

Improved Clinical Pregnancy Rates in Natural Frozen-Thawed Embryo Transfer Cycles with Machine Learning Ovulation Prediction: Insights from a Retrospective Cohort Study

Supplement section

Supplement Material and methods

Supplemental Table 1.: Demographic and cycle characteristics data of all cycles

Patient age (at oocyte retrieval) / Mean $\pm$ SD (25-75 Percentiles)	34.9 $\pm$ 5.4 (31-40)
Patient age (at transfer) / Mean $\pm$ SD (25-75 Percentiles)	35.4 $\pm$ 5.4 (32-40)
BMI / Mean $\pm$ SD (25-75 Percentiles)	23.8 $\pm$ 6.6 (20.2-26.0)
Previous retrievals (No.)/ Mean $\pm$ SD (25-75 Percentiles)	1.6 $\pm$ 1.5 (1-2)
No. of blood tests Mean $\pm$ SD (range) (25-75 Percentiles)	3.7 $\pm$ 1.3 (3-5)
No. of US tests Mean $\pm$ SD (25-75 Percentiles)	3.6 $\pm$ 1.3 (3-5)
Endometrial thickness mm/ Mean $\pm$ SD (25-75 Percentiles)	9.6 $\pm$ 1.8 (8.3-10.8)

Supplemental selected features:

The selected 20 features that were used for our model.

- Baseline characteristics:

- o Patient weight

· Ultrasound-related features:

- o Number of large (>10 mm) follicles on the instance's 2nd test day
- o Number of large (>10 mm) follicles on the instance's 1st test day
- o Size of the primary follicle on the instance's 2nd test day
- o Size of the primary follicle on the instance's 1st test day
- o Whether the size of the primary follicle has been changed (True or False)
- o The endometrial thickness on instance's 1st day
- o The endometrial thickness on instance's 2nd day
- o The endometrial thickness value difference between instance's 1st and 2nd days

· Blood-related features:

- o Progesterone value on the instance's 2nd test day
- o LH value on the instance's 2nd test day
- o Estrogen value on the instance's 2nd test day
- o Estrogen value on the instance's 1st test day
- o Avg. Estrogen difference per day between instance's 1st and 2nd test days
- o Avg. LH difference per day between instance's 1st and 2nd test days
- o Progesterone at instance's 2nd to 1st test day ratio
- o Estrogen at instance's 2nd to 1st test day ratio
- o Estrogen change between instance's 1st and 2nd test days
- o Estrogen to Progesterone ratio on instance's 1st test day

· Instances-related features:

- o Distance between the instance's test days

Supplemental Table 2. An example of NC-FET

Status			T							T		T	O	T	
Day	1	2	3	4	5	6	7	8	9	10		12	13	14	15

Possible combinations of days to generate the instances

#Instance	1 st Test Day	2 nd Test Day	Ovulation Class
1	-	3	≤ -2
2	-	10	≤ -2
3	10	12	-1
4	10	14	1
5	-	12	-1
6	12	14	1
7	-	14	1

Table 2 Supplement: An example of NC-FET over the cycle days and that status at each day, where *T* with a blue-colored background represents a test day and *O* with a purple-colored background represents the ovulation day. The seven possible combinations to create the instances for the presented NC-FET are presented.

Supplement results

Supplemental Table 3: Odds ratios for clinical pregnancy rates based on Mismatch type in a multivariate logistic regression analysis.

<i>Parameter</i>	<i>Odds Ratio</i>	<i>Confidence interval 95%</i>	<i>P value</i>
Patient BMI	0.99	0.95 - 1.04	0.87
Endometrial thickness	1.02	0.91 - 1.14	0.66
Embryo quality*	1.06	.0.72 - 1.57	0.76
No. of previous retrievals	1.02	0.90 - 1.15	0.74
Patient age at oocyte retrieval	0.95	0.91 - 0.98	0.06
Physician decision - Matched			0.04
Physician decision - Early Mismatched to model**	0.76	.0.50 - 1.16	0.20
Physician decision - Late Mismatched to model***	0.39	0.18 - 0.84	0.02

* Odds ratio for transfer of embryos grade A quality vs. grade B embryos

** Compared to clinical pregnancy rate in the Matched group

*** Compared to clinical pregnancy rate in the Matched group

62 Supplemental Table 4. Blastocyte classification

	Class A - Good	Class B - Fair	Class C - Poor
Day 5	3-6AA, 3-6AB, 3-6BA	2AA, 2AB, 2BA, 2BB 3BB, 4BB. 5BB	2-5BC, 2-5CB, 2-5CC
Day 6	3-6AA, 3-6AB, 3-6BA	2AA, 2AB, 2BA, 2BB 3AB, 3BA, 3BB 4BB. 5BB, 6BB	2-6BC, 2-6CB, 2-6CC

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