

## Sperm DNA structure assay & DNA fragmentation:

### FINDING THE BEST SPERM FOR IUI, IVF/ICSI

By Jim Meriano, Director,  
LifeQuest Embryology Laboratory

Sperm DNA is packaged by nature in a unique manner compared to that of other cells in the body. Sperm DNA is arranged in very tight organized loops so that it can be carried safely to its final destination of the fallopian tube for fertilization of the egg. The sperm is protected by components in the semen from certain dangers in its trek to its destination.

Several dangers to the sperm DNA have been theorized by researchers but three stand out as most convincing. These are oxidative stress, deficiencies in the packaging of DNA, and interrupted programmed cell death.

This brief article will touch upon oxidative damage only since the aim here is not necessarily why this happens but how this may potentially affect an IVF/ICSI cycle.

Oxidative stress is related to integrity of the packaging of the DNA of the sperm. Certain "bio-chemicals" called "reactive oxygen species", can "nick" the sperm DNA under certain circumstances and cause DNA fragmentation. When this happens, if

**"Testing the sperm for DNA damage is useful as a tool in the treatment of a couple for infertility..."**

this sperm is accepted into an egg for fertilization, errors in DNA transcription and synthesis can occur when maternal and paternal DNA come together. Numerous studies have shown no correlation with high DNA fragmentation and fertilization rates (*Larson et al 2000, Henkal et al, 2003, Zini et al 2005*). This is a concern because if the sperm has damaged DNA it may fertilize an egg and the resulting embryo may appear normal but may arrest or implant and eventually miscarry. Fortunately, there is a test that can check for this problem.

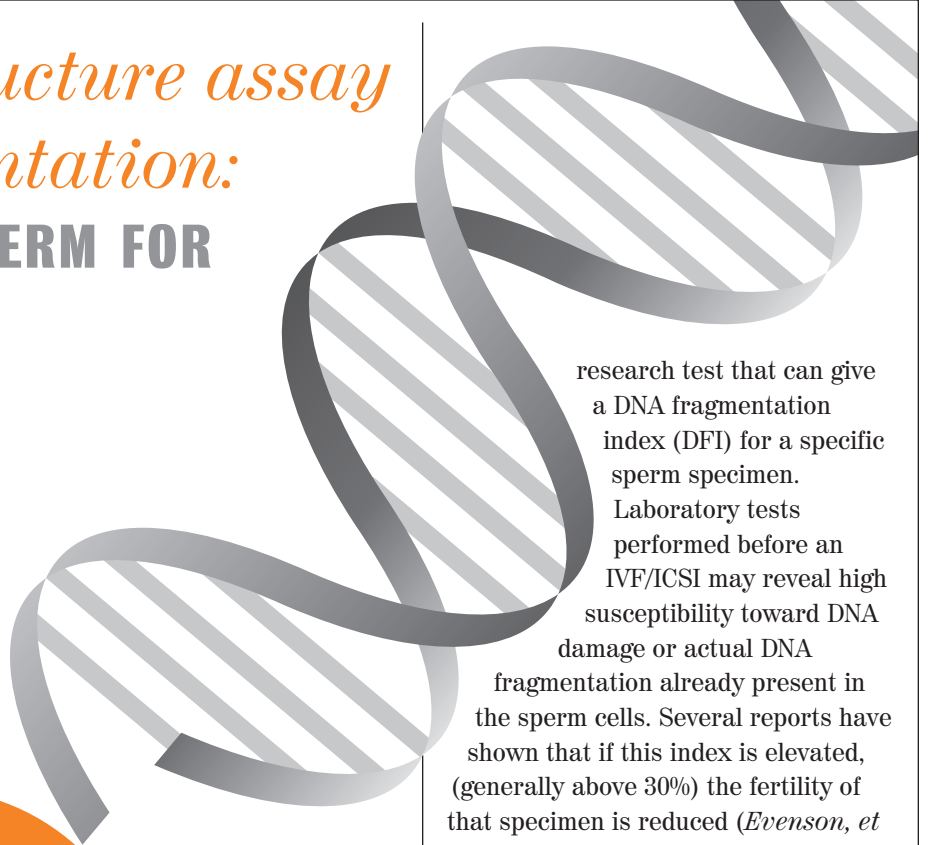
The sperm chromatin structure assay (SCSA) is a routinely performed

research test that can give a DNA fragmentation index (DFI) for a specific sperm specimen. Laboratory tests performed before an IVF/ICSI may reveal high susceptibility toward DNA damage or actual DNA fragmentation already present in the sperm cells. Several reports have shown that if this index is elevated, (generally above 30%) the fertility of that specimen is reduced (*Evenson, et*

*continued overleaf*

## Counselling for IVF Patients

Counselling helps couples deal with the stress of infertility and prepares them for the emotional highs and lows of treatment. IVF patients at LifeQuest will receive a minimum one hour counselling session from counsellor Sherry Dale, MSW. In the IVF counselling session, patients get the chance to ask questions, learn what to expect emotionally during IVF, and develop coping strategies. To book your IVF counselling session, please call the IVF reception desk at 416-506-0804. ♦



## Sperm DNA structure assay & DNA fragmentation, *continued*

al 2002). The SCSA detects DNA strands that are most possibly susceptible to be fragmented by external factors. Also detected is highly stainable DNA denoting altered packaging of the DNA, which is more likely to cause a problem in the resulting embryos compared to normally packaged DNA. It is important to note that most of the mentioned studies found this difference in men whose sperm samples were used for intrauterine insemination and cycle monitoring. When these specimens are used for ICSI the threshold can be above 30% since there have been pregnancies reported with sperm with high DFI's, (Zini, Meriano *et al* 2005, Virro *et al*, 2004). However an increased trend toward pregnancy loss was observed in the former study. Indeed, a "paternal effect" is demonstrated by embryos derived from sperm with elevated DFI, where normal preimplantation embryos are produced but fail to implant or abort soon after detection of HCG. (Tarozzi *et al*, 2007, Tesarik, *et al*, 2004). Although pregnancies are possible with specimens with high DNA damage, the rate of pregnancy does show a negative correlation with these specimens. In some cases a three month regimen of high antioxidant vitamins helps lower the percent of the sperm population affected by DNA damage. This, of course is under physician supervision.

**"Perfectly normal and healthy children have been born from embryos created with sperm with high DFI."**

Overall it is well accepted that "the paternal effect" is evident when specimens with high DFI are used for IUI and monitored timed intercourse. The use of such specimens in assisted reproduction (IVF and ICSI) should of course be discussed

fully with your physician so that all options and variables are understood. Perfectly normal and healthy children have been born from embryos created with sperm with high DFI. This fact however does not preclude the need for complete options and informed consent when using such gametes for insemination. We do know that sperm morphology does correlate with DNA integrity in most cases (Meriano, unpublished data) making our job a bit easier when choosing sperm for insemination with ICSI.

Testing the sperm for DNA damage is useful as a tool in the treatment of a couple for infertility when the "paternal effect" is demonstrated in a previous IVF cycle. Some physicians will routinely test for this parameter before infertility treatment so that this piece of information may actually influence the treatment for the couple. This

proactive approach is sometimes welcome when the DFI comes back high. However, as with all medical treatments and tests, information and education is of utmost importance to the patient receiving this treatment. It is important that the patient speak to the physician and asks many questions to know whether this testing or treatment is right for them. ♦

## Join IAAC

**Infertility Awareness Association of Canada**

**and Get Your Free Copy of Creating Families Journal**

**F**ormerly know as The IAAC Journal, *Creating Families* is IAAC's newest publication that deals exclusively with issues relating to reproductive health. IAAC is all about increasing awareness and understanding of infertility, not only for couples and families directly involved, but also for the general community. *Creating Families Journal* is a must-read.

To find out more about IAAC, or to get a copy of the publication, visit: [www.iaac.ca](http://www.iaac.ca)



QUEST

Centre for Reproductive Medicine

**When it's time,  
we're here.**

### LifeQuest Centre Downtown Toronto

655 Bay Street, 18th floor  
Toronto, Ontario, Canada M5G 2K4  
Tel: 416-506-0804 • Fax: 416-506-0600  
Toll Free: 1-866-543-3046  
Email: [info@itstime.ca](mailto:info@itstime.ca)  
[www.itstime.ca](http://www.itstime.ca)

### LifeQuest Centre Thornhill Clinic

7330 Yonge Street, Suite 218  
Thornhill, Ontario, Canada L4J 7Y7  
Tel: 905-731-5928 • Fax: 905-731-4563  
Toll Free: 1-866-543-3046  
Email: [info@itstime.ca](mailto:info@itstime.ca)  
[www.itstime.ca](http://www.itstime.ca)