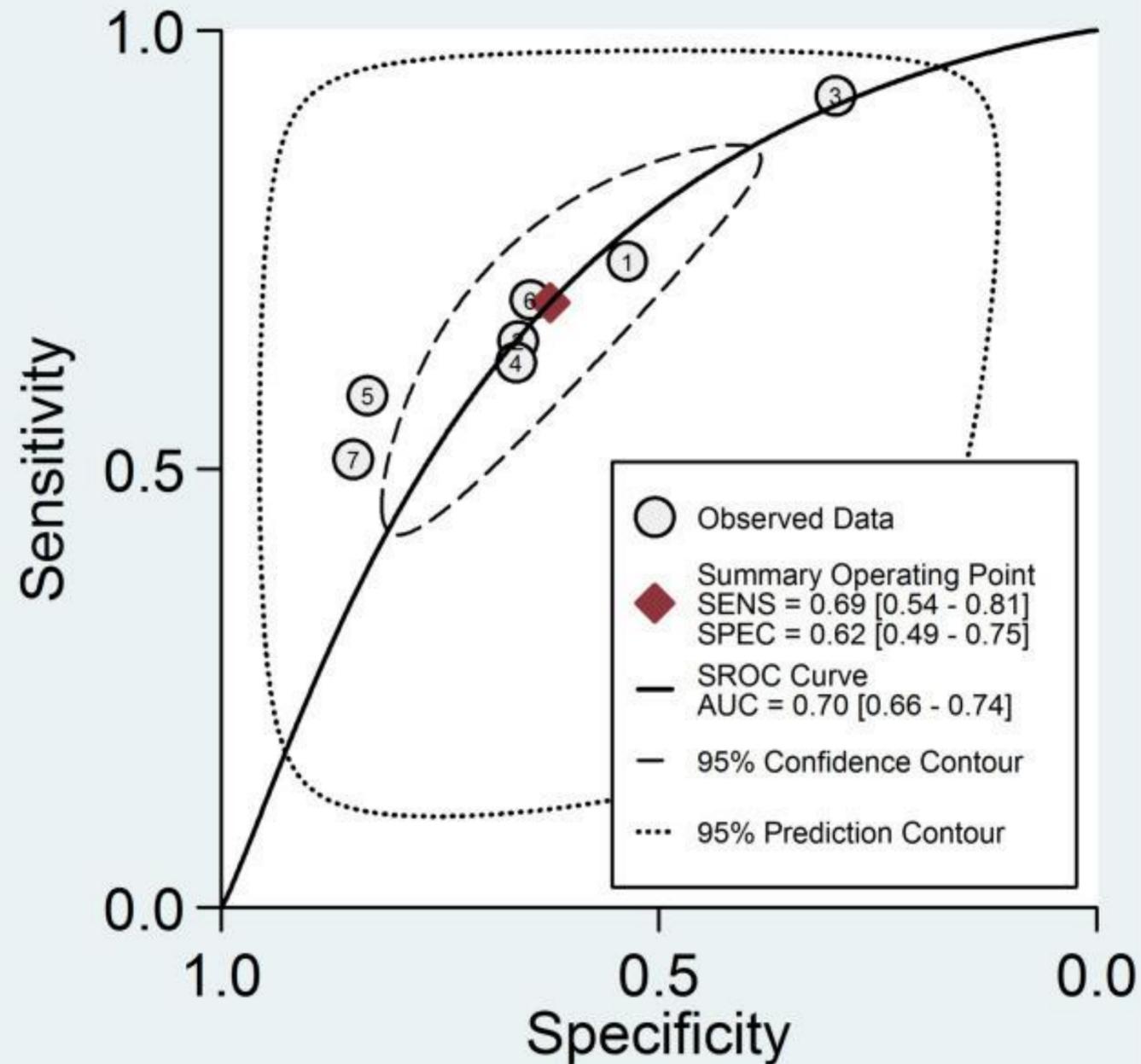
# RESULTS



- Pooled Sensitivity of 0.69
- Pooled Specificity of 0.62.

- Positive likelihood ratio: 1.84
- Negative likelihood ratio: 0.50

# RESULTS



## Hierarchical summary receiver operating characteristic (HSROC) curve

- Area under curve (AUC) was 0.7 with 95% CI ranging from 0.66 to 0.74

*Image source: Mina, A et al., Predicting pregnancy outcomes in IVF cycles: a systematic review and diagnostic meta-analysis of artificial intelligence in embryo, 2025*

# APPROVED AI MODELS



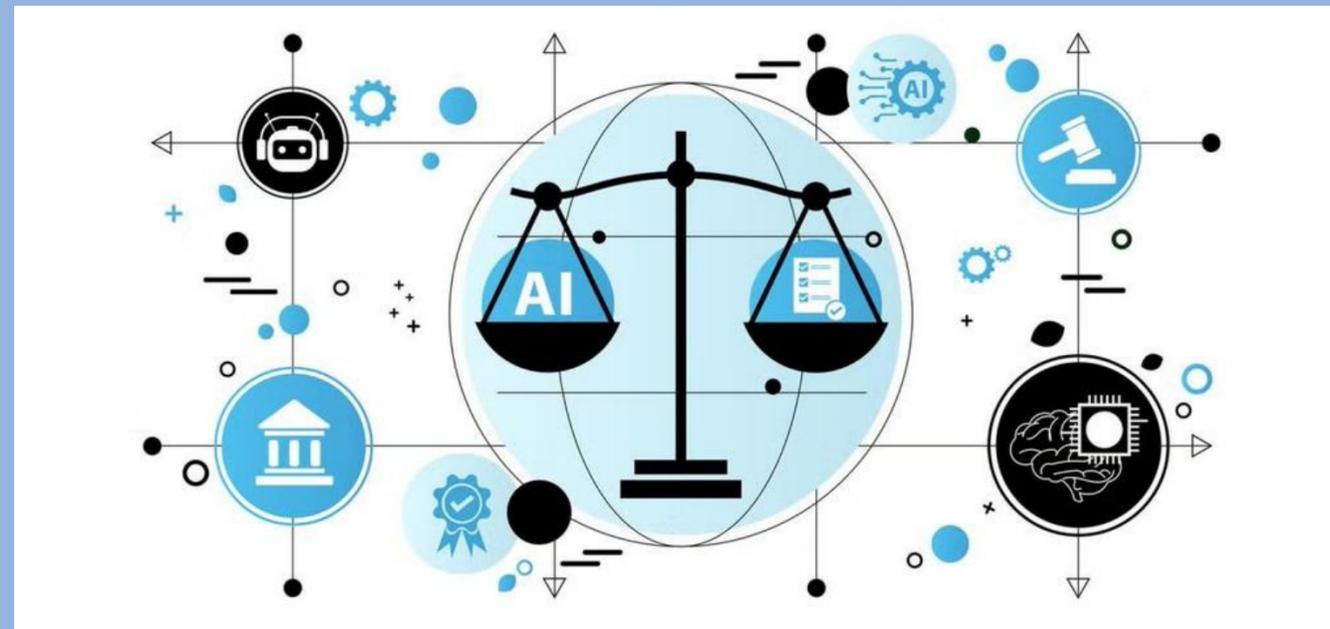
**Fairtility CHLOE Blast** first and only AI powered embryo assessment tool to receive FDA clearance

**Life Whisperer AI** evaluated by VerMileya et al., shows sensitivity and specificity rates of 70.1% and 60.5%

# ETHICAL CONSIDERATIONS

DEHUMANIZATION

ALGORITHMIC BIAS



ETHICAL  
TRANSPERANCY

DATA PRIVACY &  
SECURITY

# CONCLUSION

- AI shifts embryo selection from descriptive to predictive
- Potential to improve IVF efficiency and personalization
- Need for multicenter validation
- Ethical/regulatory concerns



# REFERENCES:

- Olawade, D. B., Teke, J., Adeleye, K. K., Weerasinghe, K., Maidoki, M., & Clement David-Olawade, A. (2025). Artificial intelligence in in-vitro fertilization (IVF): A new era of precision and personalization in fertility treatments. *Journal of gynecology obstetrics and human reproduction*, 54(3), 102903. <https://doi.org/10.1016/.jogoh.2024.102903>
- 2. Mina, A., Younesi, M., Doohandeh, T., Darzi, S., Ardehjani, N. A., Sheibani, S, H., & Valizadeh, R. (2025). Predicting pregnancy outcomes in IVF cycles: a systematic review and diagnostic meta-analysis of artificial intelligence in embryo assessment. *Contraception and reproductive medicine*, 10(1), 59. <https://doi.org/10.1186/s40834-025-00400-4>
- 3. Koplín, J. J., Johnston, M., Webb, A. N. S., Whittaker, A., & Mills, C. (2025). Ethics of artificial intelligence in embryo assessment: mapping the terrain. *Human reproduction (Oxford, England)*, 40(2), 179–185. <https://doi.org/10.1093/humrep/deae264>
- 4. Smith, A. D. A. C., Tilling, K., Nelson, S. M., & Lawlor, D. A. (2015). Live-Birth Rate Associated With Repeat In Vitro Fertilization Treatment Cycles. *JAMA*, 314(24), 2654–2662. <https://doi.org/10.1001/jama.2015.17296>
- 5. Gardner, D. K., & Sakkas, D. (2003). Assessment of embryo viability: the ability to select a single embryo for transfer—a review. *Placenta*, 24 Suppl B, S5–S12. [https://doi.org/10.1016/s0143-4004\(03\)00136-x](https://doi.org/10.1016/s0143-4004(03)00136-x)
- 6. Mastenbroek, S., van der Veen, F., Aflatoonian, A., Shapiro, B., Bossuyt, P., & Repping, S. (2011). Embryo selection in IVF. *Human reproduction (Oxford, England)*, 26(5), 964–966. <https://doi.org/10.1093/humrep/der050>
- 7. JM Raimundo, P Cabrita (2021). Artificial intelligence at assisted reproductive technology, *Procedia Computer Science*, Volume 181, Pages 442-447, <https://doi.org/10.1016/j.procs.2021.01.189>.
- 8. Cimadamo, D., Chiappetta, V., Innocenti, F., Saturno, G., Taggi, M., Marconetto, A., Casciani, V., Albricci, L., Maggiulli, R., Coticchio, G., Ahlström, A., Berntsen, J., Larman, M., Borini, A., Vaiarelli, A., Ubaldi, F. M., & Rienzi, L. (2023). Towards Automation in IVF: Pre-Clinical Validation of a Deep Learning-Based Embryo Grading System during PGT-A Cycles. *Journal of Clinical Medicine*, 12(5), 1806. <https://doi.org/10.3390/jcm12051806>
- 9. Wang, G., Wang, K., Gao, Y., Chen, L., Gao, T., Ma, Y., Jiang, Z., Yang, G., Feng, F., Zhang, S., Gu, Y., Liu, G., Chen, L., Ma, L. S., Sang, Y., Xu, Y., Lin, G., & Liu, X. (2024). A generalized AI system for human embryo selection covering the entire IVF cycle via multi-modal contrastive learning. *Patterns (New York, N.Y.)*, 5(7), 100985. <https://doi.org/10.1016/j.patter.2024.100985>