

# World Journal of *Gastrointestinal Oncology*

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**EDITORIAL**

Ren MJ, Zhang ZL, Tian C, Liu GQ, Zhang CS, Yu HB, Xin Q. Importance of early detection in multiple endocrine neoplasia type 1: Clinical insights and future directions. *World J Gastrointest Oncol* 2025; 17(4): 100013 [DOI: 10.4251/wjgo.v17.i4.100013]

Kishikawa H, Nishida J. Gastric cancer in patients with *Helicobacter pylori*-negative autoimmune gastritis. *World J Gastrointest Oncol* 2025; 17(4): 101661 [DOI: 10.4251/wjgo.v17.i4.101661]

Tawheed A, Ismail A, El-Kassas M, El-Fouly A, Madkour A. Endoscopic resection of gastrointestinal tumors: Training levels and professional roles explored. *World J Gastrointest Oncol* 2025; 17(4): 101832 [DOI: 10.4251/wjgo.v17.i4.101832]

Ye XX, Qu HH, Yang C, Teng WJ, Chen YP, Lin JM, Wang XB. Precision medicine in the prediction of metachronous liver metastasis in rectal cancer: Applications and challenges. *World J Gastrointest Oncol* 2025; 17(4): 102469 [DOI: 10.4251/wjgo.v17.i4.102469]

Sun YF, Cao XK, Wei Q, Gao YH. Potential biomarkers for the prognosis of gastrointestinal stromal tumors. *World J Gastrointest Oncol* 2025; 17(4): 102831 [DOI: 10.4251/wjgo.v17.i4.102831]

Lamprecht CB, Kashuv T, Lucke-Wold B. Understanding metastatic patterns in gastric cancer: Insights from lymph node distribution and pathology. *World J Gastrointest Oncol* 2025; 17(4): 103709 [DOI: 10.4251/wjgo.v17.i4.103709]

**REVIEW**

Zhang Y, Yue NN, Chen LY, Tian CM, Yao J, Wang LS, Liang YJ, Wei DR, Ma HL, Li DF. Exosomal biomarkers: A novel frontier in the diagnosis of gastrointestinal cancers. *World J Gastrointest Oncol* 2025; 17(4): 103591 [DOI: 10.4251/wjgo.v17.i4.103591]

**ORIGINAL ARTICLE****Case Control Study**

Liu X, Zhang S, Qiu H, Xie ZQ, Tang WF, Chen Y, Wei X. Investigation of high-mobility group box 1 variants with lymph node status and colorectal cancer risk. *World J Gastrointest Oncol* 2025; 17(4): 102584 [DOI: 10.4251/wjgo.v17.i4.102584]

**Retrospective Cohort Study**

Zhao CH, Liu H, Pan T, Xiang ZW, Mu LW, Luo JY, Zhou CR, Li MA, Liu MM, Yan HZ, Huang MS. Idarubicin-transarterial chemoembolization combined with gemcitabine plus cisplatin for unresectable intrahepatic cholangiocarcinoma. *World J Gastrointest Oncol* 2025; 17(4): 103776 [DOI: 10.4251/wjgo.v17.i4.103776]

Dolu S, Cengiz MB, Döngelli H, Gürbüz M, Arayıcı ME. Importance of hematological and inflammatory markers in the localization of gastric cancer. *World J Gastrointest Oncol* 2025; 17(4): 104455 [DOI: 10.4251/wjgo.v17.i4.104455]

**Retrospective Study**

Potievskiy MB, Petrov LO, Ivanov SA, Sokolov PV, Trifanov VS, Grishin NA, Moshurov RI, Shegai PV, Kaprin AD. Machine learning for modeling and identifying risk factors of pancreatic fistula. *World J Gastrointest Oncol* 2025; 17(4): 100089 [DOI: [10.4251/wjgo.v17.i4.100089](https://doi.org/10.4251/wjgo.v17.i4.100089)]

Lu JL, Cheng Y, Xu ZL, Qian GX, Wei MT, Jia WD. Immune checkpoint inhibitors plus anti-angiogenesis in patients with resected high-risk hepatitis B virus-associated hepatocellular carcinoma. *World J Gastrointest Oncol* 2025; 17(4): 101371 [DOI: [10.4251/wjgo.v17.i4.101371](https://doi.org/10.4251/wjgo.v17.i4.101371)]

Wang SY, Dong XT, Yuan Z, Jin LX, Gao WF, Han YK, Ni KM, Liu ZC, Wang JY, Wei XM, Su XM, Peng X, Zhang CZ. Factors associated with false fecal immunochemical test results in colorectal cancer screening. *World J Gastrointest Oncol* 2025; 17(4): 101487 [DOI: [10.4251/wjgo.v17.i4.101487](https://doi.org/10.4251/wjgo.v17.i4.101487)]

Fei J, Qi LW, Liu Y, Shu M, Mo WQ. Comparing transarterial chemoembolization alone to combined transarterial chemoembolization and radiofrequency ablation in primary hepatocellular carcinoma treatment. *World J Gastrointest Oncol* 2025; 17(4): 102038 [DOI: [10.4251/wjgo.v17.i4.102038](https://doi.org/10.4251/wjgo.v17.i4.102038)]

Mo YK, Chen XP, Hong LL, Hu YR, Lin DY, Xie LC, Dai ZZ. Gastric schwannoma: Computed tomography and perigastric lymph node characteristics. *World J Gastrointest Oncol* 2025; 17(4): 102085 [DOI: [10.4251/wjgo.v17.i4.102085](https://doi.org/10.4251/wjgo.v17.i4.102085)]

Zhang Y, Zhu WL, Wu M, Gao TY, Hu HX, Xu ZY. Using bioinformatics methods to elucidate fatty acid-binding protein 4 as a potential biomarker for colon adenocarcinoma. *World J Gastrointest Oncol* 2025; 17(4): 103113 [DOI: [10.4251/wjgo.v17.i4.103113](https://doi.org/10.4251/wjgo.v17.i4.103113)]

Guo S, Liu FF, Yuan L, Ma WQ, Er LM, Zhao Q. Subclassification scheme for adenocarcinomas of the esophago-gastric junction and prognostic analysis based on clinicopathological features. *World J Gastrointest Oncol* 2025; 17(4): 103455 [DOI: [10.4251/wjgo.v17.i4.103455](https://doi.org/10.4251/wjgo.v17.i4.103455)]

Rong Y, Liu Y, Tang SY, Ju XJ, Li H. Caregiver-involved nutritional support and mindfulness training for patients with gastrointestinal cancer: Effects on malnutrition risk and mood. *World J Gastrointest Oncol* 2025; 17(4): 103515 [DOI: [10.4251/wjgo.v17.i4.103515](https://doi.org/10.4251/wjgo.v17.i4.103515)]

Liang LW, Luo RH, Huang ZL, Tang LN. Clinical observation of nivolumab combined with cabozantinib in the treatment of advanced hepatocellular carcinoma. *World J Gastrointest Oncol* 2025; 17(4): 103631 [DOI: [10.4251/wjgo.v17.i4.103631](https://doi.org/10.4251/wjgo.v17.i4.103631)]

Yu J, Liu QC, Lu SY, Wang S, Zhang H. Detecting plasma SHOX2, HOXA9, SEPTIN9, and RASSF1A methylation and circulating cancer cells for cholangiocarcinoma clinical diagnosis and monitoring. *World J Gastrointest Oncol* 2025; 17(4): 104253 [DOI: [10.4251/wjgo.v17.i4.104253](https://doi.org/10.4251/wjgo.v17.i4.104253)]

**Clinical Trials Study**

Liu Y, Liu HG, Zhao C. Intraperitoneal perfusion of endostatin improves the effectiveness and prolongs the prognosis of patients with gastric cancer. *World J Gastrointest Oncol* 2025; 17(4): 103131 [DOI: [10.4251/wjgo.v17.i4.103131](https://doi.org/10.4251/wjgo.v17.i4.103131)]

Sun MH, Shen HZ, Jin HB, Yang JF, Zhang XF. Efficacy and safety of early pancreatic duct stenting for unresectable pancreatic cancer: A randomized controlled trial. *World J Gastrointest Oncol* 2025; 17(4): 103311 [DOI: [10.4251/wjgo.v17.i4.103311](https://doi.org/10.4251/wjgo.v17.i4.103311)]

Zhang SH, Li W, Chen XY, Nie LL. Combining immune checkpoint inhibitors with standard treatment regimens in advanced human epidermal growth factor receptor-2 positive gastric cancer patients. *World J Gastrointest Oncol* 2025; 17(4): 103855 [DOI: [10.4251/wjgo.v17.i4.103855](https://doi.org/10.4251/wjgo.v17.i4.103855)]

**Observational Study**

Suzuki M, Sakurazawa N, Hagiwara N, Kogo H, Haruna T, Ohashi R, Yoshida H. Usefulness of shear-wave elastography for detection of lymph node metastasis in esophageal and gastric cancer. *World J Gastrointest Oncol* 2025; 17(4): 101925 [DOI: [10.4251/wjgo.v17.i4.101925](https://doi.org/10.4251/wjgo.v17.i4.101925)]

**Prospective Study**

Kekez D, Prejac J, Adžić G, Librenjak N, Goršić I, Jonjić D, Krznarić Ž, Augustin G, Pleština S. Phase angle as a prognostic biomarker in metastatic colorectal cancer: A prospective trial. *World J Gastrointest Oncol* 2025; 17(4): 103029 [DOI: [10.4251/wjgo.v17.i4.103029](https://doi.org/10.4251/wjgo.v17.i4.103029)]

Wu XL, Li XS, Cheng JH, Deng LX, Hu ZH, Qi J, Lei HK. Oesophageal cancer-specific mortality risk and public health insurance: Prospective cohort study from China. *World J Gastrointest Oncol* 2025; 17(4): 103629 [DOI: [10.4251/wjgo.v17.i4.103629](https://doi.org/10.4251/wjgo.v17.i4.103629)]

**Basic Study**

Lv XL, Peng QL, Wang XP, Fu ZC, Cao JP, Wang J, Wang LL, Jiao Y. Snail family transcriptional repressor 1 radiosensitizes esophageal cancer *via* epithelial-mesenchymal transition signaling: From bioinformatics to integrated study. *World J Gastrointest Oncol* 2025; 17(4): 97644 [DOI: [10.4251/wjgo.v17.i4.97644](https://doi.org/10.4251/wjgo.v17.i4.97644)]

Tian HP, Xiao ZX, Su BW, Li YX, Peng H, Meng CY. Impact of SLC16A8 on tumor microenvironment and angiogenesis in colorectal cancer: New therapeutic target insights. *World J Gastrointest Oncol* 2025; 17(4): 99188 [DOI: [10.4251/wjgo.v17.i4.99188](https://doi.org/10.4251/wjgo.v17.i4.99188)]

Shantha Kumara HMC, Addison P, Yan XH, Sharma AR, Mitra N, Angamma HN, Hedjar Y, Chen YR, Cekic V, Richard WL. Plasma extracellular cold inducible RNA-binding protein levels are elevated for 1 month post-colectomy which may promote metastases. *World J Gastrointest Oncol* 2025; 17(4): 100678 [DOI: [10.4251/wjgo.v17.i4.100678](https://doi.org/10.4251/wjgo.v17.i4.100678)]

Ji PX, Zhang P, Zhou HL, Yu H, Fu Y. MEX3A promotes cell proliferation by regulating the RORA/ $\beta$ -catenin pathway in hepatocellular carcinoma. *World J Gastrointest Oncol* 2025; 17(4): 102084 [DOI: [10.4251/wjgo.v17.i4.102084](https://doi.org/10.4251/wjgo.v17.i4.102084)]

Xin MJ, Yuan Y. Centromere protein A knockdown inhibits rectal cancer through O6-methylguanine DNA methyltransferase/protein tyrosine phosphatase nonreceptor type 4 axis. *World J Gastrointest Oncol* 2025; 17(4): 102619 [DOI: [10.4251/wjgo.v17.i4.102619](https://doi.org/10.4251/wjgo.v17.i4.102619)]

Lu XF, Zhang HW, Chang X, Guo YZ. F-box protein 22: A prognostic biomarker for colon cancer associated with immune infiltration and chemotherapy resistance. *World J Gastrointest Oncol* 2025; 17(4): 102913 [DOI: [10.4251/wjgo.v17.i4.102913](https://doi.org/10.4251/wjgo.v17.i4.102913)]

Meng FD, Jia SM, Ma YB, Du YH, Liu WJ, Yang Y, Yuan L, Nan Y. Identification of key hub genes associated with anti-gastric cancer effects of lotus plumule based on machine learning algorithms. *World J Gastrointest Oncol* 2025; 17(4): 103048 [DOI: [10.4251/wjgo.v17.i4.103048](https://doi.org/10.4251/wjgo.v17.i4.103048)]

Ma FC, Zhang GL, Chi BT, Tang YL, Peng W, Liu AQ, Chen G, Gao JB, Wei DM, Ge LY. Blood-based machine learning classifiers for early diagnosis of gastric cancer *via* multiple miRNAs. *World J Gastrointest Oncol* 2025; 17(4): 103679 [DOI: [10.4251/wjgo.v17.i4.103679](https://doi.org/10.4251/wjgo.v17.i4.103679)]

Xiao ZW, Zeng YC, Ji LT, Yuan JT, Li L. Nitric oxide synthase 1 inhibits the progression of esophageal cancer through interacting with nitric oxide synthase 1 adaptor protein. *World J Gastrointest Oncol* 2025; 17(4): 103843 [DOI: [10.4251/wjgo.v17.i4.103843](https://doi.org/10.4251/wjgo.v17.i4.103843)]

Hou YX, Ren W, He QQ, Huang LY, Gao TH, Li H. Tetramethylpyrazine induces reactive oxygen species-based mitochondria-mediated apoptosis in colon cancer cells. *World J Gastrointest Oncol* 2025; 17(4): 104922 [DOI: [10.4251/wjgo.v17.i4.104922](https://doi.org/10.4251/wjgo.v17.i4.104922)]

### SCIENTOMETRICS

Zhang YR, Zhu HR, Li HR, Cheng YL, Yang SH, Sun SL, Wang Z. Trends in nanomedicine for colorectal cancer treatment: Bibliometric and visualization analysis (2010-2024). *World J Gastrointest Oncol* 2025; 17(4): 102438 [DOI: [10.4251/wjgo.v17.i4.102438](https://doi.org/10.4251/wjgo.v17.i4.102438)]

### CASE REPORT

Yi AQ, Xie GH. Pancreatic neuroendocrine neoplasms coexisting with biliary intraductal papillary mucinous neoplasm: A case report and review of literature. *World J Gastrointest Oncol* 2025; 17(4): 100497 [DOI: [10.4251/wjgo.v17.i4.100497](https://doi.org/10.4251/wjgo.v17.i4.100497)]

Tang XW, Zhou Y. Signet ring cell carcinoma of the appendix and terminal ileum: A case report. *World J Gastrointest Oncol* 2025; 17(4): 100526 [DOI: [10.4251/wjgo.v17.i4.100526](https://doi.org/10.4251/wjgo.v17.i4.100526)]

Tachibana S, Moriichi K, Takahashi K, Sato M, Kobayashi Y, Sugiyama Y, Sasaki T, Sakatani A, Ando K, Ueno N, Kashima S, Tanabe H, Fujiya M. Curative endoscopic submucosal dissection for esophageal squamous cell carcinoma after chemoradiotherapy for pharyngeal cancer: A case report. *World J Gastrointest Oncol* 2025; 17(4): 101123 [DOI: [10.4251/wjgo.v17.i4.101123](https://doi.org/10.4251/wjgo.v17.i4.101123)]

Li XL, Li M, Yang H, Tian J, Shi ZW, Wang LZ, Song K. Chronic myelogenous leukemia secondary to colon cancer: A case report. *World J Gastrointest Oncol* 2025; 17(4): 102021 [DOI: [10.4251/wjgo.v17.i4.102021](https://doi.org/10.4251/wjgo.v17.i4.102021)]

Du XY, Xia RJ, Shen LW, Ma JG, Yao WQ, Xu W, Lin ZP, Ma LB, Niu GQ, Fan RF, Xu SM, Yan L. Quadruple therapy with immunotherapy and chemotherapy as first-line conversion treatment for unresectable advanced gastric adenocarcinoma: A case report. *World J Gastrointest Oncol* 2025; 17(4): 102258 [DOI: [10.4251/wjgo.v17.i4.102258](https://doi.org/10.4251/wjgo.v17.i4.102258)]

Xiao X, Wang QW, Zhou ZY, Wang LS, Huang P. Precision treatment for human epidermal growth factor receptor 2-amplified advanced rectal cancer: A case report. *World J Gastrointest Oncol* 2025; 17(4): 102690 [DOI: [10.4251/wjgo.v17.i4.102690](https://doi.org/10.4251/wjgo.v17.i4.102690)]

Zhang XY, Li C, Lin J, Zhou Y, Shi RZ, Wang ZY, Jiang HB, Wang YY. Intestinal obstruction caused by early stage primary ileum adenocarcinoma: A case report and review of literature. *World J Gastrointest Oncol* 2025; 17(4): 104919 [DOI: [10.4251/wjgo.v17.i4.104919](https://doi.org/10.4251/wjgo.v17.i4.104919)]

### LETTER TO THE EDITOR

Rojas A, González I, Morales MA. Natural products and cancer: The urgent need to bridge the gap between preclinical and clinical research. *World J Gastrointest Oncol* 2025; 17(4): 100484 [DOI: [10.4251/wjgo.v17.i4.100484](https://doi.org/10.4251/wjgo.v17.i4.100484)]

Miao YR, Yang XJ. Hepatocellular carcinoma resistance to tyrosine kinase inhibitors: Current status and perspectives. *World J Gastrointest Oncol* 2025; 17(4): 101528 [DOI: [10.4251/wjgo.v17.i4.101528](https://doi.org/10.4251/wjgo.v17.i4.101528)]

Krishnan A. Radiomics and machine learning for predicting metachronous liver metastasis in rectal cancer. *World J Gastrointest Oncol* 2025; 17(4): 102324 [DOI: [10.4251/wjgo.v17.i4.102324](https://doi.org/10.4251/wjgo.v17.i4.102324)]

Sundararaju U, Rajakumar HK. Prognostic value of neutrophil-to-lymphocyte ratio in gastric cancer: Enhancing clinical relevance. *World J Gastrointest Oncol* 2025; 17(4): 103128 [DOI: [10.4251/wjgo.v17.i4.103128](https://doi.org/10.4251/wjgo.v17.i4.103128)]

**Jeong KY.** How is single-cell RNA sequencing contributing to the advancement of cancer therapeutics? *World J Gastrointest Oncol* 2025; 17(4): 103480 [DOI: [10.4251/wjgo.v17.i4.103480](https://doi.org/10.4251/wjgo.v17.i4.103480)]

**D'Acapito F, Framarini M, Di Pietrantonio D, Ercolani G.** Personalized treatment selection in colorectal cancer with peritoneal metastasis: Do we need statistically validated indicators or cultural shift? *World J Gastrointest Oncol* 2025; 17(4): 104110 [DOI: [10.4251/wjgo.v17.i4.104110](https://doi.org/10.4251/wjgo.v17.i4.104110)]

**ABOUT COVER**

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**AIMS AND SCOPE**

The primary aim of *World Journal of Gastrointestinal Oncology* (WJGO, *World J Gastrointest Oncol*) is to provide scholars and readers from various fields of gastrointestinal oncology with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJGO mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal oncology and covering a wide range of topics including liver cell adenoma, gastric neoplasms, appendiceal neoplasms, biliary tract neoplasms, hepatocellular carcinoma, pancreatic carcinoma, cecal neoplasms, colonic neoplasms, colorectal neoplasms, duodenal neoplasms, esophageal neoplasms, gallbladder neoplasms, etc.

**INDEXING/ABSTRACTING**

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## Radiomics and machine learning for predicting metachronous liver metastasis in rectal cancer

Arunkumar Krishnan

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### Abstract

A recent study by Long *et al* used a predictive model to explore the efficacy of radiomics based on multiparametric magnetic resonance imaging in predicting metachronous liver metastasis (MLM) in newly diagnosed rectal cancer (RC) patients. The machine learning algorithms, particularly the random forest model (RFM), appeared well-matched to the complex nature of radiomics data. The predictive capabilities of the RFM, as evidenced by the area under the curve of 0.919 in the training cohort and 0.901 in the validation cohort, highlighted its potential clinical utility. However, we highlighted several methodological limitations, including excluding genomic markers, potential biases from the retrospective design, limited generalizability due to a single-center study, and variability in image interpretation. We propose further investigation into integrating multi-omic data, conducting larger multicenter studies, and utilizing advanced imaging techniques. Additionally, we highlighted the importance of interdisciplinary collaboration to improve predictive model development and advocate for cost-effectiveness analyses to facilitate clinical integration. Overall, this predictive model may improve the early detection and management of MLM in RC patients, with promising avenues for future exploration. Ongoing research in this domain can potentially improve clinical outcomes and the quality of care for RC patients.

**Key Words:** Rectal cancer; Liver metastases; Neoplasm; Metastasis; Machine learning; Magnetic resonance imaging; Radiomics

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**Core Tip:** In a recent study by Long *et al*, multiparametric magnetic resonance imaging and radiomics were utilized to anticipate the occurrence of metachronous liver metastasis in individuals newly diagnosed with rectal cancer. The random forest model, a predictive model component, demonstrated significant accuracy, achieving area under the curve values of 0.919 in the training cohort and 0.901 in the validation cohort, highlighting its potential for non-invasive risk assessment. By integrating radiomic features with clinical data, the model can support tailored treatment strategies and improve patient care. Nevertheless, it is important for future research to address methodological limitations, such as the exclusion of genomic markers, potential biases from the retrospective design, and the necessity for external validation across varied patient populations. Expanding the model to integrate multi-omic data and advanced imaging techniques has the potential to further its clinical significance and practicality.

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## TO THE EDITOR

With great interest, we read the research article from Long *et al*[1]. In this study, the authors investigated the efficacy of radiomics based on multiparametric magnetic resonance imaging (MRI) images of preoperative first-diagnosed rectal cancer (RC) in predicting metachronous liver metastasis (MLM) from RC. This study is an important contribution to the growing area of predictive models in oncology, particularly in addressing the urgent requirement for dependable approaches to predict MLM in patients with RC. This study's findings can be important in pinpointing patients at high risk of liver metastasis and effectively managing their condition. It can also improve long-term survival rates and prognosis for these patients. The authors' innovative use of radiomics in combination with machine learning (ML) to build a non-invasive prediction model has substantial promise for clinical potential.

The authors emphasized the significant impact of liver metastasis on the survival of patients with RC, highlighting the ongoing challenge of early detection. Using radiomics, the authors propose an innovative approach that promises to improve clinical outcomes by facilitating personalized monitoring and therapeutic interventions. The ML algorithms, particularly the random forest model (RFM), appear well-matched to the complex nature of radiomics data. The predictive capabilities of the RFM, as evidenced by the area under the curve of 0.919 in the training cohort and 0.901 in the validation cohort, highlighted its potential clinical utility. We acknowledge the authors' efforts and valuable contributions as the study addresses a critical need for a predictive model. However, we offer some constructive suggestions based on several methodological limitations, confounders, and biases that may affect the results' accuracy and future studies to improve their study.

## AREAS FOR FURTHER INVESTIGATION

The study presented was innovative, but several areas require further investigation. Firstly, the authors note that the model did not include genomic markers like KRAS/NRAS mutations due to the invasive nature and cost of genomic testing[2]. However, future studies could benefit from incorporating non-invasive genomic or liquid biopsy markers to improve the model's predictive accuracy and clinical applicability as personalized oncology evolves to integrate multi-omic data[3]. A study by Di Sario *et al*[3] indicated that combining radiomics with liquid biopsy data could provide real-time insights into tumor biology. This integration could improve the interpretability of predictive models, potentially leading to better-informed clinical decisions. Secondly, the retrospective study design may introduce selection or recall bias due to the limited control over variables. To address this, using a propensity score matching technique to balance baseline characteristics between groups (*e.g.*, patients who develop MLM and those who do not) and conducting prospective validation of findings would be advantageous and reduce confounding[4]. Longitudinal studies that monitor changes in tumor characteristics through serial imaging and biomarker analysis can further explain the association between radiomic features and metastasis progression. Utilizing federated learning techniques to integrate datasets from various centers helps overcome issues related to data sharing, which could strengthen model robustness and protect the privacy and security of sensitive data. Thirdly, as the study only involved 301 RC patients from a single institution with a relatively homogeneous patient population, its generalizability to the larger population may be limited. Conducting multicenter studies involving more diverse populations is critical to improve the study's statistical power and generalizability.

Moreover, a larger, independent external validation cohort from multiple centers could further validate the reproducibility of the findings across diverse clinical settings. Fourth, the treatment and stage of cancer can vary among patients, which could affect the relationship between radiomic features and liver metastasis. Therefore, using multivariable models to account for these differences and to analyze the data based on patient characteristics such as cancer stage, age, and treatment history is important[5]. Fifth, when interpreting MRI images, the radiologist's expertise and the subjective nature of identifying features can lead to variations. It is recommended that multiple radiologists be involved in cross-

checking findings or utilizing artificial intelligence (AI) -assisted image interpretation to minimize subjectivity. Lastly, the differences in follow-up time among patients, with a median follow-up time of 23.5 months, could impact the detection of MLM outcomes. Standardizing the follow-up duration for all patients or adjusting for differences using time-dependent statistical models such as Kaplan-Meier survival curves or Cox regression models is recommended.

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## FUTURE RESEARCH DIRECTIONS

The present study used a framework to predict MLM involvement in RC using imaging omics and ML algorithms. However, to improve the clinical applicability and accuracy of a predictive model, it is imperative to conduct comprehensive studies, and there are several promising directions for future exploration. While the current study had 301 patients, validating the predictive model in larger, multicenter cohorts will strengthen the reliability and applicability of the findings. Similarly, we need more understanding of diverse patient populations with various tumor characteristics and responses to treatment, and larger datasets would allow the evaluation of the model's predictive performance across different demographic and clinical settings[6].

Future research endeavors should consider integrating genomic, proteomic, and metabolomic data with imaging features to improve the model's predictive capability. Understanding the molecular support of RC and its metastasis could lead to identifying additional biomarkers and risk factors that may not be discernible through imaging alone[7]. Similarly, implementing longitudinal studies that monitor changes in tumor characteristics and treatment responses over time can facilitate the development of dynamic prediction models[7]. A study by Lipkova *et al*[6] showed that integrating proteomics and metabolomics data can potentially deepen our biological understanding of MLM. This combined approach could contribute to developing more reliable predictive models. These models would enable real-time adjustments to risk assessments based on changes in radiomic features and clinical parameters, thereby improving personalized patient management.

Promoting collaboration among radiologists, oncologists, surgeons, and data scientists will augment the model's development and implementation. Interdisciplinary approaches will foster a comprehensive understanding of RC and its metastasis, ensuring that the predictive model is clinically relevant and effective[8]. Future studies could be explored using advanced imaging techniques such as functional MRI, PET/MRI, and AI-enhanced imaging techniques. These could yield further insights into tumor biology and metastatic potential and refine the prediction models by integrating more comprehensive imaging data. In addition, these imaging modalities could offer additional insights into tumor microenvironments and their metabolic conditions. Importantly, conducting cost-effectiveness analyses of the proposed predictive model is necessary for its integration into clinical practice. Evaluating the financial implications of using this model for early detection and treatment planning would help justify its adoption into healthcare systems[9]. The authors proposed an innovative predictive model, but further exploration is required on its integration into clinical practice. It is important to consider the practical limitations of implementing this model in real-world settings, such as the requirement for additional resources and clinician training. Similarly, collaboration with health economists is important to evaluate the cost-effectiveness of integrating these models into routine clinical practice.

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## CONCLUSION

In conclusion, this study significantly contributes to the ongoing efforts to improve the early detection and management of MLM in RC patients. The development of non-invasive predictive models like the one presented here has the potential to revolutionize clinical decision-making and improve patient outcomes. Nevertheless, further studies are required to address the challenges related to model standardization, multicenter validation, and cost-cogency. The suggestions aimed to address these challenges; future studies can refine predictive models. Ongoing research in this domain can potentially improve clinical outcomes and the quality of care for RC patients. We look forward to further advancements in this field and the eventual clinical integration of these predictive models.

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## FOOTNOTES

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## REFERENCES

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- 1 **Long Z**, Yu X, Xing Z, Wang R. Multiparameter magnetic resonance imaging-based radiomics model for the prediction of rectal cancer metachronous liver metastasis. *World J Gastrointest Oncol* 2025; **17**: 96598 [DOI: [10.4251/wjgo.v17.i1.96598](https://doi.org/10.4251/wjgo.v17.i1.96598)]
- 2 **Janakiraman M**, Vakiani E, Zeng Z, Pratilas CA, Taylor BS, Chitale D, Halilovic E, Wilson M, Huberman K, Ricarte Filho JC, Persaud Y, Levine DA, Fagin JA, Jhanwar SC, Mariadason JM, Lash A, Ladanyi M, Saltz LB, Heguy A, Paty PB, Solit DB. Genomic and biological characterization of exon 4 KRAS mutations in human cancer. *Cancer Res* 2010; **70**: 5901-5911 [PMID: [20570890](https://pubmed.ncbi.nlm.nih.gov/20570890/) DOI: [10.1158/0008-5472.CAN-10-0192](https://doi.org/10.1158/0008-5472.CAN-10-0192)]
- 3 **Di Sario G**, Rossella V, Famulari ES, Maurizio A, Lazarevic D, Giannese F, Felici C. Enhancing clinical potential of liquid biopsy through a multi-omic approach: A systematic review. *Front Genet* 2023; **14**: 1152470 [PMID: [37077538](https://pubmed.ncbi.nlm.nih.gov/37077538/) DOI: [10.3389/fgene.2023.1152470](https://doi.org/10.3389/fgene.2023.1152470)]
- 4 **Austin PC**. An Introduction to Propensity Score Methods for Reducing the Effects of Confounding in Observational Studies. *Multivariate Behav Res* 2011; **46**: 399-424 [PMID: [21818162](https://pubmed.ncbi.nlm.nih.gov/21818162/) DOI: [10.1080/00273171.2011.568786](https://doi.org/10.1080/00273171.2011.568786)]
- 5 **Xu W**, Huang SH, Su J, Gudi S, O'Sullivan B. Statistical fundamentals on cancer research for clinicians: Working with your statisticians. *Clin Transl Radiat Oncol* 2021; **27**: 75-84 [PMID: [33532634](https://pubmed.ncbi.nlm.nih.gov/33532634/) DOI: [10.1016/j.ctro.2021.01.006](https://doi.org/10.1016/j.ctro.2021.01.006)]
- 6 **Lipkova J**, Chen RJ, Chen B, Lu MY, Barbieri M, Shao D, Vaidya AJ, Chen C, Zhuang L, Williamson DFK, Shaban M, Chen TY, Mahmood F. Artificial intelligence for multimodal data integration in oncology. *Cancer Cell* 2022; **40**: 1095-1110 [PMID: [36220072](https://pubmed.ncbi.nlm.nih.gov/36220072/) DOI: [10.1016/j.ccell.2022.09.012](https://doi.org/10.1016/j.ccell.2022.09.012)]
- 7 **Passaro A**, Al Bakir M, Hamilton EG, Diehn M, André F, Roy-Chowdhuri S, Mountzios G, Wistuba II, Swanton C, Peters S. Cancer biomarkers: Emerging trends and clinical implications for personalized treatment. *Cell* 2024; **187**: 1617-1635 [PMID: [38552610](https://pubmed.ncbi.nlm.nih.gov/38552610/) DOI: [10.1016/j.cell.2024.02.041](https://doi.org/10.1016/j.cell.2024.02.041)]
- 8 **Horvat N**, Papanikolaou N, Koh DM. Radiomics Beyond the Hype: A Critical Evaluation Toward Oncologic Clinical Use. *Radiol Artif Intell* 2024; **6**: e230437 [PMID: [38717290](https://pubmed.ncbi.nlm.nih.gov/38717290/) DOI: [10.1148/ryai.230437](https://doi.org/10.1148/ryai.230437)]
- 9 **Khanna NN**, Maindarkar MA, Viswanathan V, Fernandes JFE, Paul S, Bhagawati M, Ahluwalia P, Ruzsa Z, Sharma A, Kolluri R, Singh IM, Laird JR, Fatemi M, Alizad A, Saba L, Agarwal V, Sharma A, Teji JS, Al-Maini M, Rathore V, Naidu S, Liblik K, Johri AM, Turk M, Mohanty L, Sobel DW, Miner M, Viskovic K, Tsoufas G, Protogerou AD, Kitas GD, Fouda MM, Chaturvedi S, Kalra MK, Suri JS. Economics of Artificial Intelligence in Healthcare: Diagnosis vs. Treatment. *Healthcare (Basel)* 2022; **10** [PMID: [36554017](https://pubmed.ncbi.nlm.nih.gov/36554017/) DOI: [10.3390/healthcare10122493](https://doi.org/10.3390/healthcare10122493)]



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