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Role of Gut Microbiota and Postbiotics for Colorectal Cancer

Advancing Therapeutic Strategies

Humana Press

About this book

The emerging role of gut microbiota and postbiotics has implications for the management of not only human health and diseases, but also colorectal cancer in particular, as these elements influence colorectal cancer pathogenesis, treatment, and prevention. This book bridges the gap between cutting-edge research and practical clinical applications in the management of colorectal cancer by offering a fresh perspective on potential therapeutic strategies and exploring the significance of microbiota in the oncology landscape. Chapters delve into the specific impacts of postbiotics, linking them to immune response modulation, inflammation reduction, and direct anticancer effects. Chapters also explore current and emerging therapies, including the manipulation of gut microbiota and the use of postbiotics supplements. Clinical trial results, case studies, and expert opinions are interwoven to present a realistic view of the benefits, limitations, and future prospects of these innovative therapeutic strategies.

This book is rounded out with perspectives on future research directions in this area, discussing potential next-generation therapies such as personalized medicine approaches and biotechnological advancements, and further contemplating broader implications of microbiota research on public health strategies. Informative and engaging, this book provides clinicians and researchers alike with a deeper understanding of how postbiotics can be harnessed in colorectal cancer treatment and potentially, the treatment of other cancers influenced by gut health.

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Editors

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Preface

The "Role of Gut Microbiota and Postbiotics for Colorectal Cancer: Advancing Therapeutic Strategies" is a dynamically advancing domain at the convergence of microbiology, oncology, and precision medicine. This book examines the complex interrelationships among gut microbiota, postbiotic metabolites, and the development of colorectal cancer (CRC), illuminating the ways in which microbial dysbiosis, immunological regulation, and bioactive chemicals derived from microbe's impact carcinogenesis and treatment results. As interest in microbiome-based therapies grows, a critical inquiry arises: Can postbiotics provide innovative approaches for the prevention and management of colorectal cancer?

This book connects fundamental microbiome science with translational and clinical applications through a multidisciplinary approach. The text commences with an extensive examination of gut microbiota composition, diversity, and function, highlighting their significance in the development and advancement of CRC. The effects of postbiotics, which are bioactive metabolites made by gut bacteria, on inflammation, oxidative stress, and the dynamics of the tumour microenvironment are covered in detail in later chapters. The therapeutic potential of microbiota-targeted approaches, such as probiotics, prebiotics, postbiotics, and faecal microbiota transplantation, is rigorously evaluated.

This book primarily concentrates on the emerging domain of microbiome-based precision medicine, which seeks to individualise colorectal cancer treatment using microbiota-focused diagnostics and therapies. This work emphasises the transformative potential of gut microbiota manipulation in colorectal cancer therapy by integrating advanced research with clinical views.

We express our profound appreciation to our colleagues, mentors, and contributors for their vital insights, and to our families for their steadfast support. Gratitude is extended to the editorial staff at Springer Nature, Humana Press for enabling this

undertaking. We anticipate this book will be a significant resource for researchers, doctors, and healthcare professionals dedicated to enhancing microbiome-based approaches in oncology.

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Abstract

This chapter explores the complex relationship between the gut microbiota and the pathogenesis of colorectal cancer (CRC), highlighting the role of microbial dysbiosis in promoting inflammation, DNA damage, and immune dysregulation. It reviews key pro-carcinogenic bacteria, such as *Fusobacterium nucleatum*, *Bacteroides fragilis*, and pks+ *Escherichia coli*, which contribute to tumor initiation and progression. The chapter also discusses the protective effects of beneficial microbes like *Lactobacillus* and *Bifidobacterium*, which help maintain gut health and inhibit carcinogenesis. Therapeutic strategies aimed at modulating the gut microbiota, including dietary interventions, probiotics, prebiotics, fecal microbiota transplantation (FMT), and postbiotics, are examined for their potential in CRC prevention and treatment. Finally, future directions in personalized microbiome-based therapies, diagnostic biomarkers, and the challenges facing clinical translation of gut microbiota research are addressed. The chapter emphasizes the growing importance of targeting the microbiome in CRC management to enhance prevention, diagnosis, and therapeutic outcomes.