Predicting human embryo viability with greater accuracy using advanced AI

A product by

Presagen
AI Enhanced Healthcare
Embryologists using Life Whisperer have significantly improved clinical pregnancy rates. The advanced AI clinical support tool is at least 25% more accurate in assessing embryo viability than traditional morphology assessment alone.

Currently, embryo selection for IVF relies on numerous subjective grading scales based on observation of embryo morphology. Life Whisperer changes that, bringing greater accuracy to viable and non-viable embryo identification through its Artificial Intelligence (AI) web-based decision support tool.

Summary of the Life Whisperer studies
- 70% average accuracy (sensitivity) in identifying viable embryos
- 25% average accuracy improvement vs embryologist grading
- Accuracy improvement was maintained across various clinics in various regions

Key points
- The AI model brings value to the IVF industry by standardizing embryo assessment
- This is the first demonstration of AI using static 2D images from standard optical light microscopes without the need for a time-lapse incubator
- Accuracy of the AI model will increase even further as more data is collected
- Help us to collect more results by reporting your clinic’s pregnancy outcomes with Life Whisperer. Improved embryo selection = Improved pregnancy success
Life Whisperer increases customer satisfaction and brings new patients to clinics.

**Greater treatment transparency and confidence in IVF outcomes means higher demand for your IVF services.**

Life Whisperer helps to reassure patients that with every IVF attempt, the embryo chosen for transfer is the one that gives them the very best chance of a successful pregnancy.

There is no subjectivity: Whatever can be assessed has been assessed, and that assessment is based on scientific data collected from thousands of blastocyst evaluations and clinical outcomes.

Knowing that they have an improved chance of pregnancy, with fewer cycles, can also overcome a key barrier for people who would like to undergo IVF but are hesitant to start because of costs or fear of being unsuccessful.

**For clinics, Life Whisperer helps to deliver:**

- A non-invasive and proven assistive technology with no set-up costs and no requirement for time-lapse incubators*
- Increased transparency to patients
- Improved clinical outcomes
- Standardization of embryo assessment and additional quality control
- Embryo assessment that is affordable for all patients
- A means to set the clinic apart to improve the reputation and brand awareness

“The technology has complemented our current workflow and embryo selection techniques, not only with the aim of improving patient outcomes but also by allowing patients to be more informed about their embryo development... The feedback from all of our patients has been overwhelmingly positive. [We] highly recommend it for any IVF clinic.”

Dr Ashleigh Storr, Flinders Fertility

*Note: Images derived from time-lapse systems can also be assessed by Life Whisperer*
Artificial Intelligence fueled by thousands of blastocysts.

Life Whisperer employs Artificial Intelligence (AI) to improve embryo selection and increase the chance of a positive pregnancy with a fetal heartbeat.

Now this assistive technology can provide additional evidence beyond the embryologist’s visual grading to rank the most viable embryos with at least 25% more accuracy than an embryologist alone.

Impossible for the human eye to see

Unknown patterns or complex features invisible to the human eye are captured by identifying complex correlations in different parts of the image.

In doing so, Life Whisperer also reduces the complexity of multiple grading scales to offer a single standardized embryo assessment tool.

Deep learning for medical imaging is an AI technique that enables computers to recognize and classify images. The AI ‘trains’ on previous examples of those images in order to self-learn complex patterns and features relating to image type. Once trained, the AI can recognize and classify new, unseen images.

Life Whisperer has been presented with thousands of images of embryos that have been transferred, and their clinical pregnancy outcomes. From this, the AI has learnt to identify the morphological features of a viable and non-viable embryo – including those invisible to the human eye.
International multi-center study demonstrates Life Whisperer’s efficacy.

The study question
Can Artificial Intelligence (AI) and computer vision improve prediction of embryo viability using static 2D images of Day 5 embryos from multiple clinics?

Study design, size and duration
Approximately 9,000 static 2D images of Day 5 blastocysts with related pregnancy and clinic geographical location information were collected. All blastocyst images were from single embryo transfers. Images were divided into three groups: training, validation, and blind test datasets.

Blind test datasets comprised images either from the same clinic used in training, or from independent clinics that were not part of training the AI model (double-blind test datasets).

9,000 static 2D images
Standard optical light microscope images from 11 clinics
Primary endpoint = fetal heartbeat at first scan
Training the model

Life Whisperer’s artificial intelligence (AI) embryo viability assessment model was trained, validated, and tested on thousands of individual embryo images, taken by traditional optical light microscopes, from patients undergoing fertility treatment at 11 IVF clinics in Australia, the US, and New Zealand.

After training, the AI model was initially validated on a subset of images that were not used in training. To determine the true accuracy, the AI was then tested on previously unseen, blind test datasets.

The first blind test dataset was comprised of images that were not involved in training, and therefore were ‘unseen’ by the AI, but were taken from the same clinic as the training data and therefore had potentially similar clinical characteristics. This dataset was used to initially assess the AI accuracy.

The double-blind test dataset was comprised of images taken from a clinic in which no data had been used for AI training. These images, including the clinical setting and demographics, had not been previously seen by the AI model. This dataset was used to validate that the AI is robust and can translate to different clinical and demographic regions, thus making it suitable for broad clinical use.

This study was deemed exempt from ethics committee review pursuant to applicable regional regulations.
Life Whisperer improves accuracy in predicting embryo viability.

Approximately 9,000 Day 5 embryo images were collected from 11 clinics in 3 countries (Australia, US and New Zealand). Accuracy was determined using 3 blind test sets. Blind test sets 2 and 3 were double-blind datasets. For the blind test set 1 and double-blind test set 3, the AI accuracy was compared directly with that of the embryologist grade. Embryologists scores were not available for double-blind test set 2, therefore only sensitivity and specificity could be determined for this test set and not the embryologist grading comparison.

![Graph showing AI Vs. Embryologist Grading Accuracy Comparison](image)

### Accuracy Improvement:

- **Double-Blind Test Set 3**: 26.5%
- **Blind Test Set 1**: 23.8%

### Frequency of AI Predicting Correctly Vs. Embryologist Incorrect and Vice Versa

![Graph showing Frequency of AI Predicting Correctly Vs. Embryologist Incorrect and Vice Versa](image)

#### AI is 25% more accurate than trained embryologists in predicting embryo viability

The AI model correctly identified viable and non-viable embryos 59% of the time, compared to embryologists who correctly identified viable and non-viable embryos 47% of the time. This represents a 25% average accuracy improvement.

#### AI predictions are correct more than twice as often as embryologists when they disagree

Over two double-blind test sets Life Whisperer produced a 2.2 fold average increase in accuracy compared to the embryologists.
Life Whisperer is ready for clinical use globally.

The total mean accuracy when applied to all three blind validation datasets of 1,667 images, independent of embryologists’ grades, was 70% for viable embryos, 61% for non-viable embryos, and 64% overall accuracy across both types of embryos.

The accuracy between blind and double-blind datasets remained consistent. This demonstrates that Life Whisperer’s AI can robustly translate to unseen images taken from new clinics with different clinical settings and demographics.

Every week around the world, hundreds of embryo images are assessed before transfer by Life Whisperer’s AI.

Don’t let your clinic fall behind.

Request a free trial: www.lifewhisperer.com/clinics

Life Whisperer’s AI has proven to be accurate and robust in different clinical and demographic regions.