

Molecular Deciphering of Colorectal Cancer: Exploring Molecular Classifications and Analyzing the Interplay among Molecular Biomarkers MMR/MSI, KRAS, NRAS, BRAF and CDX2 – A Comprehensive Literature Review

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Abstract

Background: Colorectal cancer (CRC) exhibits molecular and morphological diversity, involving genetic, epigenetic alterations, and disruptions in signaling pathways. This necessitates a comprehensive review synthesizing recent advancements in molecular mechanisms, established biomarkers, as well as emerging ones like CDX2 for enhanced CRC assessment.

Material and Methods: This review analyzes the last decade's literature and current guidelines to study CRC's molecular intricacies. It extends the analysis beyond traditional biomarkers to include emerging ones like CDX2, examining their interaction with carcinogenic mechanisms and molecular pathways, alongside reviewing current testing methodologies.

Results: A multi-biomarker strategy, incorporating both traditional and emerging biomarkers like CDX2, is crucial for optimizing CRC management. This strategy elucidates the complex interaction between biomarkers and the tumor's molecular pathways, significantly influencing prognostic evaluations, therapeutic decision-making, and paving the way for personalized medicine in CRC.

Conclusions: This review proposes CDX2 as an emerging prognostic biomarker and emphasizes the necessity of thorough molecular profiling for individualized treatment strategies. By enhancing CRC treatment approaches and prognostic evaluation, this effort marks a step forward in precision oncology, leveraging an enriched understanding of tumor behavior.

Key words: colorectal cancer biomarkers, mismatch repair system, microsatellite instability, KRAS, NRAS, BRAF, CDX2, colorectal cancer molecular classification