Microbiota: the human body is a home for bacteria

As well as allowing us to conduct our everyday lives, our body is home to a huge number of organisms, which all together are identified as the human microbiota. The human microbiota consists of organisms that come from all taxa, but in this article we will focus only on bacteria. According to some recent studies, the amount of "good" bacteria that colonises our body amounts to approx. one hundred trillion units. An almost unimaginable figure if one considers that we are talking about orders of magnitude of $10^{14}$ zeroes (at least ten times the number of cells that comprise the human organism).

But the impressive extent of the microbiota lies not only in the number of units that comprise it: according to scientists, in fact, the bacteria that live in symbiosis with each of us on average belong to 160 different species and all together encode a number of genes one thousand times greater than that of our organism.

And that's not all, because the connection between these microbes and our health is the focus of several research projects and is increasingly gaining the attention of physicians and scientists. Contrary to what is often thought, in fact, the bacteria that interact with our bodies and inhabit it are not only pathogens. On the contrary, many of them are fundamental symbionts for us, allowing us to perform most of our vital functions and in some cases even protect us from serious diseases.
But what are bacteria? From a taxonomic point of view, bacteria belong to the domain (or super kingdom) of Bacteria and their most evident characteristics consist of the fact of being single-celled organisms with a prokaryotic cell (which in Greek means "primitive nucleus"). The prokaryotic cell is different from the eukaryotic cell in a number of characteristics, including: the presence of free genetic material in the cytoplasm (while in eukaryotic organisms the DNA is organised in a nucleus, surrounded by a membrane); the absence of cell organelles (with the exception of ribosomes); the presence of a wall, a rigid casing, which protects them from the outside environment, consisting of a polymer called peptidoglycan.

The prokaryotic cell is smaller than the eukaryotic cell, has quite variable dimensions and is mostly transparent and therefore, in order to be able to observe it, we need a contrast microscope, which magnifies it and colours it to make it visible. And thus a fantasy world opens up before our very eyes. Because bacteria can have incredibly different morphologies: cocci - spherical in shape, which
in turn can be arranged, for example, in clusters (staphylococci) or chains (streptococci) - spirilla, with a helical appearance, clostridia, of bacillary appearance, and treponemes, also spiral in shape.

**Intestinal microbiota**

When we talk of microbiota, our thoughts immediately turn to the so-called intestinal flora. In the intestine, in fact, bacteria are particularly numerous and represent as much as 90% of the cells present. Each of these cells has its own function, but mostly we can say that they use them - as they use us, according to a perfect symbiosis - to convert signals arriving from the outside and communicate them to the human organism. Precisely for this reason, maintaining one's microbiota balanced also means taking care of one's health.

There are several factors that influence our microbiota and help to build it and determine its characteristics. The main ones are undoubtedly diet and the environment. Depending on where we live and what we eat, in fact, our bacterial flora changes significantly. But that's not all. Just as an example, also giving birth is an important moment. It has in fact been observed that children born with natural childbirth have a microbiota characterised by a high concentration of bacterial species typical of the maternal reproductive tract. In contrast, children born by Caesarean section have a
microbiota rich in bacteria typical of the skin. Moreover, over time and with increasing age, also the complexity of the microbiota increases.

![Illustration: bacteria](image)

**Interactions**

The characteristics of the bacterial community living in an organism may have significant and very different repercussions from one another. A fairly recent study showed that, in mice, alteration of the microbiota affects the speed of movement of the rodents. Other studies, some still in progress, show that a significant alteration of the microbiota (otherwise known as dysbiosis) can be linked to asthma, stress and even some forms of autism. And that's not all: research has clearly documented that maintaining a balance of bacterial flora has a protective effect with respect to colorectal cancer.
Products and therapies for the microbiota

In the light of these discoveries, research, not only of an academic but also industrial nature, has begun to work on developing treatments to ensure the health of the microbiota. In this sense, the products available today can be divided into three main categories: probiotics (that contain the "good bacteria"); prebiotics (fostering the selective growth of one type of bacteria); and postbiotics (more recently developed, which contain the metabolites derived from fermentation by the bacteria).

To find out more

- [http://www.nature.com/nature/focus/humanmicrobiota/](http://www.nature.com/nature/focus/humanmicrobiota/)
- [http://www.microbiologia.unige.it/dpb/Appunti/M-GENERALE01%20(1).htm](http://www.microbiologia.unige.it/dpb/Appunti/M-GENERALE01%20(1).htm)
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