**Exploiting the microbiome to prevent and treat human diseases**

**Background**

Over the past five years research  
on the interactions between the host and its intestinal microbiota has moved into the mainstream scientific arena with a stream of high impact publications describing how the microbiota can modulate the host’s immune system, metabolism and influence host development and physiology. Considerable progress has been made in identifying, isolating and culturing members of the gut microbiota, but we are only beginning to understand the complex interplay between the microbiome, host genetics and host physiology. It is now clear that the microbial community has a beneficial role during homeostasis and that beneficial host-microbiota relationships are lost under inflammatory conditions.  
  
The involvement of microbiota-human interactions in health and disease opens up many possibilities for rationally modulating these metabolic and immune interactions to prevent or to treat disease. Over the past few years several bacteria have been identified that have a profound  
effect on human physiology. A few colonic bacteria have been shown to have anti-inflammatory effects on immune cells and have protective effects in mouse models of inflammatory bowel disease. One example, is *Faecalibacterium prausnitzii*; administration of *F. prausnitzii* to mice protects against chemically induced colitis, a Th1-driven model of human inflammatory bowel disease (IBD).  
These research studies support the concept of using microbial symbionts or their products for novel prophylactic or therapeutic applications in humans.

**Objectives**

To compare the protective capacity and immunomodulatory properties of selected anaerobic strains *in vitro* and gain more knowledge on their mechanism of action *in vivo*.

Overall aim of this study is to exploit anaerobic strains in order to promote health and prevent diseases in humans.

**Methodology**

*In vitro* experiment: PBMC assay (Flow cytometry & MagPix), cell  
reporter assay (TLRs), TER assay (CellZScope), NO assay, NBT assay, ELISA and qPCR  
  
*In vivo* experiment: colitis model, Germ Free (GF) mice