
Sperm Chromatin Structure Assay (SCSA)

The ability to predict the capacity of sperm to fertilise an egg does not however tell us anything about the quality of the genetic material contained within those sperm. The genetic material contained within the nuclear part of the head of a sperm is known as **chromatin**. We have come to appreciate that **the integrity of that chromatin is important** and that the amount of that chromatin that is denatured or damaged is important. The sperm of most men have at least a small component of their chromatin damaged in some way. Experience has shown however that even men with quite high levels of sperm chromatin damage **have similar IVF fertilisation rates** to those achieved by men with low fragmentation rates. What is of most concern is that **pregnancy rates from men with high DNA fragmentation rates are significantly lower**. The embryos that their sperm create seem to have a reduced ability to continue development through to implantation and an on-going pregnancy.

The Queensland Fertility Group has set up a sperm chromatin structure assay to aid couples in their decision making around their IVF treatments. Using a machine known as a fluorescence activated cell sorter, it has the ability to individually look at thousands of sperm within a minute or so and provide statistically far more predictive information about a man's sperm than other assays. The shift from green (normal DNA) to red (abnormal DNA) fluorescence in acridine orange-stained sperm nuclei is measured, quantified, and compared with known normal sperm. The percentage of sperm containing damaged chromatin is then calculated.

The principal use of the test is in couples with unexplained infertility who have been through multiple IVF treatment cycles, achieving fertilization, having embryo transfers with apparently normal embryos, but never becoming pregnant. It is also of use in couples with long-standing unexplained infertility or who have experienced repeated early pregnancy loss. Traditionally we may have attributed the situation to problems with egg quality where moving to the use of donated oocytes may have been the best option. With our knowledge of the consequences of damaged DNA in sperm we now realise that this may be a basis for the problem and that in severe cases the use of donated sperm may have to be considered. The SCSA has the potential to help sort out these issues.

There are few indicators in men for raised levels of damaged sperm DNA. Research performed by the Queensland Fertility Group indicates that they will be found in around 10% of male partners of infertile couples. Raised levels are almost as common in men with normal sperm parameters as they are in men with reduced sperm numbers, motility or morphology. They are slightly more common in older men.

Little is understood about mechanisms for causing sperm chromatin damage and therefore whether it is reversible. Suggested causes have included infections, toxins and temperature while frequent ejaculation and the taking of anti-oxidants have been put forward as ways of reducing the problem. Certainly it is possible to see the logic in avoiding smoking and contact, both at home and at work, with chemicals potentially toxic to sperm production.

An encouraging aspect of the assay is that we have strategies to work around raised levels to minimise their effect on pregnancy likelihood. Programmes of frequent ejaculation in the male have been shown to reduce the level of sperm DNA damage as have the use of ICSI and testicular sperm.

If you think that this assay may be of help you should discuss it with your QFG infertility doctor. It is not the solution to everyone's problem and your doctor can advise if it is appropriate to your situation.