

Mapping the gut microbiome to better understand its role in obesity

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Several recent science studies have claimed that the gut microbiome—the diverse array of bacteria that live in the stomach and intestines—may be to blame for obesity. But Katherine Pollard, PhD, a senior investigator at the Gladstone Institutes, says it is not that simple.

Dr. Pollard presented at the Obesity and Microbiome symposium at the AAAS Annual Meeting in San Jose, CA on Friday, February 13, 2015.

Using powerful computational tools, Dr. Pollard and her team have reanalyzed several previous studies and revealed that there is no significant relationship between [body mass index](#) (BMI) and the types of microbes in one's gut. In fact, her lab found that there was greater variability in [gut bacteria](#) between the different studies than between the lean and [obese individuals](#) within each study.

Instead, Dr. Pollard thinks that it is the genetic make-up of the different strains of bacteria that is most important. This is because the DNA in bacteria can vary wildly. For example, while the genomes of two humans may only differ by 0.1%, two strains of the same bacteria can vary by to 30%—similar to the variation between human and mice genomes! What's more, the differences in the bacterial genomes are often important pieces that are involved in metabolism or the processing of sugar and fat.

Besides reflecting important functional changes in bacterial genomes, losses and gains of genes also affect [genome size](#). When microbiomes

are studied using metagenomics—sequencing their total DNA—differences in bacterial [genome](#) size can bias the estimation of the proportion of each gene in the sample. By developing a computational shortcut to rapidly estimate genome size using statistical modeling, Dr. Pollard's team has been able to improve the accuracy of microbiome studies.

"It's not enough to say what type of bacterial species are present, because that doesn't tell you what they're doing," explains Dr. Pollard. "Since two strains of the same species can have such different genomes, you really need to know what genes are there and what role they play in order to link someone's gut microbiota to BMI or disease."

Provided by Gladstone Institutes

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