PhD Opportunity in Engineering / Fetal Medicine

This project will see the PhD student working with a team across both Engineering and Medicine. You will join Prof Tracie Barber (in Mechanical Engineering) and Prof Alec Welsh (Royal Hospital for Women) to work on a project that will have direct clinical impact.

Unexplained stillbirth has devastating consequences; a significant proportion are secondary to poor placental blood flow for which there are currently no adequate screening or diagnostic tools. Placental function and blood flow are very closely linked, though their precise relationship is unclear.

We have developed and validated an ultrasound imaging tool called Three-Dimensional Fractional Moving Blood Volume (3D-FMBV) to non-invasively measure regional perfusion. Previous experimental work from our group has shown an excellent correlation between 3D-FMBV and accepted ‘gold-standard’ measurements of blood flow (perfusion). We believe that 3D-FMBV is the first bedside non-invasive rapid assessment tool for blood flow within the fetus and placenta. This therefore represents the first time that we can evaluate the fetus ‘at risk’ of acute or chronic impairment which may lead to stillbirth.

In this proposed study we wish to determine the feasibility and repeatability of 3D-FMBV to evaluate fetal wellbeing by means of evaluating perfusion to the fetal brain, liver and kidney as well as to the placenta (globally and regionally). We intend this to be further developed in future studies to determine normal ranges for such perfusion measures and eventually to create a tool for routine third trimester pregnancy evaluation.

The project will involve working with our medical team to gain patient data, using our novel free-hand tracked ultrasound system and using analysis tools including machine learning to understand and predict blood flow characteristics. As well as excellent engineering analysis knowledge, you will need to have good hands-on skills and excellent communication as you will be working with hospital staff, medical students, and patients.

Contract Tracie for more information t.barber@unsw.edu.au