

GUT MICROBIOTA

The difference diet makes to metabolites and microbiota

The metabolomes and gut microbiotas of Northeastern US urban-dwelling vegan and omnivorous citizens have been compared in a new study published in *Gut*. Surprisingly, gut microbial composition differed modestly between groups but the plasma metabolomes varied considerably.

Previous studies have indicated that diet affects our gut microbiota and consequently our metabolome; however, the strength of the effect is uncertain. By studying individuals living in the same area but who adhered to either a vegan or omnivorous diet, the researchers were able to separate environmental factors from dietary ones.

As expected, baseline characteristics of the macronutrients and micronutrients of vegans ($n = 15$) differed substantially from that of omnivores ($n = 16$). Despite dietary differences, 16S ribosomal RNA gene sequencing of faecal samples showed that there was a small but statistically significant difference in bacterial composition but no difference in measures of diversity.

Of 361 plasma metabolites tested, the concentration of 92 were substantially different between vegans and omnivores. Given that there was a modest difference in gut microbiota, these data indicate that diet is an important determinant of systemic metabolites.

“...the effect of diet on gut microbiota might take generations to occur...”

About one-third of 28 metabolites found to be more abundant in vegans than omnivores were formed of gut microbiota products. An example of such a product is hippurate, a compound formed by chlorogenic acid bacterial metabolism. Levels of short-chain fatty acids (produced by bacterial fermentation of indigestible fibre) are known to be lower in people from Western societies than agrarian ones. However, despite the vegans having a diet more akin to that of people in agricultural

societies, their levels of faecal short-chain fatty acids were similar to those found in the omnivores. In addition, 40% of the vegans had detectable levels of equol (a byproduct of microbial metabolism of isoflavones that are found in soy-based food) in plasma samples, whereas 60–70% of Asian populations were shown to produce equol. These data indicate that gut microbial composition and diet are important in determining the metabolites found in plasma.

The authors write that their research suggests that the effect of diet on gut microbiota might take generations to occur or require exposure very early in life. On the other hand, environmental factors, independent of diet, might help shape the gut microbiota.

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Original article Wu, G. D. *et al.* Comparative metabolomics in vegans and omnivores reveal constraints on diet-dependent gut microbiota metabolite production. *Gut* doi:10.1136/gutjnl-2014-308209