

Neutrophil to lymphocyte ratio may be predict of mortality in all conditions

S Balta^{*,1}, S Demirkol¹, M Unlu¹, Z Arslan¹ and T Celik¹

¹Gulhane Medical Academy, Department of Cardiology, Ankara, Turkey

Sir,

We read with great interest the article ‘A derived neutrophil to lymphocyte (N/L) ratio predicts clinical outcome in stage II and III colon cancer patients’ by Absenger *et al* (2013). They aimed to investigate the effect of the preoperative N/L ratio on time to recurrence and overall survival in patients with stage II and III colon cancer. They concluded that the N/L ratio is an independent prognostic marker in our study cohort including patients with stage II and III colon cancer. The ready availability of this parameter at no additional cost may encourage its wider use in clinical practice in the future. Thank to the authors for their contribution.

White blood cell (WBC) count is one of the useful inflammatory biomarkers in clinical practice. Although WBC is in normal range, subtypes of WBC like N/L ratio may predict cardiovascular mortality. N/L ratio is a readily measurable laboratory marker used to evaluate systemic inflammation (Balta *et al*, 2013c). Because hypertension, diabetes mellitus, metabolic syndrome (Balta *et al*, 2013a), left ventricular dysfunction, acute coronary syndromes, valvular heart disease, abnormal thyroid function tests, renal or hepatic dysfunction, known malignancy (Stotz *et al*, 2013; Szkandera *et al*, 2013), local or systemic infection, previous history of infection (<3 months), inflammatory diseases, and any medication that related to inflammatory condition of patients, the measurement of N/L ratio can be potentially affected in all of above conditions. For these reasons, it would be better, if the authors had mentioned these factors.

In conclusion, we strongly believe that these findings will elucidate further studies about N/L ratio as a surrogate marker of predicting mortality in colon cancer patients. Not only N/L ratio but also mean platelet volume, red cell distribution width (Demirkol *et al*, 2013), platelet distribution width, CRP, uric acid (Cakar *et al*, 2013) and gamma-glutamyl transferase (Cakar *et al*, 2012) are easy markers to evaluate the prognosis of colon cancer patients (Demirkol *et al*, 2012). However, one should keep in mind that N/L ratio itself alone without other inflammatory markers may not give exact information to clinicians about the prognosis of colon cancer patients. So, from that point of view we think that it

should be evaluated accompanied with other serum inflammatory markers (Balta *et al*, 2013b).

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- Absenger G, Szkandera J, Pichler M, Stotz M, Armingier F, Weissmueller M, Schaberl-Moser R, Samonigg H, Stojakovic T, Gergler A (2013) A derived neutrophil to lymphocyte ratio predicts clinical outcome in stage II and III colon cancer patients. *Br J Cancer* **109**: 395–400.
- Balta S, Cakar M, Demirkol S, Arslan Z, Akhan M (2013a) Higher neutrophil to lymphocyte ratio in patients with metabolic syndrome. *Clin Appl Thromb Hemost* **19**(5): 579.
- Balta S, Demirkol S, Cakar M, Arslan Z, Unlu M, Celik T (2013b) Other Inflammatory Markers should not be forgotten when assessing the neutrophil-to-lymphocyte ratio. *Clin Appl Thromb Hemost*; e-pub ahead of print 23 April 2013; doi:10.1177/1076029613486019.
- Balta S, Demirkol S, Celik T, Kucuk U, Unlu M, Arslan Z, Balta I, Iyisoy A, Kocak N, Haqmal H, Yokusoglu M (2013c) Association between coronary artery ectasia and neutrophil-lymphocyte ratio. *Angiology*; e-pub ahead of print 17 March 2013; doi:10.1177/0003319713480424.
- Cakar M, Balta S, Demirkol S, Altun B, Demirbas S (2012) Serum gamma-glutamyltransferase (GGT) should be evaluated together with other inflammatory markers in clinical practice. *Angiology* **124**: 60.
- Cakar M, Sarlak H, Balta S, Unlu M, Demirbas S, Demirkol S (2013) Serum uric Acid still carries controversies about its role in endothelial dysfunction. *J Clin Hypertens (Greenwich)* **15**: 296.
- Demirkol S, Balta S, Celik T, Arslan Z, Unlu M, Cakar M, Kucuk U, Demirbas S, Iyisoy A, Yokusoglu M (2013) Assessment of the relationship between red cell distribution width and cardiac syndrome X. *Kardiol Pol.* **71**: 480–484.
- Demirkol S, Balta S, Unlu M, Yuksel UC, Celik T, Arslan Z, Kucuk U, Yokusoglu M (2012) Evaluation of the mean platelet volume in patients with cardiac syndrome X. *Clinics (São Paulo, Brazil)* **67**: 1019–1022.

*Correspondence: Dr S Balta; E-mail: drsevkettb@gmail.com

Stotz M, Gerger A, Eisner F, Szkandera J, Loibner H, L Ress A, Kornprat P, A Zoughbi W, Seggewies FS, Lackner C, Stojakovic T, Samonigg H, Hoefler G, Pichler M (2013) Increased neutrophil-lymphocyte ratio is a poor prognostic factor in patients with primary operable and inoperable pancreatic cancer. *Br J Cancer* **109**: 416–421.

Szkandera J, Absenger G, Liegl-Atzwanger B, Pichler M, Stotz M, Samonigg H, Glehr M, Zacherl M, Stojakovic T, Gerger A, Leithner A (2013) Elevated

preoperative neutrophil/lymphocyte ratio is associated with poor prognosis in soft-tissue sarcoma patients. *Br J Cancer* **108**: 1677–1683.



This work is licensed under the Creative Commons Attribution-NonCommercial-Share Alike 3.0 Unported License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>

BJC

British Journal of Cancer (2013) 109, 3126–3127 | doi: 10.1038/bjc.2013.599

Reply: Comment on 'A derived neutrophil to lymphocyte ratio predicts clinical outcome in stage II and III colon cancer patients'

J Szkandera¹, M Pichler¹, M Stotz¹ and A Gerger^{*,1}

¹Division of Clinical Oncology, Department of Medicine, Medical University of Graz, Auenbruggerplatz 15, 8036 Graz, Austria

We would like to thank Balta *et al* (2013) for their valuable comments and suggestions on our study 'A derived neutrophil to lymphocyte ratio predicts clinical outcome in stage II and III colon cancer patients'. The results of our study show that the derived neutrophil to lymphocyte ratio (dNLR; absolute count of neutrophils divided by the absolute white cell count minus the absolute count of neutrophils) and the neutrophil to lymphocyte ratio (NLR) are independent prognostic markers for time to recurrence and overall survival in patients with stage II and III colon cancer (Absenger *et al*, 2013). In contrast to many other previously proposed biomarkers, the dNLR and NLR are relatively cheap and easily determinable laboratory parameters, which would allow a widespread clinical use.

Recent data indicate that inflammation plays a critical role in the pathogenesis and progression of cancer. Systemic inflammatory response to tumours causes changes in the haematological components. The dNLR and NLR have recently been shown to negatively influence the clinical outcome in various cancer entities, including kidney cancer, soft-tissue sarcoma, pancreatic cancer and colon cancer (Procter *et al*, 2012; Absenger *et al*, 2013; Stotz *et al*, 2013; Szkandera *et al*, 2013; Pichler *et al*, 2013a). In most studies including our study, however, major potential confounding factors, such as local or systemic infection, ischaemia, acute coronary syndrome, metabolic syndrome, diabetes mellitus and renal or hepatic dysfunction, that might affect the neutrophil and lymphocyte counts have not been taken into account (Tamhane *et al*, 2008; Azab

et al, 2012; Buyukkaya *et al*, 2012; Biyik *et al*, 2013; Gary *et al*, 2013). As the preoperative white blood cell count was obtained within 3 days before surgery in our study, at least local or systemic infections or inflammatory diseases could be relatively reliably excluded. However, we absolutely agree with Balta *et al* (2013) that a combination of multiple serum inflammatory biomarkers such as dNLR, NLR, CRP, fibrinogen, platelet to lymphocyte ratio and all possible confounding factors should be included in further studies, preferentially in prospective trials (Shiu *et al*, 2008; Demirkol *et al*, 2013; Son *et al*, 2013; Pichler *et al*, 2013b).

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- Absenger G, Szkandera J, Pichler M, Stotz M, Armingier F, Weissmueller M, Schaberl-Moser R, Samonigg H, Stojakovic T, Gerger A (2013) A derived neutrophil to lymphocyte ratio predicts clinical outcome in stage II and III colon cancer patients. *Br J Cancer* **109**: 395–400.
- Azab B, Daoud J, Naeem FB, Nasr R, Ross J, Ghimire P, Siddiqui A, Azzi N, Rihana N, Abdallah M, Azzi N, Patel P, Kleiner M, El-Sayegh S (2012) Neutrophil-to-lymphocyte ratio as a predictor of worsening renal function in diabetic patients (3-year follow-up study). *Ren Fail* **34**: 571–576.

*Correspondence: Professor A Gerger; E-mail: amin.gerger@medunigraz.at

