

## **Preliminary Design of an Artificial Placenta (AP)**

Preterm birth affects approximately 8% of pregnancies in Canada and is a leading cause of newborn morbidity and mortality. Despite significant medical advances, extreme prematurity (delivery between 23-32 weeks gestation) and associated invasive therapies necessary to support the transition of underdeveloped organs continue to result in severe injury, including chronic lung disease, loss of vision (retinopathy of prematurity), brain (intraventricular) hemorrhage and injury (periventricular leukomalacia), and sepsis. Development of an artificial placenta has been postulated as an ideal solution to promote fetal development in a protective environment that mimics the womb, maintains usual fetal physiology, avoids toxic exposures and biotrauma, and facilitates delivery at a physiologic-appropriate age.

In this project we aim to develop preliminary design of a physical AP enclosure that mimics the structure and function of the biological placenta that allows for easy transition into the AP enclosure, fetal growth and movement, allows direct observations and monitoring, and permits fetal interventions if needed.