

Name of Research Group:
Nerve Gut Research Laboratory

Name(s) of supervisors:
Dr Richard L. Young, Prof L. Ashley Blackshaw



Richard Ashley

Hanson Institute, Department of Gastroenterology & Hepatology, RAH. Affiliated with Discipline of Medicine, Faculty of Health Sciences and Discipline of Physiology, Faculty of Sciences.

Contact person:
Richard Young

Email address:
Richard.young@adelaide.edu.au

Phone:
08 8222 4144. Mobile

Description of current research interests:

The Nerve Gut Research Laboratory aims to improve treatment of digestive diseases by identifying and understanding the interactions between the nervous system and the gastrointestinal (GI) tract, and to promote translational research from single cells through to patients. Several conditions would benefit from treatments that modify signalling of sensory information from the gut to the brain. In functional gastrointestinal disorders, such as irritable bowel syndrome, patients are hypersensitive to the contents of the gut and its movements. In reflux disease there are disordered reflexes from the stomach to the lower oesophageal sphincter that allow backflow of stomach acid into the oesophagus. In diabetes, patients show exaggerated responses of the gut to glucose in the diet, accompanied by profound symptoms. In obesity, they show reduced signalling of nutrient from the gut to the brain.

The group is investigating signalling in sensory pathways in several ways. First, the release of mediators from epithelial and immune cells. Second, the direct action of mediators and nutrients on sensory nerve endings. Third, the function of the nerve ending and how it is modulated by receptors, ion channels and signal transduction pathways. Fourth, the actions of transmitters released by sensory nerves from their endings within the brain and spinal cord.

Title and short description of projects offered for 2009:

Nutrient sensing in the gut

Detection of nutrients in the intestine is of crucial importance in the control of motility, glycaemia, and energy intake, and yet we know little of the fundamental aspects of this process. Altered nutrient signalling occurs in diabetes, as evidenced by changes in gastric emptying and gut motility in response to nutrient infusions. Altered function of epithelial sensory mechanisms are strongly implicated in these disturbances. Intestinal nutrients are detected by highly specialised epithelial cells, known as enteroendocrine cells, which sample the lumen and release neuroactive mediators into the subepithelial space, which then activate sensory fibres in the vagus nerves. Several types of enteroendocrine cells exist, which contain a wide range of mediators. The aims of this project are to determine 1. which taste receptors exist in intestinal epithelium, 2. their mechanism of coupling in enteroendocrine cells, 3. which mediators enteroendocrine cells release, 4. how they activate vagal sensory nerves.

Key references:

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