Inside out: a close look at gut function

Marked by deep folds and studded with a diverse array of cells and transporters, the gut is one of the most celebrated organs in the human body. About ten times the length of the human body when unraveled, the gut is more than a digestive organ. Recent work has revealed that the gut epithelium also transmits information to the circulatory, immune and nervous systems, affecting the body’s immune function and metabolism.

How does the gut accomplish so many functions at once? Alessio Fasano takes us on a tour of the human intestine, beginning with a look at the special cellular and tissue components that make this organ unique. Fasano pauses to expand our knowledge of gut-associated lymphoid tissue and how it regulates the processes of innate and adaptive immunity.

But this is not the end of the story. The heart of Fasano’s article centers on the diverse population of microbes that exists on the intestinal epithelium. With a collective bacterial genome that surpasses the human genome by 140-fold, intestinal bacteria act as an “organ within an organ”, performing critical digestive functions that the human gut is unable to carry out. This remarkable symbiosis relies upon a two-way dialogue between gut immune tissues and microbes.

Disruption of this immunochemical balance is the hallmark of many autoimmune disorders, such as Crohn’s disease and irritable bowel syndrome. By examining how intestinal pathogens scramble the normal microbial-host communication, Fasano proposes a theory for the genesis of autoimmune disorders: the loss of normal intestinal barrier function. This, along with miscommunication between the immune system and gut microbes, as well as a change in the gut microbe population, are the main culprits of immune disorders.

Fasano believes that this process can be held in check, or even reversed. What we need is to focus on re-establishing the healthy dialogue between host and microbes. Fasano concludes by encouraging further exploration on the use of therapies such as probiotics for the management of chronic immune disorders.

References