ASSESSING THE IMPACT OF SPERM PREPARATION METHOD ON CONVENTIONAL INSEMINATION VERSUS INTRACYTOPLASMIC SPERM INJECTIONAL OUTCOMES IN SPIT IN-VITRO FERTILIZATION CYCLES

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BACKGROUND

- Proper semen preparation is a pivotal step for selecting the most motile and morphologically normal sperm to be utilized in in-vitro fertilization (IVF) cycles[1]
- Split IVF cycles in which retrieved oocytes are divided into fertilization by conventional insemination (INSEM) and intracytoplasmic sperm injection (ICSI) may take place when semen sample parameters are borderline or per physician's preference
- **Published data assessing which sperm preparation method may yield superior outcomes in INSEM vs ICSI remain limited**

OBJECTIVE

- **To assess the impact of sperm preparation method on INSEM and ICSI outcomes during split IVF cycles**

MATERIALS AND METHODS

Study Design

- **Retrospective cohort study** (IRB# 13-00389) **of couples who underwent autologous IVF cycles in which retrieved oocytes were split between INSEM and ICSI** at our academic fertility center from 1/2015 to 6/2025
- Sperm preparation methods included ISOLATE (density gradient centrifugation), SWIM-UP (swim-up technique), and ZYMOT (microfluidic sperm sorting)

Outcomes

- **Primary outcomes include fertilization, blastulation, and euploidy rates stratified by fertilization technique and sperm preparation method**

Statistical Analysis

- The Mann-Whitney U, Kruskal-Wallis, Fisher's exact, and Chi-square tests were performed with a p-value <0.05 considered significant

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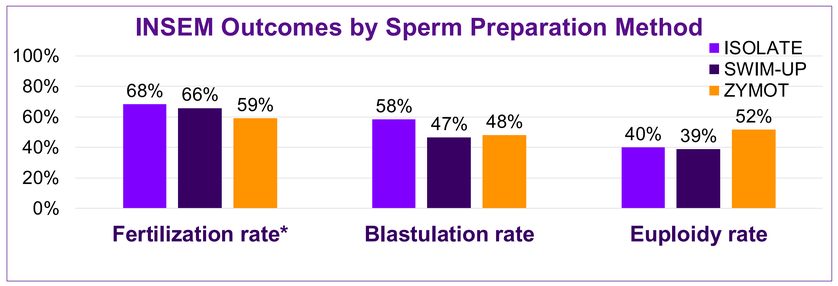
TABLE AND FIGURE

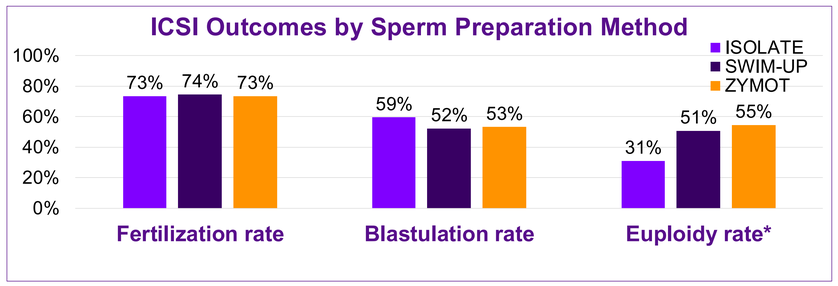
Table 1: IVF characteristics by sperm preparation method

	COMBINED INSEM AND ICSI		
	ISOLATE	**SWIM-UP**	**ZYMOT**
Median paternal age (years)	38 (R: 26-51)	37 (R: 29-57)	35 (R: 26-56)
Median maternal age (years)	36 (R: 25-43)	36 (R: 28-44)	34 (R: 27-45)
Median PP TMC* (million)	6.6 (R: 0.01-113.7)	12.4 (R: 0.5-110.9)	2.4 (R: 0.01-24.0)
INSEM:ICSI oocyte ratio	0.89:1	1:0.98	0.96:1
Median mature oocyte	9 (R: 0-31)	10 (R: 3-24)	11 (R: 2-34)

* = statistically different (p<0.05)

Figure 1: INSEM and ICSI outcomes by sperm preparation method





* = statistically different (p<0.05)

RESULTS

- **186 split IVF cycles were included** with median male age of 37 years (R: 26-57) and median female age of 35 years (R: 25-45)
- **Sperm processing method breakdown** shown below with a median total motile count after sperm processing (PP TMC) of 4.8 million (R: 0.01-113.7)
  - **ISOLATE:** 41.4% (77/186)
  - **SWIM-UP:** 18.8% (35/186)
  - **ZYMOT:** 39.8% (74/186)
- **INSEM vs ICSI outcomes regardless of sperm preparation method:**
  - Median allocated mature oocytes (9 (R: 0-34) INSEM vs 10 (R: 1-31) ICSI) and fertilization rate (64% (95% CI: 60-68) INSEM vs 74% (95% CI: 71-76) ICSI) were higher for ICSI (p<0.01)
  - **Blastulation rate (52% (95% CI: 48-56) INSEM vs 56% (95% CI: 52-60) ICSI) and euploidy rate (44% (95% CI: 39-50) INSEM vs 44% (95% CI 39-50) ICSI) were similar between INSEM vs ICSI (p>0.05)**
  - Complete fertilization failure (6% (11/186) INSEM vs 1% (2/186) ICSI) was higher in INSEM (p=0.01), while complete blastulation failure (10% (18/186) INSEM vs 5% (10/186) ICSI) was similar (p=0.2)
- **Table 1 shows IVF cycle characteristics by sperm preparation method**
- **Figure 1 shows INSEM and ICSI outcomes by sperm preparation method, separately**

CONCLUSIONS

- **Despite an overall higher fertilization rate with ICSI, blastulation and euploidy rates are similar between INSEM vs ICSI.**
- **By sperm preparation method, there was lower fertilization rate with ZYMOT for INSEM and lower euploidy rate with ISOLATE for ICSI; however, blastulation rates were similar.**
- Larger studies are still needed to identify a superior method.

REFERENCE

1. Practice Committees of the American Society for Reproductive Medicine (ASRM) and the Society for Reproductive Biologists and Technologists (SRBT). Comprehensive guidance for human embryology, andrology, and endocrinology laboratories: management and operations: a committee opinion. Fertil Steril. 2022 Jun;117(6):1183-1202.