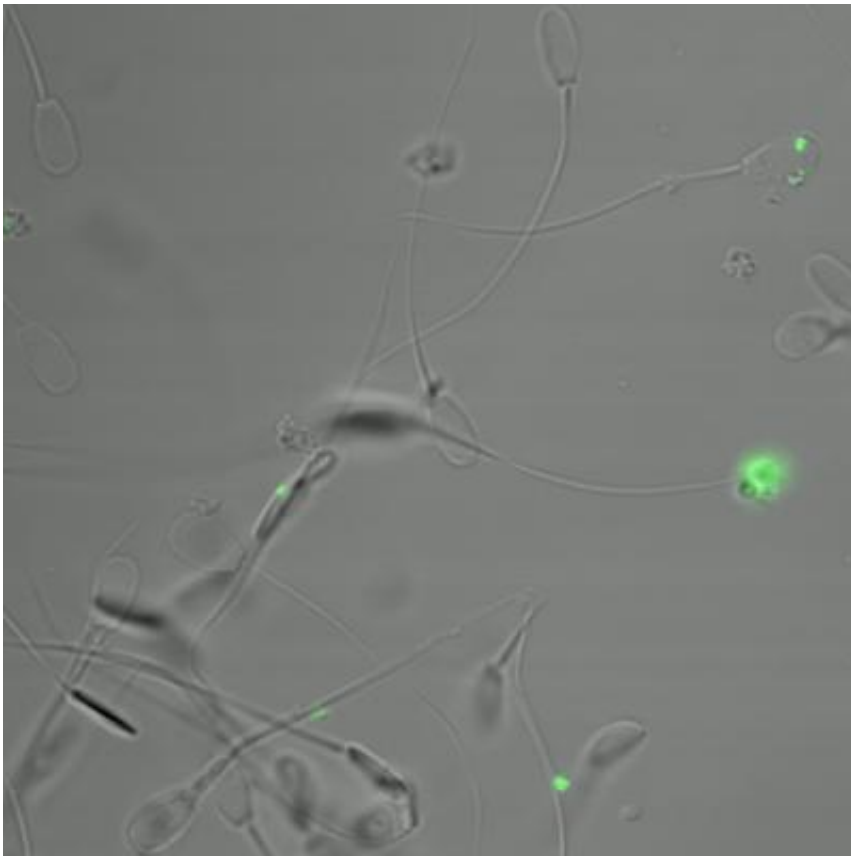


Nanoparticles to probe mystery sperm defects behind infertility

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This is boar sperm mixed with mesoporous silica nanoparticles that have been tagged with fluorescent green dye for identification. These nanoparticles were developed by Oxford University researchers to investigate 'mystery' cases of infertility. They can be loaded with any compound to identify, diagnose or treat the causes of infertility. Credit: Natalia Barkalina/Oxford University

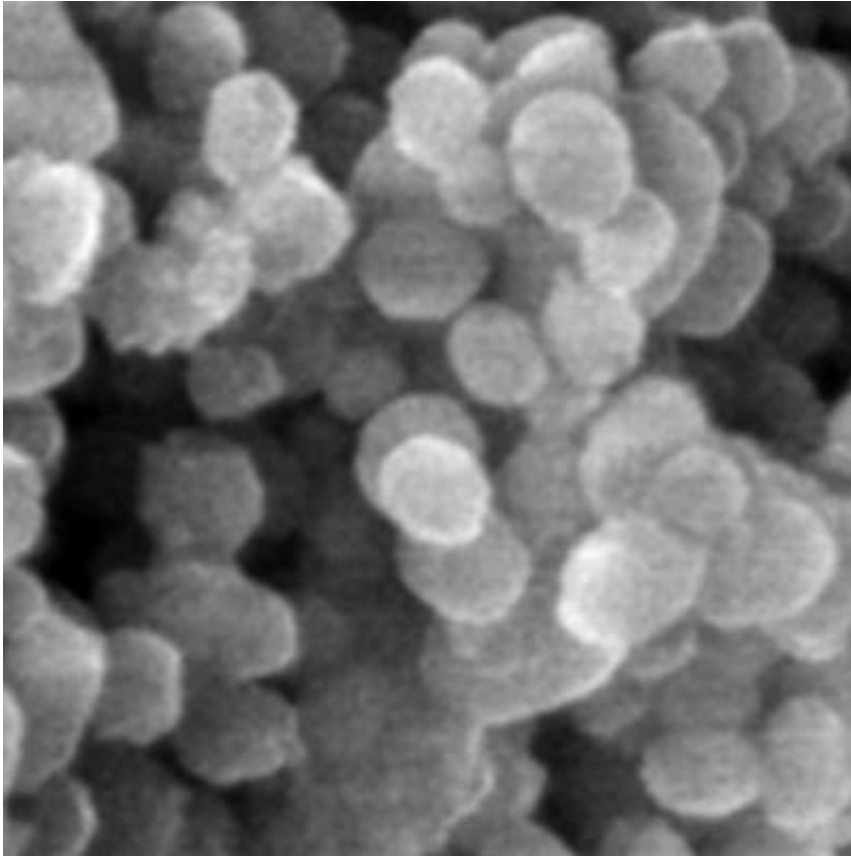
A way of using nanoparticles to investigate the mechanisms underlying 'mystery' cases of infertility has been developed by scientists at Oxford University.

The technique, published in *Nanomedicine: Nanotechnology, Biology and Medicine*, could eventually help researchers to discover the causes behind cases of unexplained infertility and develop treatments for affected couples. The method involves loading porous silica nanoparticle 'envelopes' with compounds to identify, diagnose or treat the causes of infertility.

The researchers demonstrated that the [nanoparticles](#) could be attached to boar sperm with no detrimental effects on their function.

'An attractive feature of nanoparticles is that they are like an empty envelope that can be loaded with a variety of compounds and inserted into cells,' says Dr Natalia Barkalina, lead author of the study from the Nuffield Department of Obstetrics and Gynaecology at Oxford University. 'The nanoparticles we use don't appear to interfere with the sperm, making them a perfect delivery vessel.'

'We will start with compounds to investigate the biology of infertility, and within a few years may be able to explain or even diagnose rare cases in patients. In future we could even deliver treatments in a similar way.'



This is a cluster of mesoporous silica nanoparticles under a scanning electron microscope. These nanoparticles, developed at Oxford University, can be inserted into sperm to investigate unexplained infertility cases. They can be loaded with compounds to identify, diagnose or treat infertility. Credit: Natalia Barkalina/Oxford University

Sperm are difficult to study due to their small size, unusual shape and short lifetime outside of the body. Yet this is a vital part of infertility research, as senior author Dr Kevin Coward explains: 'To discover the causes of [infertility](#), we need to investigate sperm to see where the problems start. Previous methods involved complicated procedures in animals and introduced months of delays before the sperm could be used.'

'Now, we can simply expose sperm to nanoparticles in a petri dish. It's so simple that it can all be done quickly enough for the sperm to survive perfectly unharmed.'

The team, based at the Institute of Reproductive Sciences, used boar sperm because of its similarities to [human sperm](#), as study co-author Celine Jones explains: 'It is similar in size, shape and activity. Now that we have proven the system in boar sperm, we hope to replicate our findings in human [sperm](#) and eventually see if we can use them to deliver compounds to eggs as well.'

The research was an interdisciplinary effort, involving reproductive biologists from the Nuffield Department of Obstetrics & Gynaecology and nanoscientists from the Department of Engineering Science led by Dr Helen Townley.

The study was funded by the Nuffield Department of Obstetrics & Gynaecology at Oxford University and the Engineering and Physical Sciences Research Council (EPSRC). This technique is the subject of patent applications held by Isis Innovation, Oxford University's technology transfer arm.

Provided by Oxford University

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