Opinion

Metabolic disorders and gut microbiota

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The burden of non-communicable diseases such as cardiovascular diseases, cancer, obesity and diabetes are leading causes of death and disability.[1] Recent studies in both rodents and humans indicate that the gut microbiota is also a contributor to metabolic disorders reviewed in.[2] Increased blood pressure, dyslipidemia (defined by increased triglycerides and reduced high-density lipoprotein cholesterol), elevated fasting blood sugar and central obesity are metabolic syndromes main features, as defined by the International Diabetes Federation (IDF).[3] Recent evidences have proposed the potential role of gut microbiota as pathogenic factor affecting host metabolic balance and disorders.[4]

Obesity is characterized by an excess of adipose tissue and occurs when an imbalance exists between energy intake and energy expenditure.[5] The onset of obesity is a complex process that involves genetic and environmental factors and is often associated with the development of several chronic complications, such as elevated fasting blood sugar (hyperglycemia), elevated triglyceride levels (hypertriglyceridemia), low levels of high density lipoprotein (dyslipidemia), and high blood pressure (hypertension).[6] Individuals who meet at least three of these criteria are clinically diagnosed as having the metabolic syndrome,[6] which increases the risk of developing metabolic disorders such as type 2 diabetes and cardiovascular diseases.[7] Most of the individuals with the metabolic syndrome have abnormal fat accumulation, which suggests that the excess of adipose tissue has a causative role in this syndrome.[8]

Gut microbiota has recently been proposed as a crucial environmental factor driving metabolic disorders.[9] In fact, the gut microbiota is even seen as a separate endocrine organ, which is involved, through a molecular crosstalk with the host, in the maintenance of host energy homeostasis and in the stimulation of host immunity.[10]

Shifts in gut microbial composition caused by external factors can result in a dramatic alteration of the symbiotic relationship between gut bacteria and the host, which promotes the development of metabolic disorders.[11] In particular, the gut microbiota is believed to contribute to metabolic disorders via stimulation of low-grade inflammation.[12]

One of the hallmarks of obesity and obesity-related pathologies is the occurrence of chronic low-grade inflammation and low-grade inflammation causes various disorders.[13] Lipopolysaccharides (LPS), also called endotoxins, which are derived from the outer cell membrane of gram-negative bacteria, may trigger acute and chronic inflammation associated with the onset of obesity and insulin resistance.[14]

The study of the metabolic, signalling, and immune interactions between gut microbes and the host, and how these interactions modulate host brain, muscle, liver and gut functions, has raised the concept of therapeutic microbial manipulation to combat or prevent metabolic disorders.[15,16]

The use of probiotics and probiotics to improve the interactions between gut microbes and host metabolism in obesity and other metabolic disorders has been extensively investigated.[17] Probiotics are live microorganisms that, when used as food supplements, beneficially affect the host by improving the properties of the indigenous and changing the composition of the colonic microbiota.[18]

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Conflict of interest

The author declares no conflict of interest.

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