White blood cell treatment could prevent leading cause of fetal death

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Treating a type of white blood cell using hormones could improve the development of the placenta in women with pregnancy complications, according to early research led by Queen Mary University of London (QMUL) involving mice and human blood samples.

Pre-eclampsia is a condition in some pregnant women that results in poor maternal blood vessel development in the placenta, leading to poor foetal growth. According to the World Health Organization, it is one of the leading causes of maternal and foetal morbidity and mortality in both the developed and developing world, occurring in 2-8 per cent of all pregnancies.

The study, funded by the Wellcome Trust and British Heart Foundation and published in *Proceedings of the National Academy of Sciences*, looked specifically at neutrophils - short-lived white blood cells that act as the first line of defence in infections - and discovered a new role for them in maintaining a healthy pregnancy.

The researchers studied and compared the blood from healthy and pre-eclamptic pregnant women. In the healthy women's blood, they saw that neutrophils interacted with T-cells - another type of white blood cell essential for the immune system. In contrast with the healthy pregnancies, the neutrophils failed to interact with the T-cells in the blood from pre-eclamptic women.

The authors suggest that there are signs that, in healthy pregnancies, neutrophils play a role in helping the T-cells to promote blood vessel growth and give rise to normal placental development, suggesting that this could be a potential therapeutic target for pregnancy complications.

In tests outside of the human body, the team treated the neutrophils from pre-eclamptic women with pregnancy hormones progesterone and estriol, and found that they were able to begin normal interactions with their T-cells.

Further tests in pregnant mice with pre-eclampsia found that if neutrophils underwent the same hormone treatment, and were re-infused into the mouse, placental development began to return to normal.

Study author Dr Suchita Nadkarni from QMUL said: "Although we're a long way off and need to confirm these results in a much larger cohort of patients, this could eventually form part of therapy for pregnancy complications. If we could replicate in humans what we've done in mice, and re-introduce the treated neutrophils back into their blood, we may see normal placental development in pregnant women diagnosed with

pre-eclampsia.

"In the meantime, however, these results give us a much better insight into how the maternal immune system works during pregnancy, and why in some cases it might not work and lead to complications."

More information: Neutrophils induce proangiogenic T cells with a regulatory phenotype in pregnancy, *PNAS*, www.pnas.org/cgi/doi/10.1073/pnas.1611944114

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