

SEX, GENDER AND THE MICROBIOME

Research shows that the human microbiome plays a critical role in human health and disease, from child development to autoimmune disorders. Innovative therapies are emerging from the application of microbiome science. Treatment for resistant cases of *Clostridium difficile* infection is one such therapy, with others yet to be discovered. Recently, sex and gender have been flagged as two important variables that have a significant influence on the microbiome.¹

SEX



Biological attributes of humans and animals, including physical features, chromosomes, gene expression, hormones and anatomy.

GENDER



Socially constructed roles, behaviours, expressions and identities of girls, women, boys, men and gender-diverse people.

While we know that gender norms and roles influence factors such as diet, antimicrobial exposure and conditions such as anxiety or depression, we don't yet know enough about how both sex and gender differences influence the many facets of the human microbiome. Increasing our understanding of sex, gender and the microbiome will lead to **better science and improved health outcomes for everybody.**

WHEN IT COMES TO THE MICROBIOME, SEX AND GENDER MATTER!

DID YOU KNOW?

- The mother's microbiome may have a significant influence on bacteria present in breast milk, which is important for **healthy child development.**²
- Sex differences in microbial exposure early in life may influence the lifetime risk of **autoimmune diseases.**¹ One such disease is Chronic Fatigue Syndrome, which has demonstrable sex-specific interactions with gut microbiota and women's increased symptom severity and impairment.³
- Men and women exhibit **sex-specific responses to the exact same diet,**⁴ and have distinct microbiome patterns populating the gut.⁵ Stress, ovarian hormones and sex-specific brain processes all potentially play a role in gut dysfunction, including modulation of pain and stress reactions.⁶
- In women, the cervical/vaginal microbiome has been associated with an increased susceptibility to HIV infection.⁷
- Microbiome research is an exciting avenue of inquiry for treating male-female differences in inflammatory bowel disease, which is more common in women and may respond to probiotic treatments.^{8,9}
- Stroke levels skyrocket in women after menopause, when they experience significant changes in their sex hormone levels. Women also have an increased prevalence of **microbiome-related risk factors** such as hypertension, abdominal obesity and metabolic syndrome.¹⁰

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