Chapter 12
Artificial Intelligence in Detecting and Diagnosing Microbiome-Driven Cancer:
An Emerging Paradigm

Abhiram Kumar
https://orcid.org/0000-0002-3422-2117
Birla Institute of Technology and Sciences, Pilani, India

Anjali Rai
Jagannath University, Chaksu, India

Shivang Shukla
https://orcid.org/0009-0002-6395-6838
Jagannath University, Chaksu, India

Chhavi Dhiman
Birla Institute of Technology and Sciences, Pilani, India

Kumar Pranav Narayan
https://orcid.org/0000-0001-5198-2495
Birla Institute of Technology and Sciences, Pilani, India

ABSTRACT

This chapter aim to explore transformative role of artificial intelligence (AI) in detecting and diagnosis of cancer, addressing critical gaps in early detection, diagnosis, personalized treatment, and improved patient outcomes. AI based algorithms,

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including machine learning and deep learning, are increasingly utilized to analysed complex microbiome data, identify cancer-associated signature, and predict therapeutics response. Moreover, we elucidate how AI facilitates the integration of multi-omics data (genomics, transcriptomics and metabolomics) with microbiome profiles, enhancing our understanding of cancer pathogenesis and progression. It also examines the application of AI in developing non-invasive diagnostic tools using microbiome biomarkers for various cancer, such as colorectal, lung, and breast cancer. Furthermore, the chapter addresses the challenges and opportunities in leveraging AI for microbiome-based caner immunotherapy. Conclusively, by highlighting future directions and the potential of AI revolutionize cancer care through microbiome-based precision medicine.