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What can be expected from simple laboratory Ratios in oncology? A Literature Review

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Abstract

This literature review examines the clinical relevance of readily accessible haematological and nutritional biomarkers, including the neutrophil-to-lymphocyte ratio (NLR), lymphocyte-to-monocyte ratio (LMR), platelet-to-lymphocyte ratio (PLR), and the copper-to-zinc (Cu/Zn) ratio. Derived from routine blood tests, these markers offer cost-effective and non-invasive indicators of systemic inflammation and immune function. The review integrates current evidence highlighting their prognostic significance across a range of clinical conditions, with particular emphasis on pancreatic and colorectal cancers as well as inflammatory diseases. Elevated NLR, PLR, and Cu/Zn ratios—alongside decreased LMR—are consistently associated with more aggressive disease and poorer patient outcomes. The findings suggest that while these biomarkers provide meaningful prognostic insights, their greatest value emerges when used in conjunction with established clinical and laboratory measures, reinforcing their potential as integral components of personalized patient management and risk stratification.

Keywords: Laboratory, Ratios, Cu/Zn, NLR, PLR, LMR, Oncology

Introduction

The balance between micronutrients and inflammatory markers plays a critical role in maintaining physiological homeostasis, while deviations often signal underlying pathological processes. Among these, the copper-to-zinc (Cu/Zn) ratio, neutrophil-to-lymphocyte ratio (NLR), and lymphocyte-to-monocyte ratio (LMR) stand out as key systemic immune-inflammatory biomarkers, reflecting the intricate relationship between nutritional status and immune response (1). These readily available parameters from routine complete blood counts provide a cost-effective and non-invasive means of assessing systemic inflammation, predicting disease progression, and estimating prognosis across a wide range of clinical conditions (2,3). In particular, the NLR, platelet-to-lymphocyte ratio (PLR), and LMR are increasingly recognized for their prognostic significance in inflammatory, infectious, and neoplastic diseases, as they capture systemic inflammatory activity and immune dysregulation (4,5).

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Review Results

The Clinical Significance of Diagnostic Ratios in Medicine

In medicine, various ratios from blood tests are used to provide more complete diagnostic information than single indicators, helping in the precise assessment of a patient's condition, prognosis, and disease monitoring.
For instance, the AST/ALT ratio (De Ritis Ratio) is key for differentiating the causes of liver damage, while the Neutrophil-to-Lymphocyte Ratio (NLR) serves as a marker for systemic inflammation used in the prognosis of cardiovascular, infectious, and autoimmune diseases (6- 8). The balance of trace elements is also crucial. The Copper/Zinc (Cu/Zn) ratio reflects oxidative stress and immune function, with elevated values being a risk factor for cardiovascular, neurodegenerative, and metabolic diseases. In nutrition, the Calcium/Iron (Ca/Fe) ratio is important, as high calcium intake can suppress iron absorption and lead to anemia. Furthermore, the Iron/Copper (Fe/Cu) balance is critical for red blood cell formation, since a copper deficiency impairs iron utilization and results in a specific type of anemia (9- 12).

Neutrophil-to-Lymphocyte Ratio

In recent years, the neutrophil-to-lymphocyte ratio (NLR) has gained considerable attention in the medical community. It is recognized as a reliable indicator of systemic inflammatory status and adaptive immune function, reflecting the balance between innate (neutrophil-mediated) and adaptive (lymphocyte-mediated) immune responses, and serving as a marker of immune homeostasis. Importantly, NLR has demonstrated strong prognostic value across a variety of conditions, including sepsis, pneumonia, COVID-19, and various cancers. Derived from a routine complete blood count, NLR is an easily accessible surrogate of systemic inflammation—a key biological process implicated in carcinogenesis. (13). Indeed, inflammation is now recognized as a hallmark of cancer development and progression.
In a cohort study of 156 patients with borderline-respectable or locally advanced pancreatic adenocarcinoma, Reddy et al. demonstrated that both pre- and postoperative NLR carried prognostic significance; values greater than 2.6 were associated with worse overall survival (OS) and progression-free survival (PFS) (14). Similarly, a U.S. retrospective study of 226 patients confirmed elevated NLR as an independent predictor of poor outcomes (15). Interestingly, this analysis also revealed ethnic differences: lower NLR values (<5) were more frequent among non-Hispanic Black patients, whereas non-Hispanic White and Hispanic patients more often exhibited higher NLR values (>5), potentially reflecting differences in risk profiles.
Not all studies, however, have shown consistent associations. A 2021 retrospective cohort found that although NLR generally increased following neoadjuvant therapy for pancreatic adenocarcinoma, it did not correlate significantly with OS, disease-free survival (DFS), or pathological response (16).
Emerging evidence suggests that NLR's prognostic performance improves when used in combination with other biomarkers. For example, pairing NLR with CA19-9 enhances risk stratification in pancreatic adenocarcinoma. In a retrospective analysis of 271 patients with

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advanced disease, Shin et al. reported that a post-treatment NLR <2.62, together with an 18% decline in CA19-9, strongly predicted outcomes, underscoring the utility of composite biomarker approaches (17,18).

In non-metastatic colorectal cancer (CRC), a 2020 Turkish retrospective study of 219 surgically treated patients found that a preoperative NLR >2.8 was significantly associated with worse OS, though not with DFS (12). Extending this approach, Yang et al. (2021) showed that combining NLR with interleukin-6 (IL-6) improved prediction of both OS and DFS compared with either marker alone. Elevated NLR and IL-6 levels were also correlated with tumor differentiation and stage (19). Given the challenges of managing metastatic CRC, prognostication in this population is particularly important. In a Japanese retrospective study, Nemoto et al. observed that changes in NLR from pre-chemotherapy to the third month of treatment were informative for OS in patients with metastatic or unresectable CRC (20).

Prognostic evaluation is especially critical in metastatic CRC. In a Japanese study, Nemoto et al. observed that dynamic changes in NLR from pre-chemotherapy to the third month of treatment were informative for OS in patients with metastatic or unresectable CRC (21). Consistent with this, a large Chinese cohort demonstrated that persistently elevated NLR was associated with the poorest outcomes. After stratifying patients into four groups (low–low, low–high, high–low, high–high) based on pre- and postoperative NLR, those in the “high–high” group experienced the shortest PFS, followed by “high–low,” “low–high,” and finally “low–low” groups (22).

Lymphocyte-to-monocyte ratio (LMR)

The lymphocyte-to-monocyte ratio (LMR) has been associated with several malignancies, cardiovascular diseases, and stroke severity and prognosis. It can also help categorize COVID-19 patient severity. Notably, a low LMR at admission increases the risk of COVID-19 pneumonia progression by approximately 5.1-fold.

The lymphocyte-to-monocyte ratio (LMR) has demonstrated notable prognostic value in pancreatic adenocarcinoma. In a retrospective study of 97 patients, Singh et al. reported that a higher baseline LMR (>2.05) at diagnosis was associated with significantly longer overall survival (median 194 vs. 93 days for LMR ≤2.05; P = 0.03). On univariate analysis, elevated LMR correlated with a reduced risk of death (HR = 0.83; 95% CI: 0.70–0.98; P = 0.027) (23). These findings are further supported by larger evidence syntheses. Lin et al. pooled data from 16 cohort studies including 3338 patients and demonstrated that higher pretreatment LMR was significantly associated with improved overall survival (HR = 0.68; 95% CI: 0.58–0.80; P < 0.001) as well as superior disease-free, recurrence-free, and time-to-progression outcomes (HR = 0.55; 95% CI: 0.31–0.96; P = 0.037), with consistent effects across ethnicity, disease stage, and study design (24). Similarly, Li et al. (2017) found that elevated LMR predicted improved overall survival (HR = 0.56; 95% CI: 0.38–0.83; P = 0.004) and DFS/RFS/TTP (HR = 0.38; 95% CI: 0.15–0.95; P = 0.04) (25). Collectively, these data establish LMR as a simple, inexpensive, and reliable biomarker that can complement established clinical and laboratory parameters in prognosticating outcomes for pancreatic adenocarcinoma.

In colorectal cancer (CRC), LMR demonstrates similar prognostic relevance. Tan et al. (2018) analysed a retrospective cohort of 874 surgically treated patients and identified low preoperative

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LMR as an independent predictor of worse overall and disease-free survival (26). Patients with lower LMR values experienced significantly higher risks of recurrence and death compared with those in the higher LMR group. Importantly, in multivariable models adjusted for TNM stage, tumor differentiation, age, and other clinicopathological factors, LMR retained its prognostic significance.

Taken together, current evidence supports LMR as an accessible, low-cost prognostic biomarker in both pancreatic adenocarcinoma and CRC. Its incorporation into routine risk stratification could improve individualized patient management, though further work is needed to refine disease-specific cut-offs and optimal timing of assessment.

Platelet- to- White- Blood- Cell Ratio (PWR) and Platelet-to-Lympocyte Ratio (PLR)

Over the past five years, platelet-based inflammatory ratios have gained increasing clinical relevance—most notably the platelet-to-lymphocyte ratio (PLR) and the platelet-to–white blood cell ratio (PWR).

The PWR, calculated from routine complete blood counts as the platelet count divided by the leukocyte count, was initially investigated in hematologic and oncologic settings. It has since shown independent prognostic value across multiple diseases. For example, Tang et al. reported that in pancreatic cancer, a baseline PWR ≤6 was associated with significantly poorer survival and remained an independent risk factor in multivariable analyses, supporting its utility as a novel inflammation-based prognostic marker (27).

The platelet-to-lymphocyte ratio (PLR) can be used as a prognostic and predictive marker in a wide range of conditions, including COVID-19, allergic damage, chronic gingivitis and periodontitis, and traumatic brain injury. It is also relevant in many neoplasms, such as gastrointestinal cancer, squamous cell carcinoma of the oral cavity, and metastatic disease.

The NLR and PLR likewise serve as simple, accessible markers of systemic inflammation, with commonly cited reference intervals of ~1–3 for NLR and ~90–210 for PLR. Their prognostic significance has been demonstrated across diverse conditions. In pediatric asthma, Eltyeb et al. observed that PLR—but not NLR or RDW—correlated with hospital stay duration, suggesting PLR may reflect both disease activity and short-term severity (28).

Evidence also supports PLR and PWR as prognostic markers in infectious, neurologic, and allergic conditions. In a two-center retrospective study of 730 adults hospitalized with COVID-19, Citu et al. showed that PWR and the neutrophil-to-monocyte ratio (NMR) predicted ICU admission and mortality (29).

In traumatic brain injury, a systematic review by Ilyas et al. (2024) synthesized four studies (n = 1467), of which three reported higher admission PLR as an independent predictor of 30-day mortality and poor 6-month functional outcome; one study, however, found no advantage over other hematologic parameters, highlighting the need for standardized cut-offs (30). A meta-analysis by Sarkar et al. of 32 studies similarly confirmed higher admission PLR in critically ill and deceased COVID-19 patients (31).

Beyond systemic inflammation, PLR has shown promise in acute allergy care. In a retrospective study from Hanoi, Le Vinh Nghi et al. found that both PLR and NLR were elevated in refractory

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anaphylaxis compared with non-refractory cases. ROC analysis identified PLR ≥129.5 and NLR ≥4 as informative thresholds (32).

These indices also serve as dynamic markers of treatment response. In chronic periodontitis, Acharya A.B. et al. demonstrated significantly worse periodontal indices and elevated PLR/NLR compared with controls, followed by significant declines after non-surgical therapy. ROC analyses suggested diagnostic thresholds to distinguish baseline from post-treatment status, underscoring their potential as bridging biomarkers between local and systemic inflammation (33).

Further supporting their prognostic role in COVID-19, Qu et al. reported that admission PLR was significantly higher in non-survivors compared with survivors (248.5 ± 66.8 vs. 174.2 ± 43.0; $p < 0.05$). While PLR declined toward normal in survivors, it rose further in terminal patients. ROC analysis identified an optimal cut-off of ≥180 (AUC = 0.738), and PLR remained an independent predictor of mortality after adjusting for age (34). These findings align with those for NLR and PWR, reinforcing the role of platelet-based ratios as markers of disease severity.

In oncology, PLR has been studied as both a diagnostic and prognostic tool. A meta-analysis by Bijon et al. found that patients with ovarian cancer had significantly higher PLR compared with healthy controls, indicating potential value in distinguishing benign from malignant disease and in staging (35). Similar findings have been reported in metastatic colorectal cancer, where elevated pretreatment PLR predicted worse overall and progression-free survival (36).

In oncology, PLR has consistently emerged as a stronger prognostic factor than NLR in certain cancers. In oral squamous cell carcinoma (OSCC), Tazeen et al. identified cut-offs of PLR = 142 and NLR = 3.1; elevated values correlated with shorter DFS and OS, with PLR standing out as an independent predictor (HR ≈ 3.0; $p = 0.028$) (37). Acharya et al. (2016) similarly showed that preoperative PLR outperformed NLR in predicting lymph node metastasis, emphasizing the thrombo-inflammatory axis in tumor invasion and spread (38).

Copper- to-Zinc Ratio (Cu/Zn Ratio)

Ivanova and colleagues investigated Cu, Zn, and their ratio (Cu/Zn) across three groups—patients hospitalized in the acute phase of COVID-19 (n=75), clinically stable "non-acute" patients approximately three months after illness (n=22), and healthy controls (n=68) (9). The main finding is an elevation of the Cu/Zn ratio at hospital admission, which differentiates acute cases from both non-acute patients and healthy controls (ANOVA adjusted for age/sex: $p=0.001$ and $p<0.001$, respectively). Median (IQR) Cu/Zn values were ~1.72 (1.21–2.35) in acute patients, versus 1.06 (0.91–1.33) in non-acute patients and 1.22 (1.10–1.35) in controls, with no difference between the latter two groups. That supports that Cu/Zn is a marker of active disease rather than a persistent post-infection alteration.

Cu/Zn tracked closely with the inflammatory burden. On a logarithmic scale, the ratio correlated positively with C-reactive protein (CRP) ($r=0.581$; $p<0.001$) and with the neutrophil-to-lymphocyte ratio (NLR) ($r=0.436$; $p=0.003$); Notably, the same associations were absent in non-acute patients and in controls, reinforcing the view that Cu/Zn reflects the acute-phase response. For clinical outcomes, univariable Cox models linked higher Cu/Zn with increased in-hospital mortality (HR 3.89; 95% CI 1.25–12.07), alongside older age, higher NLR, lower Zn, and elevated

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D-dimer. In multivariable selection, only NLR remained independently associated with mortality, arguing that while Cu/Zn is a strong correlate of acute inflammation and risk, it may be outperformed by established hematologic indices once covariates are considered.

More and more studies link the blood copper-to-zinc ratio (Cu/Zn) to the development of colorectal cancer. In a meta-analysis by Muñoz-Bravo et al., patients with colorectal cancer (CRC) exhibited substantially higher Cu/Zn than healthy controls (standardized mean difference SMD = 1.19, 95% CI 0.54–1.84) (39). Importantly, this was clearer and more consistent than copper alone, which wasn't significant in pooled analyses. A higher Cu/Zn ratio probably reflects combined metabolic and inflammatory changes, but results varied widely across studies.

Prospective evidence supports these associations. M. Stepien and colleagues evaluated pre-diagnostic serum copper and zinc—and their ratio—in a case–control analysis in 10 European countries (40). 966 cases with CRC 966 controls). Higher copper concentrations were linked to increased subsequent CRC risk, whereas higher zinc showed a borderline inverse association (p between 0.05 and 0.10). Crucially, a higher Cu/Zn ratio was significantly associated with greater CRC risk, underscoring the value of considering the two trace elements jointly rather than in isolation.

Findings from clinical cohorts align with this pattern. S. Byeon et al. reported higher Cu/Zn among patients with colorectal adenocarcinoma compared with controls (1.76 vs 1.53, $p = 0.002$) (41). Extending beyond the colorectum, Fabris et al. measured copper, zinc, and Cu/Zn in 29 pancreatic cancer, 46 chronic pancreatitis, 32 extra-pancreatic disease patients, and 48 healthy controls (42). The Cu/Zn ratio was markedly elevated in pancreatic cancer (2.66 ± 0.16) relative to healthy individuals (1.39 ± 0.06; $p < 0.001$), chronic pancreatitis (1.82 ± 0.09; $p < 0.001$), and extra-pancreatic conditions (1.81 ± 0.18; $p < 0.001$). Even so, the authors cautioned that Cu/Zn lacks sufficient specificity as a stand-alone diagnostic marker. They also observed age-related trends: serum zinc declined with advancing age, whereas copper and the Cu/Zn ratio increased.

Conclusion

Simple hematological ratios such as the neutrophil-to-lymphocyte ratio (NLR), lymphocyte-to-monocyte ratio (LMR), platelet-to-lymphocyte ratio (PLR), and the copper-to-zinc (Cu/Zn) ratio have emerged as cost-effective biomarkers with significant prognostic value. By capturing the interplay between systemic inflammation, nutritional status, and immune function, they provide clinically meaningful insights across a wide spectrum of diseases, particularly in oncology. Although their discriminative power alone is limited, their true utility lies in complementing established clinical and laboratory parameters. Future work should prioritize standardization of cut-offs and assessment timing to facilitate their integration into personalized risk stratification and patient management.

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References

1. Liu K, Tang S, Liu C, Ma J, Cao XL, Yang X, et al. Systemic immune-inflammatory biomarkers (SII, NLR, PLR and LMR) linked to non-alcoholic fatty liver disease risk. Front Immunol 2024;15:1337241. doi:10.3389/fimmu.2024.1337241.
2. Seo I, Lee Y. Usefulness of complete blood count to assess cardiovascular and metabolic diseases in clinical settings: A comprehensive literature review. Biomedicines 2022;10(11):2697. doi:10.3390/biomedicines10112697.
3. Oğlak SC, Tunç Ş, Ölmez F. First trimester mean platelet volume, neutrophil-to-lymphocyte ratio, and platelet-to-lymphocyte ratio values are useful markers for predicting preeclampsia. Ochsner J 2021;21(4):364. doi:10.31486/toj.21.0026.
4. Jiang Y, Zang M, Li S. Serum PLR and LMR in Behçet's disease. Medicine (Baltimore) 2017;96(21):e6981. doi:10.1097/MD.0000000000006981.
5. Mulas O, Mola B, Madeddu C, Caocci G, Macciò A, Nasa GL. Prognostic role of cell blood count in chronic myeloid neoplasm and acute myeloid leukemia and its possible implications in hematopoietic stem cell transplantation. Diagnostics (Basel) 2022;12(10):2493. doi:10.3390/diagnostics12102493.
6. Xuan, Y., Wu, D., Zhang, Q., Yu, Z., Yu, J., & Zhou, D. (2024). Elevated ALT/AST ratio as a marker for NAFLD risk and severity: insights from a cross-sectional analysis in the United States. Frontiers in Endocrinology, 15.
7. Shaikh SM, Varma A, Kumar S, Acharya S, Patil R. Navigating Disease Management: A Comprehensive Review of the De Ritis Ratio in Clinical Medicine. Cureus. 2024;16(7):e64447.
8. Buonacera A, Stancanelli B, Colaci M, Malatino L. Neutrophil to Lymphocyte Ratio: An Emerging Marker of the Relationships between the Immune System and Diseases. Int J Mol Sci. 2022;23(7):3636
9. Ivanova ID, Pal A, Simonelli I, Atanasova B, Ventriglia M, Rongioletti M, Squitti R. Evaluation of zinc, copper, and Cu:Zn ratio in serum, and their implications in the course of COVID-19. J Trace Elem Med Biol. 2022 May;71:126944.
10. Malavolta, M., Piacenza, F., Basso, A., Giacconi, R., Costarelli, L., & Mocchegiani, E. (2015). Serum copper to zinc ratio: Relationship with aging and health status. Mechanisms of Ageing and Development, 151, 90-100
11. Komarova, T., McKeating, D. R., Perkins, A. V., & Tinggi, U. (2021). Trace Element Analysis in Whole Blood and Plasma for Reference Levels in a Selected Queensland Population, Australia. International Journal of Environmental Research and Public Health, 18(5), 2652.
12. Zeng, H., Yang, Q., Yuan, P., Wang, X., & Cheng, L. (2020). Associations of blood essential and toxic metal(loid)s with both disease severity and mortality in patients with COVID-19: a retrospective study. Research Square (Research Square).
13. Buonacera, A.; Stancanelli, B.; Colaci, M.; Malatino, L. Neutrophil to Lymphocyte Ratio: An Emerging Marker of the Relationships between the Immune System and Diseases. Int. J. Mol. Sci. 2022, 23, 3636
14. Reddy AV, Hill CS, Sehgal S, He J, Zheng L, Herman JM, et al. High neutrophil-to-lymphocyte ratio following stereotactic body radiation therapy is associated with poor clinical

DOI: 10.18044/MEDINFORM.2025123.2186 ISSUE 3, 2025

outcomes in patients with borderline resectable and locally advanced pancreatic cancer. J Gastrointest Oncol 2022;13:368–379. doi:10.21037/jgo-21-513.
15. Shusterman M, Jou E, Kaubisch A, Chuy JW, Rajdev L, Aparo S, et al. The neutrophil-to-lymphocyte ratio is a prognostic biomarker in an ethnically diverse patient population with advanced pancreatic cancer. J Gastrointest Cancer 2020;51:868–876. doi:10.1007/s12029-019-00316-8.
16. Strong JS, Vos EL, McIntyre CA, Chou JF, Gonen M, Tang LH, et al. Change in neutrophil-to-lymphocyte ratio during neoadjuvant treatment does not predict pathological response and survival in resectable pancreatic ductal adenocarcinoma. Am Surg 2022;88:1153–1158. doi:10.1177/0003134821989050.
17. Cetin S, Dede I. Prognostic value of the neutrophil-to-lymphocyte ratio and carbohydrate antigen 19-9 in estimating survival in patients with metastatic pancreatic cancer. J Cancer Res Ther 2020;16:909–916. doi:10.4103/jcrt.JCRT_366_19.
18. Shin K, Jung EK, Park SJ, Jeong S, Kim IH, Lee MA. Neutrophil-to-lymphocyte ratio and carbohydrate antigen 19-9 as prognostic markers for advanced pancreatic cancer patients receiving first-line chemotherapy. World J Gastrointest Oncol 2021;13:915–928. doi:10.4251/wjgo.v13.i8.915.
19. Gülben K, Berberoğlu U, Öndeş B, Uyar O, Güler OC, Turanlı S. Preoperative neutrophil-to-lymphocyte ratio as a predictive factor for survival in nonmetastatic colorectal cancer. J Cancer Res Ther 2020;16(Suppl):S189–S193. doi:10.4103/jcrt.JCRT_489_18.
20. Yang Z, Li Y, Zhang K, Deng X, Yang S, Wang Z. Combined detection of preoperative neutrophil-to-lymphocyte ratio and interleukin-6 as an independent prognostic factor for patients with non-metastatic colorectal cancer. J Gastrointest Oncol 2021;12:2838–2845. doi:10.21037/jgo-21-763.
21. Nemoto T, Endo S, Isohata N, Takayanagi D, Nemoto D, Aizawa M, et al. Change in the neutrophil-to-lymphocyte ratio during chemotherapy may predict prognosis in patients with advanced or metastatic colorectal cancer. Mol Clin Oncol 2021;14:107. doi:10.3892/mco.2021.2269.
22. Cui M, Xu R, Yan B. A persistent high neutrophil-to-lymphocyte ratio predicts poor prognosis in patients with colorectal cancer undergoing resection. Mol Clin Oncol 2020;13:63. doi:10.3892/mco.2020.2133.
23. Singh G, Nassri A, Kim D, Zhu H, Ramzan Z. Lymphocyte-to-monocyte ratio can predict mortality in pancreatic adenocarcinoma. World J Gastrointest Pharmacol Ther 2017;8(1):60–66. doi:10.4292/wjgpt.v8.i1.60.
24. Lin S, Fang Y, Mo Z, Lin Y, Ji C, Jian Z. Prognostic value of lymphocyte-to-monocyte ratio in pancreatic cancer: A systematic review and meta-analysis including 3338 patients. World J Surg Oncol 2020;18:186. doi:10.1186/s12957-020-01962-0.
25. Li W, Tao L, Zhang L, Xiu D. Prognostic role of lymphocyte-to-monocyte ratio for patients with pancreatic cancer: A systematic review and meta-analysis. Onco Targets Ther 2017;10:3391–3397. doi:10.2147/OTT.S142022.
26. Tan D, Fu Y, Tong W, Li F. Prognostic significance of lymphocyte-to-monocyte ratio in colorectal cancer: A meta-analysis. Int J Surg 2018;55:128–138. doi:10.1016/j.ijsu.2018.05.030.

DOI: 10.18044/MEDINFORM.2025123.2186 ISSUE 3, 2025

27. Tang F, Dai P, Wei Q, Gan K, Wang Z, Chen H, et al. The neutrophil-to-monocyte ratio and platelet-to-white blood cell ratio represent novel prognostic markers in patients with pancreatic cancer. Gastroenterol Res Pract 2021;2021:6693028. doi:10.1155/2021/6693028.
28. Eltyeb EE, Gohal GA, Alhazmi SA, Alqassim MA, Hakami EF, Moafa MH, et al. Neutrophil-to-lymphocyte ratio, platelets-to-lymphocyte ratio, and red cell distribution width as prognostic indicators for length of hospital stay in pediatric asthma. Saudi Med J 2025;46(2):143–149. doi:10.15537/smj.2025.46.2.20240934.
29. Citu C, Gorun F, Motoc A, Gorun OM, Burlea B, Ratiu A, et al. The neutrophil-to-monocyte ratio and platelet-to-white blood cell ratio as prognostic markers in COVID-19 patients: A two-center cohort study. Diagnostics (Basel) 2022;12(1):119.
30. Ilyas MF, Lado A, Budiono EA, Suryaputra GP, Ramadhana GA, Novika RGH. Platelet-to-lymphocyte ratio as a prognostic predictive marker on adults with traumatic brain injury: Systematic review. Surg Neurol Int 2024;15:205. doi:10.25259/SNI_878_2023.
31. Sarkar S, Kannan S, Khanna P, Singh AK. Role of platelet-to-lymphocyte count ratio as a prognostic indicator in COVID-19: A systematic review and meta-analysis. J Med Virol 2022;94(1):211–221. doi:10.1002/jmv.27297.
32. Le VN, Nguyen HP, Pham DH. Platelet-to-lymphocyte ratio and neutrophil-to-lymphocyte ratio as predictors of refractory anaphylaxis. World Allergy Organ J 2024;17(8):100944. doi:10.1016/j.waojou.2024.100944.
33. Acharya AB, Shetty IP, Jain S, Padakannaya I, Acharya S, Shettar L, et al. Neutrophil-to-lymphocyte ratio and platelet-to-lymphocyte ratio in chronic periodontitis before and after nonsurgical therapy. J Indian Soc Periodontol 2019;23(5):419–423. doi:10.4103/jisp.jisp_622_18.
34. Qu R, Ling Y, Zhang Y-HZ, Wei LY, Chen X, Li XM, et al. Platelet-to-lymphocyte ratio is associated with prognosis in patients with coronavirus disease-19. J Med Virol 2020;92(9):1533–1541. doi:10.1002/jmv.25767.
35. Bizon M, Olszewski M, Krason B, Kochanowicz E, Safiejko K, Borowka A, et al. The diagnostic role of the platelet-to-lymphocyte ratio in ovarian cancer: A systematic review and meta-analysis. Cancers (Basel) 2021;13(23):6061. doi:10.3390/cancers13236061.
36. Wang J, Li J, Wei S, Xu J, Jiang X, Yang L. The ratio of platelets to lymphocytes predicts the prognosis of metastatic colorectal cancer: A review and meta-analysis. Gastroenterol Res Pract 2021;2021:9699499. doi:10.1155/2021/9699499.
37. Tazeen S, Prasad K, Harish K, Sagar P, Kapali AS, Chandramouli S. Assessment of pretreatment neutrophil/lymphocyte ratio and platelet/lymphocyte ratio in prognosis of oral squamous cell carcinoma. J Oral Maxillofac Surg 2020;78(6):949–960. doi:10.1016/j.joms.2020.01.001.
38. Acharya S, Rai P, Hallikeri K, Anehosur V, Kale J. Preoperative platelet-lymphocyte ratio is superior to neutrophil-lymphocyte ratio to be used as predictive marker for lymph node metastasis in oral squamous cell carcinoma. J Investig Clin Dent 2017;8(3):e12219. doi:10.1111/jicd.12219.
39. Muñoz-Bravo C, Gutiérrez-Bedmar M, Gómez-Aracena J, Rojas-García A, Navajas JF, Martínez-González LJ, et al. Copper in colorectal cancer patients: A systematic review and meta-analysis. Carcinogenesis 2025;46(1):bgaf001. doi:10.1093/carcin/bgaf001.

DOI: 10.18044/MEDINFORM.2025123.2186 ISSUE 3, 2025

40. Stepien M, Hughes DJ, Hybsier S, Bamia C, Visvanathan K, Jenab M, et al. Circulating copper and zinc levels and risk of colorectal cancer in the European Prospective Investigation into Cancer and Nutrition cohort. Int J Cancer 2017;141(9):1873–1882. doi:10.1002/ijc.30867.
41. Byeon S, du Toit-Thompson T, Hipperson L, Maloney S, Wenzel R, Gill AJ, et al. Serum and tissue metallome of pancreatic ductal adenocarcinoma. Cancer Sci 2024;115(5):1446–1458. doi:10.1111/cas.15880.
42. Fabris C, Farini R, Del Favero G, Gurrieri G, Piccoli A, Sturniolo GC, et al. Copper, zinc and copper/zinc ratio in chronic pancreatitis and pancreatic cancer. Clin Biochem 1985;18(6):373–375.

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