

Host Genetics Analyses of Microbiome Composition

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The specific composition of the gut microbiota differs markedly among individuals, and constitutes a target for novel therapies, however the development of therapeutics will require a deeper understanding of the factors that shape the microbiota, including age, diet, host physiology and health, and their interactions. Importantly, the role of host genotype in modulating microbial community composition remains to be elucidated. The gut microbiome contributes to the development of obesity and host genes also impact obesity, but whether genetics act on obesity via the microbiome is unknown. Here, I will discuss our ongoing studies that relate host genetic composition to the composition and structure of the gut microbiome and to host phenotype using a combination of population surveys and gnotobiotics. We have studied >1,000 genotyped twin pairs to identify heritable taxa in the microbiome (i.e., those whose variance across the population has a genetic component). Several of these heritable taxa have health effects. We are also exploring how host variation in the gene copy number of salivary amylase can impact the diversity of the gut microbiome. Together our findings indicate that host genetic effects on phenotype are partially modulated via effects on the microbiome.