

## ***The Microbiome and Diabetes: ADA/JDRF Research Symposium Summary***

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The microbiome—the population of bacteria, viruses, fungi and archaea that live in our gut and on our skin—is a complex ecosystem with a high degree of inter-individual variability. It provides benefits to the host, including nutrient harvest from food and protection against pathogens. The microbiome is dynamically regulated by both genes and environment, and in turn, critically influences both physiology and lifelong health.

Characteristics of the microbiome, such as diversity, have been correlated to environmental factors, including diet and medications; metabolic functions; and immune system activities. Relationships in some cases appear to be associated with type 1 and type 2 diabetes and obesity. For example, the composition of gut microorganisms in animals and humans with obesity or diabetes is distinct from those who are lean. The composition also appears to be different between children who develop type 1 diabetes and those who do not. In addition, patients who have undergone bariatric surgery experience dramatic changes in the composition of their microbes, which may be either influence, or be associated, with the improved metabolism and blood glucose control that is often observed following the procedure. These differences suggest that something about obesity and diabetes may alter the microbiome, or, alternatively, that microbiome composition may predispose individuals to these diseases.

While there appears to be a strong association between the composition of the microbiome and changes in the host's metabolism, the mechanisms behind these changes remain relatively unclear. It has been hypothesized that the microbiome may function by influencing fatty acid or carbohydrate metabolism, gut hormone concentrations, or inflammation; however, there are not enough data at present to propose a unifying model for these relationships. Once clear mechanisms for how these microorganisms exert their influence are understood, it may be possible to utilize this knowledge to intentionally change human metabolism. Importantly, many of the approaches that could potentially be derived from an understanding of the microbiome, such as probiotics and nutritional therapies, are relatively inexpensive and may be readily accessible to broad populations.

This presentation will summarize the current understanding of the microbiome as it relates to diabetes, highlighting the relationship between the microbiome and metabolism and key recommendations for pivotal research questions, as well as resource and policy needs to address these questions.

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