

Microfluidics is highly effective in selecting a sperm subpopulation with low DNA fragmentation index.

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Introduction

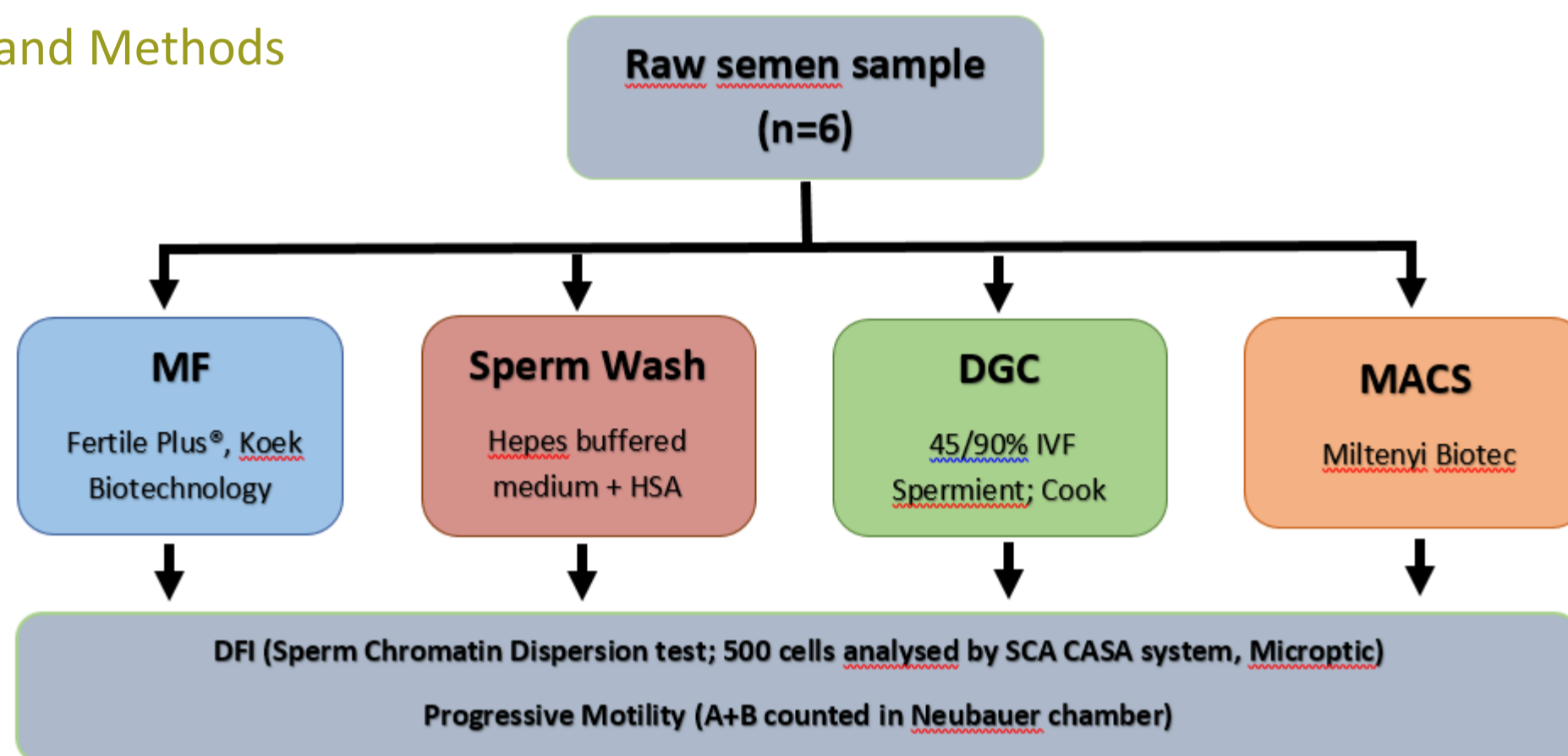
DNA fragmentation represents the last event of cell apoptosis. The use of a sperm cell with DNA fragmentation for oocyte insemination is correlated with negative effects at the time of paternal genome activation and with increased miscarriage rates.

Both microfluidic sorting (MF) of unprocessed semen (Quinn et al., 2018) and Magnetic Activated Cell Sorting (MACS) performed after density gradient centrifugation (DGC) are reported to improve the sperm quality by selecting non-apoptotic cells. However, it is uncertain which procedure leads to the lowest DNA fragmentation index (DFI).

Study question: Does MF improve the selection of sperm with lower DFI as compared to other techniques?

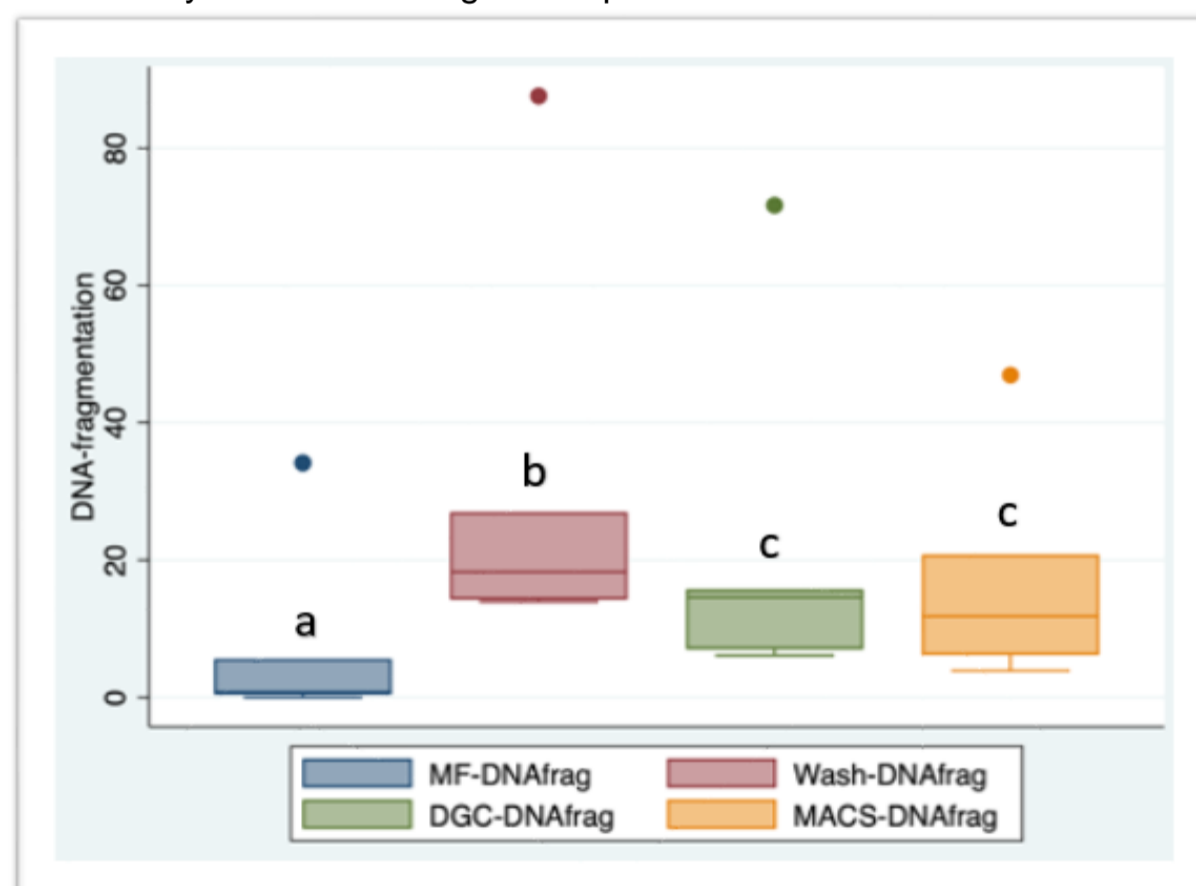


Materials and Methods

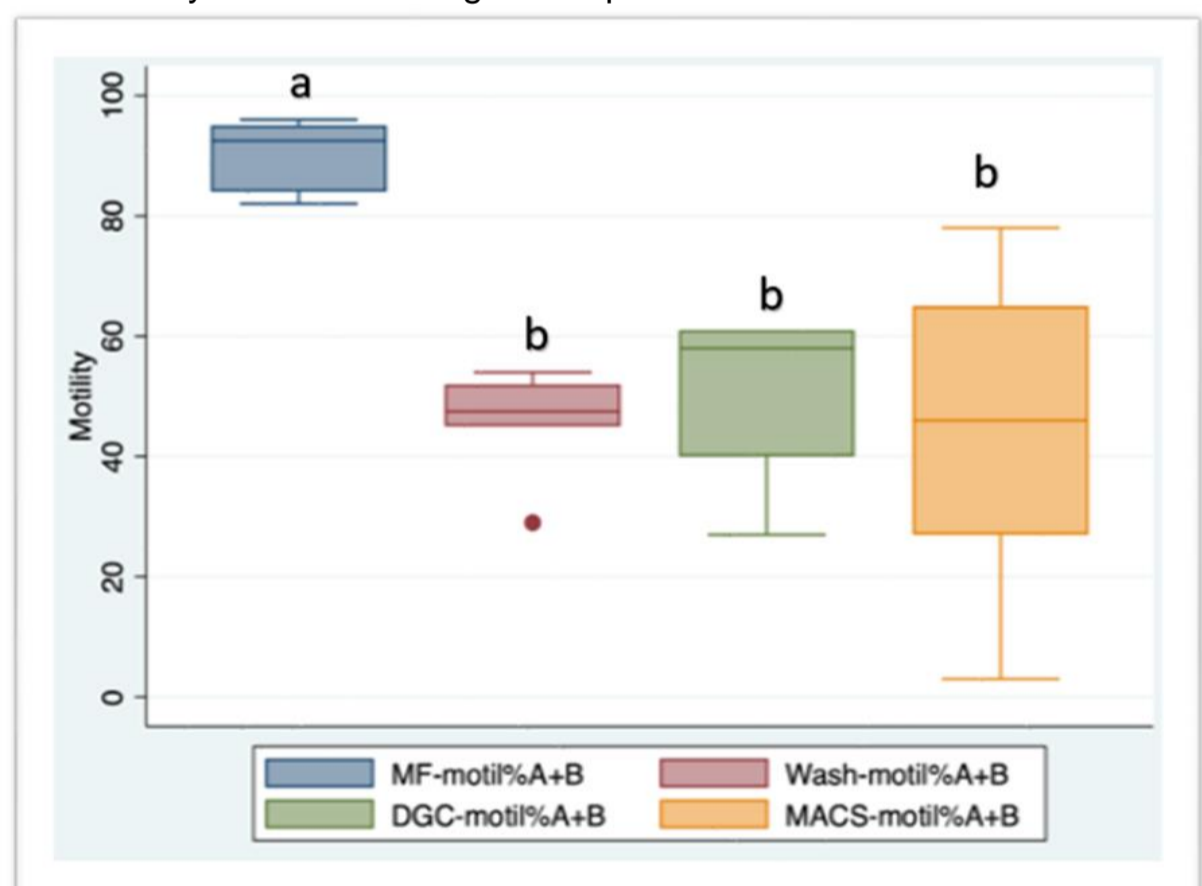


Results

DNA fragmentation (%) results from spermatozoa selected by different sorting techniques



Progressive motility (A+B; %) results from spermatozoa selected by different sorting techniques



Exact test for Friedman's test was used to investigate the presence of differences across the 4 techniques. Exact test for Wilcoxon signed rank test was used for pairwise comparisons. Values within plots with different superscripts are significantly different according to Wilcoxon signed rank test ($p < 0.05$).

Conclusion

Microfluidic sorting of sperm selects a population with significantly lower DNA fragmentation index and higher proportion of progressive motility compared to standard selection methods or MACS. Moreover, MF offers the advantage of using unprocessed semen, as such reducing the negative impact of centrifugation as compared to standard sperm selection methods.

Limitations

The major limitation of the study is the low sample size although the advantage of MF is obvious. Consequently, there is a lack of variation between the samples regarding sperm quality.

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