Research Thematics

Microbes, Intestin, Inflammation and host susceptibility

A permanent cross talk exists in the gut between microbiota and host cells. With molecular characterization of pathogenic bacteria and with data generated by genome-wide association studies concerning various pathologies, it has become evident that a parallel evolution of pathogens and hosts exists. Over the last ten years, the M2iSH Unit has been studying the interaction between bacteria and host cells, particularly pathogenic Escherichia coli associated with inflammatory bowel diseases (IBD) notably Crohn’s Disease (CD), a chronic inflammation of the intestine characterized by hyperactivation of the immune system, and colorectal cancer (CRC), as well as enterohemorrhagic E. coli involved in acute diarrhea and hemolytic and uremic syndrome.

It is now well established that abnormal inflammatory responses require interplay between host genetic and the intestinal microbiota. Several lines of evidence support the notion that CD and CRC results from an excessive immune response to gut commensal or pathogenic organisms. We are the first to report that the ileal mucosa of CD patients is abnormally colonized by adherent-invasive E. coli (AIEC). We have investigated how these bacteria can be involved in the onset or the recurrence of CD in genetically predisposed patients. In addition, as a possible infectious etiology and a possible link between chronic inflammation and cancer could exist, we opened up a new field of investigation concerning the role of E. coli in CRC development. In this context, our past research projects were focused on (i) characterization of the CD- and CRC-associated E. coli strains, (ii) host/bacteria cross-talk at the intestinal mucosal site, and (iii) development of innovative diagnostic tools and therapies.

Our research projects for the next five years will be focused on the interaction between pathogenic bacteria or pathobiont bacteria and the host in the context of intestinal inflammation (Research Axis 1) and carcinogenesis (Research Axis 2) in order to develop innovative diagnostic and/or therapeutic tools (Research Axis 3) based on the results obtained in the two first research axes.
Research thematics

Research axis 1: e. coli and intestinal inflammation
Research axis 2: e. coli and colorectal cancer
Research axis 3: diagnosis and therapeutic tools