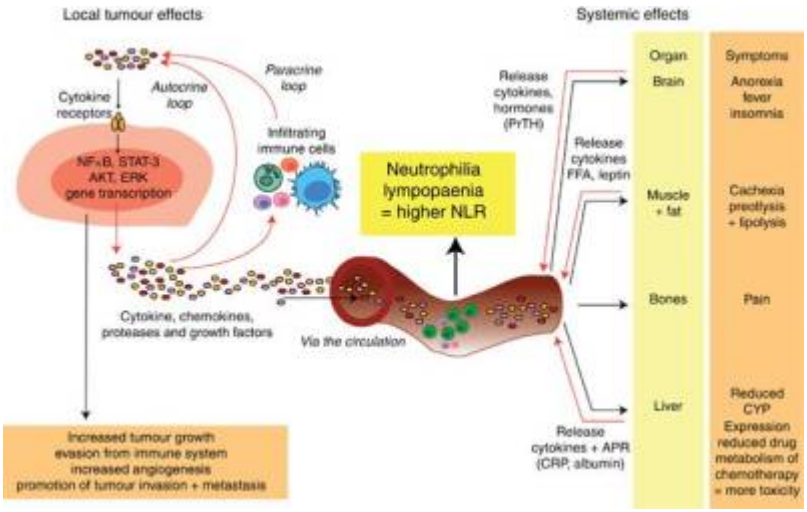
Neutrophil to lymphocyte ratio for glioma



Neutrophil to lymphocyte ratio (NLR), Platelet-to-lymphocyte ratio, the systemic immune inflammation index (SII), and red blood cell distribution width (RDW), have been recognized as promising predictors for histological grade and prognosis in multiple cancer types.

It is a simple, low-cost and easily measured inflammation marker.

Studies have shown that the peripheral blood pretreatment Neutrophil to lymphocyte ratio (NLR) is a prognostic measure in various cancers. The few studies evaluating NLR in glioblastoma multiforme (Glioblastoma) patients yielded inconsistent results.

The results of a study of Qi et al. indicated that a high dNLR was an independent risk factor for overall survival rates in patients with LGG, which may increase prognostic accuracy and improve patient outcomes [1].

In the cohort of Brenner et al., Glioblastoma patients treated with combined modality therapy, pretreatment NLR was not prognostic. Toxicity of treatment was acceptable. Investigation of the NLR with larger groups of patients selected by MGMT status is warranted [2].

For Weng et al., the preoperative NLR was correlated with glioma grading, and the elevated NLR was an independent predictive factor for poor outcome of glioblastoma patients [3].

For Bao et al., NLR was an independent prognostic factor for overall survival in glioma [4].

For Zadora et al., preoperative NLCR measurement corresponds with a glial brain tumor grading [5].

Case series

The aim of this study was to determine the prognostic value of preoperative inflammatory markers

among different molecular subtypes of low-grade glioma (LGG).

Qi et al. performed a retrospective analysis of 214 patients with LGG from 2001 to 2013, evaluating the effect of the neutrophil-to-lymphocyte ratio (NLR), lymphocyte/monocyte ratio (LMR), platelet/lymphocyte ratio (PLR) and derived NLR (dNLR) on prognosis among different molecular subtypes. Isocitrate dehydrogenase (IDH) and telomerase reverse transcriptase (TERT) promotor mutations were detected by gene sequencing, and Chromosome arms 1p and 19q 1p/19q co-deletion was estimated via fluorescence in situ hybridization.

Survival analysis showed that a high NLR, low LMR, and high dNLR were associated with poor prognosis, while the PLR had no prognostic significance. The subsequent molecular subtype analysis indicated that a high NLR and dNLR predicted worse survival in the IDH mutation only group, a high NLR and PLR predicted worse survival in the IDH and TERT promoter mutation group, and a high PLR was associated with shorter survival in the triple-positive group. Furthermore, univariate and multivariate Cox regression analysis suggested that the dNLR was an independent prognostic factor for LGG. Finally, the prognostic nomogram was developed by integrating the inflammatory marker dNLR and independent clinical risk factors.

The results of this study indicated that a high dNLR was an independent risk factor for overall survival rates in patients with LGG, which may increase prognostic accuracy and improve patient outcomes [6].

Brenner et al., analyzed 89 patients with Glioblastoma in a retrospective cohort analysis who were treated in Soroka University Medical Center's Oncology Department between the years 2005-2016. We analyzed NLR as a dichotomous variable at 3 cut-off points, 2.5, 3 and 4, as a predictor of OS and PFS. Methylation status of the O6-methylguanine-DNA methyltransferase (MGMT) promoter was not determined.

No significant correlation was found between NLR and either OS or PFS. Factors that predicted a shorter OS were age and extent of surgery. Patients over 70 years of age had a statistically significant shorter OS, 12.5 months (95% CI: 10.4-14.5 months) versus 17.6 months (95% CI: 14.2-21.1 months) in those 70 years of age and younger ($p = 0.004$). The OS of patients undergoing partial resection (12.7 months 95% CI: 8.3-17.1 months) or biopsy only (9.3 months 95% CI: 7.8-24.6 months), was significantly shorter than that of patients undergoing total resection (18.9 months, 95% CI: 11.8-26.0 months; $p = 0.035$). There were no treatment-related deaths. The most common grade III-IV toxicities were thrombocytopenia, 12.4%, and fatigue, 13.5%.

In this cohort of Glioblastoma patients treated with combined modality therapy, pretreatment NLR was not prognostic. Toxicity of treatment was acceptable. Investigation of the NLR with larger groups of patients selected by MGMT status is warranted [7].

The preoperative NLR was analyzed retrospectively in 239 gliomas of different grades, and receiver operating characteristic (ROC) curve analysis was adopted to investigate the prediction of glioma grading. Univariate and multivariate analyses were performed to analyze the variables of overall survival (OS) of glioblastoma patients.

There were significant differences in the preoperative NLR values among the four glioma groups, with

the highest values observed in the glioblastoma group ($p < 0.05$). ROC curve analysis showed the NLR value of 2.36 was a cutoff point for predicting glioblastoma. The OS of patients with high NLR (≥ 4.0) was shorter compared with that with low NLR (< 4.0) (mean 11.23 vs. 18.56 months, $p < 0.05$). Univariate analysis and multivariate analysis indicated age≥ 60, NLR≥ 4.0, Karnofsky Performance Scores (KPS) ≤ 70, incomplete tumor resection, incomplete Stupp protocol accomplishment and the isocitrate dehydrogenase 1 (IDH1) wild-type as independent prognostic indicators for poor outcome (each $p < 0.05$).

The preoperative NLR was correlated with glioma grading, and the elevated NLR was an independent predictive factor for poor outcome of glioblastoma patients [8].

A retrospective chart review study was conducted for 219 glioma patients between January 2012 and January 2017. The values of the NLR, PLR, MLR and RDW on the prognosis were evaluated. And correlations between these hematologic inflammatory markers were examined.

Patients were divided into high and low groups according to cutoff points from the receiver operating characteristic curve. The high NLR groups were associated with tumor grade ($p = 0.000$). Kaplan-Meier survival analyses shown that the high NLR group experienced inferior median survival compared with the low NLR group (11 vs. 32 months; $p = 0.000$). The high PLR group experienced inferior median survival compared with the low PLR group (12 vs. 21 months; $p = 0.001$). The high MLR group experienced inferior median survival compared with the low MLR group (12 vs. 22 months; $p = 0.006$). However, there was no significant difference in median survival between the high and low RDW groups (15 vs. 23 months; $p = 0.184$). Multivariate analysis demonstrated that NLR was an independent predictor for overall survival (OS) (HR 1.758; $p = 0.008$).

High preoperative NLR, PLR, MLR were predictors of poor prognosis for patients with glioma. NLR was an independent prognostic factor for OS in glioma [9].

A retrospective analysis of NLCR was performed in neurosurgical patients treated for glial brain tumors. The preoperative NLCR was analyzed in accordance with WHO glial tumors' classification, which distinguishes G1, G2, G3 and G4 (glioblastoma) tumors.

The analysis of NLCR was performed in 424 patients (258 males and 166 females) aged 53 ± 16 years who underwent either an open surgery or stereotactic biopsy for a glial brain tumor. G1 was diagnosed in 22 patients, G2 - in 71 patients, G3 - in 63 patients and G4 - in 268 patients. The highest value of NLCR was noted in G4 patients (5.08 [3.1; 8.7] - median [quartiles 1 and 3, respectively]) and was significantly higher compared to G3 ($p<0.01$), G2 ($p<0.001$) and G1 ($p<0.01$) groups. Moreover, NLCR was significantly higher in group G3 than G2 ($p<0.05$). ROC curve analysis showed 2.579 as a cut-off point for prediction of glioblastoma.

Preoperative NLCR measurement corresponds with a glial brain tumor grading [10].

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