

gut microbiome, diet, and human health

key takeaways

Introduction to the gut microbiome

- Microbiome: all the genes in the microbial community
- Microbiota: all community members, including Bacteria, Archaea, and Eukarya
- At least 10 different phyla of bacteria found in human gut, Bacteroidetes and Firmicutes being the most dominant, and hundreds of species⁵

Diet's effect on the gut microbiome

- Gut microbes obtain energy and nutrients from the diet leftovers to live and reproduce, and carry out reactions that human gut enzymes cannot
- Microbial metabolism of carbohydrates, proteins, dietary fats, and other dietary constituents are linked to different compositions of the gut microbiota
- Evidence from long-term food pattern consumption studies (observational) as well as short term dietary interventions reveal differences in gut microbiome based on dietary patterns¹¹

Gut microbiome's effect on diet

- The gut microbiome alters exposure to nutrients and bioactives, and generates new compounds that:
 - Serve as energy sources
 - Regulate metabolism
 - Increase or reduce inflammation
 - Cause or reduce oxidative stress
 - Are genotoxic/carcinogenic

Pro-, pre- and synbiotics

- The use of probiotics has shown efficacy for treating several gastrointestinal conditions²⁵
- Research also indicates positive results for the use of probiotics for treating obesity in rodents, but lacks consistent data for treatment in humans²⁶

- Probiotic use has shown an efficacy in reduction of total- and LDL-cholesterol, triglycerides, systolic and diastolic blood pressure, but no effect on HDL-cholesterol²⁷

Potential contributions of fermented foods

- Benefits of fermentation include food safety, enrichment of diet through diverse flavors, aromas, and textures, and enhancement of nutritional qualities
- Fermented milk products deliver many live active cultures to the GI tract²⁹
 - The most common probiotics found in fermented dairy are *Lactobacillus* and *Bifidobacterium*
 - Yogurt consumption is positively associated with improved glucose metabolism and inversely associated with risk of Type 2 diabetes; however, more research is needed to prove it can prevent the onset of diabetes³⁰

Impact of the gut microbiome on human health

- Research shows low-fat and Mediterranean diets restore microbiota in obese patients with metabolic syndrome, but do not substantially alter microbiota in non-obese groups³⁴
- Microbial production of bioactive substances varies greatly across individuals
- Substantial work is needed to establish causal relationships and therapeutic potential in humans

Consumer takeaways

- Gut microbiome health remains a young field of research
- General recommendations to consumers include:
 - Avoiding indiscriminant use of antibiotics
 - Make food choices to maintain gut microbiome diversity and function
 - To this end, choose a healthy eating pattern, such as the Dietary Guidelines for Americans

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