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IS THE NEUTROPHIL-TO-LYMPHOCYTE RATIO AN INDICATOR OF DISEASE PROGRESSION IN PATIENTS WITH INTERSTITIAL CYSTITIS?

Hypothesis / aims of study
Inflammation is a factor in the development of interstitial cystitis (IC). The neutrophil-to-lymphocyte ratio (NLR) is reported to be a novel biomarker of many diseases. Some studies reported that the elevation of NLR has been associated with a less number urinary tract symptoms. However, the relationships between NLR and IC are not yet fully understood. The aim of this study was to evaluate the inflammation parameters, and to assess the utility of the NLR as a simple and readily available predictor of clinical disease activity in patients with IC.

Study design, materials and methods
We examined 21 patients admitted to our outpatient hospital with IC from September 2007 to December 2015 and 21 healthy controls. The preoperative complete blood count (CBC), NLR, bladder capacity, and the presence of Hunner's ulcer were assessed. The O'Leary-Sant Symptom Index (ICSI) and the Problem Index (ICPI) were used to objectify the subjective symptoms. The correlations between preoperative bladder capacity, the presence of Hunner's ulcer, ICSI, ICPI and the preoperative NLR were statistically analyzed. Furthermore, to determine the best cut-off value of the preoperative NLR, we assessed the prediction accuracy for recurrence within a year using the receiver operating characteristic (ROC) curve analysis.

Results
The mean age of the patients was 64 years (range, 29 - 86 years). While the mean age of the controls was 58 years (range, 35 - 67 years). The preoperative NLR levels were significantly higher in IC patients (2.9 ± 0.7 vs. 1.3 ± 0.3, $P < 0.001$) than in controls. When analyzing IC patients, the preoperative NLR levels were significantly higher in those with Hunner's ulcer (3.1 ± 1.0 vs. 2.0 ± 0.4, $P = 0.04$) than in those without the lesion. In IC patients, the preoperative NLR was negatively correlated with preoperative bladder capacity ($P = 0.03$, $r = -0.45$). However, there were no significant differences between ICSI ($P = 0.74$), ICPI ($P = 0.88$), and NLR. The optimal cut-off point was 2.48. The generated area under the receiver operating characteristic (ROC) curve was 0.764 (95% CI: 0.54 - 0.99).
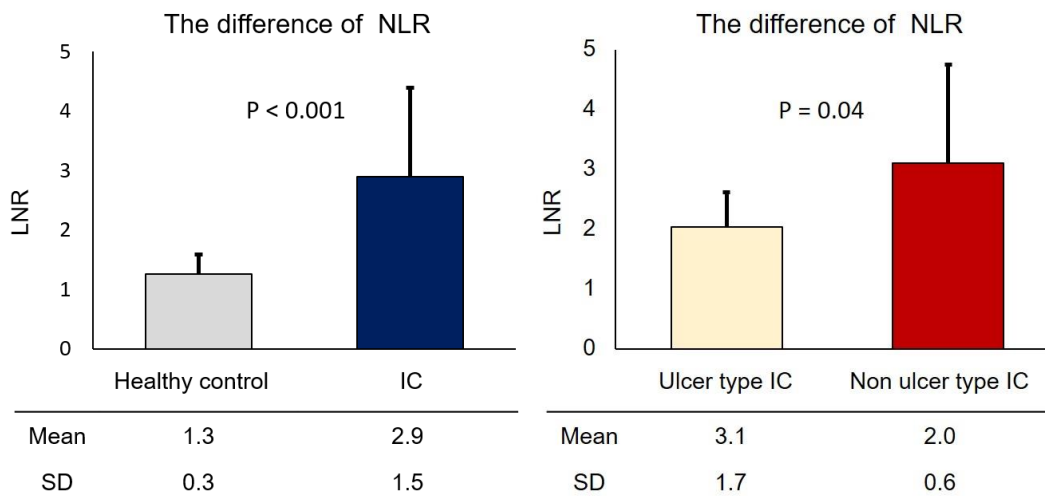The sensitivity of NLR was 66.7% and specificity was 83.3%.
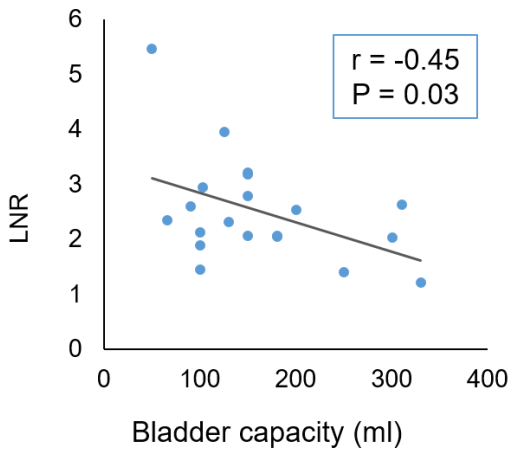
Interpretation of results
Inflammation has been considered a possible underlying mechanism for IC. Some studies investigated the relationships between CRP and IC [1, 2]. However, little is known about the relationship between NLR and IC. This study has shown that the NLR levels of the IC patients are higher than those of the healthy controls. Furthermore, it was evidenced that in the ulcer type of IC, the NLR levels were higher than in the non-ulcer type of IC. However, no significant correlation was found between ICSI, ICPI, and NLR; NLR was thought to reflect the clinical statement of IC. Moreover, this study showed the utility of NLR as a marker of recurrence within a year.
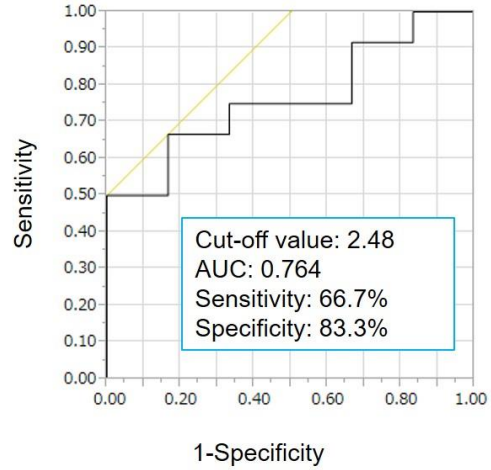
Concluding message
We propose that an increased level of inflammation is negatively associated with clinical status in IC patients. NLR has been suggested as a marker for predicting recurrece and a readily accessible marker for patient follow-up.

The difference of NLR

	Healthy control	IC
Mean	1.3	2.9
SD	0.3	1.5

The difference of NLR

	Ulcer type IC	Non ulcer type IC
Mean	3.1	2.0
SD	1.7	0.6

The correlations between preoperative bladder capacity and the NLR

r = -0.45
P = 0.03

LNR (y-axis), Bladder capacity (ml) (x-axis)

Prediction accuracy for recurrence within a year by preoperative NLR values

Cut-off value: 2.48
AUC: 0.764
Sensitivity: 66.7%
Specificity: 83.3%

Sensitivity (y-axis), 1-Specificity (x-axis)

References
1. Serhat Tanik, Asian Pac J Cancer Prev, 2014
2. Yuan-Hong Jiang, Plos One, 2013