Chapter 8
The Interplay Between Environmental Pollutants, Gut Microbiota, and Infections:
Current Concepts and Therapies

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ABSTRACT

Environmental pollutants (EPs) have become an increasingly common health hazard. Several studies have sustained the impact of these EPs on human gut microbiota (GM). The human GM is made up of thousands of microbes that play a paramount

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role to maintain hosts' health by providing many physiological functions, as well as protecting the host from pathogens and aggressions. Considering the crucial role that the host's GM plays in maintaining health, its disruption (gut dysbiosis) by the EPs can increase extraordinary the risk of infections and lead to the development of several conditions. Therefore, interventions aimed to restore the gut microbial population are of great interest. This chapter examines the intricate relationship between EPs and GM, highlighting the profound impact of EPs on human health including the development of infections. Additionally, this chapter discusses the potential role of probiotics, prebiotics, and FMT in mitigating the detrimental effects of EPs on GM.

I. INTRODUCTION

Environmental pollutants (EPs) are causing widespread concern due to their ecotoxicology and potential hazards to human health, particularly in light of the pervasive and severe pollution of biotic and abiotic environmental compartments (Chen, 2021). A growing body of research shows that being exposed to these EPs is one of the many environmental factors that contribute to the emergence of many health conditions (Claus et al., 2016b). Indeed, it has been established that chronic exposure to contaminants can raise the risk of developing metabolic and cancerous disorders(Chen, 2021). The basic role of gut microbiota (GM) in the upkeep and regulation of general host health has been confirmed in recent years by accumulating research. The GM is a complex community of microbes that produces energy from digested food, controls immunological response, and defends against pathogens(Omar et al., 2022). It comprises bacteria and other microbes such as fungi, archaea, viruses, and protozoans (Omar et al., 2022). Indeed, recent research has shown a significant connection between GM and human health. Through dietary channels, which can directly contact the gut ecosystem and come into contact with the microorganisms that naturally reside there, water and food pollution promote exposure to EPs (Chen, 2021).

GM are very sensitive to drugs, diet, and EPs (Jin et al., 2017a). Indeed, the GM system is commonly targeted and driven to dysbiosis by various pollutants (Chen, 2021). It is widely recognized that a balanced commensal microbiota is essential for defending the host against a variety of infections, either directly by eradicating them or indirectly by suppressing them inside or outside the intestine (Rothschild et al., 2018). Indeed, he human GM comprises thousands of microbes, many of which fight pathogens in infectious diseases and either inhibit or stimulate inflammation in various immunological situations (Maciel-Fiuza et al., 2023). Therefore, changes in the composition, abundance, diversity, and metabolism of the gut microbial

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