

Name of Research Group:  
Nerve Gut Research Laboratory

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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:

## TRP channels as sensors and effectors in visceral sensory nerves

Chronic pain is a major unresolved clinical problem, and pain from internal organs represents the major manifestation of this. The likely cause is increased activation of peripheral sensory mechanisms, so understanding how hypersensitivity of sensory nerves occurs would advance the design of new therapies. TRP channels are key candidates contributing to pain because they are primary mechano- and chemosensors, plus they can be effectors, mediating excitation after activation of other receptors. Plant extracts are known as traditional cures, and their potential in modern medicine is emerging. The best current treatments for visceral pain are in fact alternative medicines, which probably act via TRP channels. We shall look for TRP channels in colonic sensory neurons, determine their mechano and chemosensory properties and how they are influenced by inflammatory mediators and plant extracts. We shall also reveal if TRPs are linked with symptoms by increased expression in tissue from patients with visceral pain.

### Key references:

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