

European Association of Urology – Press Release

DNA of sperm taken directly from testicles of infertile men is “as good as that of fertile men”, possibly opening way for new treatment

Type of study: not peer reviewed/experimental study/on human subjects

Published on: Mar 17, 2019

Scientists have found that sperm DNA from the testicles of many infertile men is as good as that of ejaculated sperm of fertile men. This may explain a major cause of male infertility and opens the possibility of using sperm taken directly from the testicles of these men; to overcome their infertility.

Infertility is a major public health issue. One couple in 6 is infertile across Europe¹, with male infertility now being the biggest cause in couples seeking treatment. Sperm DNA damage is known to be a major cause of male infertility and reduces a couple's chances of having a family. This study shows that on the journey from the testicles along the long series of ducts before ejaculation, sperm DNA can suffer major damage, some of which is due to oxidative stress.

In new research, presented at the European Association of Urology Congress in Barcelona, UK-based scientists detail how they took sperm samples from the testicles from 63 infertile men and matched them with ejaculated sperm samples produced the same men. These infertile men had failed previous fertility treatment (intracytoplasmic sperm injection; ICSI). The scientists also examined the sperm for two types of DNA strand breaks (single and double strand breaks) each in the testicular and ejaculated sperm. A group of 76 fertile volunteers also gave ejaculated sperm for comparison. The group measured the DNA damage using the Comet assay² which is able to measure double and single strand breaks separately.

According to the researcher, Mr Jonathan Ramsay (Consultant Urologist, Imperial College, London):

“When we looked at ejaculated sperm, we found that the extent of sperm DNA damage was much higher in infertile men than in fertile men, with roughly 15 % in fertile men, but 40% in infertile men. It wasn't a surprise to see greater DNA damage in ejaculates of infertile men. What we didn't expect was the consistency in these results when we looked at sperm taken directly from the testicles of infertile men, we found that it was of similar quality to that of ejaculated, fertile sperm.

The majority of DNA damage caused in transit from testicles to ejaculate is caused by oxidative stress, which causes DNA single but not double strand breaks. This occurs when the sperm is subjected to poor lifestyle habits such as poor diet, sitting at a laptop all day or smoking. Diseases such as Crohn's disease and Type 2 Diabetes also cause oxidative stress”.

Professor Sheena Lewis, Emeritus Professor Queens University Belfast and founder of ExamenLab Ltd:

“What this means is that the DNA in sperm from the testicles of infertile men are better quality than sperm from their ejaculates. This opens the way to taking sperm directly from the testes of men who have highly fragmented ejaculated DNA and failed cycles of treatment and trying to achieve fertility with this testicular sperm. We also noted in a subgroup that the amount of the more serious double stranded DNA breaks was lower in the sperm taken from testicles, so using these sperms is more likely to lead to an improvement in male fertility.

We need to be aware of what this study does and doesn't show. We can't yet prove that this sperm DNA damage is the main cause of male infertility or ART failure in these men, or that using testicular sperm directly would help improve their chance of getting pregnant, but the work certainly points in that direction."

Commenting, Professor Maarten Albersen (UV Leuven, Belgium. member of the EAU Scientific Congress Office) said:

"Couples who face an unfulfilled child wish due to male infertility often have to resort to assisted reproductive techniques, such as in-vitro fertilization (IVF) or intracytoplasmic sperm injections (ICSI). Success rates of these techniques per cycle are rather low and various factors influence these rates. In many European countries, one, or a low number of cycles is reimbursed meaning that couples should optimize their chances for success. In this study, a group from London shows that DNA integrity in infertile men is higher in testicular sperm than in ejaculated sperm."

As DNA integrity is believed to play a role in fertilization rates in assisted reproduction, these results may assist in the decision-making whether or not to resort to testicular biopsy/testicular sperm aspiration rather than using ejaculated sperm to enhance success rates of assisted fertilization in infertile men with signs of DNA damage. However, improved fertilization rates and baby-take home rates would need to be confirmed before adopting this alternate strategy."

Professor Albersen was not involved in this work, this is an independent comment.

1 (Human Fertilization and Embryology Authority. "Fertility treatment 2014–2016 trends and figures." (2018). <https://www.hfea.gov.uk/media/2563/hfea-fertility-trends-and-figures-2017-v2.pdf>

2 The Comet test is marketed by ExamenLab Ltd, which is a spinout company from Queens University, Belfast. Professor Lewis is the founder of ExamenLab Ltd. Mr Ramsay is an unpaid clinical adviser for ExamenLab Ltd, he has no financial interest in the company <https://examenlab.com/> No external or commercial funding was received for this work.