

THE OPTIMAL NUMBER OF MATURE OOCYTES NEEDED TO OBTAIN THREE EUPLOID BLASTOCYSTS FOR HIGH LIKELIHOOD OF A LIVE BIRTH



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BACKGROUND

- More patients are thawing their cryopreserved oocytes, but recommendations are limited on **how many oocytes are needed**.
- Validated calculators have been published to counsel on the minimum number of mature oocytes (MII) needed for one euploid embryo for transfer (1).
- However, recent literature demonstrated there is a **>90% chance of live birth if patients have at least three euploid embryos** (2).
- There are currently no studies demonstrating **how many vitrified MIIs are required to achieve at least three euploid blastocysts to get patients the best chance of live birth**.

HYPOTHESIS

As age at time of oocyte cryopreservation increases, the number of mature oocytes required to obtain 3 or more euploid blastocysts available for transfer (i.e. a high likelihood of a live birth) decreases.

MATERIALS & METHODS

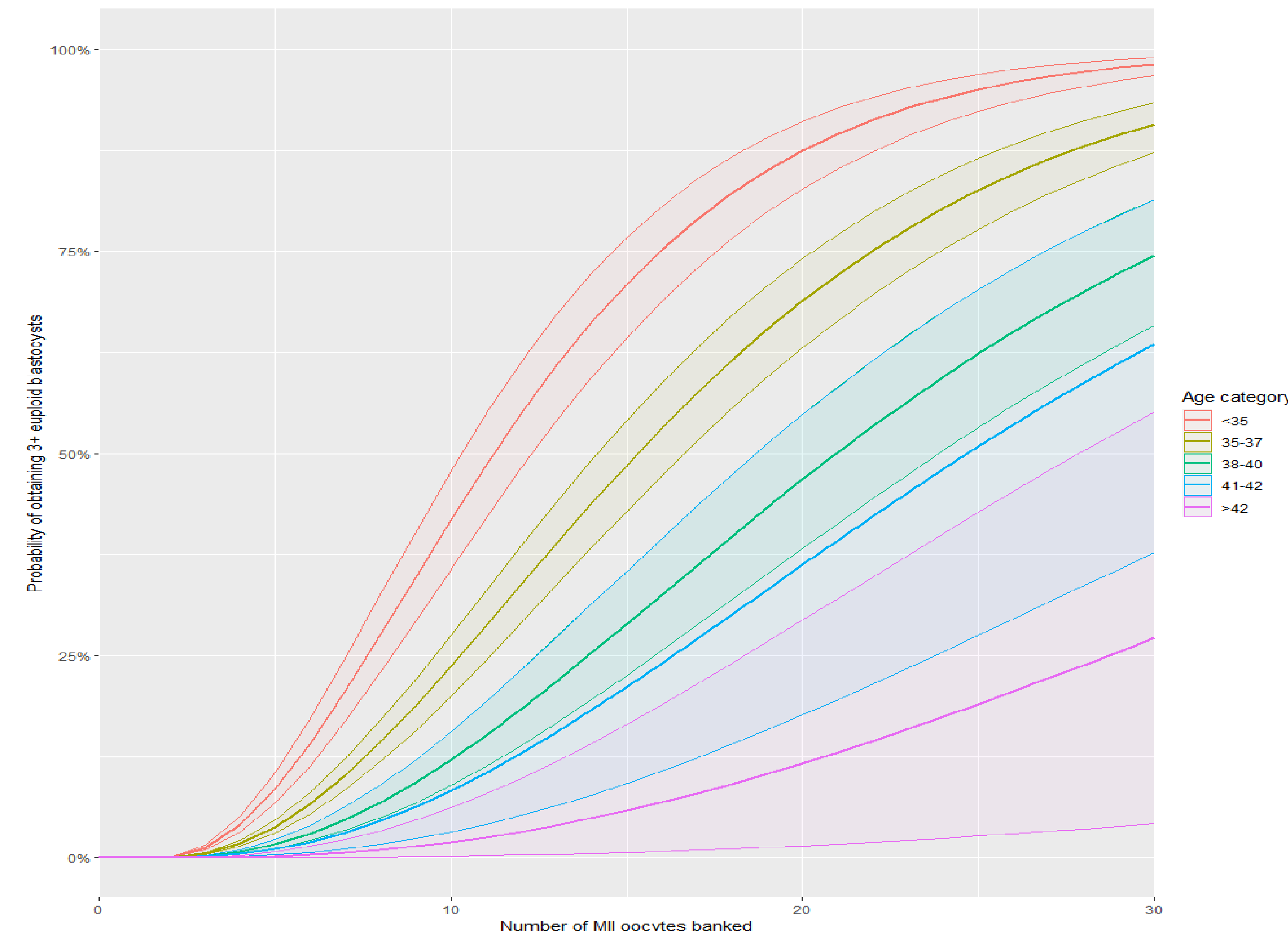
- This was a retrospective cohort study at a multi-center ART practice from 2011 to 2023
- **Inclusion criteria:** patients who underwent oocyte cryopreservation that thawed
- **Exclusion criteria:** donor oocyte cycles, cancelled cycles, and patients who did not warm their oocytes
- **Primary outcome:** number of mature oocytes (MII) cryopreserved in patients with at least 3 euploid embryos
- **Secondary outcomes:** total number of euploid embryos and live birth outcomes

Table 1: Demographics by age at time of vitrification

	<35	35-37	38-40	41-42	43+
N, thaw cycles	310	334	283	77	37
Age at vitrification (years) Mean ± SD	31.3 ± 2.5	36 ± 0.8	38.9 ± 0.7	41.4 ± 0.5	43.7 ± 1.3
Age at thaw (years) Mean ± SD	33.9 ± 4	39.6 ± 2.6	41.9 ± 2.4	43.5 ± 2.1	44.8 ± 2.1
BMI (kg/m ²) Mean (SD)	25.5 ± 5.4	25.3 ± 4.7	25.9 ± 4.7	26.9 ± 5.3	26.7 ± 6.7
AMH at vitrification (ng/mL) Median (IQR)	2.9 (1.4, 5.3)	1.6 (0.8, 3.3)	1.7 (1.0, 3.2)	0.9 (0.6, 1.7)	0.9 (0.5, 2.1)
Number of MII oocytes banked Median (IQR)	13 (6, 19)	14 (8, 21)	13 (6, 21)	10 (5, 22)	4 (2, 14)
%2PN embryos Mean ± SD	72% ± 23.1	71% ± 19.4	71% ± 20.9	68.8% ± 22.4	74.4% ± 22.8
Used PGT N (%)	103 (33.2%)	183 (54.8%)	153 (54.1%)	36 (46.8%)	13 (35.1%)
%euploid embryos Mean ± SD	62.2% ± 27.1	54.8% ± 31.4	42.4% ± 30.1	30.3% ± 30.5	35.0% ± 34.6

Figure 1:

Probability of 3+ euploid blastocysts based on MII oocytes, stratified by age



RESULTS

- Patients were stratified by age at time of cryopreservation, with over 1,000 total cycles. Measures of ovarian reserve were appropriate for age (Table 1).
- We evaluated the minimum number of MIIs needed to achieve 3 or more euploid blastocysts based on our data (Figure 1).
- For a 70% chance of obtaining at least three euploid blastocysts to theoretically have a >90% chance of live birth, patients need to bank:
 - **15-20 MIIs** if less than age 35 at time of cryopreservation
 - **20-25 MIIs** if aged 35-37
 - **30-35 MIIs** if aged 38-40
 - **35-40 MIIs** if aged 41-42
 - **More than 50 MIIs** if aged 43 or older

CONCLUSIONS

This study gives real world expectations on **the optimal, minimum number of MIIs required** to obtain three euploid blastocysts, stratified by age.

From our analysis, **15 MIIs are needed if patients are less than 35 at time of cryopreservation or 20-35 MIIs if aged 35-40 for a 70-80% chance to bank three euploid blastocysts for >90% chance of live birth.**

REFERENCES

1. Esteves SC, Carvalho JF, Bento FC, Santos J. A Novel Predictive Model to Estimate the Number of Mature Oocytes Required for Obtaining at Least One Euploid Blastocyst for Transfer in Couples Undergoing in vitro Fertilization/Intracytoplasmic Sperm Injection: The ART Calculator. *Front Endocrinol (Lausanne)* 2019; 10: 99.
2. Pirtea P, De Ziegler D, Tao X, Sun L, Zhan Y, Ayoubi JM, Seli E, Franasiak JM, Scott RT, Jr. Rate of true recurrent implantation failure is low: results of three successive frozen euploid single embryo transfers. *Fertility and Sterility* 2021; 115: 45-53.