

ASRM 2020 Virtual Scientific Congress &amp; Expo Clinical Infertility Male Reproduction

**Male Factor****O-69 - ICSI OUTCOMES USING SPERMATOZOA WITH OPTIMAL GENOMIC INTEGRITY**

Sunday, October 18, 2020



10:10 AM – 10:25 AM EDT



**Objective:** To test whether selecting spermatozoa with an intact genome enhances implantation and pregnancy rates in couples undergoing ICSI. **DESIGN:** During the past 3 years, semen specimens from consenting men with prior ICSI failure were screened for sperm chromatin fragmentation (SCF) and double-stranded DNA breaks (DSBs). These tests were performed on raw specimens that were processed by density gradient centrifugation (DGC) and microfluidic sperm selection (MFSS). Couples underwent subsequent ICSI cycles with MFSS processing in order to select spermatozoa with the highest genomic integrity. Embryological and pregnancy outcomes were recorded in the study groups and compared to the historical cycles. **MATERIALS AND**

**Methods:** Consenting men underwent standard semen analysis according to WHO 2010 criteria. DGC and MFSS were used to select spermatozoa with the highest portion of progressively motile spermatozoa. SCF was assessed by terminal deoxynucleotidyl transferase dUTP nick-end labeling (TUNEL) on at least 500 spermatozoa utilizing a threshold of  $\leq 15\%$ . DSBs were measured by a neutral Comet assay using a modified in-house protocol which assessed at least 200 spermatozoa per patient considering a normal threshold of  $\leq 3\%$ . ICSI was performed in the standard fashion.

**Results:** A total of 63 men with an average age of  $41 \pm 10$  years had the following average semen parameters: concentration of  $26 \pm 31 \times 10^6/\text{mL}$ ,  $33 \pm 14$  motility, and  $2 \pm 1\%$  morphology. After DGC and MFSS, the sperm concentration was  $18 \pm 23$  and  $8 \pm 13 \times 10^6/\text{mL}$ , with  $55 \pm 33\%$  and  $97 \pm 9\%$  motility ( $P < 0.0001$ ), respectively. The morphology remained  $2 \pm 1\%$  after DGC, and improved to  $3.2 \pm 1\%$  after MFSS ( $P < 0.001$ ). The SCF decreased from  $24 \pm 8\%$  in the raw samples to  $19 \pm 10\%$  following DGC, and fell to  $1.7 \pm 1\%$  after MFSS processing ( $P < 0.0001$ ). DSB rates were  $4.1 \pm 1\%$  in the raw samples,  $3.3 \pm 2\%$  after DGC, and only  $0.3 \pm 0.1\%$  after MFSS ( $P < 0.0001$ ).

Men ( $n=39$ ;  $42 \pm 7$  years) who underwent ICSI with their female partners ( $38 \pm 3$  years) had an average SCF and DSB rate in their raw sample of  $23 \pm 9\%$  and  $3.9 \pm 1.5\%$ , respectively, which

fell to  $19\pm 2\%$  and  $3.2\pm 3\%$  after DCG selection, and dropped to only  $1.4\pm 1\%$  and  $0.2\pm 0.1\%$  after MFSS ( $P < 0.0001$ ). These couples underwent 25 reference ICSI cycles with DGC sperm selection and achieved a fertilization rate of 60.5% (98/162). The implantation rate was only 2.1% (1/47) with a clinical pregnancy rate of 5.0% (1/20), resulting in a pregnancy loss. These couples subsequently underwent 48 ICSI cycles with MFSS and achieved a fertilization rate of 73.1% (333/455;  $P < 0.01$ ). The implantation rate rose to 27.3% (26/95;  $P < 0.001$ ) and the clinical pregnancy rate increased to 53.3% (24/45;  $P < 0.001$ ), resulting in 46.6% (21/45) ( $P < 0.0001$ ) of deliveries/ongoing pregnancies. The pregnancy loss rate was 12.5% (3/24).

**Conclusions:** According to our study, SCF is strongly correlated with sperm motility. MFSS is the only device capable of yielding the highest portion of progressively motile spermatozoa that therefore have the least amount of DNA damage. Spermatozoa with an intact genome are associated with improved embryonic development and implantation rates in couples undergoing ICSI.

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