

# COMPARISON OF OUTCOMES OF VITRIFIED METAPHASE II VERSUS IN VITRO MATURED OOCYTES IN A SELF-MATCHED POPULATION

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## BACKGROUND

Rescue in vitro maturation (rIVM) allows for the potential utilization of immature oocytes that would otherwise be discarded. However, outcomes of vitrified rIVM oocytes compared to metaphase II (MII) oocytes remain unclear.

## OBJECTIVE

Evaluate outcomes between oocytes mature at the time of oocyte retrieval, *in vivo* matured (IVO), and those reaching maturity after rescue *in vitro* maturation (rIVM) in oocyte cryopreservation patients.

## METHODS

**Subjects**  
Patients undergoing oocyte cryopreservation at a single university-affiliated academic medical center in which IVO and rIVM oocytes were cryopreserved and later thawed from the same ovarian stimulation cycle.

**Exposure**  
Cryopreservation and subsequent thaw, insemination, and embryo development in oocytes matured *in vivo* or matured following rescue *in vitro* maturation from September 2012 – October 2022.

**Outcome Measures**  
Proportion of good quality day 3 embryos (defined as ≥6 cells) between sibling oocytes. Additional outcomes included oocyte survival, fertilization, and overall embryo development.

**Sample size**  
40 patients met inclusion criteria.

Indication	n (%)
Planned	19 (47.5%)
Cancer diagnosis	14 (35%)
Male factor	7 (17.5%)

## RESULTS

**Table 1: Patient Demographics.** Data expressed as median (interquartile range) or n (%).

Characteristic	n = 40 patients
Age at retrieval (years)	36 (32 – 40)
BMI (mg/kg <sup>2</sup> )	22.8 (20.9 – 26.6)
Gravidity	
0	26 (65%)
≥1	14 (35%)
Parity	
0	36 (90%)
≥1	4 (10%)
Ethnicity	
White (non-Hispanic)	22 (55%)
Asian	6 (15%)
Other	6 (15%)
Declined	5 (13%)
Black (non-Hispanic)	1 (2.5%)

**Table 2: Ovarian Stimulation and Rescue In Vitro Maturation Outcomes**

Outcome	Overall Population (n or %)	Per patient Median (IQR)
Total oocytes retrieved	558	10 (5.5 – 19)
IVO oocytes retrieved	333	4 (2.5 – 10)
Maturity at Retrieval	59.7%	50.0% (42.0 – 70.0)
rIVM attempted (oocytes)	190	4 (2 – 6.5)
rIVM success	46.8%	53.6% (33.3 – 100)
rIVM oocytes cryopreserved (oocytes)	89	2 (1 – 3)

**Table 3: Sibling Oocyte Thaw, Fertilization, and Embryo Development**

Outcome	IVO (n=35 cycles, 329 total oocytes)	rIVM (n=35 cycles, 89 total oocytes)	p-value
Thawed Oocytes	4.0 (2.5 – 10.0)	2.0 (1.0 – 3.0)	<0.001
Thaw Survival (%)	100% (82 – 100)	100% (58 – 100)	0.057
2pn Embryos per Thawed Oocyte	73% (50 – 88)	67% (33 – 100)	0.33
2pn Embryos per Inseminated Oocyte	76% (62 – 100)	86% (42 – 100)	0.29
Day 3 Embryos per Thawed Oocyte	71% (50 – 81)	50% (0 – 100)	0.29
Day 3 Embryos per Inseminated Oocyte	75% (59 – 90)	67% (29 – 100)	0.30
Day 3 Embryos per 2pn Embryo	100% (100 – 100)	100% (100 – 100)	0.73
Good Quality Day 3 Embryos per Thawed Oocyte	37% (18 – 55)	0% (0 – 33)	0.03
Good Quality Day 3 Embryos per Inseminated Oocyte	49% (20 – 67)	0% (0 – 50)	0.03
Good Quality Day 3 Embryos per 2pn Embryo	71% (25 – 100)	0% (0 – 100)	0.02

**Table 4: Population Totals**

	IVO	rIVM
Oocytes Thawed	329	89
Oocytes Surviving	298	74
2pn Fertilizations	212	49
Day 3 Embryos	205	45
Good Quality Day 3 Embryos	134	24

## RESULTS

**Table 5: Blastulation Outcomes per Fertilized Oocyte**

Outcome	IVO (n=35 cycles, 168 2pn total)	rIVM (n=35 cycles, 38 2pn total)	p-value
Proportion Reaching Blastocyst	54% (29 – 83)	10% (0 – 94)	0.07
Proportion Reaching Good Quality Blastocysts	12% (0 – 30)	0% (0 – 31)	0.58
Euploid Overall	33 / 81 (41%)	9 / 12 (75%)	0.03
Sibling Oocytes (n = 6 patients)	20% (0 – 54)	88% (50 – 100)	0.06

## CONCLUSIONS

- Sibling IVO and rIVM oocytes display similar thaw survival, fertilization, and cleavage rates.
- Sibling rIVM derived embryos exhibited significantly poorer day 3 embryo quality relative to IVO derived embryos.
- While embryos from rIVM oocytes can contribute to the pool of available embryos in oocyte cryopreservation patients, further studies are needed to better assess the full reproductive potential of rIVM oocytes.

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