



Bile acid – microbiome crosstalk in metabolic disorders

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Abstract

The microbial-mammalian metabolic axis has become recognized as an important component governing the overall homeostatic balance of the mammalian host. Disruption of the state of homeostasis among the gut microbiota has been shown to be causally linked to the development of host metabolic diseases including diabetes. Manipulation of bile acid (BA) receptors and the BA pool has been shown to be useful in establishing glycemic control in diabetes. They have an important role in regulating energy metabolism due to their ability to bind and activate nuclear hormone transcription factors such as the farnesoid X receptor in liver and intestine as well as the G-protein coupled receptor, TGR5, in enteroendocrine cells and pancreatic β -cells. We quantitatively profiled small molecule metabolites derived from host-microbial co-metabolism in mice, demonstrating that BAs were the most significant factor correlated with microbial alterations among all types of endogenous metabolites. High fat diet (HFD) intervention resulted in a rapid and significant increase in intestinal BA pool within 12 hrs followed by alteration in microbial composition at 24 hrs, providing supporting evidence that BAs are major dietary factors regulating gut microbiota. Feeding mice with BAs along with normal diet induced obese phenotype and obesity-associated gut microbial composition, similar to HFD fed mice. Inhibition of hepatic BA biosynthesis under HFD conditions attenuated the HFD-induced gut microbiome alterations. Inhibition of BAs and direct suppression of microbiota improved obese phenotypes. In this presentation we will discuss the effect of BAs on glucose and lipid metabolism and explore our recent research on establishing glycemic control in diabetes through the manipulation of BAs and their receptors in the liver, intestine and pancreas, and alteration of the enterohepatic circulation.

Speaker

Dr. Wei Jia is currently Professor at University of Hawaii at Manoa, and Associate Director for Shared Resources, the University of Hawaii Cancer Center (a National Cancer Institute designated cancer center). Previously, he has been a Professor at University of North Carolina at Greensboro and Co-Director of UNCG Center for Translational Biomedical Research for about 5 years. Prior to his appointment with UNCG, Dr. Jia worked in China for 10 years, as Professor and Executive Vice Dean at College of Pharmaceutical Science, Tianjin University, and Professor and Vice Dean for Research, School of Pharmacy, Shanghai Jiao Tong University.

Dr. Jia's M.S. and Ph.D. were completed at the University of Missouri-Columbia in the field of radiopharmaceutical sciences. He is the author of over 300 scientific papers and 6 books, and serves on the editorial boards for 9 scientific journals in the fields of metabolomic and translational research. His current research interest focuses on the molecular mechanisms that link metabolic disruptions in gut microbial-host co-metabolism to metabolic disorders and gastrointestinal cancer. Several research projects are being conducted in Dr. Jia's group to decipher the complex metabolic interactions in gut-liver-brain axis and regulation of cancer cell metabolism. In addition, Dr. Jia directs a well-recognized metabolomics laboratory. Over the past 15 years, his lab has developed a number of metabolomics technologies and protocols, focusing on the quantitative analysis of endogenous small-molecule metabolites and trace elements from biological specimens including blood, urine, saliva, and tissues of experimental animals and human subjects.

****All are Welcome****