Supplementary methods

The definitions of PNI, CONUT and GNRI were as follow:

(1) PNI was based on the lymphocyte count and albumin level, and it was calculated by the following formula: PNI=10 × serum albumin value (g/dl) + 0.005 × total lymphocyte count in the peripheral blood (per mm³)(1)。

(2) CONUT was based on lymphocyte count, albumin and cholesterol level. The scoring rules were shown in Table 1.

CONUT score = serum albumin score + total lymphocyte count score + total cholesterol score(2).

Table 1. Definition of CONUT

Parameter	Malnutrition degree			
	Normal nutrition	Light malnutrition	Moderate malnutrition	Severe malnutrition
Serum Albumin(g/dl)	3.5-4.5	3.0-3.49	2.5-2.9	<2.5
Score	0	2	4	6
Total lymphocyte(/ml)	>1600	1200-1599	800-1199	<800
Score	0	1	2	3
Cholesterol(mg/dl)	>180	140-180	100-139	<100
Score	0	1	2	3
Total Score	0-1	2-4	5-8	9-12

(3) GNRI was based on weight and albumin level, and the formula was as follow GNRI=1.489 × serum albumin value (g/L) + 41.7 × (weight/WLo)(3). WLo represented the idea weight, which was calculated by the Lorentz-formula. For male: WLo=(height[cm]-100)-((height-150)/4), and for female, WLo=(height[cm]-100)-((height-150)/2). If the real weight exceeds the idea weight, the value of weight/WLo was defined as 1. The GNRI risk categories were divided as four level: major risk(GNRI<82), moderate risk(82≤GNRI<92), low risk(92≤GNRI<98) and no risk(GNRI>98)(3)。

Reference

1. Onodera T, Goseki N, Kosaki G. Prognostic nutritional index in gastrointestinal surgery of malnourished cancer patients. Nihon Geka Gakkai zasshi. 1984;85:1001-5.

2. Ignacio de Ulibarri J, Gonzalez-Madrono A, de Villar NG, Gonzalez P, Gonzalez B, et al. CONUT: a tool for controlling nutritional status. First validation in a hospital population. Nutricion hospitalaria. 2005;20:38-45.

3. Bouillanne O, Morineau G, Dupont C, Coulombel I, Vincent JP, et al. Geriatric Nutritional Risk Index: a new index for evaluating at-risk elderly medical patients. American Journal of Clinical Nutrition. 2005;82:777.

Supplementary Table 1. The efficacy of BLUT tool in predicting prognosis of N+ ESCC patients. (BLUT in two categories) (Post-surgery treatment included chemotherapy, radiotherapy and chemoradiotherapy)

Post-surgery treatment	BLUT category	HR	P
No (N=100)	Normal and low malnutrition risk	1	
	Moderate and high malnutrition risk	1.367(0.829-2.255)	0.221
Yes (N=87)	Normal and low malnutrition risk	1	
	Moderate and high malnutrition risk	2.330(1.233-4.404)	0.009

Supplementary Figure 1. Determine the cuf-off values of BMI and laboratory tests by X-tile software.

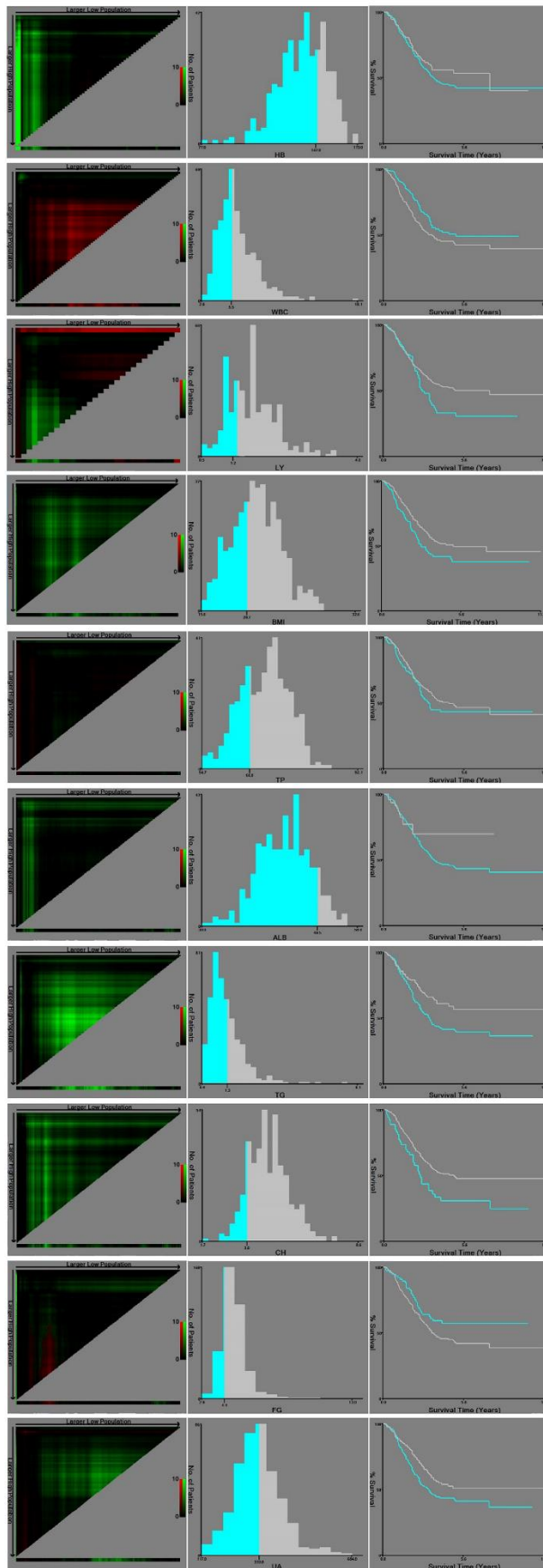**Supplementary Figure 2.** Kaplan-Meier curve of BLUT scoring tool (log rank P=0.049).

Supplementary Figure 3. Kaplan-Meier curves for BLUT tool in N+ ESCC patients (A) who didn't receive post-surgery treatment and (B) who received post-surgery treatment.

Supplementary Figure 4. Determine the cuf-off values of PNI by X-tile software.
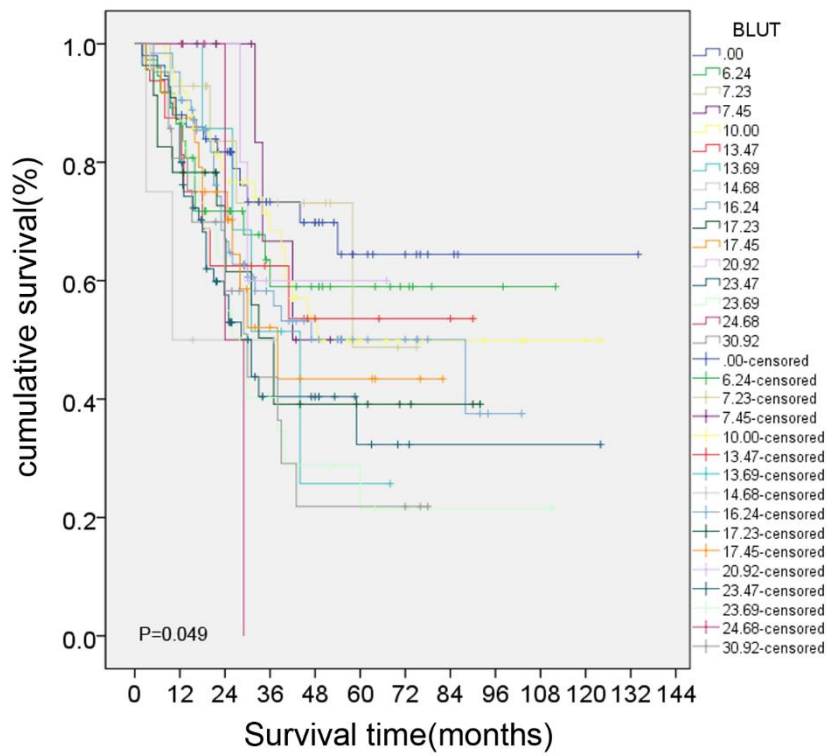
Supplementary Figure 5. (A) The internal validation of 1-year survival, (B) 3-year survival, (C) and 5-year survival. (D) The external validation of 1-year survival, (E)3-year survival, (F) and 5-year survival.

Supplementary Figure 6. The histogram of albumin level in training set population, and 97.6% patients had a normal range of albumin level.
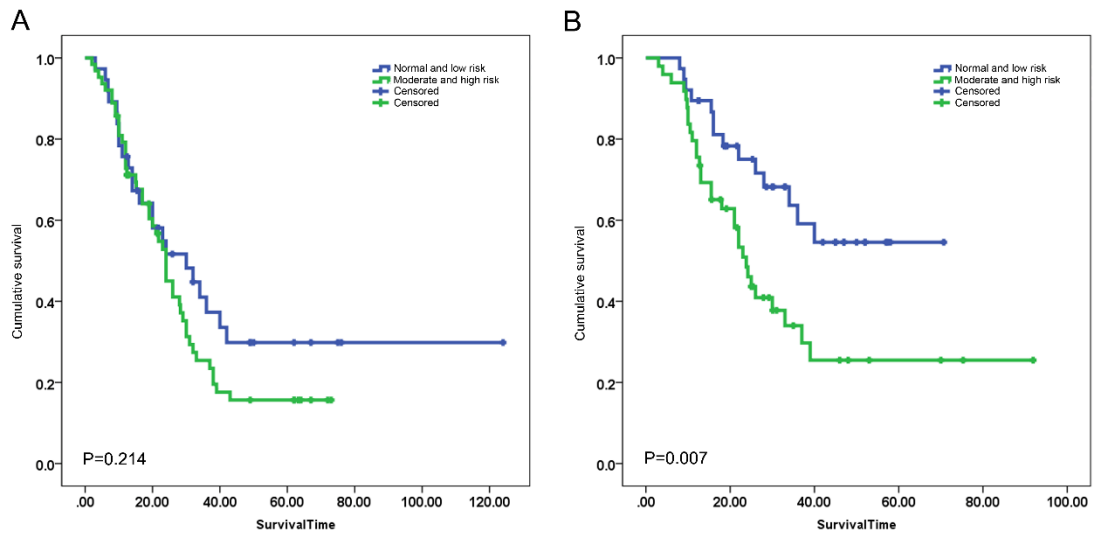
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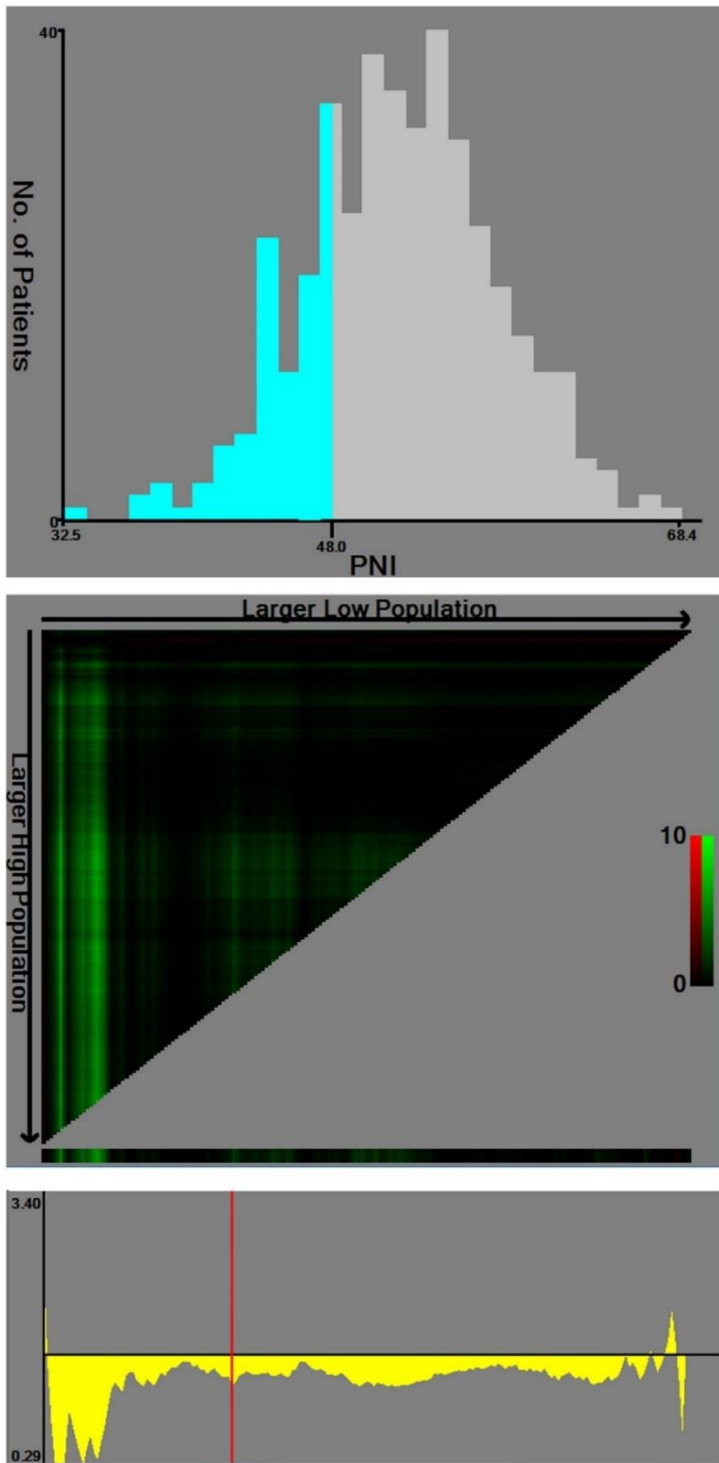
Supplementary Figure 2. Kaplan-Meier curve of BLUT scoring tool (log rank P=0.049).
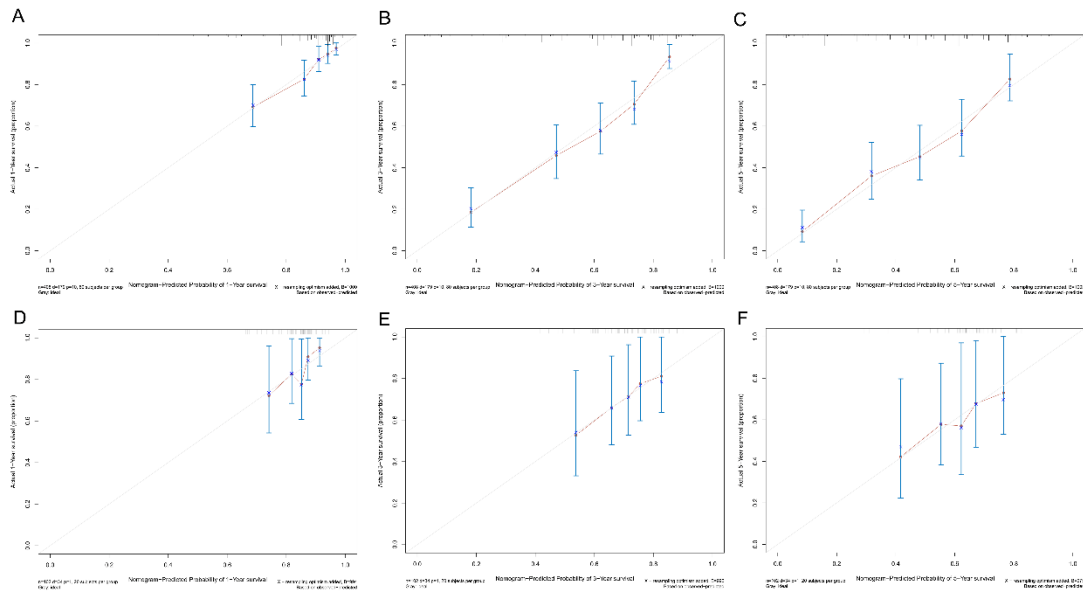

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