Correspondence

INTERNATIONAL JOURNAL OF SURGERY

OPEN

Inflammatory indices as perioperative predictors in colorectal cancer: bridging population data and surgical decision-making

Zhen-Xi Xu, MSc[a,b], Qi Zhao, MSc[a,b], Yan-Dong Miao, MD[a,b,c,d,*]

Dear Editor,

We read with great interest the article by Zhou *et al*, titled "Extensive study on the associations of 12 composite inflammatory indices with colorectal cancer risk and mortality: a cross-sectional analysis of NHANES 2001-2020," published in the *International Journal of Surgery*[1]. The authors provide a comprehensive evaluation of inflammatory indices derived from routine blood tests as potential biomarkers for colorectal cancer (CRC) risk and prognosis, leveraging a large, representative dataset from the National Health and Nutrition Examination Survey (NHANES). This work underscores the growing recognition of systemic inflammation's role in CRC pathogenesis and highlights non-invasive tools for risk stratification and monitoring, which are crucial for clinical surgery. Building on this important perspective, it is essential to examine how the study's specific findings contribute to perioperative risk assessment and long-term prognosis in CRC management. To ensure the transparency and rigor of our idea, this study adheres to the TITAN 2025 Guideline Checklist[2]. The detailed information of TITAN Guidelines 2025 is indicated in Supplemental Digital Content Table S1, available at: http://links.lww.com/JS9/F254.

Preoperative risk assessment is pivotal in colorectal cancer (CRC) surgery, yet traditional models often overlook systemic inflammation – an established driver of tumorigenesis and poor postoperative outcomes[3]. Zhou *et al*'s study key findings – that elevated neutrophil-to-lymphocyte ratio (NLR) and reduced lymphocyte-to-monocyte ratio (LMR) are associated with increased CRC risk, while low LMR, high Neutrophil-to-platelet ratio (NPR), and high Systemic Immune-Inflammation Index (SII) correlate with poorer mortality outcomes – align with emerging evidence on inflammation's prognostic utility in CRC (Fig. 1). For instance, NLR has been linked to adverse outcomes, including lymph node metastasis and chemotherapy resistance, in prior meta-analyses. Similarly, LMR's inverse association with recurrence risk supports its potential in perioperative decision-making, such as guiding adjuvant therapy in elective colorectal resections. The inclusion of 12 indices, including less-studied ones like NPR and pan-immune-inflammation value, represents a strength, offering a holistic view of the inflammatory landscape. The non-linear relationships elucidated via generalized additive models and restricted cubic splines further refine our understanding, suggesting that dynamic monitoring could enhance early detection protocols.

Recent advances have built upon these insights, integrating nutritional and inflammatory markers for more nuanced CRC prognostication. Han *et al*'s study demonstrated a linear inverse association between the prognostic nutritional index (PNI) and CRC mortality, emphasizing how chronic inflammation and malnutrition drive disease progression[4]. This complements Zhou *et al*'s findings on LMR and SII, as PNI incorporates albumin and lymphocyte counts, highlighting overlapping mechanisms in immune dysregulation. Similarly, research on peripheral blood inflammatory indices has affirmed their diagnostic value for CRC, with elevated markers like NLR and SII predicting advanced disease stages and aiding in CRC early screening[5]. In obstructive CRC, inflammatory markers such as the C-reactive protein-to-albumin ratio (CAR) and lymphocyte-to-C-reactive protein ratio have emerged as significant predictors of overall survival, particularly at 1, 3, and 5 years post-surgery[6]. These developments suggest that combining inflammatory indices with nutritional assessments could refine risk models for surgical candidates, potentially reducing postoperative complications in high-risk patients. Furthermore, an analysis of SII's association with all-cause and cancer-specific mortality in aging populations reinforces its role as a broad prognostic tool, varying across demographics and underscoring the need for personalized thresholds in CRC management[7]. Blood cell-derived markers, including NLR and PLR, have also been validated for assessing postoperative risks in CRC, correlating with extended hospital stays and complications[8]. Dietary inflammatory indices (DIIs)

[a]Cancer Center, Yantai Affiliated Hospital of Binzhou Medical University, The 2nd Medical College of Binzhou Medical University, Yantai, China, [b]Research and Translational Center for Immunological Disorders of Binzhou Medical University, Yantai, China, [c]Guangdong Provincial Key Laboratory of Medical Biomechanics, National Key Discipline of Human Anatomy, School of Basic Medical Sciences, Southern Medical University, Guangzhou, China and [d]Department of Oncology, Xinhui District People's Hospital, Jiangmen, China

Zhen-Xi Xu and Qi Zhao contributed equally to this work.

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

*Corresponding author. Address: Cancer Center, Yantai Affiliated Hospital of Binzhou Medical University, The 2nd Medical College of Binzhou Medical University, Yantai 264100, China. Tel.: +8605354773613. E-mail: miaoyd-22@bzmc.edu.cn (Y.-D. Miao).

International Journal of Surgery (2026) 112:2127–2129

Received 19 August 2025; Accepted 14 September 2025

Supplemental Digital Content is available for this article. Direct URL citations are provided in the HTML and PDF versions of this article on the journal's website, www.lww.com/international-journal-of-surgery.

Published online 29 September 2025

http://dx.doi.org/10.1097/JS9.0000000000003533

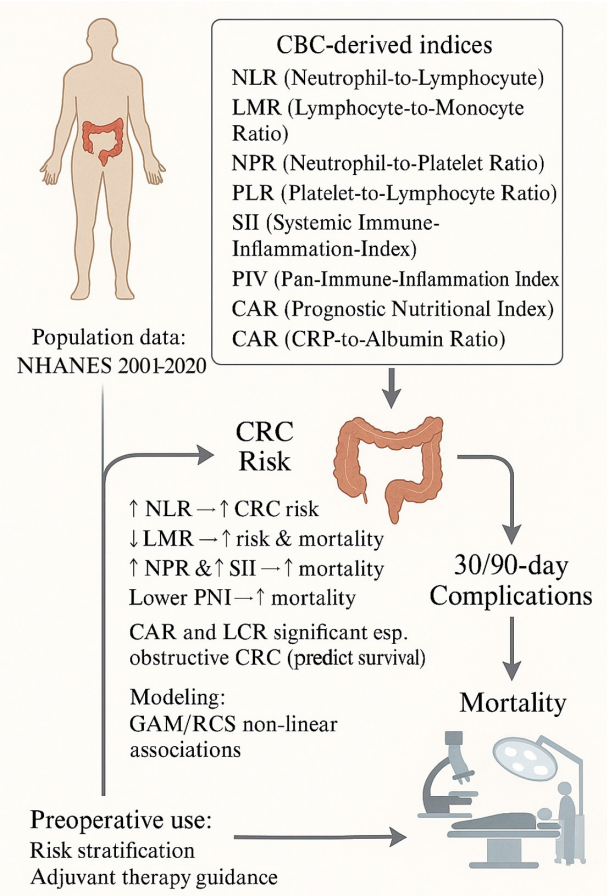

Figure 1. This diagram illustrates the analysis of the associations between complete blood count (CBC)-derived indices (such as neutrophil-to-lymphocyte ratio [NLR] and lymphocyte-to-monocyte ratio [LMR]) and colorectal cancer (CRC) risk, 30/90-day postoperative complications, and mortality, based on population data from the National Health and Nutrition Examination Survey (NHANES 2001–2020). It covers the impacts of these indices on CRC risk and prognosis, the modeling methods (generalized additive model / restricted cubic splines [GAM/RCS] for nonlinear associations), and the application in preoperative risk stratification and adjuvant therapy guidance.NLR, neutrophil-to-lymphocyte ratio; LMR, lymphocyte-to-monocyte ratio; GAM,generalized additive model; RCS,restricted cubic splines.

have gained traction, with higher pro-inflammatory diets linked to increased CRC mortality, providing actionable lifestyle interventions to modulate systemic inflammation[9]. These studies extend Zhou *et al*'s cross-sectional framework by incorporating longitudinal data and multimodal biomarkers, paving the way for integrated approaches in CRC care.

However, several methodological considerations warrant discussion to inform surgical practice. The cross-sectional design limits causal inferences; inflammatory indices may reflect rather than precede CRC, potentially confounding associations due to reverse causation. With only 126 CRC cases for mortality analysis (expanded to 239 in supplementary data), statistical power is constrained, as evidenced by non-significant trends in Cox models despite survival curve differences. This small sample may explain the lack of prognostic significance for NLR in mortality, contrasting with robust risk associations. Additionally, reliance on self-reported cancer diagnoses introduces recall bias, and the absence of tumor staging, treatment details, or genetic data (e.g., microsatellite instability) hampers subgroup analyses relevant to precision surgery. Unmeasured confounders, such as dietary factors or microbiome influences on inflammation, could also bias results. Clinically, these indices hold promise for integrating into CRC screening and surveillance, particularly in resource-limited settings where blood tests are accessible. For surgeons, preoperative NLR or LMR could aid in risk stratification for complications like intra-abdominal infections post-resection. Yet, validation in prospective cohorts with larger CRC subgroups is essential. Future studies should explore longitudinal changes in these indices perioperatively and their interaction with immunotherapies, given CRC's inflammatory microenvironment. Incorporating recent advances, such as PNI-DII synergies, could enhance predictive models, fostering multidisciplinary strategies that combine surgery with nutritional and anti-inflammatory therapies.

In conclusion, Zhou *et al*'s analysis advances the field by emphasizing inflammation-based biomarkers in CRC management. Addressing the highlighted limitations and leveraging new research will strengthen their application in clinical surgery, ultimately reducing CRC burden through targeted interventions.

Ethical approval

Not available.

Consent

Not available.

Sources of funding

This work was supported by the Shandong Province Medical and Health Science and Technology Development Plan Project (Nos 202203030713 and 202303031093), the Shandong Traditional Chinese Medicine Science and Technology Program (No. M20244201), the Yantai Science and Technology Innovation Development Program (Policy Guidance Category) (Nos 2024YD005, 2024YD007, and 2024YD010), the Science and Technology Program of Yantai affiliated Hospital of Binzhou Medical University (Nos YTFY2022KYQD06 and YTFY2022KYQD07), the Esterified Selenium Clinical Research Application Project (No. byytfy-kjc-hxkt-2024-13), and the Twenty-first Century Public Welfare Foundation Academic Subjects: Nos JJH2025001(byytfy-kjc-hxkt-2025-14) and JJH2025002 (byytfy-kjc-hxkt-2025-13).

Author contributions

Z.-X.X.: Formal analysis, Resources, Methodology, Software, Visualization, and Writing – original draft. Q.Z.: Formal analysis, Resources, Methodology, Software, Visualization, Funding acquisition, and Writing – original draft. Y.-D.M.: Conceptualization, Funding acquisition, Project administration, and Writing – review & editing. All authors reviewed the manuscript.

Conflicts of interest disclosure

The authors affirm that they have no financial or personal conflicts of interest that could have influenced or appeared to influence the work reported in this paper.

Research registration unique identifying number (UIN)

Not applicable.

Guarantor

Yan-Dong Miao.

Provenance and peer review

Not commissioned.

Data availability statement

The data included in the study are available from the corresponding author upon reasonable request.

Acknowledgements

Not applicable.

Declaration of whether any AI was used in the research and manuscript development

In accordance with the TITAN 2025 Guideline Checklist (https://premierscience.com/pjs-25-950/), we declare that generative AI tools (ChatGPT 5.0) were solely used for language polishing, including grammatical correction and sentence structure refinement. All scientific content, data interpretation, and conclusions remain the sole responsibility of the authors, with no AI involvement in substantive revisions.

References

[1] Zhou M, Gu Q, Zhou M, *et al*. Extensive study on the associations of 12 composite inflammatory indices with colorectal cancer risk and mortality a cross-sectional analysis of NHANES 2001-2020. Int J Surg (London, England) 2025.
[2] Agha RA, Mathew G, Rashid R, *et al*. TITAN Group. Transparency In The reporting of Artificial INtelligence – the TITAN guideline. Prem J Sci 2025;10:100082.
[3] Schmitt M, Greten FR. The inflammatory pathogenesis of colorectal cancer. Nat Rev Immunol 2021;21:653–67.
[4] Han Y, Zhou P, Wang L, *et al*. Linear inverse association between prognostic nutritional index and colorectal cancer risk based on NHANES data. Sci Rep 2025;15:25647.
[5] Rezazadeh M, Kamyabi A, Pisheh RG, *et al*. Diagnostic value of peripheral blood inflammatory indices for clinicopathological profile of colorectal cancer: a retrospective observational study. BMC Gastroenterol 2025;25:127.
[6] Harmantepe AT, Şentürk A. Survival predictors in obstructive colorectal cancer: a combined clinical, inflammatory, and histopathological approach. In Vivo (Athens, Greece) 2025;39:2419–28.
[7] Lu W, Gong Y, Liu L, Zhang Y, Tian X, Liu H. Association of systemic immune-inflammatory index with all-cause and cancer mortality in Americans aged 60 years and older. Front Aging 2025;6:1502746.
[8] Shevchenko I, Serban D, Simion L, *et al*. Clinical significance of blood cell-derived inflammation markers in assessing potential early and late postoperative complications in patients with colorectal cancer: a systematic review. J Clin Med 2025;14:2529.
[9] Zahedi H, Jowshan MR, Rasekhi H, *et al*. The association between the dietary inflammatory index and multiple myeloma: a case-control study. Sci Rep 2025;15:3123.