Conference Abstracts

Harnessing Artificial Intelligence for Predicting Colorectal Cancer Risk: A Comprehensive Systematic Review

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Background

Colorectal cancer (CRC) is a leading cause of cancer-related morbidity and mortality worldwide. Early identification of individuals at high risk is essential to improving screening strategies. Artificial intelligence (AI), particularly machine learning (ML) and deep learning (DL), has shown promise in predicting CRC risk through complex data integration.

We aimed to systematically review studies that employed AI to predict CRC risk in asymptomatic individuals or patients based on clinical, genetic, or lifestyle data.

Methods

A comprehensive search was performed in PubMed, Scopus, and Web of Science for studies published between January 2015 and April 2025. Eligible studies used AI models (ML or DL) to predict CRC risk and reported model performance metrics. Two independent reviewers conducted study selection, data extraction, and quality assessment using the PROBAST tool.

Results

1. studies were included. Most used retrospective cohort data, incorporating variables such as age, sex, family history, fecal occult blood test (FOBT), colonoscopy findings, and genetic polymorphisms. Machine learning models such as random forest, support vector machines, and neural networks outperformed traditional risk scores. Reported AUCs ranged from 0.76-0.91. Key studies demonstrated the feasibility of AI in real-world screening settings, especially for identifying high-risk individuals who may benefit from early colonoscopy.

Conclusion

AI-based models show significant promise in predicting CRC risk, offering higher accuracy than conventional risk stratification tools. Integration into clinical workflows could personalize screening and enhance early detection. However, prospective validation and transparency of algorithms remain necessary.