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**MICROFLUIDIC SEPARATION DEVICE COMPARED AGAINST DENSITY GRADIENT CENTRIFUGATION FOR SPERM SELECTION IN ICSI-PGT-A CYCLES: A RETROSPECTIVE ANALYSIS**

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**Title:**  
MICROFLUIDIC SEPARATION DEVICE COMPARED AGAINST DENSITY GRADIENT CENTRIFUGATION FOR SPERM SELECTION IN ICSI-PGT-A CYCLES: A RETROSPECTIVE ANALYSIS

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**Preferred Presentation Type:**  
Oral or Poster

**Study Type:**  
Retrospective Cohort Study (includes comparator groups)

**Category - Subcategory(ies):**  
**Technology & Innovation:** Reproductive Urology

**Funding:**  
No financial aid was received for this abstract.

**References:**  
Godiwala P, et al. The impact of microfluidics sperm processing on blastocyst euploidy rates compared with density gradient centrifugation: a sibling oocyte double-blinded prospective randomized clinical trial. *Fertil Steril.* 2024 Jul;122(1):85-94. doi: 10.1016/j.fertnstert.2024.02.021. Epub 2024 Feb 15. PMID: 38367686.

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Nothing to disclose. No off-label or otherwise non-approved product use.

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This abstract has been approved by a local Institutional Review Board (IRB) or equivalent.

**Applying for an award**

**Trainee: Yes**

**Abstract Category:**  
Reproductive Urology

**Applied for the SMRU Traveling Scholars Award**

**Abstract Text:**  
**OBJECTIVE:**

Some investigators have hypothesized that compared to density-gradient centrifugation (DGC), microfluidic sperm separation devices (MSSD) may offer benefits such as reduced sperm DNA fragmentation, improved blastulation, and enhanced workflow efficiency in the embryology laboratory. This study aims to compare IVF stimulation and single euploid embryo transfer (SEET) outcomes between patients who utilized the MSSD and those who underwent DGC

**MATERIALS AND METHODS:** This retrospective cohort study analyzed IVF/PGT-a cycles from 2016 to 2024. Patients were categorized into two groups: the MSSD group and a propensity score-matched DGC (control) group. Ovarian stimulation and embryological outcomes, including euploidy, fertilization, blastulation rates, and single euploid embryo transfer (SEET) outcomes, were compared. Sample size calculations determined a sample of 356 cycles to detect a 10% difference in euploidy rates ( $\alpha=0.05$ ,  $\beta=0.80$ ) and 388 SEETs to detect a 10% difference in live birth rates

**RESULTS:**

2499 DGC cases were compared to 834 MSSD cases. Median number of retrieved oocytes were comparable (12 IQR 12 vs 13 IQR 13,  $p=0.053$ ). Both groups had similar total fertilization failure rate (1.2% vs 2.0%,  $p=0.59$ ). Fertilization rates were comparable (89.3 vs 89.7%,  $p=0.31$ ). Significant differences were found in blastulation rates (65.6% vs 60.1%,  $p<0.0001$ ); biopsied embryos (44.6% vs 38.7%,  $p<0.0001$ ); euploidy rates (52.4% vs 48.7%,  $p=0.0002$ ) and mosaic rates (11.9% vs 13.8%,  $p=0.003$ ) respectively. After adjusting for age, BMI, AMH, partners age, Estradiol at surge; normal semen analysis (SA) and year of treatment. There was not any significant association between MSSD and lower fertilization (aOR 1.11 CI95% 0.91-1.35); blastulation (aOR 0.91 CI95% 0.81-1.02); biopsied embryos (aOR 0.91 CI95% 0.82 – 1.01); lower euploidy (0.90 CI95% 0.81 – 1.008) or higher mosaic rates (aOR 1.17 CI95% 0.96-1.43).

Sensitivity analyses showed similar findings when only comparing patients with normal SA and when comparing only patients with abnormal SA.

SEET showed comparable implantation rates (77.2% vs 76.5%,  $p=0.77$ ), higher clinical pregnancy (65.1 vs 68.0%,  $p<0.0001$ ), live birth (56.1% 60.9%,  $p=0.01$ ) and lower biochemical loss (15.7% vs 11.1%,  $p=0.03$ ) and clinical pregnancy loss rates (11.6% vs 9.4%,  $p<0.0001$ ) compared with DGC. In the multivariate analysis MSSD demonstrated higher odds of clinical pregnancy (aOR 1.54 CI95% 1.02 – 2.32); higher live birth (aOR 1.51 CI95% 1.10-2.07) and lower odds of biochemical pregnancy loss (aOR 0.64 CI95% 0.42 – 0.97)

**CONCLUSIONS:** Patients whose sperm was processed by MSSD exhibited similar embryonic euploidy rates compared to those whose sperm was processed by DGC. However, among patients who underwent SEET, the use of MSSD was associated with a higher likelihood of live birth and lower biochemical pregnancy loss rates compared to DGC cohorts. Further research is needed to validate these findings

**IMPACT STATEMENT:**

Compared to density-gradient centrifugation, microfluidic sperm separation maintains similar euploidy rates while potentially improving live birth outcomes.

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Biographical Sketch Early success, marked by his first publication in CELL at Harvard Medical School, inspired Joseph to continue his research endeavors in reproductive endocrinology and infertility. Joseph has been with Reproductive Medicine Associates of New York since 2011. Joseph has authored over 400 peer-reviewed abstracts & manuscripts. Passionate about development, he cultivates relationship with investors & entrepreneurs to advance reproductive endocrinology & infertility care.

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Biographical Sketch Richard Slifkin, MS, TS(ABB), CLT(NYS) serves as the Associate Laboratory Director at Reproductive Medicine Associates of New York. Rick is a frequent presenter and has led the development and dissemination of best practices for embryology laboratory efficiencies and how to employ emerging technologies to lower staff burnout while improving pregnancy rates and integrity of specimen identity.

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Organization Name	Relationship Type	Who has this Relationship?
genentech/ roche Pharmaceuticals	Grant Recipient Relationship Began - Sunday, August 13, 2023 Relationship Ended - Honoraria Relationship Began - Sunday, June 11, 2023 Relationship Ended -	Self
WINFertility	Paid Consultant Relationship Began - Sunday, January 1, 2023 Relationship Ended -	Self

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Organization Name	Relationship Type	Who has this Relationship?
Progyny	Company Officer Relationship Began - Friday, August 25, 2017 Relationship Ended - Thursday, June 1, 2023 Paid Consultant Relationship Began - Relationship Ended - Direct Stockholder Relationship Began - Friday, August 25, 2017 Relationship Ended - Friday, November 1, 2024	Self

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