

Data you never see

Federated Learning for Oocyte Assessment



Life Whisperer

AI Enhanced Fertility

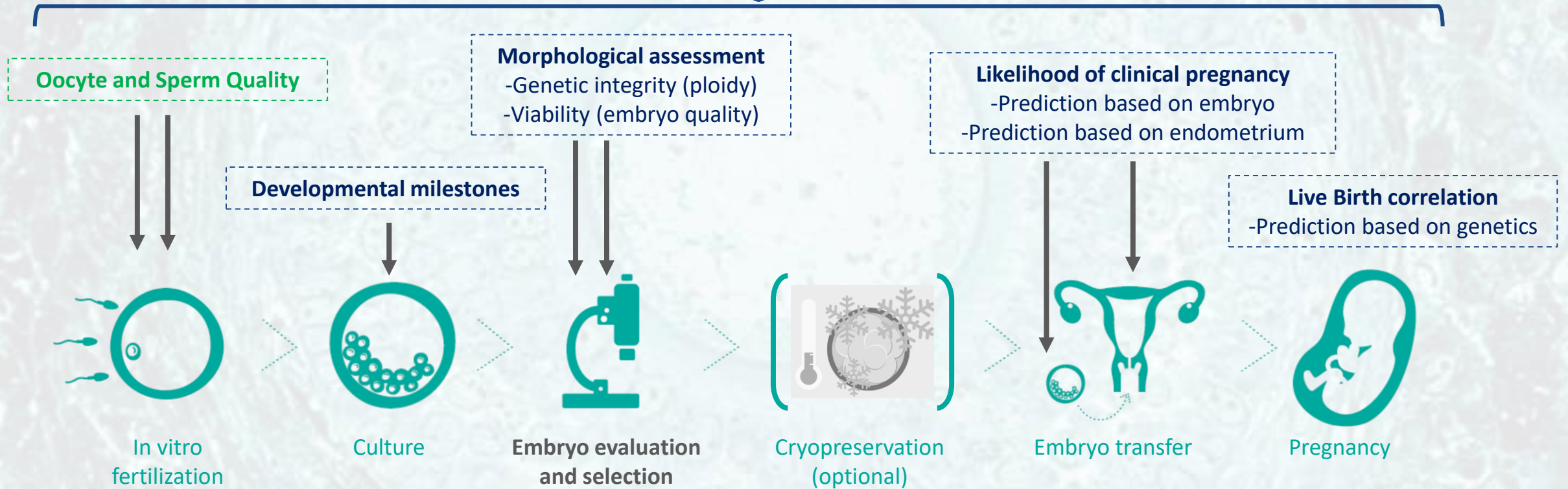
Jonathan Hall PhD
Co-founder & Chief Scientist



New Technology
New Data

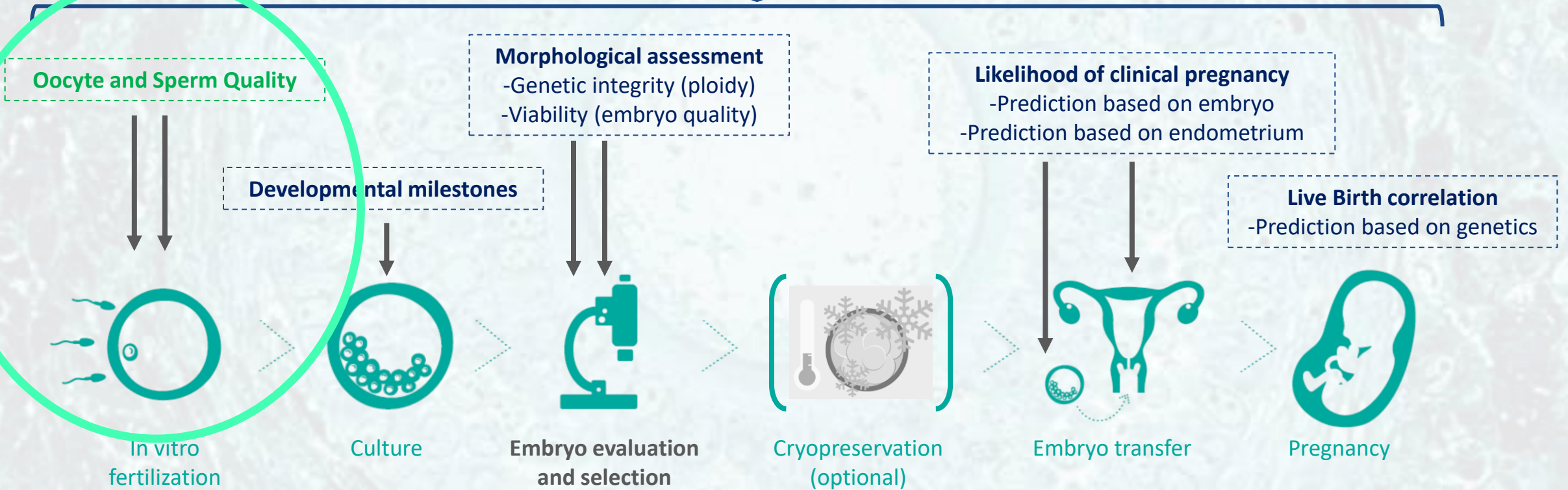
Where AI can help in the IVF process

ARTIFICIAL INTELLIGENCE



Where AI can help in the IVF process

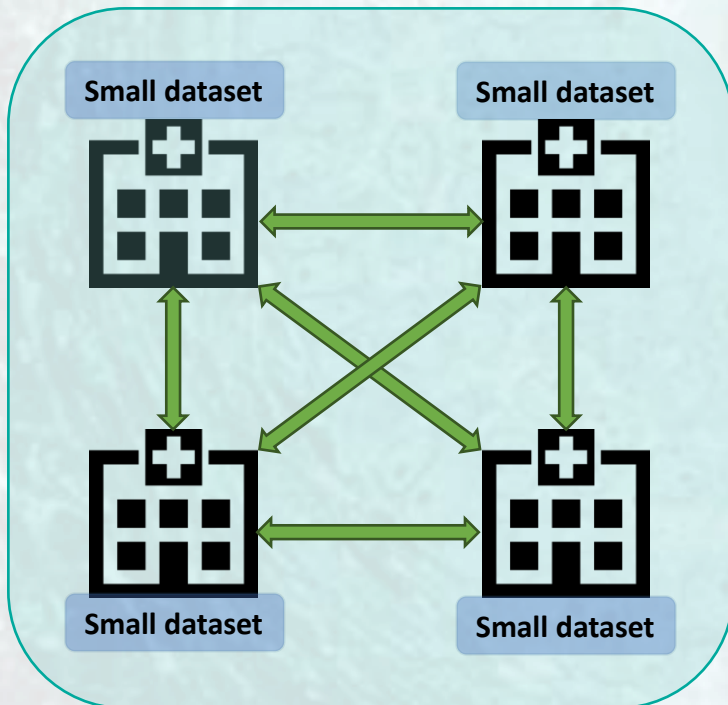
ARTIFICIAL INTELLIGENCE



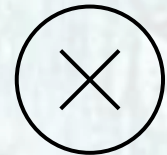
Where AI can help in data collection

 Institutions **want to collaborate on oocytes** but can't compromise on data privacy/regulations

 Silos typically don't have a large enough or **diverse** enough dataset to train general AI



▪ **Can't collect data in one place**



▪ **Can't access each other's data**





Federated Learning

SILOED DATA is common for medical data.

“What if you could **access distributed data without moving it or seeing it?**”

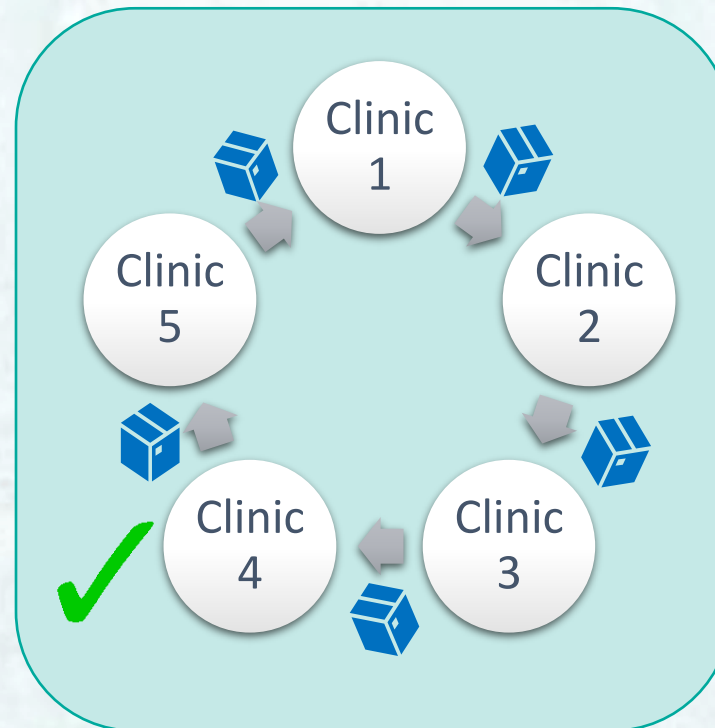
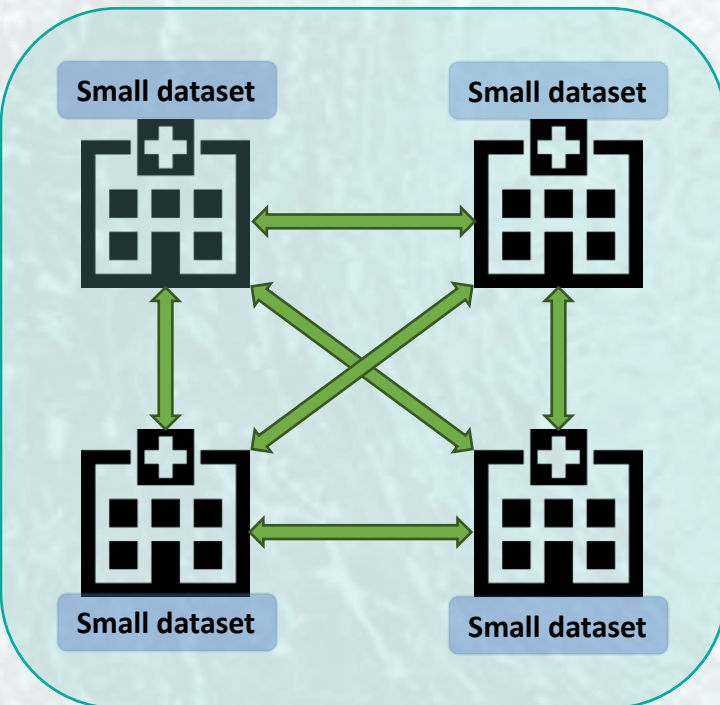
MULTIPLE CLINIC DATA can help AI to **generalise across distributions** by accessing **diverse data**

AI LEARNINGS ONLY – We don’t really want to know the private information, only the **learnings from the AI**

NEW TRAINING METHODOLOGY – **Federated Learning** a key enabler by having the training AI transferred to the silo and back out again

Where AI can help in data collection

- AI goes to the **data** in its local region
- AI can learn from **distributed** and **diverse** data around the world
- Allows **safe** and **privacy-respecting collaboration**



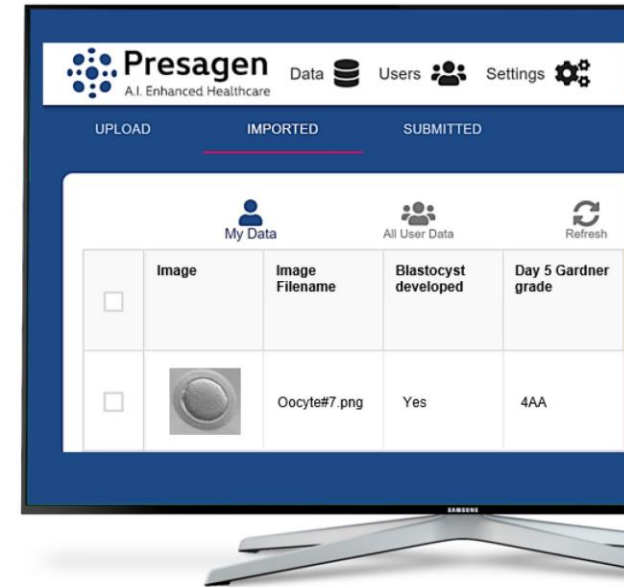
Where AI can help in data collection

- Where are we so far?
- How to be involved?



Clinical Data Portal

OOCYTE ASSESSMENT

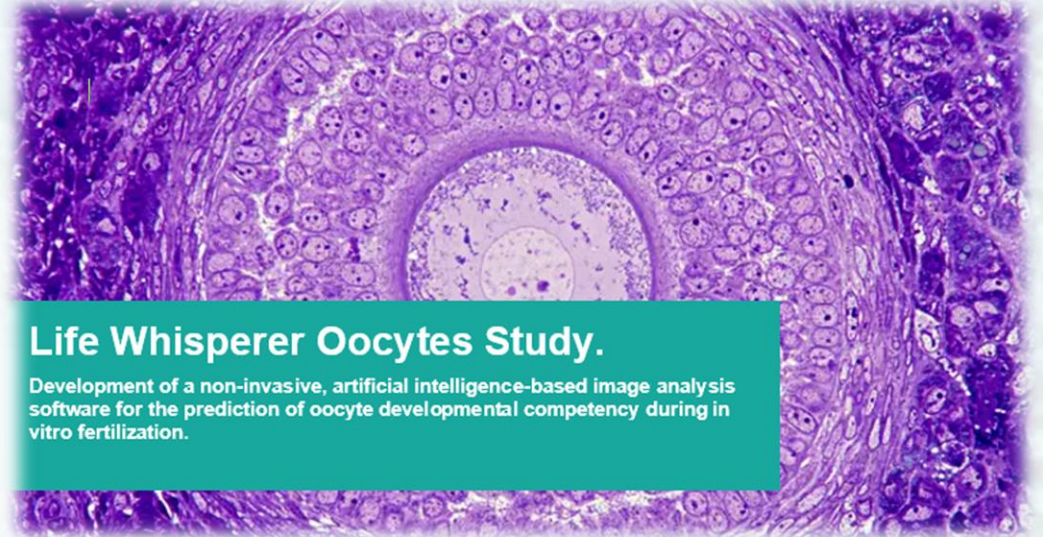




AI Open Projects

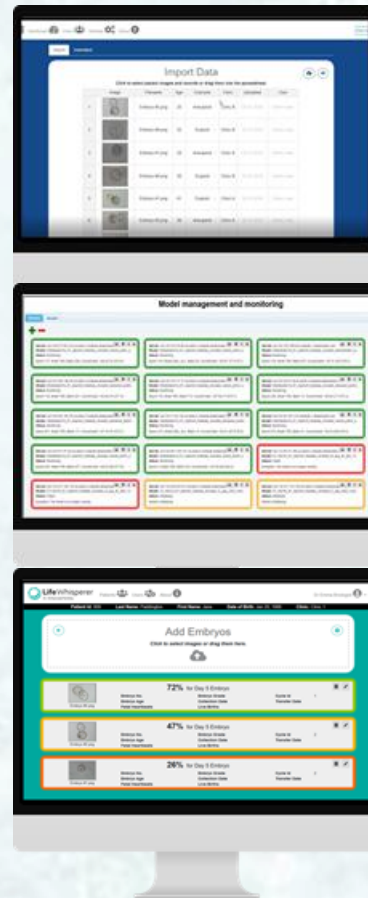
Presagen AI Open Projects – Oocyte Assessment

- **AI development is nearing completion**
 - We are collaborating with a wide network across India, USA, Japan, Malaysia/Singapore, & The Caribbean **collecting *diverse data***
 - The dataset is kept in-region and makes use of Federated Learning to train the AI and **protect privacy**
- **AI double-blind testing, and productionization for clinical use**
 - We are collecting additional datasets *not* used to train the AI to ensure the AI generalizes to new demographics
 - To be involved, we have R&D protocol, patient informed consent, templates and materials to get started, and we provide royalties to participants who help us build and test: <https://www.presagen.com/ai-open-projects-oocytes>



Presagen AI Open Projects – Partnering Program

A global cloud platform that allows us to collaborate with clinics globally and crowdsource data to build scalable AI products for clinics globally



1. Partner with clinics: Clinical Data Portal

Clinics globally “drag-and-drop” data to contribute to specific AI healthcare products. Data remains safe, secure and local.

2. Co-create with clinics: Federated AI Training Platform

Presagen uses its platform to train the AI on globally distributed data, conducts trials with clinics, and drives regulatory approvals for global markets.

3. Clinical Cloud Delivery System

Presagen owned AI healthcare product is delivered to clinics globally, using a simple “drag-and-drop” AI assessment. Partner clinics receive royalties.



Oocyte Assessment

Where AI can help in assessing oocytes

- We are working to complete a **range of AI applications** using the global collaborative network of clinics, both upstream and downstream of embryo selection.
- Our project closest to reaching completion is **Oocyte Assessment**.

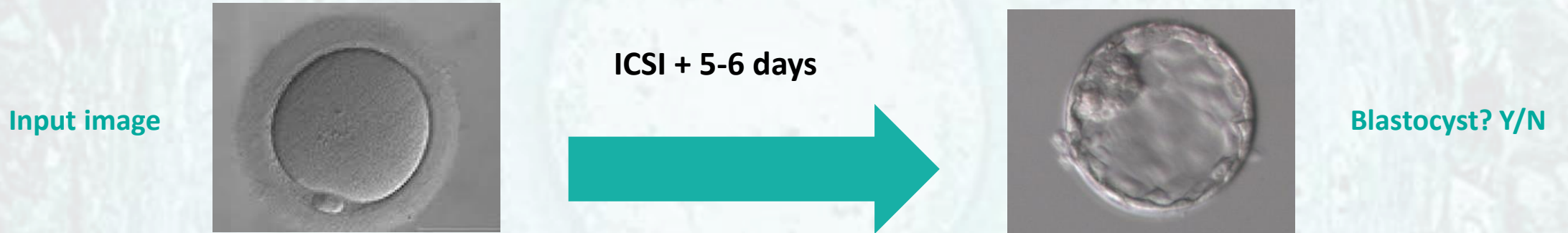
Clinical relevance

1) What if we could help **select oocytes** that will result in **good quality embryos**, and help patients understand the likelihoods?

2) What if we could help **make decisions** about whether **additional rounds of oocyte collection** are needed?

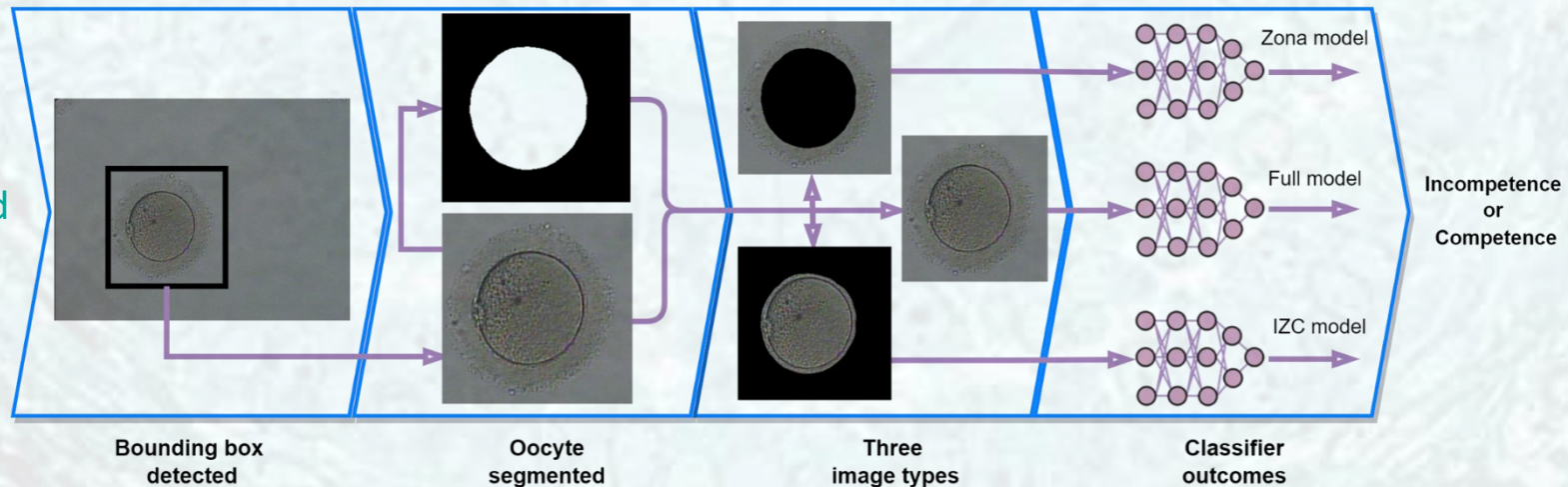
First oocyte assessment experiments

- AI for predicting **oocyte quality**
 - Analyses images of **denuded** oocytes **prior to ICSI**
 - Evaluates **likelihood of developing into a blastocyst** (AI score of 0.0 – 10.0)



Segmentation AI

Specially trained for denuded oocytes, Intersection-over-Union Score: **94.77%**



Promising preliminary results (USA)



ABSTRACT ONLY | VOLUME 118, ISSUE 4, SUPPLEMENT , E113, OCTOBER 01, 2022

A NON-INVASIVE ARTIFICIAL INTELLIGENCE (AI) ALGORITHM CAN PREDICT COMPETENCE OF DENUDED OOCYTES FROM IMAGES TAKEN PRIOR TO INTRACYTOPLASMIC SPERM INJECTION (ICSI)

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DOI: <https://doi.org/10.1016/j.fertnstert.2022.08.338> • Check for updates

ASRM 2022

Preliminary study that oocytes are predictive of blastocyst development

[www.fertstert.org/article/S0015-0282\(22\)00860-3](http://www.fertstert.org/article/S0015-0282(22)00860-3)

For new developments, see

www.lifewhisperer.com/science-and-training



California Fertility Partners



A product by Presagen



31.6% Known male infertility cases identified using UDC, which were likely mislabeled as non-competent oocytes.

8.3% AI accuracy improvement by training the AI on a UDC cleansed dataset excluding the mislabeled oocyte data.

83.7% Final AI model accuracy on the cleansed validation set of 92 images with known male infertility cases removed.

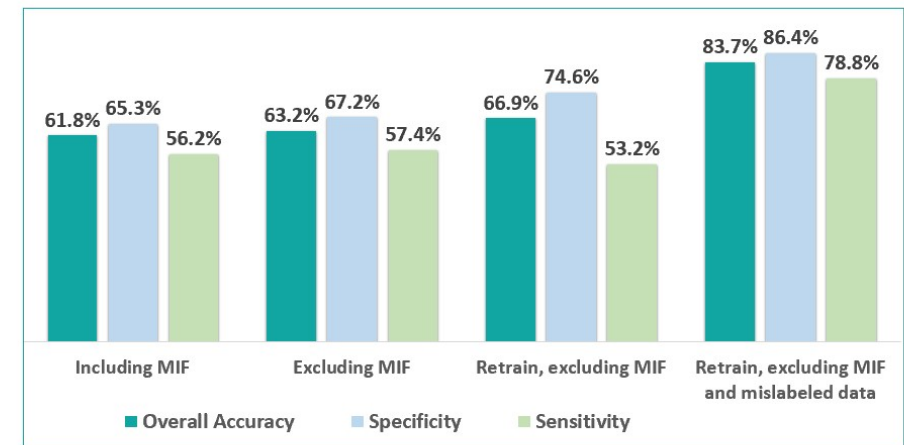
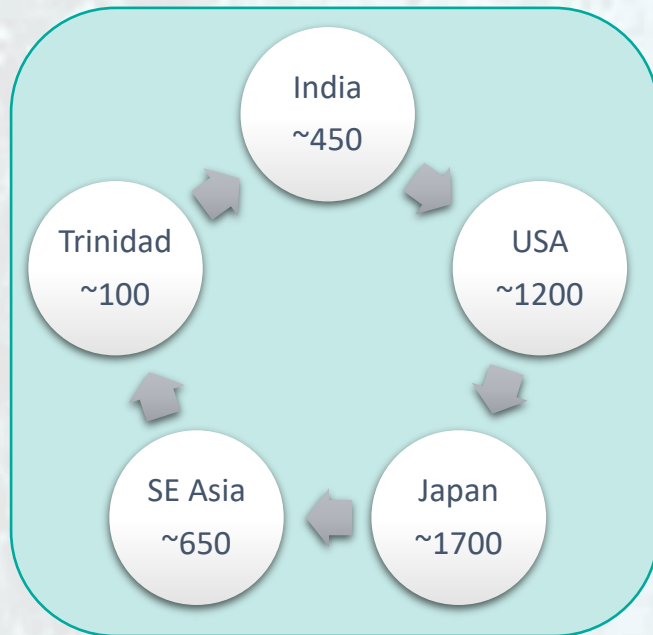


Figure 1: Mean accuracy metrics for AI models for 4 scenarios: (1) including male infertility factors (MIF), (2) excluding MIF, (3) retraining the model with MIF excluded and (4) retraining the model with both MIF and UDC-identified mislabeled data excluded.

Promising preliminary results (India, USA, Japan, Malaysia/Singapore, Caribbean)

- Collaboratively training on many different regions helps ensure the AI will work in **different clinics** and on **different patient groups**.



Day 1 fertilization outcome also tracked



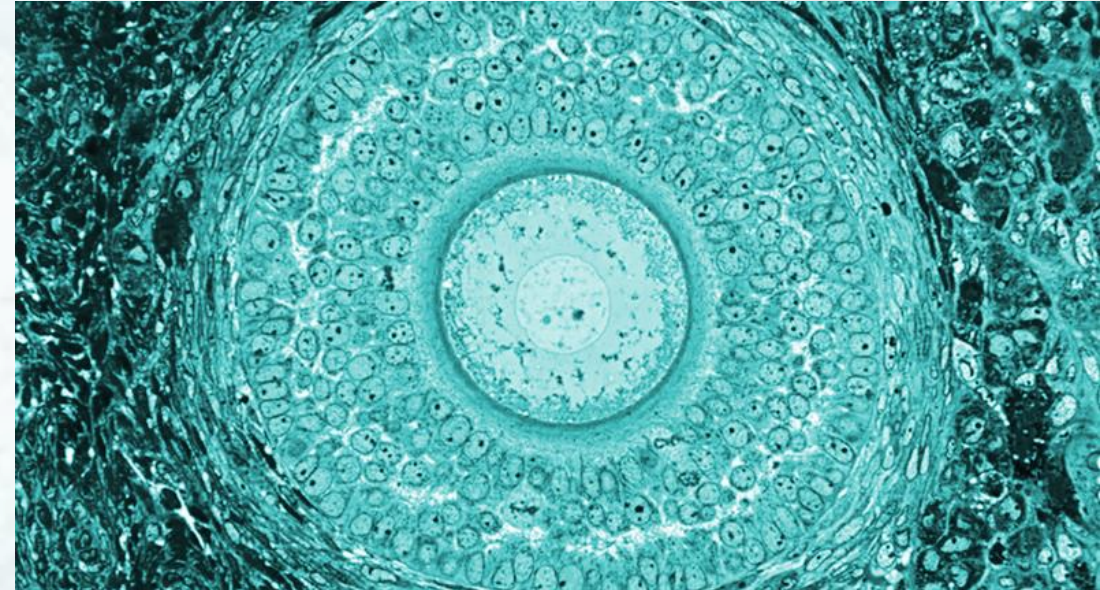
32% male infertility factors



Oocyte score 0-10: likelihood of development into a blastocyst

Summary

- A collaborative network of clinics is vital for collecting **diverse data** and we can create AI that **works across demographics** and **clinical settings** whilst respecting data **privacy**
- **Collaborators world-wide from 48 countries** are helping, and we are always looking for more for a **range of projects**. Please reach out for more info! info@presagen.com
- AI can help with assessment of **oocytes**, and demonstrates **early predictive power**
- The final AI will be tested on a **double-blind** set to ensure it **generalises correctly** to any new clinics, and it is ready for productionization
- **Life Whisperer Oocytes** will work in tandem with our other AI technologies to improve embryo quality and improve outcomes





Life Whisperer

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