

# The Science Behind Sperm DNA Testing

Examen's Sperm DNA Testing is powered by SpermComet® technology, a specialist cell-by-cell method designed to assess sperm DNA integrity. The information from these tests may support clinician-led fertility assessment and discussion when interpreted alongside semen analysis, reproductive history, female-factor assessment, embryo development data, and other relevant investigations.

## Used by Fertility Clinics

Used by fertility clinics across the UK and Ireland.

## SpermComet® Technology

Cell-by-cell sperm DNA analysis.

## ISO-Accredited Lab

Tests are performed within defined laboratory quality processes and applicable accreditation scope.

# The Role of DNA in Sperm Cells

Every cell in our bodies — except red blood cells — contains DNA in its nucleus. This DNA holds all the information needed for each cell to function. To fit into the nucleus, DNA is carefully packed onto chromosomes (23 pairs in total). This packing must strike a balance: tight enough to protect the DNA, but loose enough to allow access to genetic information when needed.

Sperm carry one set of paternal chromosomes (23 in total) that contributes to embryo development after fertilisation, alongside the maternal set carried by the egg. To ensure the DNA reaches the egg safely, it is tightly packed for the journey. Like a Formula 1 car, sperm cells strip away everything unnecessary for the journey, including cellular DNA repair capacity.

## Two Types of DNA Damage

### Single-Strand Breaks (ssDB)

More common and may have different clinical relevance depending on context.

### Double-Strand Breaks (dsDB)

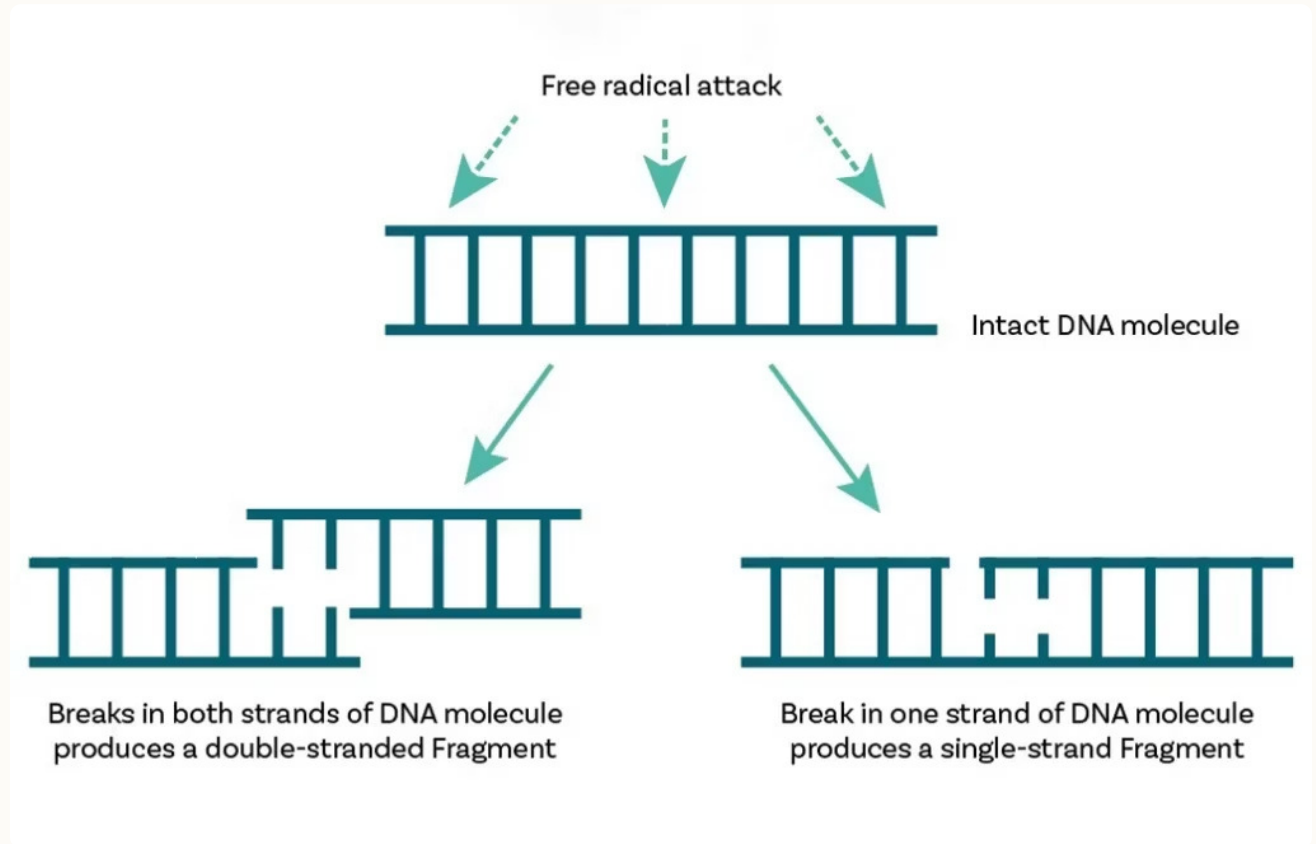
Less common and may be more clinically relevant in some fertility settings.



## DNA DAMAGE

# How DNA Damage Affects Sperm

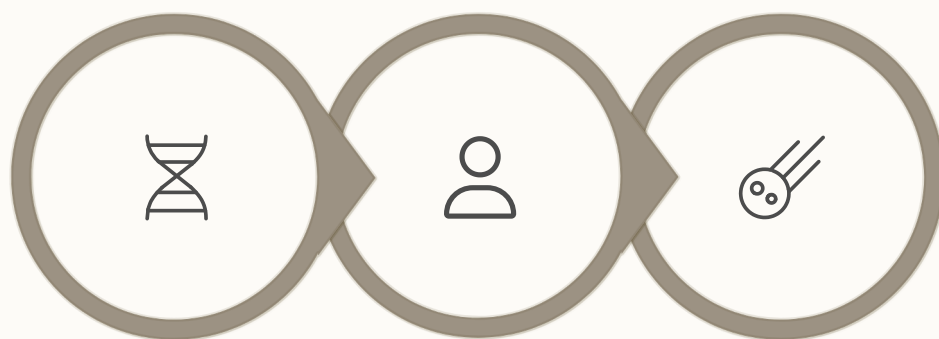
DNA exists as two strands arranged in a double helix, resembling a spiral staircase. Sperm cells may be vulnerable to DNA damage because mature sperm have limited DNA repair capacity. This vulnerability stems from the dense packing of DNA and the absence of cellular machinery that prevents or repairs damage. Some lifestyle, environmental, and medical factors have been associated with increased sperm DNA damage.



# The Science Behind SpermComet® Technology

Examen's tests are powered by **SpermComet® technology**, based on a well-established scientific technique called **single cell gel electrophoresis**. This method measures DNA damage in individual sperm cells, providing detailed cell-by-cell information on sperm DNA damage, which differs from some methods that report population-level measures.

- ③ This detailed, cell-by-cell analysis is designed to support detailed assessment of sperm DNA integrity.

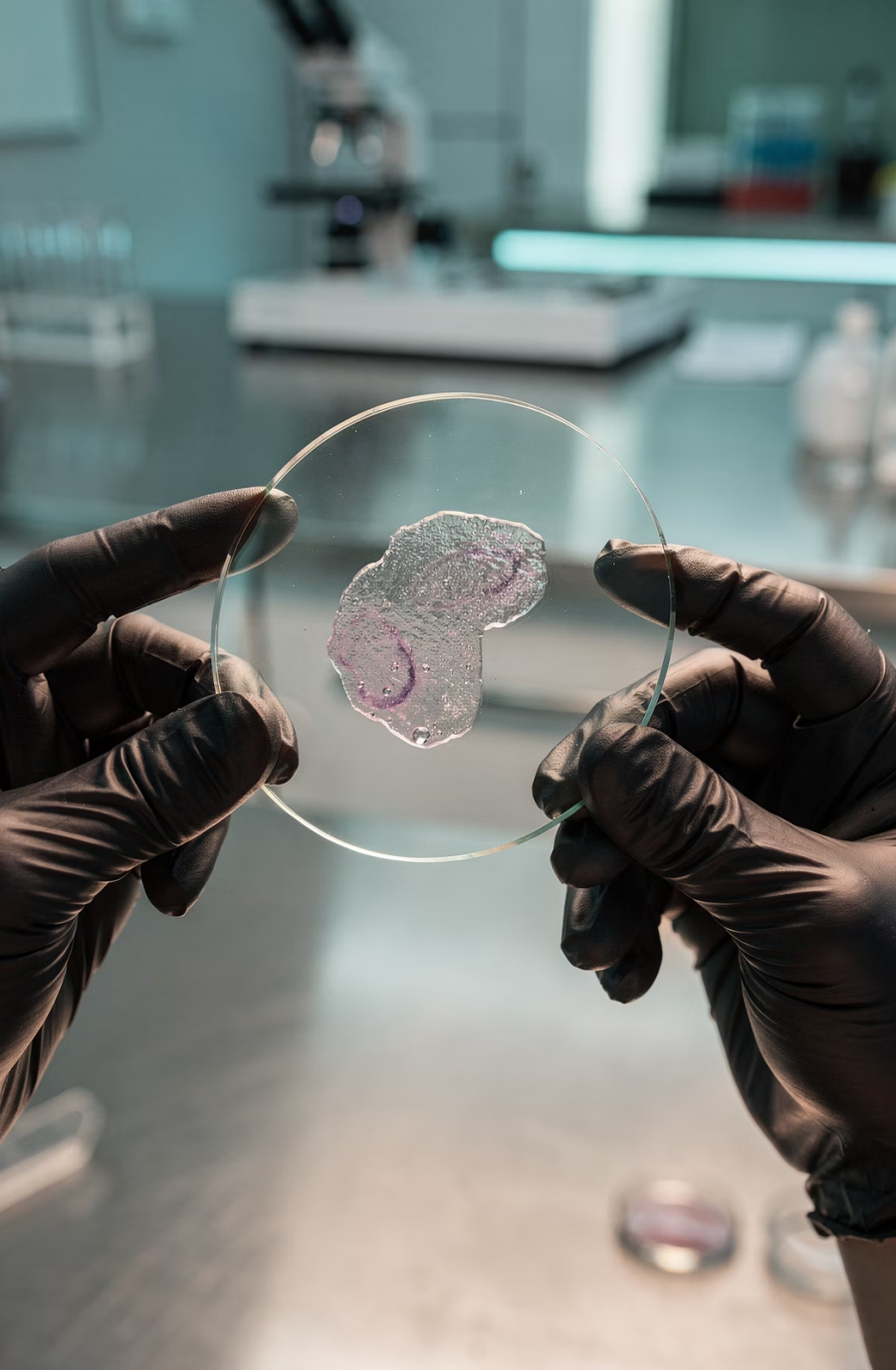


Relax DNA

Electrophoresis

Comet Form





#### OUR TESTS

# Measuring Total and Double-Strand DNA Damage

Examen offers two specialist tests that may provide additional information when investigating possible contributing factors in fertility challenges and supporting clinician-led treatment planning discussions. Each test is designed to reveal a different dimension of sperm DNA integrity.

## Exact® Test

Measures **total DNA damage**, including both single- and double-strand breaks. Designed to provide information on total sperm DNA damage. May support fertility investigations when clinically appropriate.

## Extend® Test

A proprietary, **patent-pending test** that specifically measures double-strand break damage, providing additional information on double-strand DNA damage in selected complex fertility cases.

# Why Human Expertise Matters

Unlike automated methods, the **SpermComet® technique** incorporates a high degree of human skill and experience. Our laboratory experts analyse each sample with precision, supporting reliable and reproducible reporting. This human expertise is what makes Examen's tests a detailed specialist sperm DNA testing approach — human expert analysis provides a different form of review from fully automated approaches. Examen's **ISO-accredited** laboratory and proprietary SpermComet® technology support quality-controlled testing within the laboratory's stated accreditation and quality management scope, underpinned by rigorous scientific research and a genuine commitment to advancing male fertility diagnostics.

## Cell-by-Cell Analysis

Individual sperm cells are assessed by trained laboratory specialists.

## Precision & Reproducibility

Human expert analysis supports reliable and consistent reporting.

## ISO-Accredited Standards

Rigorous scientific research underpins every test, meeting recognised laboratory quality standards.





## RISK FACTORS

# Factors That Can Affect Sperm DNA

A wide range of lifestyle, medical, and environmental factors can compromise sperm DNA integrity. Understanding these factors may support discussion of modifiable risks with a qualified clinician.

### Lifestyle Choices

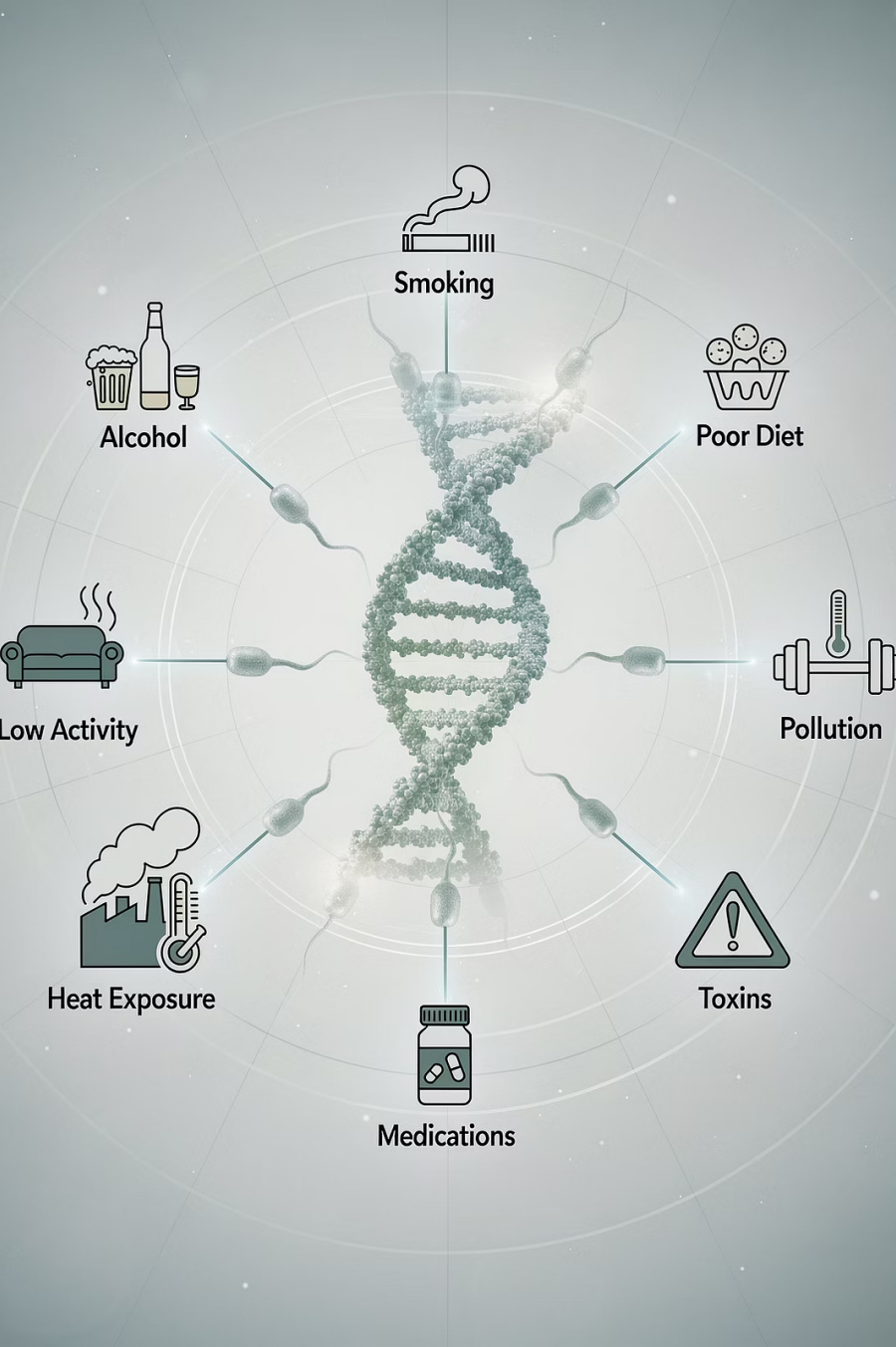
Smoking, alcohol consumption, poor diet, caffeine, high BMI, and psychological stress have been associated in published studies with changes in sperm DNA fragmentation.

### Medical Conditions

Varicocele (enlarged veins around the testicle) and infections such as prostatitis or STIs may be associated with elevated sperm DNA damage.

### Age & Environment

Advanced paternal age and exposure to environmental toxins, pesticides, heavy metals, and heat or cold may be associated with changes in sperm DNA quality.



# A Broader View of Sperm DNA Risk Factors

This diagram illustrates a range of medical, lifestyle, and environmental factors that may affect sperm DNA integrity — from radiation therapy and chemotherapy to oxidative stress, obesity, and imbalanced microbiome. Understanding these factors may help support informed discussions with your clinician.

## Medical Factors

Including radiation therapy, chemotherapy, and conditions that may affect sperm DNA integrity.

## Lifestyle Factors

Oxidative stress, obesity, and daily habits that may affect sperm DNA quality.

## Environmental Factors

Exposure to toxins, an imbalanced microbiome, and other external influences on sperm health.

# Why Sperm DNA Quality Matters

Traditional semen analysis focuses on parameters like sperm count, motility, and morphology — but it does not assess DNA quality. Even when semen parameters are within the reference range, sperm DNA fragmentation may still be present and may be clinically relevant in selected cases. A man can have excellent conventional semen parameters and yet carry high levels of DNA fragmentation that may be associated with reduced fertility potential or recurrent pregnancy loss in some published studies.

## ❏ Medical Research

*Osadchuk et al. (2023)* — Effects of cigarette smoking on semen quality, reproductive hormone levels, metabolic profile, zinc and sperm DNA fragmentation in men. *Front Endocrinol (Lausanne)*. PMID: 37920251.

*Çayan et al. (2025)* — Global Andrology Forum Clinical Guidelines on the Relevance of Sperm DNA Fragmentation in Reproductive Medicine. *World J Mens Health*. [doi:10.5534/wjmh.250005](https://doi.org/10.5534/wjmh.250005)

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This is one reason sperm DNA testing may be considered in selected clinical contexts. They provide additional information about sperm DNA integrity not assessed by standard semen analysis, enabling clinicians and patients to make more informed discussions about treatment pathways.





SCIENTIFIC CONFIDENCE

# Discuss Sperm DNA Testing with Scientific Context

Sperm DNA testing may provide additional information in selected fertility investigations, particularly where there is unexplained infertility, recurrent pregnancy loss, poor embryo development, or previous unsuccessful ART treatment. Examen is committed to advancing the field of male fertility diagnostics through rigorous scientific research and innovation. Our ISO-accredited laboratory and proprietary SpermComet® technology support quality-controlled testing within applicable laboratory standards. Results should be reviewed with a qualified fertility clinician and interpreted alongside the full clinical picture.

## ISO-Accredited

Tests are performed within defined laboratory quality processes and applicable accreditation scope.

## Used by Fertility Clinics

Used by fertility clinics across the UK and Ireland.

## Fast & Reliable

Results are reported through trained laboratory review and quality-controlled processes.

❏ This information is provided for educational purposes only and should not be interpreted as medical advice, diagnosis, or a recommendation to undergo testing without clinical assessment. Examen Sperm DNA Testing should be interpreted by a qualified healthcare professional alongside semen analysis, female-factor assessment, reproductive history, embryo development data, and other relevant investigations. The test does not diagnose infertility on its own and does not guarantee fertilisation, pregnancy, live birth, miscarriage reduction, treatment success, or improved fertility outcomes.