

The Influence of Hyperglycaemia during the Periconception Period on Pig Oocyte Development

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Aims and significance

Oocyte development can be studied using a technique called *in vitro* oocyte maturation (IVM), which involves culturing immature oocytes until they are ready to be fertilised. In this project, pig oocytes will be exposed to different glucose levels and the effects on oocyte maturation will be determined. Techniques involved include tissue culture, staining and metabolism assays and has implications for a better understanding of oocyte development and improving clinical outcomes.

Introduction to the laboratory

A major focus of our laboratory is the influence of the microenvironment surrounding the oocytes (eggs) and embryos on development outcomes, with particular focuses on metabolites (glucose, oxygen) and associated pathways and genes (for example Hypoxia Inducible Factor, HIF).

The incidence of diet related obesity (such as high glucose diets) in Australia is rapidly increasing and is associated with higher susceptibility to chronic diseases, decreased fertility, poor pregnancy outcomes and development of children born from obese mothers. Glucose is particularly important for oocyte development and alterations in the level of glucose the oocyte is exposed to prior to fertilisation can have a negative impact on the success of embryo development.

Research performed within our group is relevant to human reproduction, human assisted reproduction and the livestock farming industries through a better understanding of the impact of the maternal environment on successful fertilisation and early embryonic development. Furthermore, our research aims to enhance the outcomes of both human and livestock *in vitro* embryo production by developing improved culture conditions.

References:

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Sutton-McDowall ML, Gilchrist RB and Thompson JG (2004) Cumulus-expansion and glucose utilisation by bovine cumulus-oocyte complexes during *in vitro* maturation: the influence of glucosamine and follicle stimulating hormone, *Reproduction*, 128 (3): 313-319