

Manipulation of the intestinal microbiota: the medicine revolution of the 21st century

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Bacteria usually co-exists with humans for millennium, and can be found in our bodies in many places, most of them in the gastrointestinal tract. They constitute the human microbiome formed by a great variety and diversity of microorganisms. It is estimated that 70% of these microorganisms are concentrated in the intestine, particularly in the colon, forming the intestinal microbiota, with up to 10^{11} bacteria per milliliter. It shelters about 3 million microbial genes, corresponding to 150 times the human genome. The set formed by microbial cells and genes added to human cells and genes creates the concept of “superorganism”.

Before birth, there are no bacteria present in the digestive tract, but in childbirth, their colonization happens quickly. The intestinal microbiota begins to settle from 2 to 3 years of age and, from there, remains relatively stable. However, this stability can be influenced by diet, diseases, use of medications (mainly antibiotics) and aging. This microbiota is composed of commensal bacteria (native to the host) or temporary bacteria (passing through the body). Both can be beneficial, potentially harmful or pathogenic to humans. The beneficial bacteria interact positively with the human immune system, provoking a competitive inhibition with the pathogens bacteria, keeping the intestinal microbiota in a balance called **eubiosis**. The genre of bacteria with the greatest health benefit are *Bifidobacterium* and *Lactobacillus*.

Recent researches suggests that the normal intestinal microbiota is not simply a collection of microorganisms but reflects an interrelationship between different genre of bacteria that possibly work together to benefit the host. It is now believed that the existence of a large diversity of microorganisms in the gastrointestinal tract is important and beneficial for the host. A healthy microbiota plays an important role in digestion and absorption of nutrients, production of vitamins, maintenance of the structural and functional integrity of the intestine, protection against pathogens and modulation of the inflammatory response through the interaction of the microbiota and the immune system (gut associated lymphoid tissue – GALT).

The balance of the intestinal microbiota is a dynamic process, constantly exposed to factors that alter the quantity and diversity of its bacteria, which may be positive or negative.

These studies^(1,5-8) have also shown that particularities of the modern lifestyle associated with intrinsic factors of the host, such as unbalanced feeding, excessive consumption of alcohol, smoking, stress, frequent use of laxatives, gastric protectors, antibiotics, gestation, old age, frequent constipation or diarrhea, contribute to negative changes in the microbiota. This favors the increase of the pathogenic bacteria in relation to the beneficial ones, installing an imbalance called **dysbiosis**.

Current studies⁽²⁻⁴⁾ have shown the presence of dysbiosis in patients with certain diseases such as inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), gastrointestinal infections, antibiotic-associated diarrhea (AAD), pseudomembranous colitis, celiac disease, colorectal cancer, type I and II diabetes, obesity, atopy and asthma, rheumatoid arthritis, and some neurological diseases. However, it is not yet known whether this change in the intestinal microbiota causes all or part of the disease, or whether the change is a consequence of the disease itself.

However, one of the main goals of these researches is to determine how to intervene or even to positively manipulate the composition of the intestinal microbiota favoring a greater quantity and diversity of beneficial bacteria, seeking the cure of various diseases. This positive intervention is possible with the practice of healthy living habits associated with adequate diet, consumption of prebiotics, probiotics and even the transplantation of feces microbiota.

At the beginning of the 21st century, researches seem to indicate that there will be another revolution in medicine, the possibility of manipulating the intestinal microbiota, opening new horizons for us humans in the ancient, primitive and cruel war between health and disease.

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