



Women's Health Research Institute
Putting Women First

May 2015

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Dear Friends,

On May 12, 2015, the Women's Health Research Institute will celebrate National Women's Health Week with a day of panel discussions, exhibits, research posters, and a special lecture on an exciting new area of discovery: the Microbiota! This month's e-newsletter is an introduction to this fascinating area of research: what it is, how it influences health and disease, and how it may impact the future of personalized medicine

We hope you can join us on May 12 to learn more about the microbiota, as well as other cutting-edge research and care in women's health and sex-based medicine. The event is free, thanks to our event sponsors: Sprint, Fifth Third Bank, Whole Foods Market, and Corner Bakery Cafe. You can register [here!](#)

Sincerely,

The Institute Staff

Microbiota or Microbiome?



The human body contains vast numbers of bacteria, viruses, fungi, and microorganisms. The term 'microbiota' refers to this community of healthy (and sometimes unhealthy) microorganisms that live within an established environment like the human body. This collective mass is also referred to as the 'microbiome,' a term that focuses on the genes within the organisms and their unique genetic codes.

Clusters of microorganisms or microbiota reside in human skin, the mucosal tissues (mouth, vagina, respiratory tract), and the intestines. The largest mass of microbiota is found in the gut (intestine) and is the main focus of this article. We acquire these microbiota at birth and they become an important factor in health and disease throughout our lives.

Establishing Our Gut Microbiota

Gut microbiota lives in the intestine and is made up of trillions of microorganisms, including at least 1,000 different species of bacteria, representing millions of genes. Some people call this microbiota an "organ" (that can weigh between 1/2 to 3 pounds), but the better term is "acquired organ," since babies are microbe-free while in the uterus. The gut microbiota starts developing at birth during delivery.

Initially the first exposure depends on the method of deliver (vagina vs. caesarian), but within 3 days, the composition of the intestine microbiota depends solely on how the infant is fed. By the age of 3, an individual's microbiota becomes pretty well established, though it continues to evolve throughout one's life at a slower pace. Changes between childhood and old age depend greatly on environment and diet. About one-third of the gut microbiota is common to most humans, and two-thirds are specific to an individual and can serve like a "fingerprint" that is unique to the individual.

The more common gut microbiota will readily reestablish themselves early in the human; the more transient, less common types may colonize for short periods in the host, but are unable to permanently colonize. When the sterile fetus starts colonizing microbiota at birth, the best adapted types will colonize more readily and are more predominant.



Physiologic factors such as the availability of nutrients, temperature, moisture, pH, oxidation-reduction potential, and resistance to local antibacterial substances play a role in determining which microbiota get established in each of us. The majority of commensal and symbiotic organisms are bacteria and fungi (less often protozoa and virus).

Major differences in diet and other exposures could result in difference among ethnic

groups. For example, the Japanese may easily digest seaweed products because they are part of their traditional diet that is established early in life, but an American may find them difficult to digest because they are not a major part of the U.S. diet.

Microbiota and Health

The gut microbiota influences health in several ways. They:

- Help digest certain foods that the stomach and small intestine cannot digest
- Produce some vitamins like B and K
- Combat unwanted organisms that could disrupt the intestinal mucosa
- Help the immune system by performing a barrier effect
- Support proper digestive functioning

Dysbiosis is the term used when there is a loss of balance in gut microbiota due to some changes in diet, lifestyle, or environmental exposure, such as a medication or infections. One's gut can adapt, but it could take a while. Gut microbiota produce substances which are involved in the regulation of multiple metabolic pathways, giving rise to interactive host-microbe metabolic, signaling, and immune-inflammatory pathways.

Disruption of the gut microbiota can lead to diseases like Irritable Bowel Disease and Syndrome, colon cancer, gastric ulcers, obesity, metabolic syndromes, and asthma. It may even impact mood and behavior problems due to neurotransmitter interruption.

Antibiotics and the Microbiota



One of the major causes of dysbiosis of the gut microbiota is antibiotic use. Antibiotics have a powerful effect on the microbiota balance and their overuse is linked to the rise of antibiotic resistant pathogens. Unfortunately, many antibiotics kill healthy microbes as well as the pathogenic ones. Many people use probiotics to prevent the diarrhea, cramping, and yeast infections caused by antibiotics by reestablishing the healthy

bacteria. Yogurt and fermented foods that contain live cultures have been used for years, especially for digestive health. While they have not caused any alarming illnesses over time, they are foods and not drugs, and thus not regulated for safety. There is a growing movement to include more probiotics and prebiotics in infant formula and foods that are popular with children; and more safety oversight may be needed if this trend continues. The elderly and people with weakened immune systems should check with doctors if they increase their use of probiotic supplements.

The Future of Microbiota Research

Many of us are exposed to pathogenetic microbiota, microorganisms known to carry disease; however, many do not get us sick. They simply coexist with their host along with healthy organisms. Researchers are trying to figure out why some pathogens turn deadly and under what conditions. We are also learning that changes in the hormonal milieu during pregnancy and menopause shift the microbiota balance--an area that needs future exploration in sex-based biology.

New genome sequencing technology methods are helping scientists answer these questions at the Human Microbiome Project, a consortium of researchers organized to map the normal microbial make up of humans. This project is looking at the associations of the microbiota with diseases and their role in specific diseases. As we begin understanding what the normal human microbiota looks like, researchers will be able to understand how changes in the microbiota result in disease.



Eventually, this could lead to the development of microbionic-based therapeutics.

Sources

- <http://www.gutmicrobiotawatch.org/gut-microbiota.info>
<http://encyclopedia2.thefreedictionary.com/Microbiota>
<http://nih.gov/news/health/jun2012/nhgri-13.htm>

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Institute Happenings

- The Institute has opened applications for our Women's Health Science Program Summer Academy for high school girls. If you know a female high school student interested in a free Northwestern University weeklong academy on science and medicine, please have them [apply here](#). If you are a medical student interested in becoming a medical student mentor for the academy, please [apply here](#).

- Our annual **National Women's Health Week Celebration** will be held Tuesday, May 12 from 9:00am-3:00pm. This year we will include a keynote speaker as well as two panel discussions on the latest women's clinical services now available at Northwestern Medicine. **[Click here to register to attend!](#)**

Our sponsors for this event are:



- If you are interested in being a sponsor or having an informational table at the event, please fill out the **[online application](#)** or contact: megan.castle@northwestern.edu for details!
- If you are interested in submitting a poster abstract on your research related to women's health, please fill out the **[online application](#)**

Upcoming Events

Tuesday, May 5th, 5:15pm-8:00pm: Men's Health 2015: What you need to know. **[Click here to learn more!](#)**

Tuesday, May 12th, 9:00am-3:00pm: National Women's Health Week Celebration. This annual conference and expo features a keynote international speaker on a women's health issue, panel discussions led by experts in women's health, exhibits on health services and community resources for women, and scientific posters on the latest

research projects in women's health. [Click here to learn more!](#)

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