PLANET YOU

BACTERIA HAVE YOU COVERED

CIHR IRSC
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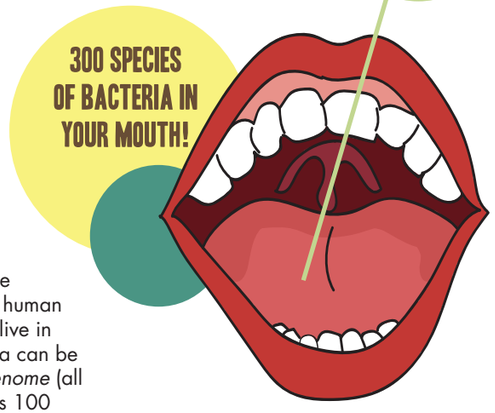
1,000 + SPECIES OF BACTERIA IN AND ON YOU!

A HUMAN WHAT? THE HUMAN MICROBIOME

Trillions of individual bacteria, viruses and other microscopic creatures live on the surface and inside of the human body and make up the human microbiome.

BACTERIA AND HEALTH

Scientists have known for many years that bacteria play an important role in health and a few, known as pathogens, cause disease. Among the tens of thousands of known bacterial species in the world, however, only about 100 are pathogens. Scientists are now learning the important role of bacteria in protecting health.



GETTING TO KNOW YOU

Learning about what makes up the microbiome is, in a way, like getting to know ourselves. Microbes live everywhere in the human body – in any person there are at least ten times as many bacterial cells as human cells. More than 1,000 species of bacteria live in and on us. At least 300 species of bacteria can be found just in a person's mouth. The *metagenome* (all of the genetic material in our body) contains 100 times more microbial genes than human genes.

- HUMAN CELLS
- BACTERIAL CELLS

BACTERIA CAN

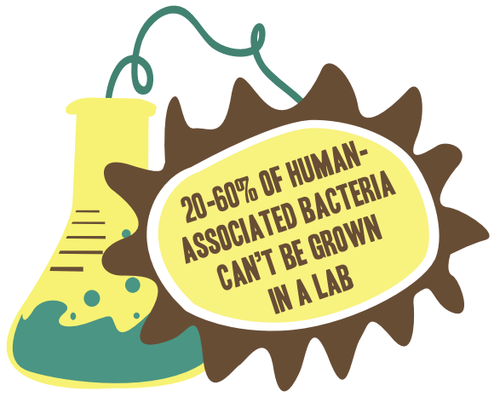
- HELP US ABSORB NUTRIENTS
- PROTECT US FROM OTHER PATHOGENS
- SERVE AS INDICATORS OF BAD HEALTH
  - CROHN'S DISEASE, BACTERIAL VAGINOSIS AND OBESITY

HOW CAN WE USE THIS INFORMATION?

Knowledge gained from research on the human microbiome will increase our understanding of the associations between our microbial flora and our health and may provide insight on how manipulations of microbiome can be used to prevent and treat disease.

WHAT SCIENTISTS ARE DOING

Canadian researchers, supported by the Canadian Institutes of Health Research (CIHR) are participating in the International Human Microbiome Project. Because of the scale of this undertaking, some researchers have described the initiative as a second Human Genome Project. But it's not going to be an easy job. It's estimated that between 20 to 60 % of human-associated bacteria, depending on body site, cannot be grown in the lab using conventional techniques.



WHAT WE KNOW

Here's what's known about the role of bacteria in maintaining health. Some bacteria help protect us from other pathogens, in some cases literally taking up space so that harmful bacteria cannot set up residence. Some bacteria help us absorb nutrients and others serve as indicators of the status of our health. Changes and perturbations in a person's microbiome have been associated with a number of diseases and conditions such as Crohn's disease, bacterial vaginosis and obesity.

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PLANET YOU

THE RESEARCH THAT HAS YOU COVERED

DR. MONEY'S TEAM

Perturbations in the microbial community of the vagina can result in enhanced acquisition of HIV and other sexually transmitted infections, pelvic inflammatory disease, infertility, early pregnancy loss, and localized infections that significantly impact quality of life. To understand the vaginal microbes and how they can modulate women's health and diseases, Dr. Deborah Money and her team will examine and identify the microorganisms living in the female genital tract. The data collected will help to identify and characterize microbes that are related to womens' health and and potentially lead to the development of new treatments and therapies.

DR. SURETTE'S TEAM

In general, the bacteria that live on, or in, the human body are beneficial (commensal bacteria) and are essential for health. However, lurking among the commensal bacteria are pathogens which are commonly found in healthy individuals and are held in check by the commensals. Dr. Mike Surette and his team will study the commensal microbiota in the respiratory tract and investigate how they inhibit or activate the pathogens that cause disease. Understanding these interactions may lead to new ways to control respiratory infections.

DR. DOOLITTLE'S TEAM

Dr Ford Doolittle's team will characterize the bacteria in and on our bodies and assess their role in health and disease. The results will teach us how to encourage the "good" bugs and discourage the "bad". Achieving this goal requires better methods for identifying microbial types and predicting their activities. The team will; develop software for characterizing the diversity and predicting the impact of the many human microbial communities. It is expected that this software will be of wide and immediate use to all microbiome scientists.

DR. FINLAY'S TEAM

Allergic asthma is an ever-increasing problem in developed countries and affects up to 20% of all Canadians. Recent evidence suggests that shifts in the normal microbiota may play a significant role in the development of asthma (the so-called "hygiene hypothesis"). However, the role of the gastrointestinal microbiota in asthma has never been explored experimentally, and no attempt has been made to identify the microbial populations associated with asthma. Dr. Brett Finlay and his team propose to explore the effect of different antibiotics on the microbiota and immune development. This research will provide key information about the role of the intestinal microbiota in immune development and atopic diseases and could lead to new ways of treating asthma.

DR. CROITORU'S TEAM

Inflammatory bowel disease (IBD) is a condition that causes inflammation and ulcers in the intestine and colon and affects over 200,000 Canadians. Dr. Ken Croitoru and his team are conducting a prospective study of currently healthy people who have an elevated genetic risk of developing Crohn's disease. This study,, entitled "The GEM Project," will identify changes in the gut bacteria and host immune response in people who develop IBD, before they develop disease. By assessing these individuals, Dr. Croitoru and his team can study how specific genes influence the makeup of the entire population of gut bacteria in healthy people.

DR. GUTTMAN'S TEAM

Cystic Fibrosis (CF) is the most common fatal genetic disease among individuals of European descent, with mortality due to respiratory problems associated with repeated episodes of bacterial infection of the airways. Dr. David Guttman's team will use state-of-the-art genomic technologies to characterize the composition and dynamics of the microbial communities found in the CF lung during the progression of the disease and the initiation of antibiotic treatment. The long-term goal of the study is to establish guide-lines to assist clinicians in the design and selection of therapies tailored for individual patients based on their clinical status and the specific nature of the infectious community.

DR. KOZYRSKYJ'S TEAM

Dr. Anita Kozyrskyj and the SyMBIOTA research team will study the impact of antibiotic use on the composition of intestinal microbiota in newborn infants. The team is exploring whether changes in infant microbiota are associated with the development of allergy and asthma in children. The team will follow 2,500 infants enrolled in the Canadian Healthy Infant Longitudinal Development (CHILD) study to test the association between the use of antibiotics, changes in the infant gut microbiota and the development of atopic disease. Study objectives will be achieved through linkage of detailed data on antibiotic use in infants from provincial prescription database records with clinical data and bacterial profiles of their fecal samples.

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Genome BritishColumbia

Crohn's and Colitis Foundation of Canada

Fondation canadienne des maladies inflammatoires de l'intestin

Cystic Fibrosis Canada
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