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Pretreatment serum albumin concentration and lactic dehydrogenase activity as prognostic factors in patients with small cell lung cancer.*

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Abstract

Pretreatment laboratory parameters were analyzed as prognostic factors in patients with small cell lung cancer. Serum lactic dehydrogenase activity, serum albumin concentration, PPD skin reaction, and peripheral lymphocyte count were of prognostic importance. When these factors were evaluated by multivariate analysis together with performance status and disease extent, lactic dehydrogenase and albumin were the most influential factors related to survival.

KEYWORDS: small cell lung cancer, prognostic factors, serum albumin, lactic dehydrogenase

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—— BRIEF NOTE ——

PRETREATMENT SERUM ALBUMIN CONCENTRATION AND LACTIC DEHYDROGENASE ACTIVITY AS PROGNOSTIC FACTORS IN PATIENTS WITH SMALL CELL LUNG CANCER

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Abstract. Pretreatment laboratory parameters were analyzed as prognostic factors in patients with small cell lung cancer. Serum lactic dehydrogenase activity, serum albumin concentration, PPD skin reaction, and peripheral lymphocyte count were of prognostic importance. When these factors were evaluated by multivariate analysis together with performance status and disease extent, lactic dehydrogenase and albumin were the most influential factors related to survival.

Key words : small cell lung cancer, prognostic factors, serum albumin, lactic dehydrogenase.

The performance status (PS) and extent of disease have been identified as the most important prognostic factors in patients with small cell lung cancer (1). The purpose of this study is to develop a prognostic index, based on pretreatment laboratory parameters, which might serve to define risk groups so that better therapeutic programs can be designed.

Seventy-one patients with small cell lung cancer treated by chemotherapy in the Second Department of Medicine, Okayama University Hospital, between 1974 and 1981 were analysed. There were 63 males and 8 females. Forty-one patients had limited disease (confined to one hemithorax with or without mediastinal and ipsilateral supraclavicular nodes), and the remaining 30 patients had extensive disease (beyond the limits mentioned above). Thirty-two had Zubrod PS (2) 0 or 1 and 39 had PS 2, 3, or 4. A multi-drug regimen including cyclophosphamide, vincristine, methotrexate and procarbazine (3) was the standard program for these patients. In 22 patients with limited disease, thoracic radiotherapy was given concomitantly as part of the primary treatment program.

The clinical and laboratory variables analysed in this study were age, sex, PS, extent of disease, serum lactic dehydrogenase (LDH) activity, serum albumin

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concentration, PPD skin reaction, peripheral lymphocyte count, plasma fibrinogen concentration and erythrocyte sedimentation rate. These variables were analysed for their individual impact on survival using the generalized Kruskal-Wallis test (4). As shown in Table 1, PS, disease extent, serum LDH and albumin, PPD skin reaction and lymphocyte count were of prognostic importance. As for the relation between PS and laboratory variables, all had a close assosiation with PS, in the order of serum albumin ($P = 0.0014$), serum LDH ($P = 0.0143$), PPD skin reaction ($P = 0.0412$) and lymphocyte count ($P = 0.0552$). Laboratory variables which were significantly associated with the disease extent were serum LDH ($P = 0.001$) and the lymphocyte count ($P = 0.0498$).

TABLE 1. CLINICAL AND LABORATORY VARIABLES SIGNIFICANTLY RELATED TO PATIENT SURVIVAL

Clinical and laboratory variables	No. of patients	Median survival (wks.)	Statistical differences
Performance status:			
0-1	32	50	P=0.0001
2-4	39	34	
Disease extent:			
Limited	41	45	P=0.0510
Extensive	30	34	
LDH:			
< 400u/liter	35	47	P=0.0004
≥ 400u/liter	27	32	
Albumin:			
≥ 4.0g/100ml	27	45	P=0.0124
< 4.0g/100ml	33	32	
Lymphocytes:			
≥ 2,000/μl	27	51	P=0.0034
< 2,000/μl	40	36	
PPD:			
Positive	38	47	P=0.0010
Negative	15	26	

To determine which of the clinical and laboratory variables exert an important and independent effect on survival, 46 patients with values recorded for all variables were evaluated using a categorical regression analysis (5). The only factor that was significantly correlated with survival was serum LDH. Serum albumin was the next most important factor associated with survival, while PS and disease extent were no longer significantly related to survival after accounting for serum LDH and albumin.

The combined association of serum LDH and albumin with survival is illustrated in Fig. 1. Combination of these two factors gave four prognostic cat-

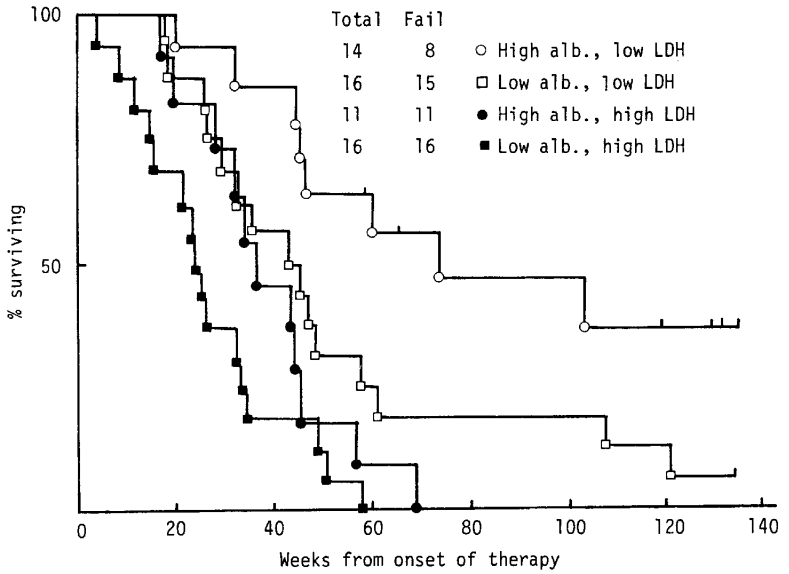

Fig. 1. Survival of patients with small cell lung cancer as related to pretreatment values for serum albumin and LDH. High albumin: ≥ 4.0 g/100 ml, low albumin: < 4.0 g/100 ml, high LDH: ≥ 400 u/liter, and low LDH: < 400 u/liter.

TABLE 2. RESPONSE AND SURVIVAL AS A RESULT OF RISK DEFINITION*

Clinical and laboratory variables	No. of patients	Median survival (wks.), all	% with CR	Median survival (wks.), complete responders	% of patients alive > 2 years
Good risk	14	63	53	114	36
Intermediate risk	27	43	33	56	11
Poor risk	16	24	13	55	0

*Criteria for risk definition: See text.

egories that were clearly associated with survival. Patients with high albumin (≥ 4.0 g/100 ml) and low LDH (< 400 u/liter) lived significantly longer than those with low albumin (< 4.0 g/100 ml) and high LDH (≥ 400 u/liter). The survival of patients with low albumin and low LDH was comparable to that of patients with high albumin and high LDH. The survival curves of these groups fall between the most favorable and the least favorable groups. Finally, three risk groups were defined. The good risk group consists of patients with high albumin and low LDH. The poor risk group consists of those with low albumin and high LDH. In addition, patients with low albumin and low LDH, and those with high albumin and high LDH were joined together as an intermediate risk group. As shown in Table 2, patients in the good risk group were

significantly superior to those in the poor risk group in regard to median survival, complete response rate to chemotherapy, and 2-year survival rate, as well.

The purpose of this study was to determine the usefulness of pretreatment laboratory parameters as prognostic factors in patients with small cell lung cancer. Using multivariate analysis, we clarified the significance of serum LDH and albumin in patient survival, and defined three risk groups by combining these two major factors. This risk classification seems to be useful in the design of future clinical trials.

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