

## Predict 1000

Researchers at The University of Western Australia's (UWA) School of Women's and Infants' Health have had a long-standing interest in understanding the causes of preterm birth, in particular the role of bacterial infection.

Over the past three decades it has become clear that about one quarter of all preterm deliveries are caused by bacterial infections in the womb.

The amniotic cavity – the inside of the womb containing the amniotic fluid and growing fetus – is usually free of harmful bacteria.

A few bacteria may be present in the fluid and placenta, but these appear to be 'harmless passengers'.

In some cases, however, bacteria manage to colonise the amniotic fluid and proliferate dramatically, triggering the mother's and baby's immune systems to produce chemicals to

and kill the infection. Ironically, it is this very reaction (called an inflammatory response) that triggers preterm labour and birth.

The problem is particularly common in extremely preterm deliveries – those more than two months premature.

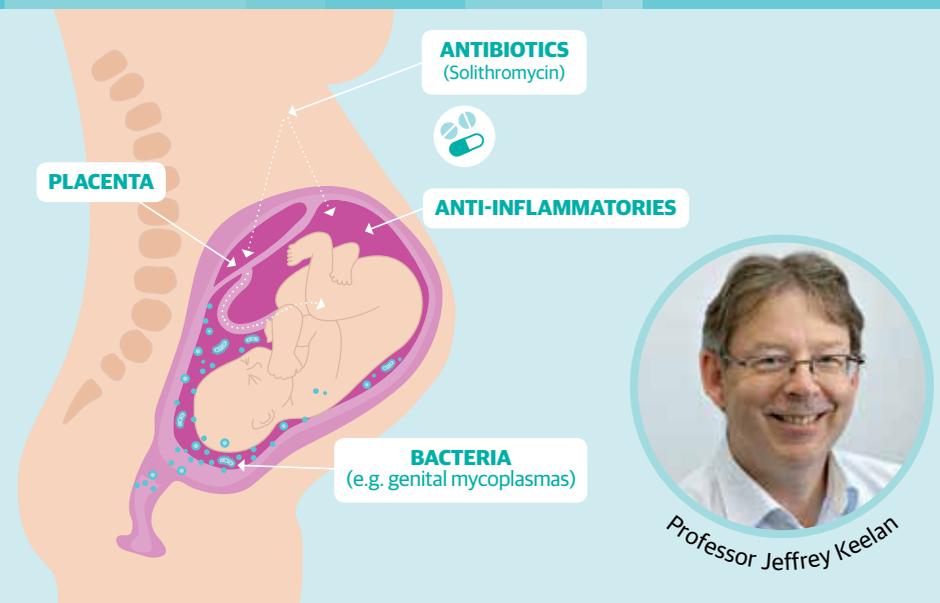
Exposure of the fetus to the bacteria and the inflammatory response in the womb is known to be linked to organ damage and a number of serious illnesses that can have lifelong consequences.

It is very hard for doctors to detect this until after birth, by which time the damage is done.

Many different types of bacteria have been found in the amniotic cavity of preterm deliveries, although the most common by far is a tiny bacteria called Ureaplasma.

This bacteria is present in about half of all Australian women in pregnancy, usually without causing any symptoms or problems.

It uses urea, a chemical found in urine, as a source of energy, which is probably why it seeks out and colonises the amniotic fluid (which is mostly composed of fetal urine).



## Important research underway

So, why do some women deliver preterm with a severe inflammatory reaction to amniotic Ureaplasma infection, while most do not?

Can they be identified early in pregnancy and receive antibiotic treatment to prevent preterm birth?

These and related questions are being investigated by a team of researchers led by Professors Jeff Keelan and John Newnham of the UWA School of Women's and Infants' Health at King Edward Memorial Hospital in Subiaco.

One of the researchers in the team, Dr Demelza Ireland, is attempting to develop a blood test that will identify women with Ureaplasma colonisation who are at risk of developing a harmful inflammatory reaction.

She is working on the theory that women who deliver preterm have a distinct immune response to Ureaplasma and that this can be picked up by measuring levels of antibodies and white blood cells in the blood.

The advantage of a blood test is that it would be cheap and simple to perform, plus the treatment would be a short course of antibiotics – again, simple and inexpensive.

Her preliminary results are encouraging, although the final results are still some way off.

Another team member, Dr Matt Payne, is exploring a different approach.

He is analysing the bacterial signature of 1000 women in mid-pregnancy to attempt to identify a microbial profile that predicts high risk of delivering preterm.

Researchers now know that microbes that live in the body exist as communities, often consisting of hundreds of different species, each occupying a niche and performing a distinct role in that particular body site.

Dr Payne's research will analyse the various bacterial communities that live in the vagina during pregnancy to identify a community type, or a specific set of bacteria, that are likely to lead

to infection of the womb and preterm birth.

Recruitment for the study (called 'Predict 1000') started in 2015 and is due to be completed at the end of this year.

Professor Keelan and his team are also working on a new antibiotic, called solithromycin, for use in pregnancy for the prevention of preterm birth. Solithromycin belongs to a class of antibiotics called macrolides.

Macrolides have been used for decades in pregnancy and are safe and effective antibiotics.

However, most macrolides have difficulty crossing the placenta, so when given to the mother they may not be able to treat an infection in the fetus or the amniotic cavity. Professor Keelan recently found that solithromycin is the first macrolide antibiotic capable of efficiently crossing the placenta, reaching high levels in fetal blood and amniotic fluid after a single maternal dose.

This breakthrough discovery could lead to new and effective treatments for bacterial infections in pregnancy.

Solithromycin is particularly good at killing Ureaplasma and related bacteria, which are often insensitive to many other antibiotics.

It also kills many antibiotic-resistant bacteria, plus it may also have anti-inflammatory properties.

Trials of solithromycin in pregnancy are planned for later this year.

The team hopes that within five years to have developed a comprehensive program of risk identification and treatment that could dramatically reduce the numbers of infection-driven preterm births in WA and around the world.

**Professor Jeffrey Keelan**

Head of Research,  
Women and Newborns Health Service

## Caring for your baby should begin before you know it's there

The first 6-8 weeks after conception are critical for a baby's development including growth of its vital organs. Yet most women don't know they are pregnant until after their baby starts to grow and develop.

It can take time to build the higher level of nutrients your body will need to support you and your growing baby. So it's important to start taking Elevit at least a month before you start trying to fall pregnant.

Elevit contains essential nutrients for baby's healthy development including folic acid, iron and iodine. Folic acid is clinically proven to reduce the risk of neural tube defects like spina bifida.<sup>1</sup> Iron helps prevent dietary iron deficiency and iodine is important for your baby's brain development.

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