Pregnant sheep considered in pre-term birth study

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Prof Kemp says up to 60 per cent of preterm human babies born before 30 weeks gestation have inflammation of their fetal membranes or chorioamnionitis.Image: Stuart_Handy

Scientists are a step closer to understanding how bacterial infections in pregnant women lead to pre-term births—the main cause of neonatal death and disease in Australia.

University of Western Australia researchers have discovered that bacterial infection in a pregnant sheep's uterus quickly triggers an immune response in her unborn lamb's spleen, causing long-lasting inflammation in the fetus.

The immune system responds to infection with inflammation and both are linked to pre-term births in humans.

The spleen plays an important role in activating the immune system.

But little is known about how a developing fetus' immune system copes with inflammation in the amniotic fluid or which organs spark the initial immune response.

UWA School of Women's and Infants' Health Assistant Professor Matthew Kemp says this is the first time researchers have studied how an unborn lamb's spleen responds to inflammation of the uterus.

"The primary implication of this study was that intrauterine exposure to bacterial agonist in fetal sheep results in a lasting systemic inflammatory response, including changes in T-cell and cytokine profiles in the spleen," A/Prof Kemps says.

"This data brings us closer to developing much needed therapies for preterm birth."

Merino ewes considered as part of study

Prof Kemp and his team injected 37 pregnant merino ewes with Escherichia Coli bacteria at different times over 15 days.

The sheep were carrying single lambs and were 125 days pregnant—the equivalent of 28 to 32 weeks in humans.

"In the model system used in this study, intra-amniotic administration of E.coli lipopolysaccharide induced a large, statistically significant change in the inflammatory profile of the fetal spleen that persisted for an extended period of time," Prof Kemp says.

The team, which included Dutch and American researchers, found immune proteins, called cytokines, in the fetus' spleen changed after just five hours and lasted up to 15 days.

Prof Kemp says up to 60 per cent of preterm human babies born before 30 weeks gestation have inflammation of their fetal membranes or chorioamnionitis.

Infection in the uterus is linked to respiratory, visual, gastrointestinal and neurological problems

such as cerebral palsy, in babies.

The research was part of the world's largest and longest running perinatal sheep research program.

Prof Kemp says the federally funded, 25-year study involves researchers from across the globe and their work on antenatal steroids, antimicrobial therapies in pregnancy, fetal inflammation and neonatal ventilation in sheep is translated to human treatments.

More information: "Responses of the spleen to intra-amniotic lipopolysaccharide (LPS) exposure in fetal sheep." *Pediatr Res*. 2014 Oct 6. DOI: 10.1038/pr.2014.152. [Epub ahead of print]

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