

Immune cells essential to establishing pregnancy

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New research from the University of Adelaide shows for the first time that immune cells known as macrophages are critical to fertility by creating a healthy hormone environment in the uterus.

Laboratory studies led by researchers in the University's Robinson Institute have shown that macrophages play an essential role in production of the hormone progesterone, which is crucial for embryo implantation and the initiation of pregnancy.

Results of the study, which will be published online today by the *Journal of Clinical Investigation*, could lead to new insights into how to treat infertility in women.

"Previous research has demonstrated that macrophages are prevalent in reproductive tissues, but this is the first time that their absolute necessity for pregnancy has been demonstrated," says the leader of the project team, Professor Sarah Robertson, NHMRC Principal Research Fellow and member of the University's Robinson Institute.

"Macrophages organize the development of blood vessel networks in the ovary required for production of progesterone, which is the major hormone for initiating pregnancy."

The researchers have found that insufficient numbers of macrophages leads to reduced production of progesterone, which results in embryos implanting poorly or not at all, and can manifest later as miscarriage.

"The contribution of macrophages to the healthy vascular structure of the corpus luteum, which must develop rapidly in a matter of days to produce high levels of progesterone, was a surprise," Professor Robertson says.

"This is the first time that we have understood how pivotal macrophages are for conception and establishing pregnancy.

"Environmental factors such as infection, obesity and stress all contribute to inflammatory responses and affect the generation and function of macrophages in women. This could therefore impact on the macrophages' ability to support pregnancy," she says.

However, the laboratory studies showed that treatment with progesterone could reverse the effects caused by reduced levels of macrophages.

"Insufficient progesterone is one reason for infertility in some women," Professor Robertson says. "Infertile women are now routinely provided with progesterone supplements as part of their assisted reproductive treatments, and this is also a promising therapy for recurring miscarriage."

But ultimately the researchers hope to improve fertility by more natural means. "If macrophages are shown to play the same role in women as we've seen in our laboratory studies, this gives us potential new avenues for targeting them with lifestyle and nutritional intervention, improving fertility by advancing the quality of the conception environment."

More information: Macrophages regulate corpus luteum development during embryo implantation in mice, *J Clin Invest*.

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