

## Placental Research

### Research overview

The Placental Research Group is interested in the immunology and microbiology of the placenta (and attached fetal membranes) and their roles in pregnancy complications such as preterm birth. It also has a focus on the placenta/placental membranes as a target for drug therapies. The group has links with the UWA Schools of Anatomy, Human Biology & Physiology, Medicine & Pharmacology, UWA Large Animal Facility, the Centre for Strategic Nano-fabrication, UWA, The Perinatal Research Centre at Melbourne's Royal Women's Hospital, the National Center for Nanoscience and Technology in Beijing, China, and Prince Henry's Institute, Sydney.

### Research highlights

The analysis of the data from our NHMRC-funded *Placental Inflammation Study* was completed over the course of the year. This study, led by Dr Ireland, found that two selective anti-inflammatory drugs were capable of suppressing inflammation in fetal membranes delivered preterm following preterm labour. One of the drugs was also shown to be moderately effective in a pregnant sheep model when given intra-amniotically. The findings are being assembled for publication and further preclinical studies are planned to pave the way for clinical trials. Dr Ireland's studies into maternal and placental immunological responses to Ureaplasma infection have also commenced, aided by visiting immunologist Dr Jain Xiao from GuangXi University of Chinese Medicine in Nanning, China.

### Research achievements

Our studies of the transplacental passage of *solithromycin*, an exciting new macrolide antibiotic, were published in the journal *Placenta*. Solithromycin efficiently crosses the human placenta, and hence is the first macrolide antibiotic capable of being administered in pregnancy for the treatment of intraamniotic and fetal infections. A combination of solithromycin and anti-inflammatory drugs is a promising therapy for the prevention and treatment of infection-driven preterm birth.

PhD candidate, Joan Leong refined her techniques for preparing drug-loaded nanoparticles that specifically target the placenta. Placental therapies are not currently available clinically, despite the role of the placenta in many major pregnancy complications. Studies in an animal model are about to get underway to explore the efficacy of the nanoparticles in delivering drugs selectively to the placenta. Sarmah Bin Nayeem completed his studies on Wnt signaling in the placenta, submitted his thesis and was awarded his MPhil this year. Finally, Lisa Stinson rejoined the team after two years overseas to commence her PhD studies on the fetal microbiome and its relationship to placental and amniotic bacterial colonisation.

The group has 19 publications in the last year, including several major reviews. Both Prof Keelan and Dr Ireland presented the group's work at national and international conferences throughout the year.

## THE TEAM

### Chief Investigator

Prof Jeffrey Keelan PhD FSRB

### Senior Investigator

Dr Demelza Ireland PhD

### Researchers

Sarmah Bin Nayeem MSc

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### Sponsors

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