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Media Release

Artificial womb rewrites its own record books

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A major milestone in technology based around the use of an artificial womb is further matching this pioneering medical intervention to those that will one day require it – extremely premature babies.

Recently published in the leading medical publication, The American Journal of Obstetrics & Gynecology (AJOG), the study presents world-first data demonstrating the ability of an artificial placenta-based life support platform to maintain extremely preterm lamb fetuses exposed to intrauterine inflammation.

Head of WIRF's Perinatal Research Laboratories and Local Chief Investigator, Professor Matt Kemp, said that whilst previous research had demonstrated the feasibility of extended survival with artificial placenta technology in late preterm fetuses, there was no published evidence that demonstrated the use of the platform to support extremely preterm fetuses compromised by exposure to intrauterine inflammation.

"It is important to remember that the unborn preterm babies that we anticipate requiring this technology in the future will not be from healthy pregnancies and they will most likely have other major compromising conditions," Prof Kemp said.

"Intrauterine inflammation is a common antecedent of extremely early preterm birth and is associated with adverse outcomes.

"We want the technology and medical interventions that we are designing to align as closely as possible to the clinical need which we see as essential for any future clinical application."

The AJOG study maintained eight extremely preterm fetuses (600-700g) - equivalent to a human fetus at 24 weeks of gestation - for a pre-determined period of 5 days. Biological parameters and cardiovascular performance were largely equivalent to in utero controls and there was no identification of infection or additional injury.

"Our data highlights key challenges to be overcome in the development and use of artificial placenta technology for extremely early preterm infants which include: refractory hypotension, growth restriction and brain injury," Prof Kemp explained.

"As such challenges appear largely absent from studies based on healthy pregnancies, additional experiments of this nature using clinically relevant model systems are essential for further development of this technology and its eventual clinical application."

Preterm babies are not simply undersize or underweight—they are underdeveloped in very important ways.

Often, their lungs are too small and their hearts not strong enough to function properly. This is especially true for extremely premature babies, who still need gas and nutrient exchange through the placenta in order to grow, which means it's hard for them to live on their own.

The Artificial Womb was designed to revolutionise the treatment of severely premature newborns. The goal is to offer a bridge between a natural womb and the outside world to give babies born at the earliest gestational ages more time for their fragile lungs to mature.



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The project brings together leading academic researchers from the Women and Infants Research Foundation, The University of Western Australia and Tohoku University Hospital, Japan, and is undertaken in close partnership with one of Japan's foremost biomedical technology companies, Nipro Corporation.

Perth-based researchers, including Visiting Fellow and project development head Dr Haruo Usuda, work year-round with researchers from Tohoku University Hospital in Sendai (led by Prof Masatoshi Saito and Dr Shimpei Watanabe) and the Artificial Placenta Development Team at Nipro Corporation in Osaka (led by Mr Shinichi Kawamura).

The AJOG paper is the latest in a long list of achievements for the research project which includes:

- Achieving a perfect score by the key driver of health and medical research in Australia (NHMRC) placing it in the top 0.1 per cent of all national projects,
- Recognised as one of the Top 10 Science Stories of 2017 by the Australian Science Media Centre
- Featured at the 2018 Ars Electronica Festival in Linz, Austria.

This work has been supported by the Channel 7 Telethon Trust, the Department of Health, Government of Western Australia, Nipro Corporation, the Women & Infants Research Foundation and the National Health and Medical Research Council.

The paper, *Successful use of an artificial placenta-based life support system to treat 1 extremely preterm ovine fetuses compromised by intrauterine inflammation* has been published online at [The American Journal of Obstetrics & Gynecology](#).

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Media opportunity:

Professor Matt Kemp is the Head of WIRF's Perinatal Research Laboratories and is available for interview and follow-up media comment. You can view his [WIRF researcher profile here](#).

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Background:

The Women and Infants Research Foundation

The Women & Infants Research Foundation is one of Australia's leading medical research institutes dedicated to improving the health of women and infants. We focus our research and programs across four principal areas: the prevention of preterm birth, gynaecological cancers, women's mental health, and the development of an Artificial Womb. Our research and programs have directly contributed to a number of improved clinical practices and health outcomes.