SEARCH FOR A HETEROPHILIC FORSSMAN ANTIGEN IN HUMAN BREAST TUMOR TISSUES

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The problem of whether heterophilic Forssman antigen is present in human tissues has not yet been unequivocally answered. Some workers consider that this antigen is not present in man [1, 2], others claim to have found it in erythrocytes of persons of all blood groups [3, 4]. Hakomori et al. [9] found both Forssman-negative (the majority) and Forssman-positive human populations.

The problem of whether Forssman antigen is present in human malignant tumors has hardly been studied at all. The present writers showed previously that human cancer tissues — carcinoma of the lung, stomach, pancreas, intestine, sigmoid colon and rectum, and genitalia — do not contain Forssman antigen and that man is not tolerant of this antigen and produces antibodies against it [2]. Kawanami [10], on the other hand, found Forssman antigen in the metastasis of a biliary adenocarcinoma in the liver. Interesting results were reported by Hakomori et al. [9]. They found Forssman antigen in tumors of the gastrointestinal tract in Forssman-negative individudals, whereas in Forssman-positive individuals this antigen is lost if tumors develop.

It has been shown for animal tumors that their distinguishing feature is the appearance of Forssman antigen in Forssman-negative animals or an increase in its concentration in animals originally carrying this antigen [7, 8, 11].

Because of the scarcity and contradictory nature of the data on Forssman antigen in human and animal tumors, a new attempt was made in the investigation described below to study the content of this antigen in human tumors.

EXPERIMENTAL METHOD

Breast tissue from patients with malignant (adenocarcinoma, solid carcinoma) and benign (fibroadenoma, fibrocystic mastopathy) tumors was the test object; areas of breast tissue not affected by the tumor from the same patients also were studied. Normal breast tissue

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TABLE 1. Content of Forssman Antigen in Human Breast Tumors Investigated in CFT

Breast tumors studied	Number of cases	Number of tumors containing Forssman antigen
Carcinoma	62	0
Fibroadenoma	13	0
Fibrocystic mastopathy	5	0
Normal breast	1	0

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from a patient dying from a cardiovascular disease served as the control. Specific immune serum against Forssman antigen (standard hemolytic serum against sheep's red blood cells) was used in the complement fixation test (CFT). Saline and lipid extracts (extraction with a mixture of 96% alcohol and ether in the ratio of 3:1, during boiling for 10 min) of the tumors and normal breast tissues and also a lipid extract of guinea pig kidney (Forssman antigen) were used as antigens for the CFT. The CFT was carried out by the usual method at 37°C in a volume of 1.25 ml with 120% of fresh guinea pig complement.

EXPERIMENTAL RESULTS

Eighty human breast tumors were studied for the presence of Forssman antigen: In 62 cases these were carcinomas with various degrees of malignancy (adenocarcinoma, solid carcinoma), 13 were fibroadenomas, and five were from patients with fibrocystic mastopathy. The experimental results are summarized in Table 1.

It will be clear from Table 1 that the breast carcinoma tissues gave negative results with serum against Forssman antigen. This serum, however, reacted well with antigen from guinea pig kidney. Incidentally, areas of breast tissue from cancer patients unaffected by the tumor did not fix complement in the presence of anti-Forssman serum. Tissues of fibroadenoma and fibrocystic mastopathy likewise did not react with this serum. Hence no heterophilic Forssman antigen could be found in the tissues of human malignant and benign breast tumors, just as we had previously failed to find it in tissues of other human malignant tumors [2].

Normal breast tissue likewise did not contain Forssman antigen (Table 1), in the same way as other normal human tissues did not contain it [2].

The study of relations between Forssman antigen and human isoantigen A was interesting because of evidence that they are antigenically closely similar [5, 6, 12]. For this purpose, besides 80 subjects with breast tumors whose blood group on the ABO system was not determined, we also studied five patients with blood group A (II) with a breast tumor: carcinoma in three cases, fibroadenoma in one case, and fibrocystic mastopathy in one case. The tests showed that tumors of patients with blood group A (II) did not contain Forssman antigen, in the same way as it was not present in tumor tissues from patients with another blood group. Despite their similarity, heterophilic Forssman antigen and isoantigen A thus differ in the antigenic respect.

The experimental data described above broaden our knowledge of the antigenic composition of human tumors and they indicate that man is not a carrier of heterophilic Forssman antigen. This is in agreement with Boyd's opinion [1] and also with the view that the process of conversion of normal cells into tumor cells is not accompanied by the appearance of Forssman antigen in them.

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