Tissue and plasma carcinoembryonic antigen concentration in gynecologic malignancies

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Summary

In this study tissue and plasma concentrations were established in eight patients with gynecologic malignancies, and correlations between tissue and plasma CEA concentrations were compared. Tissue concentration was determined by the immunoperoxidase staining method. Plasma CEA concentration was lower than tissue concentration. The causes of this difference were examined in this study.

Key words: Carcinoembryonic antigen; Gynecological malignancy; Tissue; Plasma.

Introduction

Carcinoembryonic antigen (CEA) secretion has been established in adenocarcinoma of the colon and in gynecologic malignancies, particularly cervical and ovarian cancer. Since CEA is a nonspecific antigen, it cannot be used in specific diagnoses. However it is useful especially in the follow-up period to determine recurrence [9, 10]. CEA plasma level is dependent on antigen secretions in tumor tissue and the metabolism rate of antigens in the organism [8]. Recently, CEA concentrations could be determined by the immunoperoxidase method developed by Primus *et al.* [7] and consequently, positive staining showed CEA concentrations over 3 mg/g. CEA concentrations and CEA plasma concentrations of the samples taken concurrently from tumor tissue of eight patients with gynecologic malignancies were determined by using the defined method.

Materials and Method

Tumor tissue taken from eight patients with gynecologic malignancies was fixed in formol saline in a concentration of 10% and blood samples concurrently taken from the same patient were examined in the laboratory. Tissue was embedded in paraffin and cross-sections were made in a thickness of 5-7 μg. Every sample was taken on a microscopic slide and incubated twice for five minutes with 0.01 M phosphate buffer solution-Na Cl (pH = 7.2). Later these samples were treated with donkey antigoat 1 g antibody – peroxide conjugate. Histochemical reaction was conducted by incubation in Karnovsky solution following washing with phosphate buffer solution (Na Cl). Immunoperoxidase stain reaction was evaluated primarily according to the CEA antiserum reference which was totally neutralized by absorption. CEA level was determined in plasma as ng/g and in plasma as ng/ml. Plasma levels were assigned by radioimmunoassay according to Hansen's Z-gel procedure. The upper normal level of plasma CEA level was accepted as 2.5 ng/ml.

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Results

In all cases tissue CEA levels were higher than plasma CEA levels. Age, histological and cellular type did not affect either blood or tissue CEA levels. Tissue CEA level was not related to stage of cancer but plasma CEA level was directly related to tumoral mass.

Discussion

In this prospective study CEA was neither specific nor sensitive to any histological type of gynecologic cancer. It has been demonstrated that higher levels of CEA are expected in well-differentiated gastric and colon adenocarcinomas but CEA is also elevated in benign gastric and rectum diseases, prostate, breast, lung, bladder and gynecologic malignancies. CEA is elevated in squamous cervix cancer, adenocarcinoma of the cervix and endometrium, and some histological types of ovarian cancer [1, 2, 4, 6, 11]. The existence of CEA in squamous cervix cancer has shown production of the antigen in non-endometrial tumor [5]. Plasma CEA levels depends on tumor CEA concentration and extention of the tumor. The difference between blood and tissue CEA levels depends on several factors. Most important factors are tumoral cell mass, antigen secretion and metabolism of the organism. In test animals CEA metabolism is directly related to liver function [8]. CEA is not a diagnostic or prognostic parameter in gynecologic cancer, however in cases with elevated CEA, serial plasma level determination reveals occult recurrences. CEA levels begin to increase two to five months before clinical recurrence. Serial plasma CEA determination has revealed 50% of occult recurrences in gynecologic malignancies. If initial CEA plasma level is normal serial plasma determination has no significance [9, 10]. Tissue CEA levels can be identified by immunoperoxidase stain before plasma CEA levels begin to increase, thus it may be even more useful than serial plasma CEA determination.

Table 1. — *Blood and tissue CEA concentrations of eight cases with gynecologic malignancies.*

Cases	Tissue CEA concentration (ng/g)	Blood (ng/ml)	Tumor histological type
1	60	12	Cervix cancer
2	60	26	Cervix cancer
3	44	2	Vulva cancer
4	33	2.4	Epidermoid cancer
5	51	3	Cervix cancer
6	46	30	Over cancer
7	44	5.6	Papillary adenocarcinoma
8	51	0.6	Breast cancer

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