Colon Cancer Diagnosis and Therapy

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Editors

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This book is dedicated to our families, our teachers, and friends

Preface

Colorectal cancer (CRC) is the second most lethal cancer recorded for tumor-associated mortalities globally. The incidence and mortality are gradually increasing in the developing countries due to adaptation of western lifestyle. The increasing incidence of this heterogenous disease is due to various modifiable and unmodifiable risk factors that lead to the occurrence of CRC. In spite of advanced technologies in screening, surgery, and conventional therapies, the survival rate remains low due to asymptomatic conditions and delay in diagnosis. Additionally, development of resistance and tumor recurrence are major obstacles confronted by the present-day therapies. Therefore, a better surveillance of incidence, mortality, and survival of the population suffering from CRC would provide efficient preventive measures. A better understanding of the CRC progression at the molecular level would assist in developing effective therapeutic options. In this book, we will try to compile information thoroughly by exploring novel biomarkers, therapeutic options, and advanced nanomedicine for the treatment of CRC, which will benefit patients.

The volumes focus on elucidating a better understanding of the current epidemiological statistics of CRC. The incidence, mortality, and survival rate included define the population on varied disparities like race, sex, age, and geography. The data surveillance of the population suffering from CRC supports the clinicians as well the patients to be diagnosed at their early stage of disease to improve survival rate. The diagnosis of CRC performed by various screening techniques including sigmoidoscopy, colonoscopy, double contrast barium enema (DCBE), and fecal occult blood test (FOBT) is found to be efficient but exhibits limitations like minimal sensitivity and specificity. Therefore, discovery of non-metabolite signature patterns using NMR and MRI provides better understanding of imaging and progression of CRC. The chapters in this book focus on the novel advanced dynamic contrast enhanced-MRI and diffusion weighted imaging to study oncometabolites and angiogenesis. A better understanding of CRC growth and progression promotes the researchers and clinicians to develop efficient therapy strategies. Therefore, increased understanding of these processes and their related growth factors and transcription factors along with their dysregulated pathways reveal the complexity of the mechanism implicated. These also promote modifications in chief oncogenic

and tumor suppressive miRNA that play a major role in regulating CRC. This knowledge will allow the development of novel biomarkers like exosome biomarkers that aid in early diagnosis of the diseases based on techniques like in-situ hybridization. It will also support ways to design more innovative therapeutic protein and compounds targeted against vital signaling cascades that play a crucial role in developing cancer angiogenesis and metastasis.

Conventional therapies including chemo and radiotherapies are found effective but the cytotoxicity developed by the chemodrugs is more disappointing. The main challenge for these conventional therapies is the resistance developed by the tumor cells due to the dysregulation of various transcription and growth factors. Therefore, improvements in techniques like targeted immunotherapy and nanotechnology are emerging to treat CRC patients for efficient results. Our authors will briefly compile information about these therapeutic options by systematically exploring the novel therapies for the betterment of patients. Finally, our book explores data pertaining to various advances integrated into a precision and personalized medicine treatment that can eventually enhance patient safety and efficacy.

We hope that our collection of novel therapeutic strategies reflects current research concept and we find immense pleasure in presenting our copy to the science community for the benefit of patients.

Atlanta, GA, USA — Ganji Purnachandra Nagaraju
Bilaspur, India — Dhananjay Shukla
Bilaspur, India — Naveen Kumar Vishvakarma

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About the Editors

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Dhananjay Shukla is an assistant professor in the Department of Biotechnology, Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India. He obtained his MSc in biotechnology from APS University Rewa, Madhya Pradesh. Dr. Shukla obtained his PhD in biotechnology from Defense Institute of Physiology and Allied Sciences, Defense Research and Development Organization, and Jamia Hamdard University, Delhi, India. Dr. Shukla did his postdoctoral research work at the Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad, Telangana, under DBT-Postdoctoral fellowship award. He received advanced research training from the Centre of Veterinary Health Sciences, Oklahoma State University, Stillwater, USA. He uses in vitro, in vivo, and in silico models to explore the role of bioactive compounds against lung diseases and cancer prevention. Dr. Shukla's current research interest is to evaluate phytomedicines against lung pathologies and cancer. He has published over 25 research papers in highly reputed International journals having high impact factors and has presented more than 15 abstracts at various national and international conferences. Dr. Shukla has been working as a faculty member since 2013 in the Department of Biotechnology, Guru Ghasidas Vishwavidyalaya.

Naveen Kumar Vishvakarma is currently assistant professor of biotechnology at Guru Ghasidas Vishwavidyalaya. He earned his master's degree in microbiology and then did his doctoral research in tumor immunology. During his doctoral research, he worked in the area of tumor acidity–mediated immunosuppression. After completing doctoral research work, he worked as postdoctoral fellow/research associate at Banaras Hindu University, Manitoba Institute of Cell Biology (Canada), and Moffitt Cancer Center and Research institute (USA). During his work at Moffitt Cancer Center, he demonstrated the role of acidic tumor microenvironment in selection of aggressive phenotype with metabolic alterations. In 2013, he joined HNB Garhwal University as assistant professor and later moved to his current position at Guru Ghasidas Vishwavidyalaya in 2014. His current research interest includes modulation of tumor metabolism, evaluating derivative anticancer drugs, and chemosensitization.