

Healthy diet, healthy pregnancy: stem cell approaches to modulate placental hormones and improve pregnancy outcomes

Supervisory team:

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Host institution: Cardiff University

Project description:

Pregnancy is where human life begins and where we can make the most effective changes to improve the health not only of the mother and her child, but also for future generations. We are studying placental lactogen which is a hormone vitally important for a healthy and successful pregnancy. Placental lactogen induces adaptations in the mother ensuring the availability of nutrients to support the growing fetus and the newborn, in the form of milk. Placental lactogen is also key to maternal behaviour priming mothers are ready for their new nurturing role when the baby is born. Unsurprisingly, insufficient placental lactogen is associated with low birth weight babies and we have reported that low placental lactogen is present in pregnancies where women report significant symptoms of anxiety and depression.

Our research is now focused on understanding how this pregnancy hormone is affected, positively or negatively, by maternal factors such as diet. We, and others, have discovered that women who are obese and those consuming unhealthy diets have lower levels of placental lactogen. Obese mothers are at higher risk of mental health problems and children born from obese mothers are at higher risk of cognitive problems and developmental delay. Conversely, women consuming health conscious diets appear to be protected against low hormone levels, and are also less likely to deliver a low birth weight baby or to experience poor mental health. Despite these robust associations, we do not know what causes low placental lactogen in pregnancy. This project will combine human cohort data analysis, in vivo experimental models and human stem cell work to investigate how placental lactogen levels are affected by factors such as obesity and diet. Critically, the student will determine whether low placental lactogen is caused by either obesity or the fatty acid components of a high fat diet, and whether factors such as polyunsaturated fatty acids can protect against low pregnancy hormones. This work is important because if we can understand how diet influences the production of this important hormone, we can develop interventions to improve health and wellbeing of both mothers and their children across their life course, reducing the need for medical and social intervention – a key priority of our funders UKRI BBSRC.

Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.