



### Introduction

The gut microbiota, a large ecosystem interacting with the host, has been shown to affect the health and fitness of the host-microbial superorganism. Recent studies suggest that gut microbiota can communicate with distal organs in the host, such as liver, testis, brain, kidney, bone and eye, through several complex mechanisms producing different alterations.

### Objectives

This work aims to study the relationship between microbiota and different corporal axes for a future new therapeutic approach in precision medicine.

### Methods

A pubmed and scopus revision of the literature about microbiota diversity, dysbiosis, corporal/body axes, precision medicine, cancer treatment, etc., was performed. Only articles related to different diseases were considered.

### Conclusions

There is a marked relationship between the composition and diversity of the microbiota and various diseases distant from the intestine. This relationship occurs through different body axes between the intestine and the eye, brain, liver, bone, kidney and hormonal system. A correct action on dysbiosis can lead to a better response to the treatment of diseases in these organs. This new therapeutic approach is of great interest for precision medicine.

### Results

The development of new technologies has allowed to establish a bowel-eye relationship where an imbalance of the intestinal microbiota can be a key factor that affects the appearance of eye diseases such as uveitis, dry eye or glaucoma. This is called the intestine-eye axis. Today, physicians use prebiotics and probiotics to restore the normal microbiota of patients with eye problems. Likewise, in the intestine-kidney axis, the processes of dysbiosis also seem to be directly related to chronic kidney diseases. The mechanisms underlying dysbiosis may involve immunological, metabolic or systemic disorders that directly affect kidney functionality. Moreover, this process of dysbiosis also seems to be related to arthritis because the inflammatory processes that produce these changes in the microbiota worsen the conditions of such disease. However, they are not fully understood. Another of the most affected organs is the liver by the intestine-liver axis. The toxins produced by pathogenic bacteria have the ability to enter the circulatory system and spread throughout the rest of the body, causing cell death. One of the cells most sensitive to this type of infection are hepatic cells, whose death can cause severe problems to the health ranging from simple inflammation to multiorgan failure. These hepatic diseases are collected under the name of acute chronic liver failure (ACLF) and are characterized by a sudden organic dysfunction that comes to cause the death of the organism. The composition of the microbiota greatly affects this decompensation process. Therefore, the prevention and treatment strategy for ACLF symptoms could be very useful. Some hormones, such as androgens, can reshape the gut microbiota by means of the intestine-hormones axis. This field has emerged as an interdisciplinary field called "microgenderoma".

Recent studies reported that gut microbiota can act as an important regulatory factor in the production of androgens, and even they are able to influence in the process of spermatogenesis when crossing the blood testicle sweep. Bones can also be seen to be related to dysbiosis processes by means of the intestine-bone axis. Osteoporosis (OP) is a degenerative disease characterized by bone loss and bone destruction. It is a disease that is currently being studied due to the interest in solving the problems it causes. The development of microbiology and in-depth knowledge of the gut microbiota has allowed us to know the existence of an intestine-brain axis that can be strongly linked to bones. This field of study is of special interest because the correct modulation of microbiota could prevent the appearance or at least could reduce the disease progress. Bipolar disorder (BD) is a mental disease caused by a set of factors such as gene interaction or the environment. Currently, by the intestine-brain axis, the microbiota is considered an essential environmental factor for the health of the individual. Recent studies showed that patients suffering from BD showed a different gut microbiota than healthy individuals. This diversity is due to the fact that, in addition to proinflammatory factors such as IL-6 and tumor necrosis factor  $\alpha$ , the microbiota is also responsible for modulating interferon type 1 signaling, altering it and producing inflammation of the peripheral and central nervous system that could explain the etiology of BD. Finally, it is known that interferon type 1 is linked to the induction of the expression of TRANK1, which generates a high circulation in the blood-brain barrier, worsening the symptoms of patients with BD.

