Chapter 14
Dietary Modulation of the Gut Microbiome and Its Impact on Host Health:
Understanding the Intricate Interplay Between Nutrition, Microbiota, and Physiolo

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ABSTRACT

Gut microbiota is highly influenced by dietary consumption. Lifestyle choices affect the microbial ecology, which in turn affects gut homeostasis. Altering host physiology may be possible with nutrition-induced alterations in gut microbiota triggering several diseases. Hence, the aggregate of food processing, the presence of prebiotic and probiotic, and the gut microbiota impact the host's immune system and health. Understanding these factors might justify individualized dietary therapies meant to prevent dysbiosis and help avert severe chronic diseases. This chapter describes

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the pathways involved in the metabolism of fat, protein, and carbohydrates in addition to the ways they communicate and control body systems. It also discusses how nutrition affects the microbiota and how dietary microbiome interactions may affect the development and progression of disease. It also spotlights on the features to preserve intestinal wellness.

INTRODUCTION

Nowadays, it is acknowledged that all eukaryotes are meta-organisms which means that their microbiota form an integral functioning unit. Water and minerals are directly used by the many microbial populations in the gastrointestinal system for their upkeep and obtain energy by using the leftover protein and carbohydrates in the host's metabolism following digestion. The gut microbiota is shaped in large part by nutrition, hence. This perspective article's goal is to give a broad overview of all dietary factors that may influence the stability, changes, and function of the gut microbiota (Maukonen et al., 2015). These factors can include food additives, cooking methods, dietary regimens, macronutrient profiles related diets need to be tailored to particular population groups and special situations like lactation, sports nutrition, and feeding alternatives for young children. Since their biomass exceeds 1011 cells per gram content, most bacteria are found in the more distal portions of the digestive system. Microorganisms produce vital metabolic byproducts from food ingredients that the small intestine does not fully digest, as well as assist in the biosynthesis of vitamins and critical amino acids in the distal gut, all of which support host health. However, short-chain fatty acid (SCFA) byproducts such as butyrate, propionate, and acetate help improve the mucosal barrier since they are important sources of energy for intestinal epithelial cells. Numerous biochemical functions carried out by the microbiota affect the host, including the production of metabolites, modifications to physiology and biochemistry, and the system of immunity. Significantly, the environment that the gastrointestinal system is subjected to continually affects the makeup, functionality, and metabolism of each particular intestinal microbiota (Bibbo et al., 2016).

The main determinant of the gut environment is diet. Thus, the intestine Microbiota is highly responsive to modifications in the dietary habits of the host. Food decomposition, the fermentation of complex carbohydrates and amino acids, as well as the formation of SCFAs such as butyrate, propionate, and acetate, and the digestion of lipids and proteins, are all aided by the gut microbiota (Kashtanova et al., 2016). Numerous factors impact the host's metabolism, such as diet, usage of antibiotics, illnesses, and lifestyle decisions. The main component affecting the conditions in the stomach is nutrition. The gut microbiota facilitates the production

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