SPERM DNA DAMAGE AND ITS IMPLICATIONS FOR SUCCESS IN FERTILITY TREATMENT

What is Sperm DNA damage?
DNA is the genetic make-up of an individual. You inherit half your DNA from your mother's egg and half from your father's sperm.
It appears that sperm quality is declining and this is thus contributing to the increasing rates of infertility throughout the world. Many factors have been implicated (smoking, dietary deficiencies, environmental pollutants, cancer therapy) and it is thought that the problem is related to free radicals that damage the DNA of the sperm.
A certain degree of damage (fragmentation) of the sperm DNA is inherent, but the woman’s eggs can repair some of it. This is especially true if the woman is young and so her eggs are also younger and healthier, but as a woman gets older; the ability of her eggs to repair the damaged DNA in the sperm is reduced.
Increasing sperm DNA fragmentation is associated with:
- poorer fertilisation
- poorer embryo quality
- poorer pregnancy rates
- increased risk of miscarriage

Sperm DNA Tests
A conventional semen analysis is still the ‘gold standard’ initial batch of tests for the infertile male. However, over the past decade many studies have shown that they have limited value in diagnosing infertility and little value in predicting Assisted Reproductive Technology (ART) success. As a result, sperm DNA tests are becoming popular additions to the traditional semen analysis. These tests go beyond the simple semen analysis to explore the sperm at a molecular level. Recent studies report that they show great promise for male infertility diagnosis and also for prediction of success with intrauterine insemination (IUI) and in vitro fertilization (IVF). These tests include the SpermComet, SCSA and Halo tests. They are specialised tests that are usually provided at dedicated labs, outside the fertility clinic. They can be requested by the couple and the fertility clinic can send off a small portion of the semen sample to have the test performed, providing this further valuable information. If the sperm DNA damage is high, the clinic will consider this information along with that of test results from the woman. It may be decided ICSI is a better choice than IVF as ICSI may give the egg a better chance of repairing sperm DNA damage.
Can dietary supplements help?
There is some evidence that prolonged vitamin and mineral supplements can improve the quality of the sperm in men with poor sperm counts (as assessed by traditional semen analysis). This is thought to be due to a reduction in free radicals which, in turn, can increase the pregnancy rate and the live birth rate if they then undergo ICSI. However, further research is required to determine which vitamins are best, how many are needed and for how long we need to take them to get maximum benefit.

What if the sperm count is normal? Can testing for sperm DNA damage help decide what treatment is best for you?
Yes. The evidence is growing that there is no relationship between a semen analysis result and the amount of sperm DNA damage a man has. Hence, there can be a lot of DNA damage in the sperm even if a man has a “normal” sperm count. This means that just because the man has a normal semen analysis, he and his partner will not necessarily be able to get pregnant even if they have IVF treatment.

What should I do?
If ICSI has already been recommended, it may be worthwhile taking supplements for at least three months prior to, and during, your partner having ICSI. Unfortunately, there are many different vitamins and minerals that have been investigated and no one knows which individual supplement would be best for a particular man. Hence, it’s probably best to take a combination of supplements and these are commercially available. It must be accepted that whilst they might make a difference to the quality of the sperm, they may make no difference at all, but at least we know that at ‘over the counter’ levels they are unlikely to do any harm.

If you have a “normal” sperm count, you are over 40 years old, you and your partner have had a couple of miscarriages, or if the fertilisation and embryo quality with IVF is poor, it will be worthwhile testing for sperm DNA damage. If the amount of DNA damage is high, then ICSI will be the best treatment option.

What if fertilisation and embryo quality with ICSI is poor?
Sperm production and maturation is a “conveyor belt” system from production in the testicles until the sperm is ejaculated. There is now good data to show that the DNA damage in sperm gets progressively worse as it goes along these tubes before it is ejaculated. So, if the embryo quality was poor, even with ICSI, then surgical sperm retrieval might yield better quality sperm - which in turn will increase the chances of ICSI working. Unfortunately, this is an invasive procedure, but it may give you a better success rate. If ICSI fails with ejaculated
sperm and you do not wish to have sperm retrieved surgically, the only alternative is donor sperm.

Sperm DNA tests are also useful for couples with unexplained infertility as these tests can often pick up anomalies that the semen analysis doesn’t detect.

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