

IMPACT OF CALCIUM IONOPHORE-ASSISTED OOCYTE ACTIVATION ON IVF-TESE CYCLE OUTCOMES

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Introduction

- In cases of fertilization failure following ICSI, artificial oocyte activation (AOA) using calcium ionophore has been introduced to stimulate egg activation and improve pregnancy outcomes.
- Fertilization failure is primarily due to oocyte activation failure (related to either oocyte or sperm factors)
- Oocyte activation in uncomplicated fertilization is triggered by sperm-borne phospholipase C ζ , which leads to a series of intracellular calcium oscillations (1)
- Calcium ionophores mediate calcium transport and influx, causing a single large calcium release that allows for oocyte activation

Objectives

To evaluate the impact of calcium ionophore-assisted AOA on pregnancy outcomes, fertilization rates, and blastocyst development in IVF-TESE cycles at one large private fertility practice.

Methods

- A retrospective review of lab data between January 2023 and July 2025 from a private fertility clinic was conducted
- Inclusion criteria were IVF-TESE cycles - with 95% of all TESE using twitching or motile sperm - with and without calcium ionophore
- Standard protocol: oocytes were placed in calcium ionophore solution for 15 minutes then rinsed and placed in the incubator
- Welch's t-test and a chi-square test of independence were applied
- Primary endpoint: pregnancy outcome
- Secondary endpoints: fertilization and blastulation rates

Results

For 107 patients:

	Experimental Group (TESE with Calcium Ionophore)	Control Group (TESE without Calcium Ionophore)
Total Cycles	85	66
Mean Female Age ± SD (years)	35.7 ± 4.6 years	36.6 ± 4.5 years

Table 1: Summary of demographic data for patients who underwent IVF-TESE cycles between January 2023 and July 2025.

Outcome	Experimental Group (TESE with Calcium Ionophore)	Control Group (TESE without Calcium Ionophore)
Mature Oocytes Injected	1,019	759
Normal Fertilization (2pn)	625 (61%)	466 (61%)
Usable Blastocysts	243 (39%)	148 (32%)

Table 2: Fertilization rates and rates of blastocyst development in IVF-TESE cases with and without calcium ionophore.

Outcome	Experimental Group (TESE with Calcium Ionophore)	Control Group (TESE without Calcium Ionophore)
Fresh Transfers	13	16
Total Pregnancies*	9 (69%)	6 (38%)
Biochemical Pregnancies	1	1
Spontaneous Abortions	2	2
Clinical Pregnancies	6	3
# Livebirths**	6	3

*Pregnancy as defined by HCG > 5 mIU/mL.

**All deliveries occurred at or after 34w0d gestation. There were no birth defects noted.

Table 3: Pregnancy outcomes in IVF-cases with and without calcium ionophore.

Outcome	RR (95% CI)	p-value
Fertilization Rate	1.00 (0.93–1.08)	1.00
Usable Blastocysts	1.22 (1.04–1.45)	0.018
Pregnancy Rate	1.85 (0.89–3.83)	0.185

Table 4: Relative risk and statistical comparison of key clinical outcomes

Conclusion

- The use of calcium ionophore for artificial oocyte activation in IVF-TESE resulted in a greater number of usable blastocysts
- The use of calcium ionophore for artificial oocyte activation in IVF-TESE also resulted in improved pregnancy outcomes
- Fertilization rates were similar for both groups of TESE cases with and without calcium ionophore.
- Future studies will analyze the indication for TESE in these cases.
- Further studies with larger sample sizes are required to better understand the clinical significance of calcium ionophore on IVF-TESE cycles. Follow-up studies to assess live birth and neonatal outcomes recommended

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