

The Future of A.R.T.

AI in Reproductive Medicine:
What is essential to implement in clinical practice?

Simon Lumsdon

Conflict of interest
Employed at FertilAI

Consult
Simbryo Technologies

AI in the lab

Trying to Conceive

Natural

Tracking

Pre-IVF

Professional tracking

Medication

IUI

IVF Retrieval

Ovarian stimulation

Egg retrieval

IVF Lab

Fertilization

Embryo development

IVF FET

Embryo transfer

Clinical pregnancy



artificial intelligence for embryo selection



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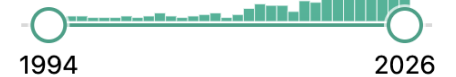
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MY CUSTOM FILTERS

460 results

Page 1 of 46

RESULTS BY YEAR



460 results



Chloe OQ™ CHLOE OOCYTE QUALITY [OQ]: AI-BASED OOCYTE ASSESSMENT

S00004

Collection fare

View



OQ Score: 2.0
 Oocyte: 22
 MIB: Fresh

Add comment



OQ Score: 2.3
 Oocyte: 23
 MIB: Fresh

Add comment



OQ Score: 2.3
 Oocyte: 23
 MIB: Fresh

Add comment



OQ Score: 2.0
 Oocyte: 22
 MIB: Fresh

Add comment



OQ Score: 2.3
 Oocyte: 23
 MIB: Fresh

Add comment



OQ Score: 2.0
 Oocyte: 23
 MIB: Fresh

Add comment



OQ Score: 2.3
 Oocyte: 23
 MIB: Fresh

Add comment



OQ Score: NA
 Oocyte: 23
 MIB: Other

Add comment

Assessment Result

11 MII (maturing oocytes) - Assessed

0	1	0
MII (maturing oocytes) Not assessed	OVI (maturing oocytes) Not assessed	Other Not assessed

At least 1 blastocysts

90+%

At least 2 blastocysts

90+%

At least 3 blastocysts

90+%

At least 4 blastocysts

90+%

AI outside the lab

Trying to Conceive

Natural

Tracking

Pre-IVF

Professional tracking

Medication

IUI

IVF Retrieval

Ovarian stimulation

Egg retrieval

IVF Lab

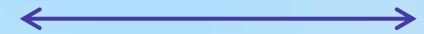
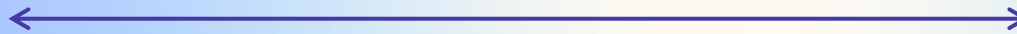
Fertilization

Embryo development

IVF FET

Embryo transfer

Clinical pregnancy



artificial intelligence for ovarian stimulation

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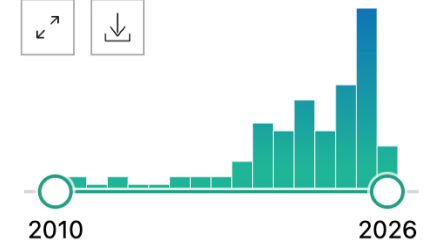
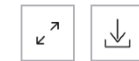
Display options

MY CUSTOM FILTERS

75 results

Page 1 of 8

RESULTS BY YEAR



75 results

Is it needed?

Initial dose

Trigger timing

Ovulation timing

Initial Dose



Dosing- Regional variance

Region	N	Mean stim days	Mean total GT IU	Mean daily GT IU	Mean total oocytes
Europe	1313	9.9	2687	271	10.1
Middle East	1884	9.7	3101	321	8.5
USA	2160	11.2	4973	444	13.1

Initial Dosage

Description:

Defining optimal dosage based on patient parameters, currently based on providers preference and expertise.

Advantages:

- Optimizing oocyte yield.
- Reducing unnecessary medications (reducing medications costs).

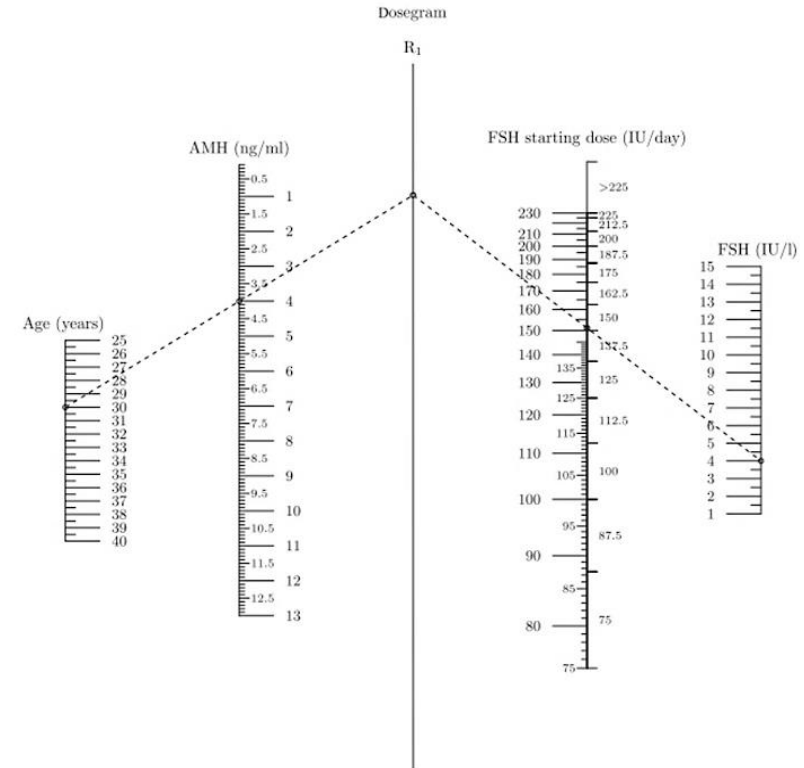


Figure 1. The nomogram for the calculation of the FSH starting dose based on age, serum AMH and FSH. In the example, for a 30-year-old woman with serum AMH level of 4 ng/ml and FSH level of 4 IU/l, the FSH starting dose is 152 IU/day. As the new upcoming FSH delivery system will have the dosage dial based on doses of FSH of 12.5 IU, on the right hand side of the FSH starting dose column, the FSH dose as selected for the delivery system is reported (150 IU/day for the example). AMH conversion factor: 1 ng/ml = 7.143 pmol/l.

Initial Dosage

Algorithm:

linear regression algorithm on top of a linear function, for predicting amount of MII's for specific dosage.

Input:

Age, BMI, proven fertility (Y/N), AMH, AFC, first dose of FSH.

Results:

A expert opinion based approach based on 'performance score' was performed. Mean performance score of the model recommendation was 0.89 (95% CI 0.88 to 0.90), significantly better than the clinicians (0.84, 95% CI 0.82 to 0.86; $P=3.81 \times 10^{-5}$)

RBMO



ARTICLE

Supporting first FSH dosage for ovarian stimulation with machine learning



BIOGRAPHY

Núria Correa is senior clinical embryologist and researcher at the R&D department of the Eugin Group. She is a PhD candidate at the Universitat Autònoma de Barcelona, working on a research project centred on the application of artificial intelligence in assisted reproduction.

Nuria Correa^{1,2,3}, Jesus Cerquides², Josep Lluís Arcos², Rita Vassena^{1,*}

Initial Dose for Fertility Specialists

☰ Tuesday, 1 July 2025, 10:11

Age: 30 ✓

Height: 5' 0" ✓ cm ft

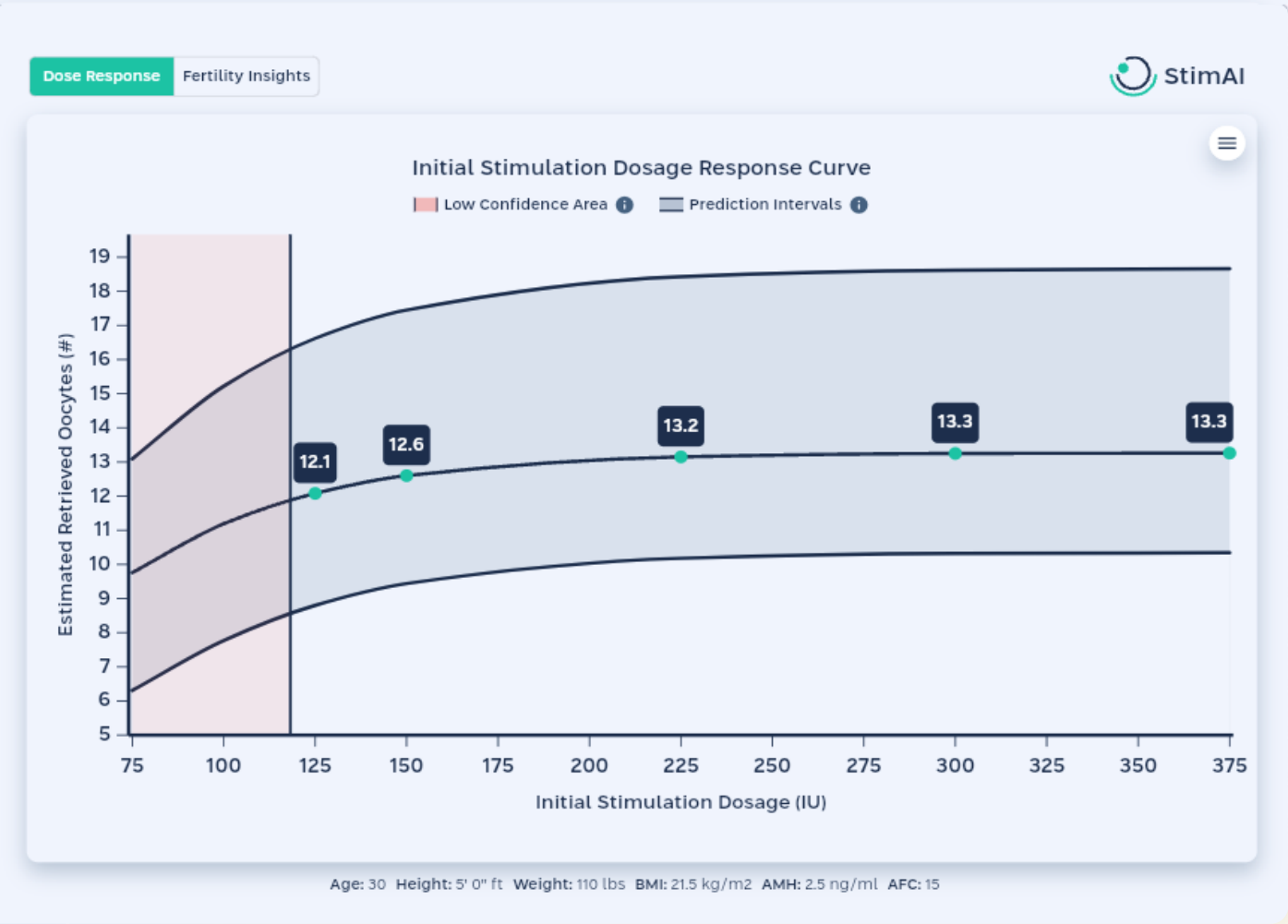
Weight: 110 ✓ kg lbs

AMH: 2.5 ng/mL ✓

AFC: 15

Run AI

ⓘ Please verify that all input values were measured within the last 12 months.



A machine learning model outperformed fertility specialists in predicting the number of oocytes retrieved based on patient profile and predefined r-hFSH- α starting dose

Study design

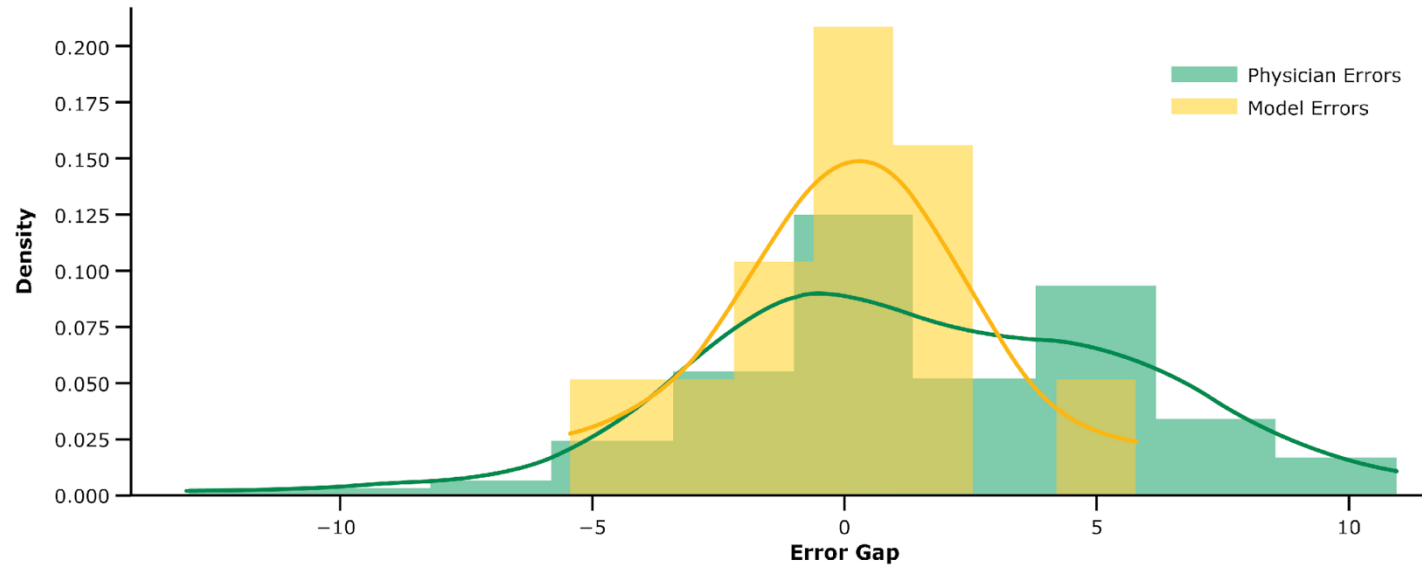
29 fertility specialists from 29 clinics evaluated 12 real world IVF cases treated with fixed r-hFSH- α starting doses.

Prediction task

Physicians predicted the number of oocytes retrieved based on patient profiles and predefined dosing and were compared with an XGBoost machine learning model.

Accuracy advantage

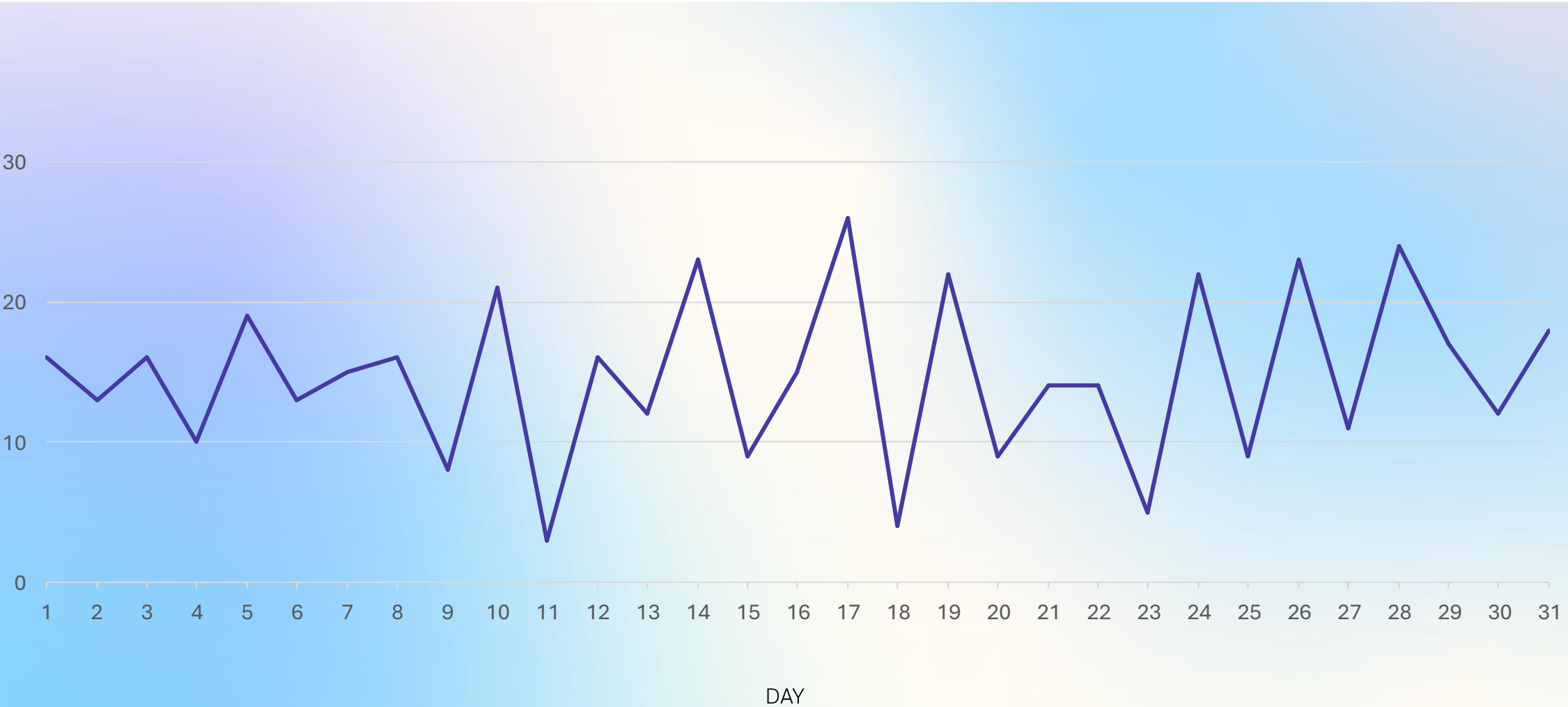
The machine learning model was more accurate than physicians with a mean absolute error of **1.94** oocytes versus **3.77** oocytes.



Trigger Day

The background of the slide is a 4x6 grid of 24 rounded squares. The colors of the squares transition from a light yellow in the top-left corner to a dark blue in the bottom-right corner, following a diagonal gradient. The text 'Trigger Day' is positioned in the top-left corner, overlapping the first few squares of the first row.


Workload variance: OPUs per day



Trigger Day

Artificial intelligence in in vitro fertilization: a computer decision support system for day-to-day management of ovarian stimulation during in vitro fertilization

Gerard Letterie, M.D.   • Andrew Mac Donald, M.S.

Published: October 01, 2020 • DOI: <https://doi.org/10.1016/j.fertnstert.2020.06.006> •  Check for updates

Advantages:


Optimized oocyte yield.

Workflow benefits.

A MACHINE LEARNING ALGORITHM CAN OPTIMIZE THE DAY OF TRIGGER TO IMPROVE IN VITRO FERTILIZATION OUTCOMES

Eduardo Hariton, MD, MBA • Ethan A. Chi, BS • Gordon Chi, BS • ... Jon F. Braatz II, BS •

Pranav S. Rajpurkar, MS • Mitchell P. Rosen, MD, HCLD • [Show all authors](#)

[Open Archive](#) • DOI: <https://doi.org/10.1016/j.fertnstert.2021.07.466> •  Check for updates

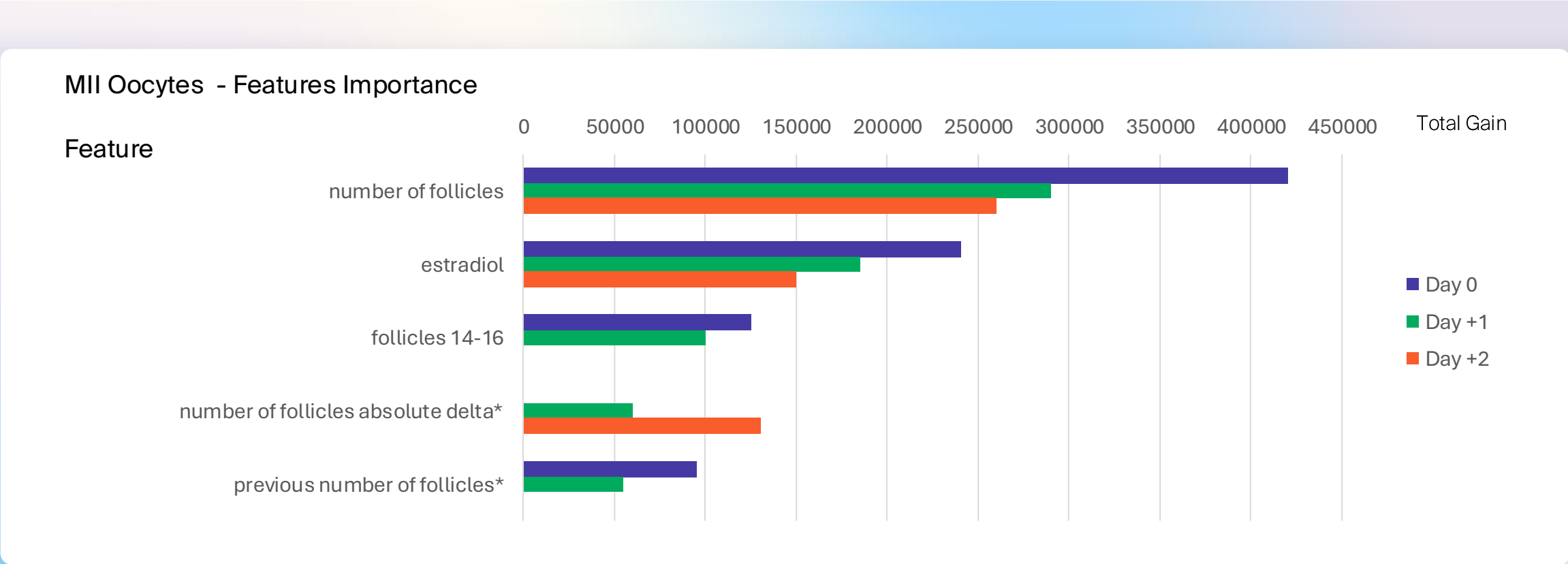
An artificial intelligence-based approach for selecting the optimal day for triggering in antagonist protocol cycles

Shachar Reuveny [†] • Michal Youngster  [†]  • Almog Luz • ... Ettie Maman • Micha Baum [†] •

Ariel Hourvitz [†] • [Show all authors](#) • [Show footnotes](#)

Published: September 27, 2023 • DOI: <https://doi.org/10.1016/j.rbmo.2023.103423> •  Check for updates

Feature Importance for MII Oocytes prediction



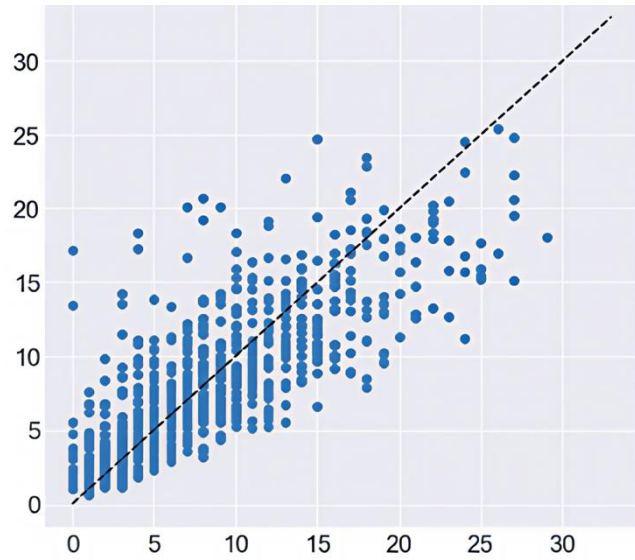
Materials and Methods. Data.



Results

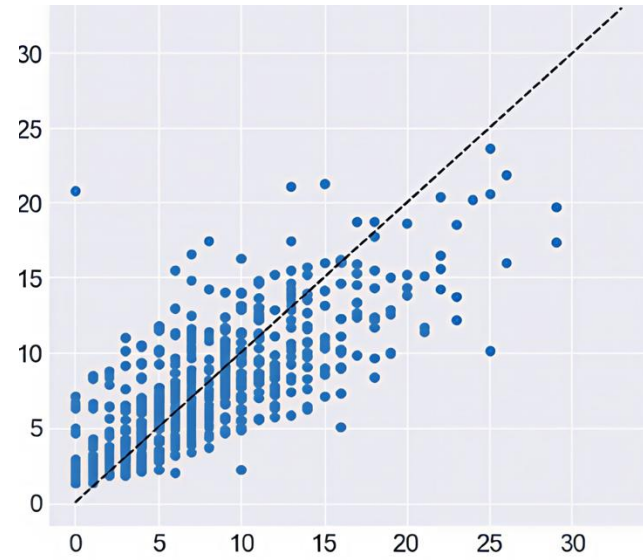
Prediction vs actual graphs of the number of MII oocytes.

DAY 0



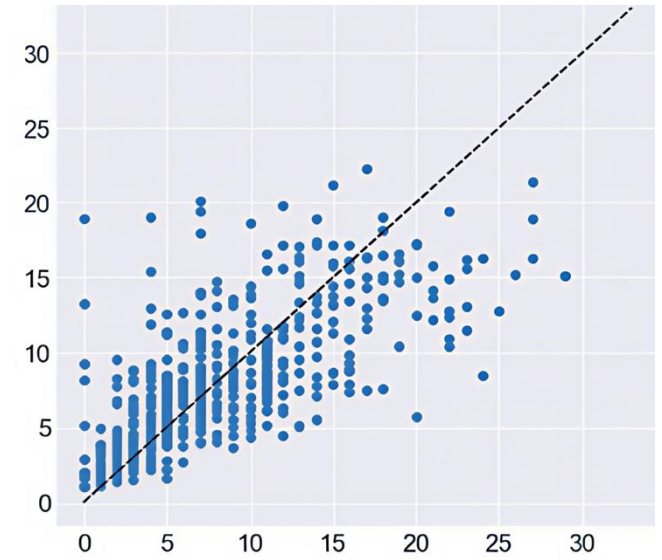
R2: 0.69
MAE: 2.26

DAY +1



R2: 0.62
MAE: 2.58

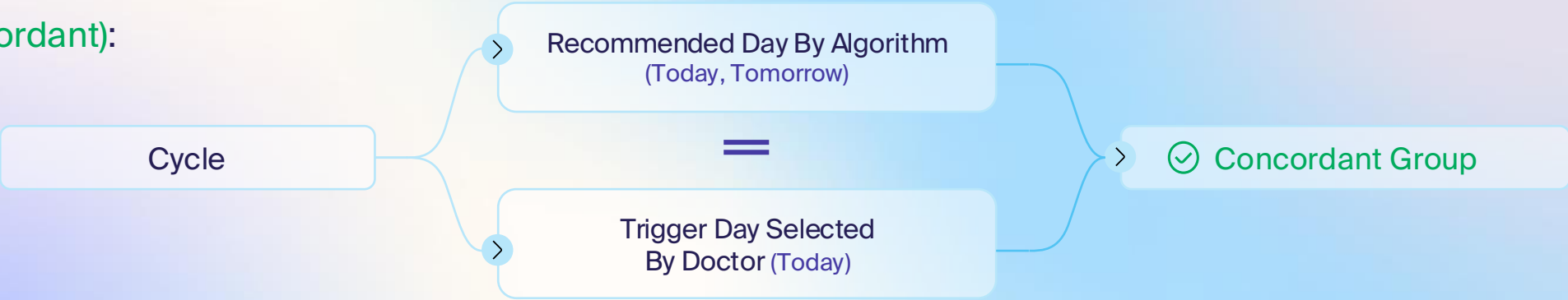
DAY +2



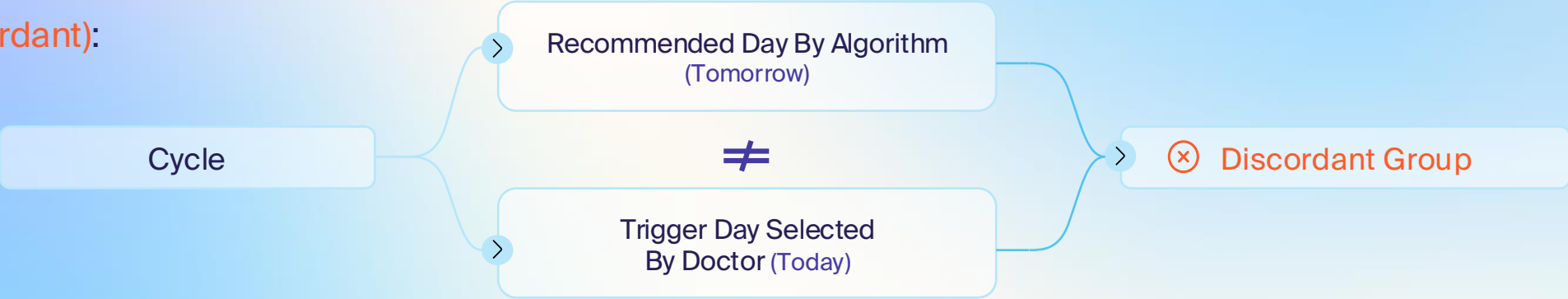
R2: 0.56
MAE: 2.62

Materials and Methods

Example One (Concordant):



Example Two (Discordant):



Results.

Parameter	Concordant	Discordant	P value
Sample size [n]	421 (25%)	1254 (75%)	
Total number of oocytes	12.3±7.7	8.7±7.0	<0.001
Number of 2PNs	6.8±5.3	4.7±4.0	<0.001
Number of usable embryo	3.5±2.5	2.6±2.1	<0.001

* Across all Age Groups

Trigger timing: data on file submitted for publication

Updated Algorithm



3 IVF Networks

Europe (EU) (24.3% of cycles), the United States (US) (32.3%), and Asia (43.4%), by more than 180 clinicians in 11 clinics.



All ovarian stimulation protocol cycles

antagonist, long agonist, flare-up, progesterone primed ovarian stimulation (PPOS), modified natural (MNC).



Trigger timing: data on file

Updated Algorithm

	Concordant	Discordant	Difference [absolute, percentage]	p-value
Sample size [n] ([%])	2,584 (48.2%)	2,773 (51.8%)		
Total number of oocytes	12.5±8.1	9.2±6.1	3.3, 36%	<0.001
Number of MII oocytes	9.4±6.5	6.7±4.7	2.7, 40%	<0.001
Number of usable embryos	3.4±3.2	2.5±2.2	0.9, 36%	<0.001

Results

Fertilize All Comparison – Regional View

	EU		Asia		US	
Parameter	Concordant	Discordant	Concordant	Discordant	Concordant	Discordant
Sample size [n]	764 (58%)	549 (42%)	622 (33%)	1262 (67%)	1198 (55%)	962 (45%)
Age	38.2±3.9	38.2±4.2	37.8±5.7	37.6±5.5	37.0±4.2	37.0±4.3
Total Number of Oocytes	11.2±6.8	8.6±5.5	7.8±6.3	5.9±4.6	10.8±7.0	7.8±5.0
Number of MII oocytes	8.6±5.3	6.4±4.2	7.8±6.3	5.9±4.6	10.8±7.0	7.8±5.0
Number of usable embryo	3.0±2.6	2.2±2.2	2.8±2.3	2.4±2.0	4.0±3.8	2.7±2.6

* Across all Age Groups

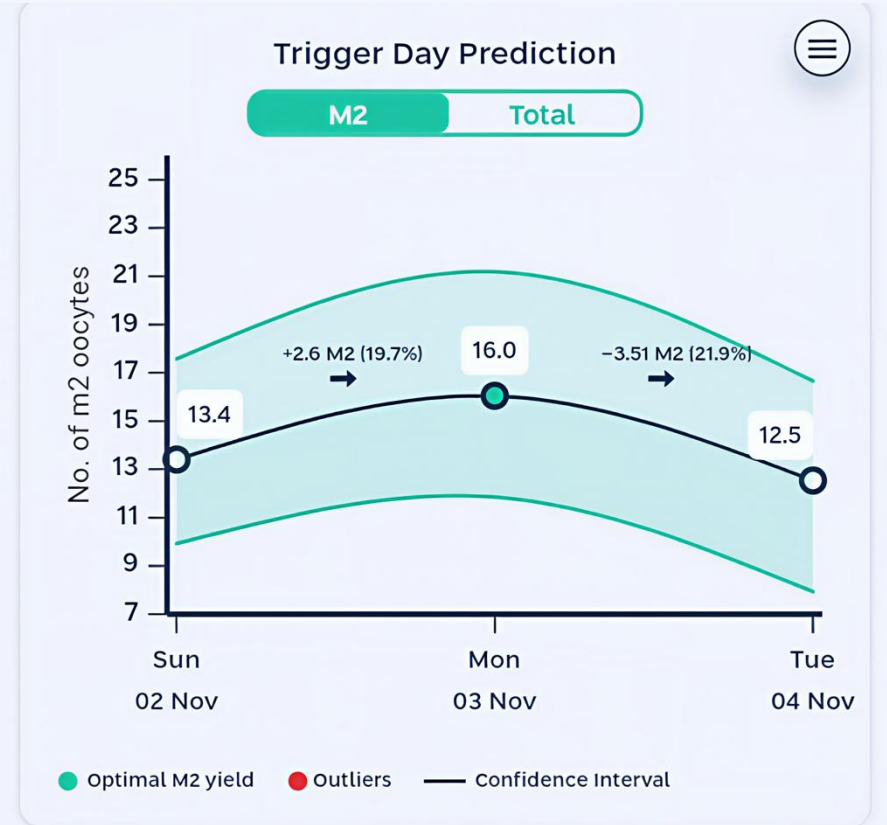
Trigger timing: data on file

53,753 cycles

1 optimal trigger day 52%

2 optimal trigger days 34%

3 optimal trigger days 14%



	Before Balancing	After Balancing
STD (Daily Retrievals)	6.44	3.44

ABSTRACT ONLY · Volume 124, Issue 6, Supplement , E50-E51, December 2025

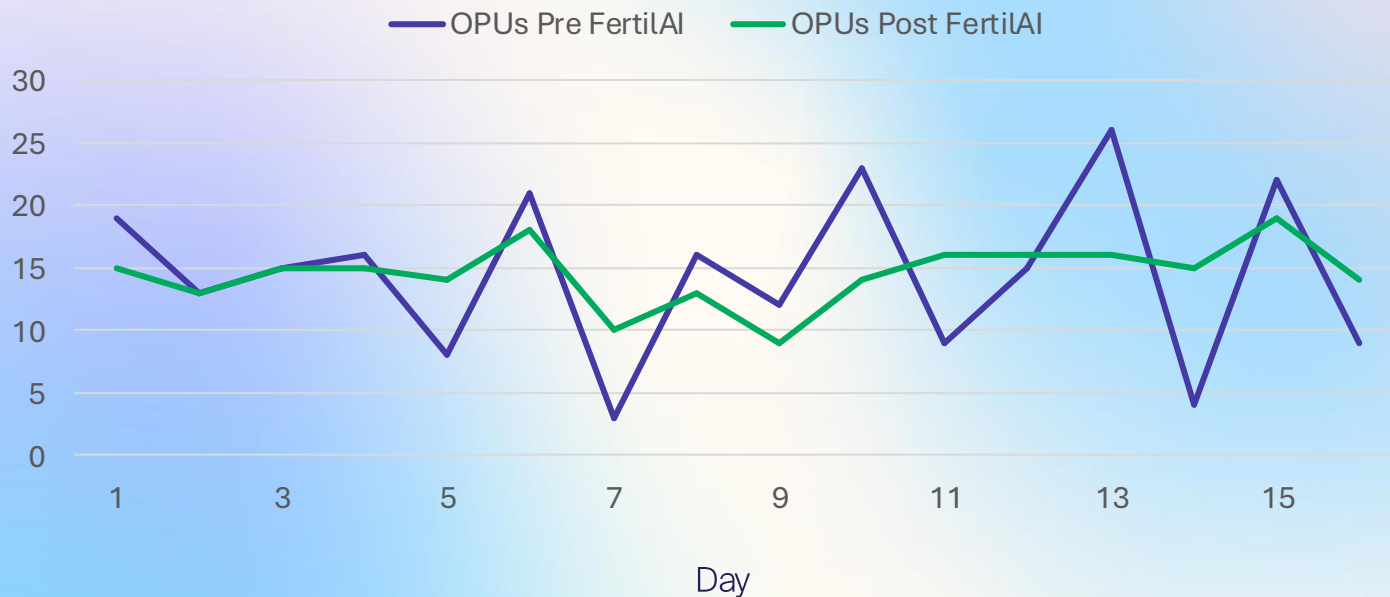
A COMPREHENSIVE CLINICAL AND LABORATORY RETRIEVAL WORKLOAD OPTIMIZATION USING AI BASED ALGORITHMS FOR BOTH NUMBER OF RETRIEVALS AND OOCYTE YIELD

[Michal Youngster, MD¹](#) · [Shachar Reuveny, M.SC²](#) · [Nevo Itzhak, PHD³](#) · ... · [Ettie Maman, M.D.⁶](#) · [Alyssa Hochberg, MD, MPH⁷](#) · [Ariel Hourvitz, M.D.¹](#) ... [Show more](#)

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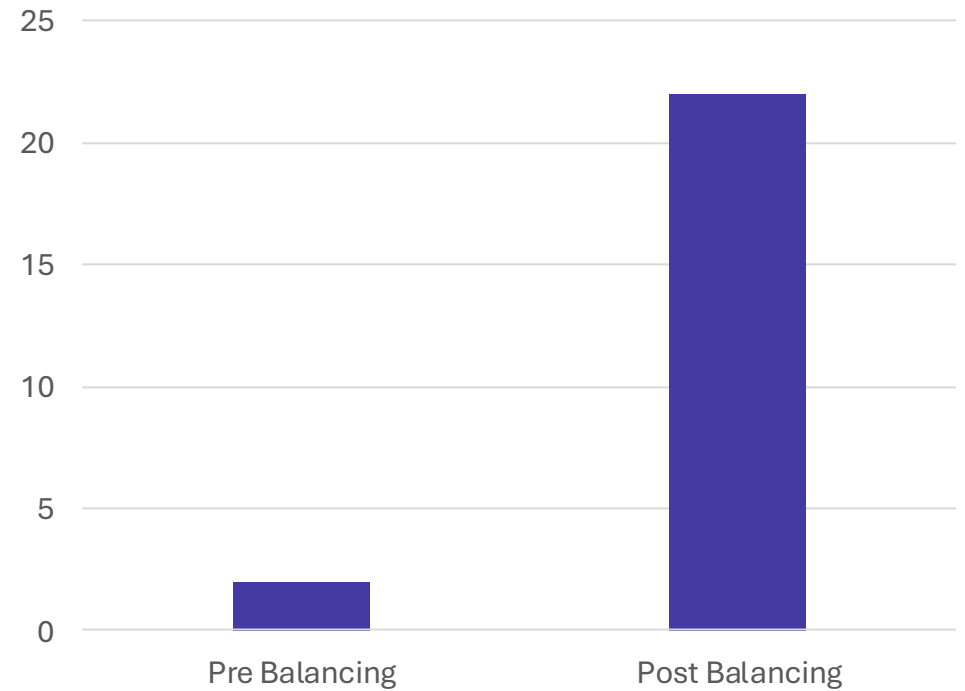


OPUs Pre FertilAI and OPUs Post FertilAI



Weekends with no OPUs

	# Of days with 0 retrievals	
Strategy	Saturday	Sunday
Pre Balancing	1	1
Post Balancing (% change)	8	14



NC / mNC Frozen Embryo Transfer

Endometrial preparation variance....

RESEARCH ARTICLE | Originally Published 26 September 2022 |  

 Check for updates

Risk of Hypertensive Disorders in Pregnancy After Fresh and Frozen Embryo Transfer in Assisted Reproduction: A Population-Based Cohort Study With Within-Sibship Analysis

Sindre H. Petersen  , Kjersti Westvik-Johari, Anne Lærke Spangmose , Anja Pinborg, Liv Bente Romundstad, Christina Bergh , Bjørn Olav Åsvold , Mika Gissler , Aila Tiitinen, Ulla-Britt Wennerholm , and Signe Opdahl  | [AUTHOR INFO & AFFILIATIONS](#)

ORIGINAL RESEARCH | GYNECOLOGY · Volume 221, Issue 2, P126.E1-126.E18, August 2019

 Download Full Issue

Neonatal and maternal outcome after frozen embryo transfer: Increased risks in programmed cycles

Erica Ginström Ernstad, MD   · Ulla-Britt Wennerholm, MD, PhD ^a · Ali Khatibi, MD, PhD ^b · Max Petzold, PhD ^c · Christina Bergh, MD, PhD ^d

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09:30 - 10:30

Debate: Natural cycle is the best protocol for FER/FET

09:30 - 09:45

Pro
Nikolaos P. Polyzos, Spain

09:45 - 10:00

Con
Eve Feinberg, U.S.A.

10:00 - 10:05

Rebuttal
Nikolaos P. Polyzos, Spain

10:05 - 10:10

Rebuttal
Eve Feinberg, U.S.A.

10:10 - 10:30

Discussion



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Train, validation, test

Database

A dataset containing 500 NC-FET cycles from September 2018 to June 2021 In a large private hospital with documented hormonal levels (Estrogen, Progesterone, and LH) and ultrasounds recording follicle sizes.

Test Dataset

Ovulation determined by three independent fertility experts

101 cycles with documented ovulation (LH surge ≥ 17 and disappearance of a leading follicle on two consecutive days of blood and ultrasound tests)

Method

An NGBoost machine learning model based on the available visit's data - developed to predict the day of ovulation.

Sarah Brook
 sarah.test@fertilai.com
 Age: 32
 Phone: 1-555-123-4567



FET: 03 Nov 23 -

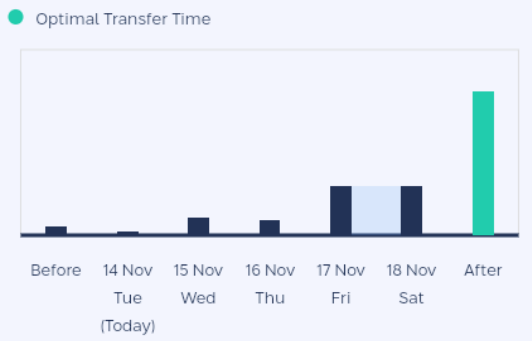


Cycle Day	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Date	10 Nov Fri	11 Nov Sat	12 Nov Sun	13 Nov Mon	14 Nov Tue	15 Nov Wed	16 Nov Thu	17 Nov Fri	18 Nov Sat	19 Nov Sun	20 Nov Mon	21 Nov Tue	22 Nov Wed	23 Nov Thu	24 Nov Fri
Instructions	B	+	+	+	B	+	+	+	+	+	+	+	+	+	+
Files															
E2	300.0 pmol/L														
P4	1.3 nmol/L														
LH	7.4 IU/L														
FSH															
HCG															
AMH															
Endometrial Thickness															
Endometrial Type															
Follicle Size															

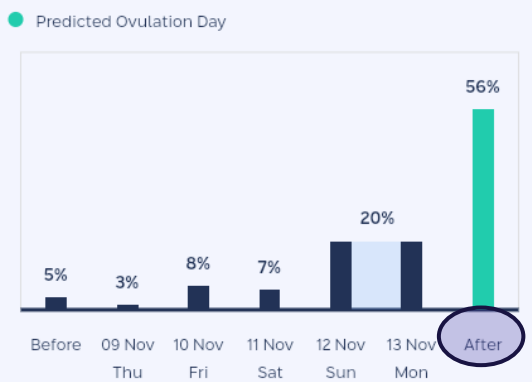
Prediction Day: Today

Optimal Transfer Days

Embryo Age 2 3 4 5



Ovulation Day Probabilities



Sarah Brook

sarah.test@fertilai.com

Age: 32

Phone: 1-555-123-4567



FET: 03 Nov 23 -



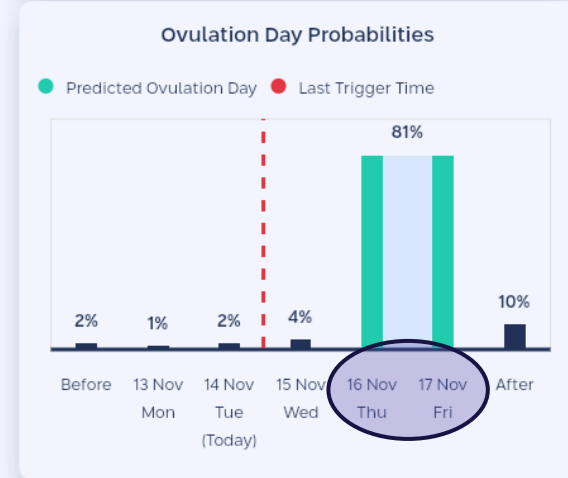
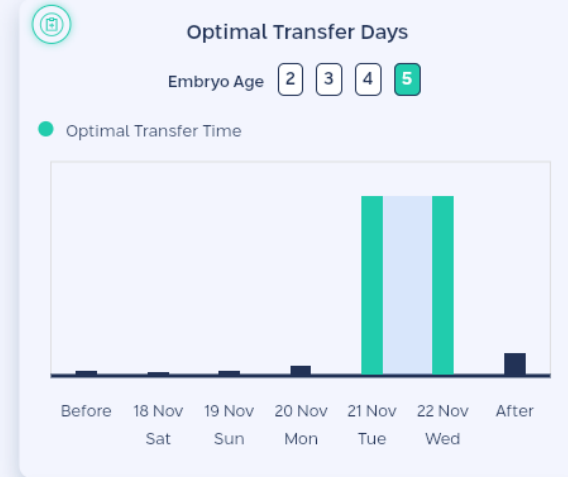
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Date	10 Nov Fri	11 Nov Sat	12 Nov Sun	13 Nov Mon	14 Nov Tue	15 Nov Wed	16 Nov Thu	17 Nov Fri	18 Nov Sat	19 Nov Sun	20 Nov Mon	21 Nov Tue	22 Nov Wed	23 Nov Thu	24 Nov Fri
Instructions	B	+	+	+	B	+	B	+	+	+	+	+	+	+	+
Files															
E2	300.0 pmol/L				862.0 pmol/L										
P4	1.3 nmol/L				1.4 nmol/L										
LH	7.4 IU/L				9.2 IU/L										
FSH															
HCG															
AMH															
Endometrial Thickness															
Endometrial Type															
Follicle Size															



Transfer Pregnancy

Procedure Notes ↑

Prediction Day: Today



Sarah Brook

sarah.test@fertilai.com

Age: 32

Phone: 1-555-123-4567



FET: 03 Nov 23 -



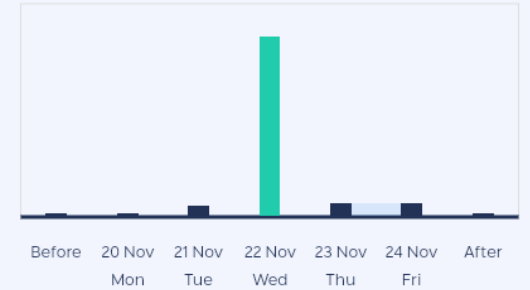
Prediction Day: Today



Optimal Transfer Days

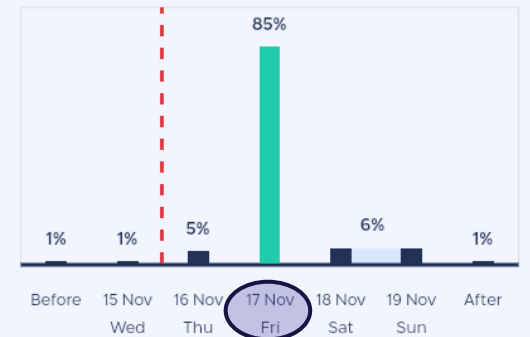
Embryo Age 2 3 4 5

Optimal Transfer Time



Ovulation Day Probabilities

Predicted Ovulation Day Last Trigger Time



Cycle Day	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Date	10 Nov Fri	11 Nov Sat	12 Nov Sun	13 Nov Mon	14 Nov Tue	15 Nov Wed	16 Nov Thu	17 Nov Fri	18 Nov Sat	19 Nov Sun	20 Nov Mon	21 Nov Tue	22 Nov Wed	23 Nov Thu	24 Nov Fri
Instructions	B	+	+	+	B	+	B	O	+	+	+	+	FET	+	+
E2	300.0 pmol/L				862.0 pmol/L		1057.0 pmol/L								
P4	1.3 nmol/L				1.4 nmol/L		3.1 nmol/L								
LH	7.4 IU/L				9.2 IU/L		47.0 IU/L								
FSH															
HCG															
AMH															
Endometrial Thickness															
Endometrial Type															
Follicle Size															

Transfer Pregnancy

Procedure Notes ↑

Retrospective analysis, 4,032 patients where monitoring data was taken an appointments remodeled through AI model.

Objective

Transfer on the correct day according to the patients ovulation timing (natural or modified)

Eliminate cycles cancelled due to transfer on a closed working day (Sunday) or missed ovulation

Minimise increases workload on low staff days e.g. Saturday

Smooth transfer rate/day on working days

When hCG trigger is required keep it as close to the day of predicted ovulation

Minimise monitoring appointments

Result

93% of patients could be accommodated through an entire natural cycle (54%) or triggered (40%)

6% of patients either had a transfer land on a Sunday (2%) or ovulated prematurely that the software would have missed (4%)

Saturday workload was in line with Monday-Thursday, although Fridays became busier.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
7%	13%	14%	16%	32%	16%	2%

Average monitoring 2.4 per cycle

Summary- what is essential to implement?



AI is a tool that can be used by physicians

To help standardize treatment and possibly improve outcomes

AI can help with scheduling constrains

Built with trusted partnerships

Curated and diverse dataset with over 100K patients from leading global partners



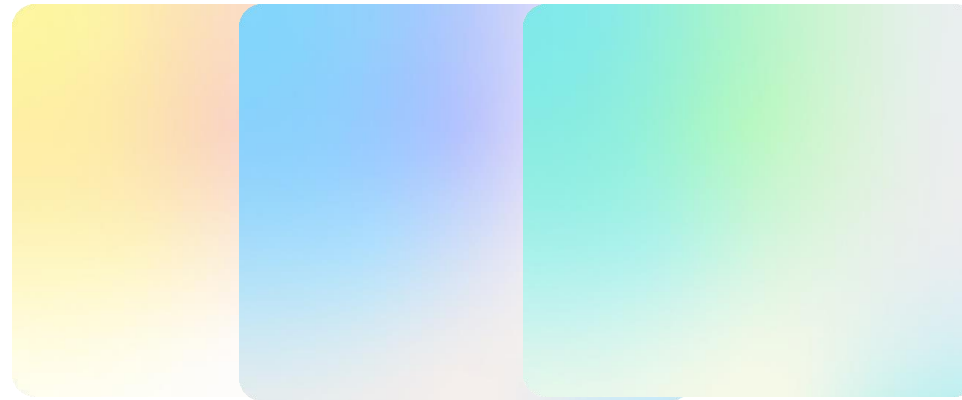
Fonts

Heading and Subheadings

Suisse Intl

Body Text – Suisse Intl

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RGB 69, 58, 163
HSL 246°, 48%, 43%
HSL(0-255) 174, 121, 110
Hex #453AA3

RGB 0, 171, 93
HSL 153°, 100%, 34%
HSL(0-255) 108, 255, 86
Hex #00AB5D

RGB 249, 93, 44
HSL 14°, 94%, 57%
HSL(0-255) 10, 241, 146
Hex #F95D2C

RGB 37, 30, 84
HSL 248°, 47%, 22%
HSL(0-255) 176, 121, 57
Hex #251E54

RGB 183, 230, 250
HSL 198°, 87%, 85%
HSL(0-255) 140, 222, 217
Hex #B7E6FA

RGB 212, 252, 192
HSL 100°, 91%, 87%
HSL(0-255) 71, 232, 222
Hex #D4FCC0

RGB 249, 249, 250
HSL 240°, 9%, 98%
HSL(0-255) 170, 23, 250
Hex #F9F9FA

RGB 249, 213, 189
HSL 24°, 83%, 86%
HSL(0-255) 17, 212, 219
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