

Epigenetic consequences of placental restriction and dietary methyl supplementation

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Poor growth before birth is often caused by poor development and function of the placenta, which delivers nutrients from the mother to the growing fetus. The supply of particular nutrients, including methyl donors, is important for chemical modifications to DNA, which affect gene transcription and can persist into later life. These epigenetic changes are thought to contribute to long-term increased disease risks, such as diabetes and obesity, in the baby who grew poorly before birth. We have shown that surgical restriction of placental growth and function (PR) produces similar long-term outcomes as poor growth before birth in humans, including impaired insulin secretion and diabetes. As part of a larger NHMRC-funded study, we are testing whether feeding the mother extra methyl donors in the diet can improve outcomes in the growth-restricted lamb. In this study, an Honours student will investigate how PR affects circulating methyl donors levels in the neonate at birth, and whether this can be increased by feeding the mother with methyl donors in late pregnancy. We will also investigate the effects of PR and methyl donors on expression of epigenetically-regulated genes in white blood cells and circulating metabolites in plasma collected at birth, to assess whether the supply of these nutrients in late pregnancy changes epigenetic and metabolic state at birth.

The student will gain skills in animal handling including venepuncture, analysis of circulating metabolites including radioimmunoassay, measurement of gene expression by RT-PCR, data analysis, written and oral presentation skills.