Cariad Medical Technology Co., Ltd.

Sperm DNA Fragmentation Series Reagents

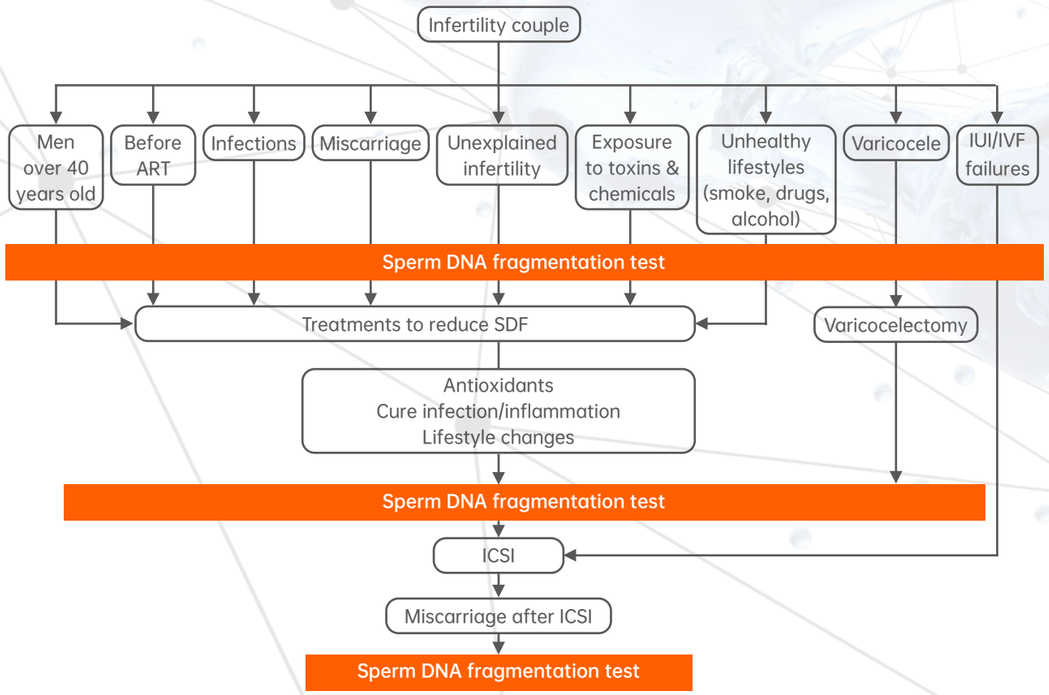
Clinical Significance

Sperm DNA fragmentation is a condition that affects male fertility. It refers to the presence of sperm with damaged (broken) DNA. Alterations of any kind in sperm DNA are likely to cause infertility in the man affected, as integrity of sperm DNA is key to obtaining viable embryos and subsequently a healthy baby. Sperm DNA fragmentation (SDF) is associated with male infertility, and it adversely affects reproductive outcomes. Both chromatin integrity and protamination status determine the extent of DNA damage.

Cause and Treatment

SDF can be caused by various factors such as age, lifestyle choices, environmental factors, and medical conditions. Some of the common causes include smoking, alcohol consumption, exposure to toxins and chemicals, varicocele, infections, and testicular cancer.

Treatment options for SDF include lifestyle changes such as quitting smoking and reducing alcohol consumption, antioxidant therapy, and assisted reproductive techniques such as intracytoplasmic sperm injection (ICSI). Antioxidants such as vitamin C, vitamin E and coenzyme Q10 have been shown to reduce oxidative stress and improve sperm quality.

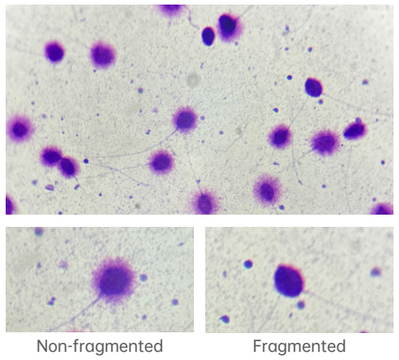


Detection Method

The extent of DNA damage can be determined by various tests such as the Sperm Chromatin Structure Assay (SCSA), Terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL), Sperm Chromatin Dispersion (SCD) method. These tests can help identify the underlying cause of SDF and guide treatment options.

Sperm Chromatin Dispersion (SCD) Test

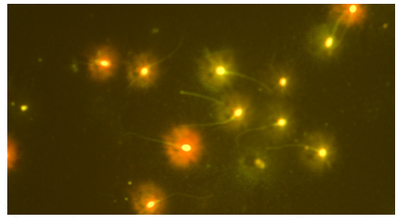
Based on the principle that sperm with fragmented DNA fail to produce the characteristic halo of dispersed DNA loops that is observed in sperm with non-fragmented DNA, following acid denaturation and removal of nuclear proteins. The SCD test can also be used to assess sperm DNA longevity by incubating spermatozoa in vitro and revealing underlying DNA damage that is not apparent on initial assessment.



Non-fragmented Fragmented

Sperm Chromatin Structure Assay (SCSA) Test

When acridine orange enters sperm DNA, it can produce green or red fluorescence after being excited by fluorescence (double-stranded DNA: green; single-stranded DNA: red). Normal sperm DNA has a complete double helix structure, while abnormal sperm DNA has a broken single-strand structure which can be recorded by fluorescence microscope or flow cytometry, and DFI can be calculated to reflect the integrity of sperm DNA. DFI = red fluorescence/total fluorescence (red fluorescence + green fluorescence): DFI ≤ 15%, good integrity; 15% < DFI ≤ 29%, general integrity; DFI > 30%, poor integrity.



Non-fragmented Fragmented

Cariad SDF products	Method	Spec.	Instrument	Reaction time
Sperm DNA Fragmentation Detection Kit (SCD)	Sperm Chromatin Dispersion Method (SCD)	20 T/Kit	Optical microscope	35 minutes
Sperm Nuclear Staining Solution (Acridine Orange Method)	Sperm Chromatin Structure Assay (SCSA)	20 T/Kit	Fluorescence microscope	6 minutes
Sperm DNA Fragmentation Detection Kit (Fluorescence Staining)		50T/Kit	Flow cytometry	6 minutes

Reference:
[1] World Health Organization. WHO Laboratory Manual for the Examination and Processing of Human Semen, 6th ed.; WHO Press: Geneva,Switzerland, 2021. Available online: https://www.who.int/publications/i/item/9789240030787 (accessed on 3 December 2021).
[2] Agarwal A, Majzoub A, Baskaran S, et al. Sperm DNA fragmentation: A new guideline for clinicians. World J Mens Health, 2020, 38(4) : 412-471.
[3] European Association of Urology.EAU Guidelines on-Sexual and Reproductive Health.[OL] https://uroweb.org/guidelines/sexual-and-reproductive-health

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