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CEA in Esophageal Cancer Tissues

Masao Tomita, Hiroyoshi Ayabe, Katsunobu Kawahara, Yutaka Tagawa, Akihiro Nakamura, Nobufumi Sasaki, Takao Takahashi, Seiichiro Ide and Hiroshi Shingu

The First Department of Surgery, Nagasaki University School of Medicine

The presence of carcinoembryonic antigen (CEA) was assessed in cancer tissues of 53 patients with esophageal carcinoma.

Positive rates of CEA staining in tissues were 81.1%. Well differentiated carcinomas tended to be well stained. The survival time in positive tissue CEA patients was longer than that in negative one. The measurement of a presence of tissue CEA is of help to judge the prognosis.

Introduction

It has been well known that carcinoembryonic antigen (CEA) is one of the tumor-markers, in particular, it is sensitive to well differentiated adenocarcinoma. Furthermore, changes in CEA is of clinical value in knowing occurrence and appearance of recurrence in the follow-up study.

The CEA measurement in patients with carcinoma of the esophagus is of great benefit in the diagnosis of carcinoma of the breast, the lung and the stomach as well as the colon.

In this study, the serum CEA levels were compared with the intensity of tissue CEA staining of esophageal carcinomas to elucidate CEA transition from the cancer-bearing tissues to the serum in terms of pathohistological factors.

Material and Method

Surgical specimens obtained from 53 patients with carcinoma of the esophagus were subjected in this study. Fifty-three patients comprised 52 of squamous cell carcinoma and one of adenocarcinoma according to histologic types.

The sex distribution was 42 men and 11 women. The patients' ages ranged from 44 to 80 with a mean age of 63.7 years old.

The relationship in positive rates between tissue and serum CEA was shown in Table 1. There was no close correlation. CEA production, which was thought to be represented in positive tissue CEA staining, was not necessarily reflected in the serum CEA levels. The serum CEA levels were not correlated with the tissue CEA staining which implied CEA production in carcinoma cells. Positive tissue CEA staining was rarely seen in undifferentiated carcinoma.

Table 1. Number of cases on the serum CEA level and CEA stain of esophageal cancer

S-CEA	No. of cases (%)	CEA stain	No. of cases (%)
negative	44 (91.7)	negative	10 (18.9)
positive	4 (8.3)	positive	43 (81.1)
total	48 (100)	total	53 (100)

Table 2 showed a relationship between histologic findings and positive rates of tissue CEA staining. The positive rate of tissue CEA staining shows higher tendency in well differentiated adenocarcinoma rather than poorly one. According to growth patterns of the tumors, the rates of tissue did not vary with growth patterns.

Table 2. Correation between CEA stain and histologic classification-differentiation and growth pattern

	no. of cases		
	well.	mod.	poor.
CEA stain –	0	6	1
CEA stain +	14	20	3

N. S.

	no. of cases		
	expan.	mod. inv.	mark. inv.
CEA stain –	1	5	1
CEA stain +	7	18	12

N. S.

Each a growth pattern showed almost the same rate as tissue CEA staining.

In view of the gross appearance, a high tissue CEA staining rate was seen in the superficial type and moderately clear margin as shown in Table 3. However, the positive rates of tissue CEA staining were not affected by gross appearances or histologic types.

Table 3. Correation between CEA stain and gross classification-gross types and margin

	no. of cases		
	prot.	super.	ulcer.
CEA stain –	4	0	6
CEA stain +	8	5	30
N. S.			
	no. of cases		
	well.	mod.	ill.
CEA stain –	7	2	1
CEA stain +	20	19	4
N. S.			

As for the depth of cancer infiltration and nodal involvement as shown in Table 4, tissue CEA staining rates were not well correlated with the depth of cancer invasion and node metastasis. It is indicated that the tissue CEA production was actively achieved even in early cancers such as a_0 and n_0 as well as advanced one such as a_3 and n_4.

Table 4. Correation between CEA stain and histologic invasion to the adventitia, degree of lymph node metastasis

	no. of cases				
	a0	a1	a2	a3	
CEA stain –	1	3	2	2	
CEA stain +	13	6	11	8	
N. S.					
	no. of cases				
	n0	n1	n2	n3	n4
CEA stain –	2	0	0	1	2
CEA stain +	11	3	10	5	8
N. S.					

Concerning a histologic finding of vascular invasion, carcinomas without vascular invasion were more likely to be stained by CEA antigen when compared with carcinoma with vascular invasion as shown in Table 5.

Table 5. Correation between CEA stain and lymphatic invasion, blood vessel invasion

	no. of cases	
	ly (–)	ly (+)
CEA stain –	1	7
CEA stain +	14	22
N. S.		
	no. of cases	
	v (–)	v (+)
CEA stain –	1	7
CEA stain +	20	16

$P < 0.05$

There was statistically significant difference ($p < 0.05$) in positive tissue CEA rates between with and without vascular invasion in spite of no significant difference between with and without lymphatic vessel invasion.

A comparative study was made between the intensity of tissue CEA staining and the serum CEA levels.

Fig. 1 shows postoperative changes in serum CEA levels in accordance with the intensity of tissue CEA staining.

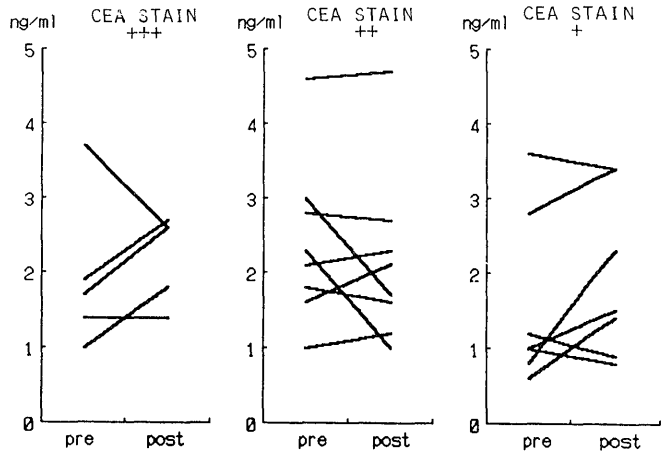

Fig. 1. Correation between CEA stain and serum CEA level

The more tissue CEA staining was intensive, the less a decrease in postoperative serum CEA levels was seen. Even in those who showed a weak tissue CEA staining, postoperative changes in serum CEA levels varied with wide variety.

The survival times were compared between those with and without tissue CEA staining.

The survival curve showed a better result in those with positive tissue CEA staining than negative one as indicated in Fig. 2. It is obvious that tissue CEA staining is an

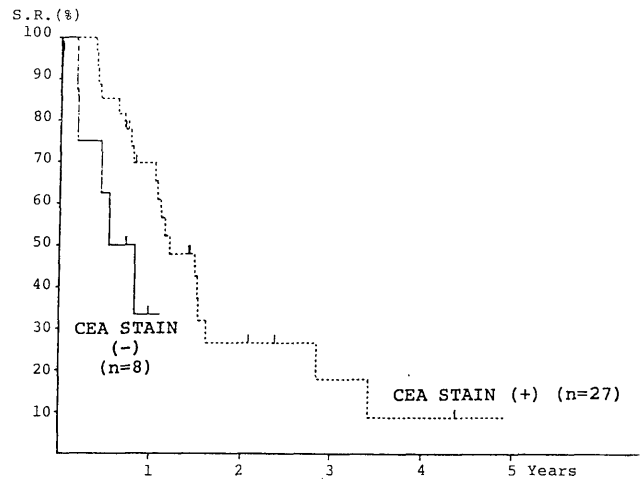

Fig. 2. Survival rates according to tissue CEA stain

independent indicator for the prognosis of patients with carcinomas of the esophagus.

Discussion

It has been well known that CEA is a representative tumor marker with progression and extension of carcinomas on the basis of the fact that gene expression of growing tumors moves backward to the embryonic period.[1-5]

Recent studies clarified that CEA is producing even in the normal epithelium and CEA is no longer a specific tumor marker.

Positive rates of serum CEA in carcinoma of the esophagus ranges from 23 to 46 percent.[6] However, it is very rare that the serum CEA levels are high as seen in carcinoma of the colon.

It is documented that the serum CEA measurement is not useful as a diagnostic tool of squamous cell carcinoma. However, observation of changes in serum CEA levels is necessary for judging the therapeutic effect in the follow-up study. It is of great value to monitor the therapeutic effect in the course of the disease and predict recurrence, and also a high serum CEA level after surgery means poor surgical radicality.

Several tumor markers have been detected and used for the diagnosis of squamous cell carcinomas. However, the early diagnosis is limited by using tumor markers.

Difficulty in early diagnosis by using tumor markers is based on the fact that the serum CEA levels are low in spite of high tissue CEA staining rates (81.1%) in this study. Well differentiated carcinomas were forced to be more frequently stained with CEA antigen. And also it is concluded that the tissue CEA measurement is of help to judge the prognosis.

Positive tissue CEA staining is one of the prognostic factors from a result of this study that the survival time in those who show positive tissue CEA staining is longer than those with negative one.

It is evident that CEA is detected in the normal mucosa. Specificity and significance of CEA as a tumor marker are not made clear yet. The mechanisms of CEA generation, transportation and excretion are concerned in association with cancer specificity.

Further researches should be accumulated to elucidate a CEA character in progression of carcinomas.

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