

## FUNCTIONAL MEDICINE UPDATE

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### **The Gastrointestinal Health “Mini Course” Concludes**

In January, Dr. Bland began a discussion much too large for a single issue—a discussion of how the health of the gastrointestinal tract connects to the systemic health of the whole body. Always on top of the latest research, Dr. Bland sought to use this series to bring FMU subscribers up-to-date on discoveries the leading researchers in this field are making, and suggest ways this research will one day—one day soon, most likely—translate into clinical application.

The series began with an interview with Alessio Fasano, MD, who not only is the Director of the Center for Celiac Research and Treatment at Massachusetts General Hospital for Children, but also received the 2013 Linus Pauling Functional Medicine Award presented by the Institute for Functional Medicine. The series continued in February with an interview with Antonio Gasbarrini, MD, who is a faculty member at the Catholic University of Rome and a noted expert in both gastroenterology and hepatology. Dr. Gasbarrini is actively conducting research on the gut immune system, and particularly leaky gut (increased intestinal permeability).

This month—March—the series on GI health concludes. Dr. Bland interviews Patrice Cani, PhD, a dynamic and closely followed young researcher at the Catholic University of Louvain in Belgium. Professor Cani and his research colleagues are investigating the role of the gut microbiota in the development of chronic disease.

### **Researcher of the Month**

**Patrice Cani, PhD**

**Louvain Drug Research Institute (LDRI)**

**Metabolism and Nutrition (MNutr)**

**Catholic University of Louvain**

**Belgium**

<http://www.uclouvain.be/en-269734.html>

Several years ago—in the August 2009 issue of *Functional Medicine Update*—Dr. Bland interviewed Dr. Nathalie Delzenne and her research colleague, Professor Patrice Cani. The two jointly coordinate the activities of the Metabolism and Nutrition research group at the Louvain Drug Research Institute, which is part of the Catholic University of Louvain. In just a few short years since that initial interview, this research group has published extensively in the medical literature about their activities and has become a leading research facility focused on the role of the gut microbiota in the development of inflammation

associated with obesity and related disorders. Dr. Bland characterizes the scope of work emerging from Professor Cani's laboratory as "seismic" in terms of the impact it will have on medicine.

The discussion begins with a focus on the concept of metabolic endotoxemia, which is an increase in plasma lipopolysaccharides (LPS)—large and complex molecules composed of different lipids—that may result from a high-fat diet, from compromised intestinal permeability, or from a combination of both. This increase in plasma LPS might be a triggering factor involved in insulin resistance and inflammation associated with obesity, which can lead to a variety of chronic diseases. In the course of conducting experiments in both animal and human subjects, Professor Cani was instrumental in developing an accurate method of measuring LPS in the blood. REF #1-11

Lipopolysaccharides are found in the outer membrane of Gram-negative bacteria, which generally cause an inflammatory or immune response in the body. But not always. Dr. Bland and Professor Cani discuss a particular strain of Gram-negative bacteria identified and characterized by his lab, *Akkermansia muciniphila*, which appears to improve gut barrier function and may have a positive impact on health. This work on *Akkermansia muciniphila* ties into the lab's efforts to characterize the impact of specific molecular targets such as gut peptides, the endocannabinoid system, and metabolite-binding receptors in the control of body weight, fat mass, systemic immunity, and energy homeostasis. REF #12-13

How does/will Dr. Cani's work translate to clinical practice? One area he is investigating is how the gut microbiota—and obesity and diabetes—are influenced by gastric bypass surgery. Thus far, work in this area by Dr. Cani and by other research groups has demonstrated that Roux-en-Y gastric bypass (RYGB) treatment changes gut microbiota composition, and this phenotype can be replicated by transferring the gut microbiota from RYGB donor mice into naïve germ-free mice. What could the future implications be? Could a complex of microbes—three-, four-, or five different bacteria—be put together to replicate the phenotype? It is still too early to say this approach will be the next treatment for obesity, but these are the types of questions currently being investigated. REF #14-17

### **In Closing: Synthesis**

To bring the series to a close, Dr. Bland provides an extensive commentary at the end of this issue. He remarks on recent research he has read regarding immunological alteration stemming from the intestinal tract, including the potential influence of vitamin A and vitamin D status. He also discusses emerging research on the role phytochemicals can play in influencing the composition of the gut microbiome. Numerous research groups are now examining the myriad ways the gut microbiome appears to influence health status, including a potential correlation between postprandial chronic endotoxemia and increased incidence of endothelial dysfunction and cardiovascular disease risk. Postprandial systemic inflammatory tone has also been linked to mitochondrial function within the fat mass of adipocytes. All of these variables, as Dr. Bland points out in his conclusion, are now converging on central mechanisms.

REF #18-24

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