

Review: Surprising Human Microbe

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ABSTRACT

Common belief about microorganisms has been built up in the mind of mass people mostly on the basis of their harmful activities. Although approximately ninety percent of all cells in the human body are microorganisms, their beneficial support on our existence has hardly ever been taken into consideration. They reside on our skin, in mouth, nose, ears, intestinal tract and genitals. The microbial material living in our gut weighs about 1-2 kg, and there are more bacteria on our skin than human beings on the Earth. Regarding these numbers, it is not surprising that the human microbiome (the entity of all microorganisms living with us) has an enormous power: Most species (out of approximately ten thousand of them) are essential for our survival, health and well-being. This article is focused to correct misbelief about microbes.

INTRODUCTION:

Microbes are the foundation of life as they're everywhere. They are in the air we breathe, in the food we eat, in the ground we walk and cultivate crops on and even inside us. There are more microbes on a person's hand than there are people on the entire earth. They do many jobs in an extremely wide field. Without them the planet wouldn't survive, as we know it. We couldn't digest food, neither of course could animals, plants couldn't grow, rubbish and waste wouldn't decay and there will be a lot less oxygen in the air we breathe. Many people believe they were the very start of evolution, which in turn led to humans, you and me.

Most microbes are harmless to humans, and many of them (95%-97%) are essential or useful to the existence of plant and animal life. Only a small fraction (3%-5%) causes disease (1). Microbes are microscopic organisms such as bacteria, archaea, protozoa and fungi, and these microorganisms that reside on or within human body are referred to microbiota, microflora, or normal flora and their genome is known as microbiome (2, 3). This microbial colonization begins during and shortly after birth. Human body is composed of 10^{14} , or 100 trillion microbes and in contrast, the average human body is thought to contain about 10^{13} , or 10 trillion cells. It is clear from that estimation that microbes outnumber human cells 10 to 1 (4). That is approximately ninety percent of all cells in the human body are microorganisms. They reside on skin, in mouth, nose, ears, intestinal tract and genitals. Almighty creator has made 10 microbes to serve each cell of our body. The microbiome is actually the first line of defense and essential for our development, immunity and nutrition. The bacteria living in and on us are not invaders but beneficial colonizers. When we kill it off with antimicrobial agents, we really are doing our own system a disservice.

Microorganisms occur nearly everywhere in nature. Since the conditions that favor the survival and growth of many microorganisms are those under which people normally live, it is inevitable that we live among a multitude of microbes. Microorganisms affect the wellbeing of people in great ways. They

bring many changes; some desirable and some undesirable. To know about the beneficial and non-beneficial microbes and their roles in our life, microbiology must be a great field of study.

The microbiota colonizes virtually every surface of the human body that is exposed to the external environment. Microbes flourish on our skin and in the genitourinary, gastrointestinal, and respiratory tracts (5, 6). By far the most heavily colonized organ is the gastrointestinal tract (GIT); the colon alone is estimated to contain over 70% of all the microbes in the human body (7). The human gut has an estimated surface area (200 m²) of a tennis court (8) and, as such a large organ, represents a major surface for microbial colonization. Researchers are actually starting to recognize gut microbiota as one of unappreciated "human organ" which is even been suggested that it would be more apt to view human body as a "super organism" composed of symbiotic microorganisms (9). Additionally, the GIT is rich in molecules that can be used as nutrients by microbes, making it a preferred site for colonization. Gut microbiota is an assortment of microorganisms inhabiting the length and width of the mammalian gastrointestinal tract.

The composition of this microbial community is host specific, evolving throughout an individual's lifetime and susceptible to both exogenous and endogenous modifications. Recent renewed interest in the structure and function of this "organ" has illuminated its central position in health and disease. The microbiota is intimately involved in numerous aspects of normal host physiology, from nutritional status to behavior and stress response. Additionally, they can be a central or a contributing cause of many diseases, affecting both near and far organ systems (10).

According to the quote of ancient Greek physician Hippocrates "death sits in the bowels" and "bad digestion is the root of all evil" in 400 B.C. (11), showing that the importance of the intestines in human health has been long recognized. In the past several decades, most research on the impact of bacteria in the intestinal environment has focused on gastrointestinal pathogens and the way they cause disease. Gut microbiomes help digest our food, regulate our immune system, protect against other bacteria that cause disease, and produce vitamins including B vitamins B12, thiamine and riboflavin, and Vitamin K. The later one is needed for blood coagulation. It has been found that the gut microbiomes are different between obese and lean twins. Obese twins have a lower diversity of bacteria, and higher levels of enzymes, meaning the obese twins are more efficient at digesting food and harvesting calories. Obesity has also been associated with a poor combination of microbes in the gut (12). Many studies reported that the immune system undergoes major development during infancy and is highly related to the microbes that colonize the intestinal tract (13, 14, 15). With the rapid evolution of metagenomics technologies, through study on the genetic variation in intestinal microbiota, it is established that obesity (16) and insulin resistance (17) are determined by the specific metabolic characteristics of gut microbiota. It is not surprising that nearly 99% of the genes in humans are microbial in origin (18).

CONCLUSION:

Microbes' important role in the continuous sustenance of life is discussed above in brief. They are human's best friends due to their beneficial aspects and enemies due to their harmful aspects, so proper care must be taken to both. Now it is not wise to disturb or remove or destroy the friendly microbes by use of antimicrobials indiscriminately. Development of awareness against removal and killing of beneficial microbes is very important for better outcome. We have to remember that man can control the harmful activities but their beneficial activities cannot be replaced by artificial processes. So the microbes are our friends more and enemies less.

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