Weill Cornell Medicine

FEMI: Next-Generation AI Platform for Comprehensive IVF Embryo Analysis and Selection

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Background & Unmet Need

- Current IVF success heavily depends on accurate embryo assessment, requiring multiple complex tasks including ploidy prediction, quality scoring, and developmental monitoring
- Traditional diagnostic tools are costly, lack standardization, and often rely on invasive procedures like PGT-A testing
- Current AI models are constrained by insufficient training data diversity, reliance on manual input, and limited accessibility for clinical adoption
- Available AI platforms show reduced accuracy when analyzing specific developmental stages and lack standardization across different clinical settings
- High costs and varying regulations around genetic testing create barriers to access for many patients
- **Unmet Need:** Efficient non-invasive, and standardized approach for comprehensive embryo assessment

Technology Overview

- **The Technology:** FEMI is a foundation model trained on ~18 million time-lapse embryo images for comprehensive, non-invasive assessment of embryo viability and development
- Self-supervised learning approach enables comprehensive feature extraction without manual annotation requirements
- A single unified platform handles multiple critical assessment tasks through task-specific fine-tuning
- **PoC Data:** Achieves >0.75 AUROC for ploidy prediction using single images, improving to >0.80 AUROC with video sequences and >0.85 AUROC when including maternal age data
- Demonstrates >90% F1 score in embryo tracking across 96-112 hours post-insemination
- Predicts developmental timing with mean absolute errors under 6 hours across datasets

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Patents:
US Patent 12,014,833
IL Patent 280645
US Application
Provisional Application Filed

Publications:
Rajendran et al. *NPJ Digit Med*. 2026.
Rajendran et al. *Nature Communications*. 2025.

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Cornell Reference:
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PGT-A: Preimplantation Genetic Testing for Aneuploidy

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Technology Applications

- Clinical decision support tool for IVF clinics enabling standardized embryo selection
- Potential applications in broader reproductive medicine research and developmental biology for studying embryo morphology and development patterns

Technology Advantages

- State-of-the-art performance across multiple embryo assessment tasks
- Standardized, objective analysis with generalization across multiple clinical settings and datasets, enabling consistent embryo assessment protocols
- Provides cost-effective implementation through seamless integration with existing time-lapse imaging equipment in IVF clinics

Supporting Data / Figures

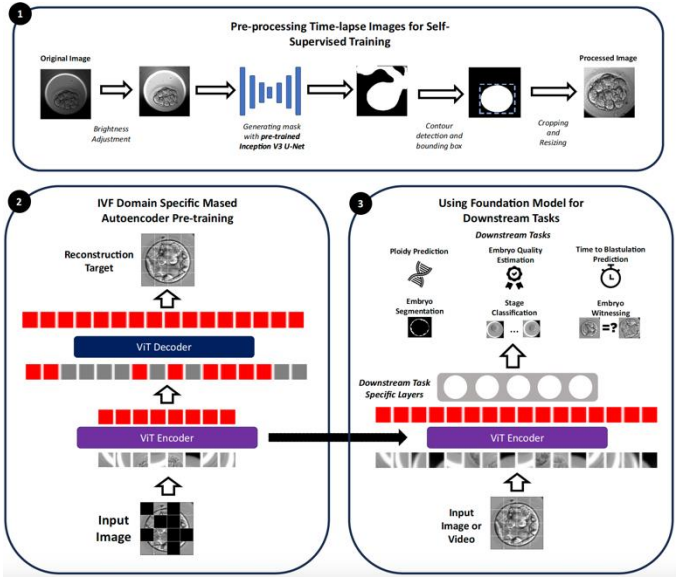

Figure 1: Overview of FEMI and downstream applications.

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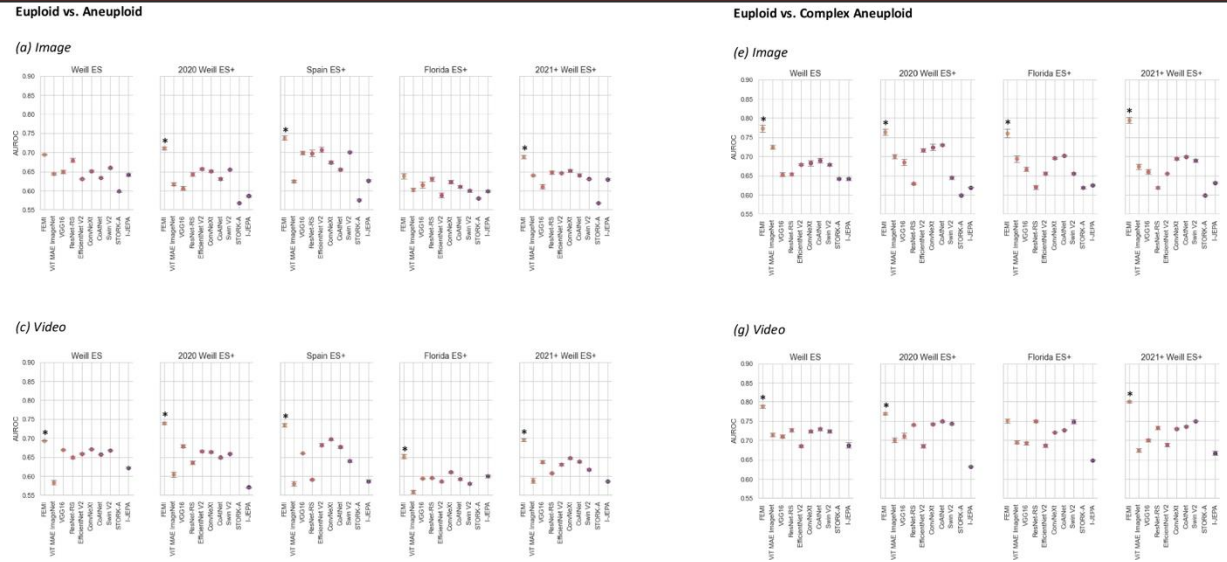

Figure 2: Comparison of FEMI's ploidy prediction performance across multiple datasets. Model performance shown as AUROC values for both euploid vs. aneuploid and euploid vs. complex aneuploid classifications using different input types (single image, video sequences) with and without maternal age data. FEMI demonstrate consistent performance across multiple clinical settings using different time-lapse imaging systems.

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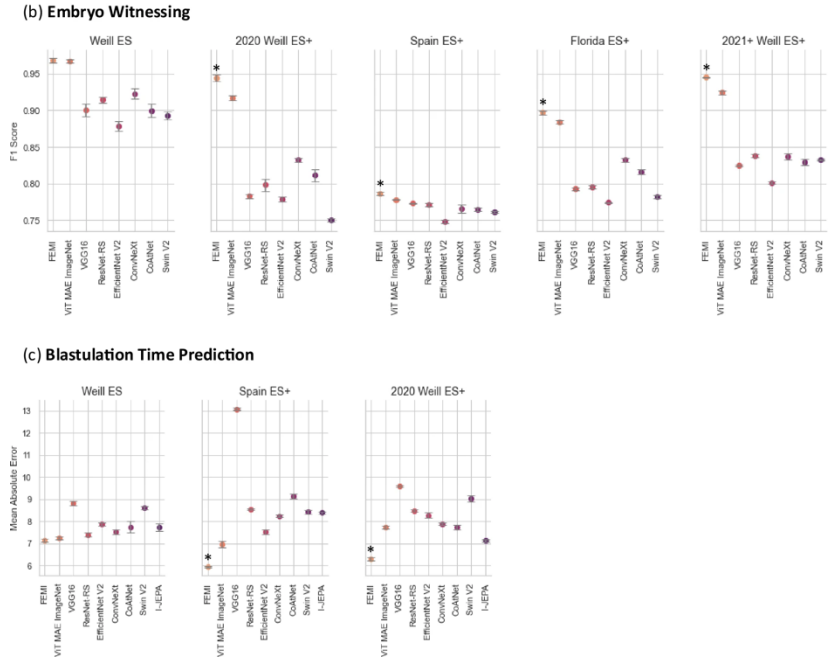

Figure 3: FEMI performance in embryo tracking and developmental timing prediction. (B) Embryo identification accuracy shown by F1 scores (>90%) across multiple datasets for tracking between 96-112 hours post-insemination. (C) Blastulation time prediction accuracy demonstrated by mean absolute errors under 6 hours across three independent clinical datasets.

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