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[◀ Prev \(ea0056GP213.htm\)](#)[Next ▶ \(ea0056GP215.htm\)](#)[^ Table of contents \(/ea/0056/\)](#)[Cite \(/cite\)](#)

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Sperm DNA fragmentation index as a promising predictive tool for male infertility diagnosis and treatment management

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Background: Conventional parameters evaluated in semen analysis show several limits in the diagnostic setting of male infertility and do not provide any useful prognostic tool for assisted reproductive technique (ART). On the contrary, the assessment of sperm DNA fragmentation (sDF) was proposed to discriminate fertile from infertile men and to predict the follicle stimulating hormone (FSH) treatment response in infertile men. However, a comprehensive evaluation thereof is not available so far.

Purpose: This meta-analysis was designed to assess the sDF power in the diagnosis of male infertility and, in addition, to assess the sDF role in predicting FSH therapy response in infertile men.

Methods: Two literature searches were conducted. Firstly, both interventional and observational clinical trials comparing fertile to infertile/subfertile men were included. Secondly, interventional/observational clinical trials evaluating FSH-treated infertile men were assessed.

Results: Twenty-eight studies were included in the first analysis. sDF levels resulted significantly higher in infertile men ($P<0.001$), independently from the sDF method applied. ROC curves identified a sDF threshold of 20%, with a sensitivity of 79% and a specificity of 86%. Six studies were included in the second analysis, showing a significant sDF improvement ($P=0.04$) of 4.24% (C.I.: 0.23–826%) after 3 months of therapy. This sDF improvement was in line with the sperm number improvement ($P<0.001$), suggesting a similar efficacy in this setting.

Conclusion: This meta-analysis demonstrates the sDF relevance in male infertility assessment, showing a higher accuracy in detecting sperm function than conventional semen parameters. Although larger and properly designed prospective trials are needed before sDF may be adopted as an established diagnostic and prognostic test in male infertility, for the time it represents the most promising tool in clinical and research practice.

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 [Table of contents \(/ea/0056/\)](/ea/0056/)

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