

Hormone discovery marks breakthrough in understanding fertility

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Credit: University of Nottingham

Scientists at The University of Nottingham have shown, for the first time, that a naturally occurring hormone plays a vital part in regulating a woman's fertility, a discovery that could lead to better diagnosis and treatment of infertility.

Research by Associate Professor Ravinder Anand-Ivell, Professor Richard Ivell and Yanzhenzi Dai in the School of Biosciences has been published in the online journal *Frontiers in Physiology*. It has revealed that an insulin-like peptide [hormone](#) INSL3 made within the ovary plays an essential role in orchestrating and coordinating the growth and development of ovarian follicles and the eggs contained in them.

Associate Professor Anand-Ivell led the study and said: "This research is breaking new ground in the understanding of [female fertility](#) and reveals that this hormone plays a crucial role in the fertility of women. Previously the role of this hormone has been fairly unknown especially after birth, with studies focusing on its function in the male fetus.

While it has long been known that ovarian [steroid hormones](#), such as estrogens play an important part in the reproductive process, this new work shows that INSL3 is just as important in regulating a woman's fertility."

Crucial role

Theca cell INSL3 is made in small amounts in the ovaries of women of reproductive age and plays a crucial role in the ability of the follicles containing the egg cells to make and regulate steroid hormones, particularly androgens.

A significant finding of this study is that some of these so-called androgens then act within the ovary predominantly like an estrogen and work together with the pituitary hormones to create a feedforward loop effect promoting the healthy growth and development of follicles.

Professor Anand-Ivell continues: "Having a more in depth understanding of female fertility will pave the way for better treatment and diagnosis of infertility and we have had feedback from clinicians who are very excited about what this research represents in terms of the future of fertility treatment. For example, this new evidence suggests that INSL3 could be involved in the hormone imbalance associated with [polycystic ovarian syndrome](#), which affects a very large number of women of reproductive age."

Translational research

Professor Ivell and Associate Professor Anand-Ivell began looking at INSL3 more than 15 years ago as a hormone produced by the testes of adult men and animals and since then they have published several important pieces of research, each providing a better understanding of the role this hormone plays in the reproductive system and elsewhere.

The present research was carried out using ovarian tissue from cows as one of the best model systems to study human female fertility, and with relevance to pregnancy in all mammals.

Professor Anand-Ivell added: "Infertility affects so many areas of society, in humans the cost is very much social and emotional, but in livestock species there is a very real economic cost to breeding

problems. Studying INSL3 in such depth is getting us ever closer to understanding the root causes of infertility. So far, pharmacological approaches in fertility and contraception have been targeting the ancient hormone systems, such as the gonadotropins or steroid hormones. By targeting newer hormone systems like INSL3 we may be better and more specifically able to address the special mammalian aspects of reproductive physiology."

More information: Yanzhenzi Dai et al. Theca Cell INSL3 and Steroids Together Orchestrate the Growing Bovine Antral Follicle, *Frontiers in Physiology* (2017). DOI: [10.3389/fphys.2017.01033](https://doi.org/10.3389/fphys.2017.01033)

Provided by University of Nottingham

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