

## **The Wnt/ $\beta$ -catenin system and regulation of intestinal stem cells in the piglet**

### **Contact: Associate Professor Adrian Cummins**

Email: [adrian.cummins@health.sa.gov.au](mailto:adrian.cummins@health.sa.gov.au)

Phone: 8222 6672

Associate Professor Gordon Howarth

Email: [gordon.howarth@adelaide.edu.au](mailto:gordon.howarth@adelaide.edu.au)

Phone: 8303 7885

Dr William Van Wettere

Email: [William.vanwettere@adelaide.edu.au](mailto:William.vanwettere@adelaide.edu.au)

Phone: 8303 7911

### Background:

Studies of growth and development of the small intestine often use rodents but they have delayed development (predominantly postnatally) compared with humans. The pig is a better model to study intestinal growth. The Wnt/ $\beta$ -catenin system is thought to regulate intestinal stem cells and therefore intestinal growth. Activation of the pathway is shown by nuclear expression of  $\beta$ -catenin in stem cells but this is also present in adjacent Paneth cells in intestinal crypts. There are 19 Wnts in mammals but we do not know which are present in the small intestine of pigs at this age.

### Aims and Significance:

The aims of this project are to investigate activation of the Wnt/ $\beta$ -catenin pathway in intestinal crypts and to identify which Wnts are present that could promote intestinal growth and development. The significance is that these could be administered (eg by nanoparticle transfection) to augment growth in both humans medically (eg to treat short bowel syndrome) and agriculturally for improved efficiency of pork production.

### Techniques to be used:

Dual and triple immunostaining for nuclear  $\beta$ -catenin in intestinal crypt cells for lysozyme to identify Paneth cells and for OLFM4 or DCAMKL-1 stem cell markers will be undertaken. The proportion of activated stem cells expressing only nuclear  $\beta$ -catenin will be counted compared to the total stem cells. Wnt expression will be assessed by real time PCR and localisation undertaken by laser dissection microscopy and by immunostaining.

### Reference:

Camac KS, Thompson FM, Cummins AG. Activation of  $\beta$ -catenin in the stem cell region of crypts during growth of the small intestine in infant rats. *Dig Dis Sci* 2007;52:1242-6.

May R, Sureban SM, Hoang N *et al.* DCAMKL-1 and LGR5 mark quiescent and cycling intestinal stem cells respectively. *Stem Cells* 2009;27:2571-9.