

Medical scientists discover potent method for improving drug-free fertility treatment

August 23 2016



UNSW Associate Professor Robert Gilchrist. Credit: University of New South Wales

For those facing infertility, IVF has long been the established option to have a baby. Now Australian and Belgian medical scientists have

discovered how to improve a woman's chances of becoming pregnant using a less invasive and cheaper alternative.

The innovation, which has already undergone pre-clinical testing, uses growth factors to enhance an existing fertility treatment known as in-vitro maturation (IVM). The result is improved [egg quality](#) and a 50% increase in embryos, with the use of minimal drugs.

The advance has significant implications for [infertility](#) treatment and fertility preservation worldwide.

While standard in-vitro fertilisation (IVF) requires women to take follicle stimulating hormones (FSH) to stimulate egg cell (oocyte) growth before they are removed from the ovary, IVM retrieves eggs while they are still in the immature stage, and brings them to maturity in cell culture. This is achieved with minimal hormone stimulation. Until now, most clinicians have recommended IVF because pregnancy rates after IVM have been lower.

While the use of hormone drugs for conventional IVF is a proven fertility treatment, its use comes with significant discomfort for the patient, some medical complications and is expensive to patients and Australia's healthcare system.

An international research team, led by UNSW Associate Professor Robert Gilchrist, has enhanced the IVM process by adding a combination of a growth factor (cumulin) and cAMP-modulators (small signalling molecules) to the egg cells. Associate Professor Gilchrist's team recently discovered cumulin and his laboratory is one of only two worldwide that make it.

"The aim of our research has been to restore as far as possible, the natural processes that occur during egg maturation," said Associate

Professor Gilchrist, who is based at UNSW's School of Women's and Children's Health.

"We have demonstrated that it is possible to improve egg quality and embryo yield with next to no drugs, using potent [growth factors](#) produced by the egg."

The innovative technique, which is awaiting US Food and Drug Administration approval, has been 15 years in the making. It is the result of a long partnership between Associate Professor Gilchrist and the University of Adelaide (where he was based previously), UZ Brussel at Vrije Universiteit Brussel (VUB), Belgium and Cook Medical.

In published research, initial experiments using the technique in pigs showed an improvement in egg quality and a doubling of the embryo yield compared to the existing IVM method. In a pre-clinical trial on human eggs, conducted by Professor Johan Smitz from VUB's Follicle Biology Laboratory in Brussels, the researchers likewise found an improvement in egg quality and a 50% increase in embryo yield.

Associate Professor Jeremy Thompson, from the University of Adelaide's Robinson Research Institute, said the new technique is a significant advance in fertility research.

"While the enhanced IVM treatment is not currently available as a [fertility treatment](#) option, if it is accepted into clinical practice it will remove the need for a woman to inject herself with high doses of hormones for up to 12 days," Associate Professor Thompson said.

"Most importantly, it could give a woman almost the same chance of becoming pregnant as with hormone-stimulated IVF," Associate Professor Thompson said.

Professor Michel De Vos (UZ Brussel) said the use of IVM also reduces the risk of ovarian hyperstimulation syndrome (OHSS) to zero.

"Young women facing cancer treatment, who wish to preserve their fertility but often don't have time to freeze their eggs, will also benefit from this breakthrough," Professor De Vos said.

The researchers are currently conducting safety studies to ensure that altering the conditions of egg maturation using this enhanced IVM technique does not affect the long-term health of offspring.

More information: David G. Mottershead et al. Cumulin, an Oocyte-secreted Heterodimer of the Transforming Growth Factor- β Family, Is a Potent Activator of Granulosa Cells and Improves Oocyte Quality, *Journal of Biological Chemistry* (2015). [DOI: 10.1074/jbc.M115.671487](https://doi.org/10.1074/jbc.M115.671487)

Provided by University of New South Wales

Citation: Medical scientists discover potent method for improving drug-free fertility treatment (2016, August 23) retrieved 27 April 2024 from <https://medicalxpress.com/news/2016-08-medical-scientists-potent-method-drug-free.html>

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