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Microbial metabolites in responses to metabolic interventions

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Increasing evidence indicates that interactions between the gut microbiota, diet, and the host contribute to the development of number of diseases from intestinal diseases, metabolic diseases and even to neurological disorders. Many studies investigating the role of microbiota in different diseases have identified associations between host phenotypes and microbiota composition. However, associations between individual bacterial genus/species and disease can be positive or negative depending on the disease or treatment context, making it difficult to determine whether particular bacteria are beneficial or detrimental. Despite this issue, the gut microbiome has been shown to be functionally similar even in samples from geographically different regions and between human and mice. In addition, accumulating data suggest that the microbiota may affect host phenotypes through the production of metabolites, which would contribute to the development or treatment of diseases. These bioactive microbial metabolites, sensitive fingerprints of microbial function, can act as inter-kingdom signaling messengers via penetration into the liver through the portal vein and into the host blood circulation and multiple tissues. Thus, investigating microbial metabolites that reflect disease-associated changes of microbial function would overcome the limitations of current microbiome research. This seminar will focus on the microbially produced metabolite imidazole propionate and how it potentially contributes to the pathogenesis of type 2 diabetes. In addition, I will also describe our recent work about investigating potential role of microbial metabolites on inter-individual variations in responses to anti-diabetic drug and metabolic surgery.