

Table 4. Relationship between SDF-values and miscarriages

| Title | Year/ Journal | Authors | Main outcome | Short conclusion |
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| Role of sperm DNA fragmentation in male factor infertility: A systematic review | 2018- Arab Journal of Urology | Cho, C. L. and Agarwal, A. | Selection of men at risk for high SDF | The beneficial role of SDF testing in selection of varicocele candidates, evaluation of patients with unexplained infertility and recurrent pregnancy loss, selection of the most appropriate assisted reproductive technique with highest success rate for infertile couples, and assessment of infertile men with modifiable lifestyle factors or gonadotoxin exposure has been recently proposed |
| Relationship Among Traditional Semen Parameters, Sperm DNA Fragmentation, and Unexplained Recurrent Miscarriage: A Systematic Review and Meta-Analysis | 2021- Frontiers in Endocrinology | Dai, Y. et al. . | Selection of men at risk for high SDF | Meta-analysis to explore the relationship among traditional semen parameters, SDF, and unexplained RM. Our results showed that couples with unexplained RM had significantly increased levels of SDF and significantly decreased levels of total motility and progressive motility compared with couples without RM, although significant differences were not observed in the semen volume, sperm concentration, and total sperm count between couples with and without RM. The SDF assay may be considered for inclusion in evaluations of couples with unexplained RM |
| Recurrent miscarriage and male factor infertility: diagnostic and therapeutic implications. A narrative review | 2023- Central European Journal of Urology | Gkeka, K. et al. | Selection of men at risk for high SDF | Lifestyle, obesity, genetic predisposition, chromosomal anomalies, endocrine dysfunction, anatomical abnormalities, immunological factors, infections, and oxidative stress can result in poor embryo development and recurrent miscarriage. Although professional organizations currently recognize male gender as a possible risk factor, specific recommendations on the diagnostic and therapeutic |

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| | | | | field are still lacking, and the condition necessitates a high level of suspicion and case-by-case management. |
| Recurrent pregnancy loss: a male crucial factor, a systematic review and meta-analysis | 2023- Andrology | Inversetti, A. et al. | No clear association between at risk male and SDF | SDF and some specific semen parameters were associated with RPL in a multi-ethnic evaluation. Taking into considerations the three aspects, our systematic review and meta-analysis found an association between SDF and RPL, although a clear association between paternal age, BMI values, cigarette smoking and alcohol consumption, and RPL was not observed |
| Good practice recommendations on add-ons in reproductive medicine | 2023- Human Reproduction | Lundin, K. et al. | No clear evidence of SDF to predict treatment decisions | ESHRE guideline: There is insufficient evidence for the relevance of SDF tests to predict pregnancy or guide treatment decisions. Further research in this field is strongly recommended to enhance our understanding and knowledge. |
| Sperm DNA fragmentation and recurrent pregnancy loss: a systematic review and meta-analysis | 2019- Fertility and Sterility | McQueen, D. B. et al. | Suggestion to evaluate SDF only in motile fraction | These findings support an association between sperm DNA fragmentation and recurrent pregnancy loss. However, given the significant heterogeneity between studies and lack of prospective pregnancy outcome data, further large prospective studies are needed. The vast majority of current literature uses tests of sperm DNA fragmentation on whole semen. Although this is unlikely to significantly bias results toward RPL or fertile control subjects, a measurement of DNA fragmentation in motile sperm may be more applicable to an RPL cohort that conceives spontaneously. |
| The paternal role in pregnancy loss | 2024- Andrology | Muncey, W. et al. | Indirect evidence for increased SDF | Emerging findings warrant a paradigm shift in the investigation of pregnancy loss that includes not only maternal, but also a paternal health evaluation. Despite limitations within the existing literature and the need for |

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| | | | | additional research, the evolving comprehension of the paternal contribution to pregnancy underscores a substantial possibility for enhancing outcomes among couples grappling with pregnancy loss. Only indirect evidence (older men, more DNA damage, but not direct correlation that only age plays a role) |
| The effect of sperm DNA fragmentation on miscarriage rates: A systematic review and meta-analysis | 2012- Human Reproduction | Robinson, L. et al. . | Evidence for higher SDF in miscarriages | Meta-analysis showed a significant increase in miscarriage in patients with high DNA damage compared with those with low DNA. Meta-analysis showed a significant increase in miscarriage in patients with high DNA damage compared with those with low DNA damage . A subgroup analysis showed that the miscarriage association is strongest for the TUNEL assay (RR ¼ 3.94 (2.45, 6.32), P , 0.00001). |
| Association between sperm DNA fragmentation and idiopathic recurrent pregnancy loss: a systematic review and meta-analysis | 2019- Reproductive BioMedicine Online | Tan, J. et al. | Evidence for higher SDF in miscarriages | These results support the diagnostic value of sDF over standard semen analysis, as well as a possible paternally derived genetic origin of unexplained RPL. Further prospective studies are required to further assess the predictive utility of sDF for assessing couples with unexplained RPL |
| Sperm DNA fragmentation index with unexplained recurrent spontaneous abortion: A systematic review and meta-analysis | 2020- Journal of Gynaecology Obstetrics and Human Reproduction | Yifu, P. et al. | Evidence for higher SDF in miscarriages | These findings support an association between sperm DFI and recurrent pregnancy loss. Previous studies revealed that DFI negatively impacts unexplained RSA. |
| Association between semen parameters and recurrent pregnancy loss: An umbrella review of meta-analyses | 2024- Journal of Obstetrics and Gynaecology Research | Zhang, L. et al. | Evidence for higher SDF in miscarriages | Our results suggest level II evidence for the association between male SDF and RPL, while the evidence level for the association between conventional semen routine parameters and RPL was low (classes III and IV). |

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| Sperm DNA fragmentation index and pregnancy outcome after IVF or ICSI: a meta-analysis | 2015- Journal of Assisted Reproduction and Genetics | Zhang, Z. et al. | No clear evidence of SDF to predict treatment outcome | The predication value of DFI for IVF or ICSI outcome is not confirmed in our meta-analysis. Further better designed studies with larger subjects involved are needed to better address this issue |
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Richtlijn Mannelijke subfertiliteit 2026