MedicalXpress

Antibiotics disrupt gut ecology, metabolism

April 20 2011

(PhysOrg.com) -- Humans carry several pounds of microbes in our gastro-intestinal tracts. Recent research suggests that this microbial ecosystem plays a variety of critical roles in our health. Now, working in a mouse model, researchers from Canada describe many of the interactions between the intestinal microbiota and host, and show that antibiotics profoundly disrupt intestinal homeostasis. The research is published in the April 2011 issue of the journal *Antimicrobial Agents and Chemotherapy*.

“Intestinal microbes help us digest our food, provide us with vitamins that we cannot make on our own, and protect us from microbes that make us sick, amongst other things,” says L Caetano M. Antunes of the University of British Columbia, a researcher on the study. In this study, the investigators used powerful mass spectrometry techniques to detect, identify, and quantify more than two thousand molecules which they extracted from mouse feces. They then administered antibiotics to the mice, to kill off most of their gut microbiota, and analyzed the feces anew.

The second round of mass spectroscopy revealed a very different metabolic landscape. The levels of 87 percent of the molecules detected had been shifted up or down by factors ranging from 2-fold to 10,000-fold.

The most profoundly altered pathways involved steroid hormones, eicosanoid hormones, sugar, fatty acid, and bile acid. “These hormones have very important functions in our health,” says Antunes. “They

control our immune system, reproductive functions, mineral balance, sugar metabolism, and many other important aspects of human metabolism."

The findings have two important implications, says Antunes. "First, our work shows that the unnecessary use of antibiotics has deleterious effects on human health that were previously unappreciated. Also, the fact that our gut microbes control these important molecules raises the possibility that manipulating these microbes could be used to modulate diseases that have hormonal or metabolic origins (such as inmmunodeficiency, depression, diabetes and others). However, further studies will be required to understand exactly how our microbial partners function to modulate human physiology, and to devise ways of using this information to improve human health."

More information: L.C.M. Antunes, J. Han, R.B.R. Ferreira, P. Lolic, C.H. Borchers, and B.B. Finlay, 2011. Effect of antibiotic treatment on the intestinal metabolome. Antim. Agents Chemother. 55:1494-1503.

Provided by American Society For Microbiology