

## Facts about EVE Therapy and extreme preterm birth

### FAQs about EVE Therapy – The Artificial Womb

- An artificial womb has been successfully used to incubate healthy baby lambs for a period of one week. It is hoped the technology will one day be able to do the same for extremely premature babies born at the border of viability (22-23 weeks).
- Preterm lambs were successfully maintained in a healthy, infection-free condition with significant growth, for a period of one week using *ex-vivo* uterine environment (EVE) therapy. Current lab-based trials are hoping to extend this timeframe to a three week period.
- EVE therapy is designed to prevent the severe morbidity suffered by extremely premature infants by potentially offering a medical technology that does not currently exist. It does not intend to replace the perfect environment for a fetus that is a mother's womb, rather provide a safe and developmentally appropriate alternative for cases where extreme premature birth is inevitable.
- The research team believed that one means of improving outcomes for this group would be to treat them as a fetus rather than a small infant.
- The lungs of extreme premature babies are often too structurally and functionally under-developed for the baby to breathe easily.
- The end goal is to provide preterm babies the chance to better develop their lungs & other important organs before being born. And with it avoid the prospect of life-long health issues and disability.
- The research collaboration's close partnership with one of Japan's foremost biomedical technology companies, Nipro Corporation, is significant as it represents a clear pathway for moving the results beyond the laboratory and into clinical use.
- The equipment is essentially is a high-tech amniotic fluid bath combined with an artificial placenta. Put those together, and with careful maintenance, you've got an artificial womb.
- The artificial womb system is driven by the fetal heart. Gas exchange is performed by passive diffusion across large a gas exchange membrane in each oxygenator. There are air/oxygen hoses connected to each block, along with a gas exhaust. In this system, carbon dioxide is exchanged for oxygen. The fetus performs its own filtration. We run a battery of infusions into the animal at any given time.

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- Those born at the earliest gestational ages may suffer from severe and life-long problems such as cerebral palsy, developmental delay or blindness. For those born at a later gestation, even approaching full-term, there may be behavioural and learning problems.
- In WA alone, nearly 3000 babies are born preterm each year – approximately 1 in 12 pregnancies ends preterm. Rates of preterm birth among Aboriginals populations are approximately double.
- Preterm birth is the single greatest cause of death and disability in children up to five years of age in the developed world. Worldwide, an estimated 15 million babies are born preterm each year. In 2015, preterm birth was responsible for nearly 1 million deaths.
- Immediate care for a single newborn with a birth weight of less than 750 grams typically costs the WA health system \$216,000 and in the range 1.5kg – 2kg around \$59,000.