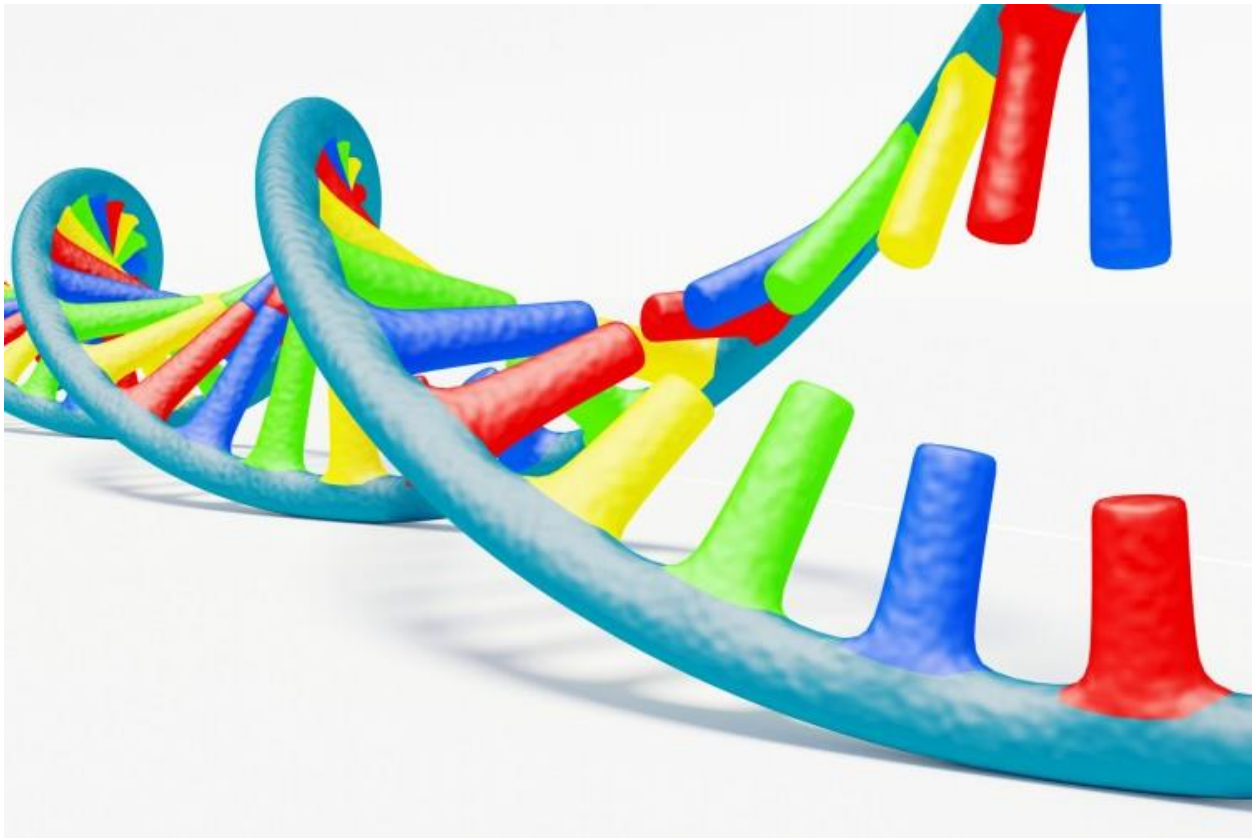
Understanding Sperm DNA Fragmentation by Dr Gill Lockwood

Gillian Lockwood · 9th March 2016



A scientific study[1] has suggested that high levels of sperm DNA fragmentation is linked to lower live birth rates for couples undergoing assisted reproductive techniques – and ICSI is likely to be more successful than IVF for men in this situation.

ICSI (intracytoplasmic sperm injection, to give it its proper name) is where the sperm is injected into the egg, rather than IVF (in-vitro fertilisation), where eggs and sperm are placed together in a laboratory dish where they fertilise and the embryos can be monitored before the strongest are transferred to the womb.

Conventional sperm analysis measures the number of sperm (concentration), how well they swim (motility) and if they are oddly shaped (morphology) but it does not detect DNA fragmentation – that is, when the strands in the "double helix" chain which contains the genetic code have broken.

So **DNA fragmentation could be the cause of a high level of infertility, and has been linked to early miscarriages**.

So what can you do?

Dr Gillian Lockwood, Medical Director of Midland Fertility, takes us through it.

What is DNA?

The head of a sperm contains genetic building blocks, called DNA (deoxyribonucleic acid), which are needed from the male to achieve fertilisation, make an embryo and create a successful pregnancy. Within the sperm head, the DNA is wound and twisted on itself and wrapped around blocks of protein called chromatin. Part of the role of these protein blocks is to protect the DNA from damage during the sperms' journey from the testes to the female reproductive tract. However damage can still occur to the DNA and it can become fragmented.

What is the DNA fragmentation test?

The DNA fragmentation test is a method of **examining the sperm head to look for any fragmentation of the genetic material**. The breakdown of this material can cause problems with fertilisation, poor quality embryos and it may be linked to a reduction in the chances of achieving a pregnancy or an increase in the risk of miscarriage.

Any of the problems below may be helped by testing for sperm DNA fragmentation

- **long term unexplained infertility : 80% of couples may have sperm DNA fragmentation**
- multiple failed treatment attempts
- low fertilisation rate
- embryos which stop developing (arrest)
- poor blastocysts
- recurrent early miscarriages
- men exposed to toxic chemicals or radiation
- older men wishing to conceive

What causes DNA fragmentation?

All men, whether fertile or infertile, have some proportion of sperm with fragmented DNA. However, higher levels of DNA fragmentation in sperm heads may be caused by:

- environmental pollution
- chemical and radiation exposure
- excessive heat exposure
- varicocele
- infections
- some cancers

What does the test involve?

The patient attends the clinic for a semen analysis as normal and produces a sample which is sent to a specialist lab. It is important that he is not suffering from any illness at this time which could cause a fever as this may alter the results.

What if the test identifies DNA fragmentation?

A normal result is less than 25% fragmentation. Even if a man's sample has a high degree of DNA fragmentation there are many factors which can affect a couple's ability to conceive, so this should not be taken as the only reason for infertility, but may be a contributing factor.

- treatment with anti-oxidants such as Zinc, Vitamin C and Vitamin E may be effective
- if fertilisation has previously been a problem, using ICSI instead of IVF may increase the number of embryos
- as there tends to be less DNA fragmentation in (immature) testicular sperm than in ejaculated sperm, a surgical sperm recovery with ICSI may be advised

[1] The Effect of sperm DNA fragmentation on live birth rate after IVF and ICSI: a systematic review and meta-analysis (Reproductive BioMedicine Online (2015) 30, 120-127).