Project Title: Gut barrier function in disease pathogenesis

Project type: Laboratory: Human blood, urine and tissue preparation, protein separation, enzymology and fluorescence spectroscopy

Supervisor: Dominic-Luc Webb, BS, PhD, Associate professor in experimental gastroenterology. Tel: 018-471-4721. Email: dominic-luc.webb@medsci.uu.se

Location: Gastroenterology & Hepatology Unit, Medical Sciences, Uppsala University. Rudbeck Lab, Hus R3, plan 4 (BV), Dag Hammarskjölds väg 20, 751 85 Uppsala, Sweden.

Project description
Increased gut mucosal permeability is now a recognized early warning system for upcoming health problems. It is an early event in type 2 diabetes, inflammatory bowel disease (IBD), Parkinson’s disease, post-infectious irritable bowel syndrome (PI-IBS) and colon cancer. We also suspect involvement in juvenile idiopathic arthritis (JIA), also called juvenile rheumatoid arthritis (JRA). We have a series of studies to explore in vitro and in vivo regulation of the gut barrier in relation to permeability and inflammation. Accordingly, there are several potential student projects covering different diseases and methods. Below are two current project areas:

Project 1) Determination of upper versus lower GI permeability in IBD. Following oral ingestion of permeability probes (lactulose, mannitol, riboflavin, sucralose), urine was collected to determine the extent to which these probes penetrated the gut mucosal epithelium. The student will take part in processing and assaying urine samples, and in some cases, matched blood samples. A related in vitro project explores consequences of hyper-permeability in the context absorption of endotoxins and synthetic environmental toxins.

Project 2) Bile factors in gut hyper-permeability and inflammation. We propose that entero-hepatic circulation is altered in several GI disorders such that mucosal barrier integrity is adversely affected. Measuring this is methodologically challenging. We have come as far as getting bile samples and preliminary 2D electrophoresis protocols to isolate and study bile proteins. Method development is done with dog bile.

We work with human gut tissue, blood and urine. Real samples from real hospitals do not always come from healthy people. Please take into consideration your status with hepatitis B vaccination.