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Modulation of Inflammation with Gut Microbiome-Targeted Dietary Intervention

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The links between our gut microbiome and our health, combined with the malleability of this community, suggests that if we learn the rules for how to manipulate our gut microbes, we may be able to treat and prevent disease. Recent data from our lab and others focused on humans living different lifestyles ranging from hunter-gatherer to industrialized suggest that the gut microbiome is profoundly influenced by lifestyle. Those of us in the industrialized world are harboring a community of microbes that diverges from ancestral states and may present incompatibilities with our human biology. Diet has emerged as one of the most powerful levers available to shape the composition and functionality of the gut microbiome. We have conducted a dietary intervention that serves as a proof-of-concept study for dietary modulation of the gut microbiota to control aspects of human biology in health and disease. The study followed humans longitudinally during a period with large increases in plant-based high fiber food or fermented food. Collection of stool and blood has enabled high resolution microbiome and immune profiling and revealed increased microbiota diversity and a broad decrease of numerous inflammatory markers during fermented food intervention. Molecular mechanisms of host-microbial interaction are pursued using an array of technologies and experimental approaches including gnotobiotic and conventional mouse models, quantitative imaging, molecular genetics and synthetic biology, and a metabolomics pipeline focused on defining microbiota-dependent metabolites.

Wastyk HC, Fragiadakis GK, Perelman D, Dahan D, Merrill BD, Yu FB, Topf M, Gonzalez CG, Van Treuren W, Han S, Robinson JL, Elias JE, Sonnenburg ED, Gardner CD, Sonnenburg JL. Gut-microbiota-targeted diets modulate human immune status. Cell. 2021 Jul 6:S0092-8674(21)00754-6. doi: 10.1016/j.cell.2021.06.019.