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LETTER TO THE EDITOR

The prognostic value of geriatric nutritional risk index in patients with follicular lymphoma

Kota Mizuno[1] · Tomonori Nakazato[1] · Chisako Ito[1] · Yuriko Fujita[1] · Shinji Ogura[1] · Takahiro Kamiya[1] · Aki Sakurai[1] · Yoshinobu Aisa[1] · Takehiko Mori[2]

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Dear Editor,

We read with interest the recently published article, "Geriatric nutritional risk index as a prognostic factor in patients with diffuse large B cell lymphoma" by Kanemasa et al. [1]. The authors performed a retrospective analysis of 476 newly diagnosed diffuse large B cell lymphoma (DLBCL) patients. The 5-year overall survival (OS) in patients with a geriatric nutritional risk index (GNRI) of < 96.8 was significantly lower in comparison to those with a GNRI of ≥ 96.8 (61.2 vs 84.4%, $p < 0.001$). A multivariate analysis showed that GNRI was an independent prognostic factor for OS. However, no studies have demonstrated the prognostic value of GNRI in patients with follicular lymphoma (FL). We therefore retrospectively analyzed and compared the outcomes of FL patients with high or low GNRI. This retrospective study included patients with FL who were treated at our institution between 2004 and 2017. The GNRI was calculated as follows: [1.489 × albumin (g/L)] + [41.7 × (body weight/ideal body weight)]. The ratio of body weight to ideal body weight was set to 1 when the patient's body weight exceeded the ideal body weight. A total of 130 patients (male, $n = 60$; female, $n = 70$; median age, 67 years [range, 32–91]). The median follow-up time was 52 months. According to the WHO pathological grading, 60 patients had grade 1; 19 grade 2; 10 grade 1 or 2; 16 grade 3a; 1 grade 3b and 24 an unknown grade. The optimal GNRI cutoff value for predicting 5-year survival was determined by a ROC analysis to be 99.2. Thirty-four patients (26.2%) had a GNRI < 99.2, and 96 patients had a GNRI ≥ 99.2. The baseline characteristics of both groups are shown in Table 1. Patients with low GNRI scores (GNRI < 99.2, $n = 34$) had significantly shorter OS than those with high GNRI scores (GNRI ≥ 99.2, $n = 96$) (5-year OS, 52.8 vs 92.0%, $p < 0.001$) (Fig. 1). The same results were obtained when 96.8 was used as a cutoff value described by Kanemasa et al. [1]. Patients with low GNRI scores (GNRI < 96.8, $N = 27$) had significantly shorter OS than those with high GNRI scores (GNRI ≥ 96.8, $N = 103$) (5-year OS, 41.8 vs 84.7%, $p < 0.001$). The influence of the following variables on OS was evaluated: age > 60 years, male sex, the presence of B symptoms, performance status (PS) > 1, Ann Arbor stage 3 or 4, number of extranodal disease sites > 4, LDH > upper limit of normal, high FLIPI, and GNRI < 99.2. On univariate analysis, all variables other than sex and Ann Arbor stage were associated with poor OS. However, in a multivariate analysis that included these significant factors, GNRI was the only factor that was significantly associated with poor OS (hazard ratio, 4.17; 95% confidence interval, 1.73–10.05, $p < 0.001$).

There are some studies reporting the prognostic values of body mass index (BMI) and albumin in DLBCL patients [2–5]. However, the conclusions from these studies are controversial for the impact of BMI on treatment outcomes. It has already been reported that the GNRI is a better nutrition-related risk index compared with albumin or BMI alone [1, 6, 7]. The GNRI is a simple and

✉ Tomonori Nakazato
n-tomo@eurus.dti.ne.jp

[1] Department of Hematology, Yokohama Municipal Citizen's Hospital, 56 Okazawa-cho, Hodogaya-ku, Yokohama 240-8555, Japan

[2] Division of Hematology, Keio University School of Medicine, Tokyo, Japan

Table 1 Baseline characteristics of the study patients

Characteristic	Overall	GNRI < 99.2	GNRI ≥ 99.2	*p* value
Number of patients	130	34 (26.2%)	96 (73.8%)	
Age (years)				
Range, median	32–91, 67	45–91, 70	32–91, 64	
> 60	86 (66.2%)	26 (76.5%)	60 (62.5%)	0.21
Sex (male)	60 (46.2%)	18 (52.9%)	42 (43.8%)	0.43
B symptom (+)	15 (11.5%)	6 (17.6%)	9 (9.4%)	0.22
Performance status (> 1)	16 (12.3%)	8 (23.5%)	8 (8.3%)	0.032
Ann Arbor stage (3 or 4)	92 (70.8%)	27 (79.4%)	65 (67.7%)	0.27
Extranodal diseases (> 4)	1 (0.8%)	1 (2.9%)	0 (0%)	0.26
LDH (> normal upper limit)	50 (38.5%)	16 (47.1%)	34 (35.4%)	0.31
FLIPI (high)	37 (28.5%)	15 (44.1%)	22 (22.9%)	0.027

well-established nutritional assessment tool that is a significant prognostic factor for various cancers. Although the GNRI was originally developed as a new index for evaluating at-risk elderly patients, several studies demonstrated that the usefulness of GNRI for both elderly and younger patients [1, 8]. Therefore, younger patients were also included in this analysis.

The present study demonstrated that low GNRI scores were deeply associated with poor outcomes in patients with FL. Some studies have demonstrated that the GNRI was a significant prognostic factor for cancer patients, including patients with DLBCL, esophageal carcinoma, and lung cancer [1, 6, 7]; however, our study is first to demonstrate the significance in patients with FL. Since our results are based on a small-sized retrospective analysis, further large prospective studies are warranted to verify these findings.

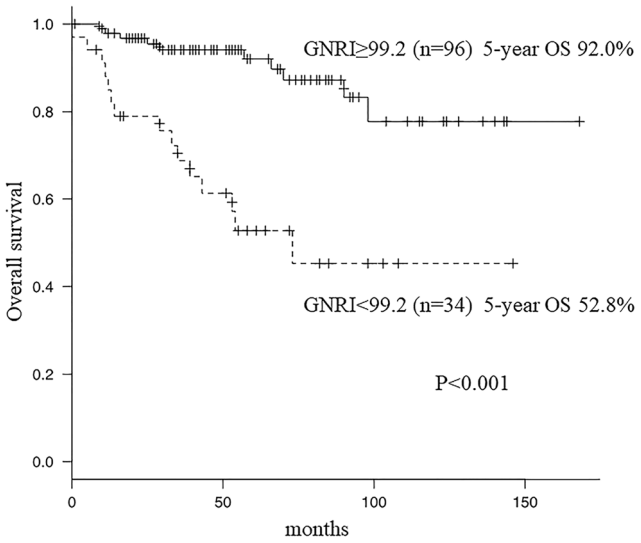

Fig. 1 Kaplan-Meier curves of overall survival according to the GNRI

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from the patients. The study was approved by the Ethics Committee of Yokohama Municipal Citizen's Hospital.

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