

Healthy humans are host to diverse communities of microbial organisms

What is this research about?

Within the human body, it is estimated that there are ten times as many microbial cells as human cells. These microbes are responsible for a number of metabolic reactions that are necessary for human health. Several sites on the body, including the gut, skin, and vagina, are ideal habitats for microbes. Each of these habitats is home to a number of different types of microbes that make up a microbial community. The diversity of the microbial community in a given habitat has been linked to several human diseases: for example, a low diversity in the gut is associated with obesity and inflammatory bowel disease. Studies have shown that even healthy individuals have very different microbes living in each of these habitats. While scientists are unsure what causes this diversity, possible explanations include diet, environment, an individual's genetics, and early exposure to microbes. In order to begin to analyze the role of these microbes in human health and disease, the Human Microbiome Project (HMP) is attempting to identify and characterize the microbes that are present in body habitats of healthy individuals.

What did the researchers do?

The HMP team of researchers obtained microbial samples from 242 healthy adults in the United States (129 males and 113 females). Samples were taken from men at body habitats including the mouth, behind each ear, the inner elbows, the nostrils, and the gut (represented by a stool sample). Women were sampled at the same body habitats plus the vagina. Over half of the individuals were sampled again at a later date, in order to check whether there was a change in microbes within a particular person over time. The samples were then genetically analyzed to identify the microbes present in each habitat. In addition, the samples were assessed to describe the function of the microbial communities.

What you need to know:

This research characterized microbial communities in healthy human subjects. Improved understanding of the human microbiome can help answer questions regarding the links between microbial activity, health and disease.

What did the researchers find?

The researchers defined the microbial communities at each habitat, and found between 81-99% of all predicted species of human body microbes. Oral and stool communities were especially diverse in terms of the number and abundance of microbes, and vaginal sites had relatively simple (non-diverse) communities. The samples from the same person at two points in time were more similar than samples compared between two different people; this led the researchers to believe that the uniqueness of each individual's microbial community seems to be relatively stable over time. While the compositions of microbial communities differ widely between people, the functionality was found to be similar. This indicates that there are many ways to construct microbial communities to perform similar functions. The state of the microbial community structure in individuals may be an indicator of disease susceptibility.

How can you use this research?

Researchers can use this baseline information to further investigate the links between the human microbiome, health and disease.

About the University of Guelph researcher:

Emma Allen-Vercoe is an Assistant Professor in the Department of Molecular and Cellular Biology at the University of Guelph. Email: eav@uoguelph.ca

Article citation:

The Human Microbiome Project Consortium. (2012). Structure, function and diversity of the healthy human microbiome. *Nature* 486: 207-214.

Keywords:

Human Microbiome Project; genes; microorganism; disease

Cite this work:

University of Guelph, Institute for Community Engaged Scholarship (2012). Healthy humans are host to diverse communities of microbial organisms. Retrieved from: <http://hdl.handle.net/10214/5579>

This summary is a project of the Institute for Community Engaged Scholarship (ICES) at the University of Guelph, with project partners: the [Catalyst Centre](#), [SPARK](#) Program at the University of Guelph, and the [Knowledge Mobilization Unit](#) at York University. This project is part of the Pan-Canadian [Research Impact](#) Network. http://csahs.uoguelph.ca/pps/Clear_Research