

# COMPARATIVE STUDY OF THE ANTIGENIC PROPERTIES OF CANCER-SARCOMA - AND LEUCEMIC TISSUE IN MAN

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The method of specific adsorption [3, 5] and also the method of preparing antitumor sera [4] developed by us enables us to detect specific antigens in human and animal tumors and to study the similarities or differences between the antigens in tumors of different localization [2, 3, 5].

In view of data in the literature concerning the tumorous character of leucoses [7], and in view of the possible relation between the etiological factor causing that illness and other malignant neoplasmas [1] we made an attempt to use the method of specific adsorption for comparative studies of the antigens prepared from tumor tissues (cancer, sarcoma) and leucemic tissues of man respectively. It was the aim of the present investigation to establish whether a similarity exists between the assumed specific leucemic antigen and the specific components in human cancer and sarcoma.

## EXPERIMENTAL METHOD

Anticancer and antisarcoma immune sera, obtained from rabbits, were used for the experiments as well as sera against organs (liver, spleen) of healthy persons, which sera had been liberated of accessory unspecific antibodies by treatment with normal formalinized tissues.

The antigens for the complement-fixation reaction and for specific adsorption were prepared from the leucocytes of patients suffering from leucemia, (acute or chronic) from the liver and spleen of patients who had died of leucemia, as well as from human cancer and sarcoma tissue. Antigens prepared from the leucocytes of healthy donors, and from the tissues of persons, who had died due to street accidents or cardiovascular disease, served as control. All tissues and the leucocytes were used in a crude state with the exception of cancer tissues in which case we used, in addition to the crude antigens, aqueous-saline extracts from tissues treated with formalin. The experimental and the control material belonged to different blood groups in the ABO system.

The antigens were obtained from the tissues by homogenizing the tissues in a mortar with normal saline (20 ml normal saline per 1 g tissue) and subsequent centrifugation of the suspensions at 3500 rev/min. The supernatant was used to carry out the complement-fixation reaction and the precipitate washed off with normal saline was used for adsorption experiments. Antigens were obtained from the leucocytes (10 ml normal saline per 1 ml leucocytes) by freezing and thawing. The homogenization of the leucocytes in the mortar was accompanied by freezing of the material with a mixture of CO<sub>2</sub> snow and alcohol and thawing in warm water at 55°C-57°C. This procedure of homogenization and alternative freezing and thawing was repeated 3-4 times.

The adsorption of the sera with crude tissues is connected with a number of difficulties, as the results of the experiments are not always successful, due to the anticomplementary properties, acquired by the sera after the adsorption. For this reason the preparation of the antigen for the adsorption and the adsorption experiment itself were carried out on the day of the experiment, which enabled us to diminish to a certain degree or to avoid the anticomplementary properties of the sera obtained.

## EXPERIMENTAL RESULT

Table 1 shows the results of the complement-fixation reaction carried out with anticancer serum No. 203 and antigens from a cancer, from the leucocytes of six patients suffering from leucemia and from normal human tissues (liver, spleen).

TABLE 1. Comparative Study of Antigens Prepared from Cancer Tissue and Leucocytes of Patients Suffering from Leucemia

Specific serum	Serum dilution	Antigens prepared from crude cells and tissues								
		of cancer no.48	of leucocytes of patients suffering from leucemia						healthy human tissues	
			no. 1	no. 2	no. 3	no. 4	no. 5	no. 6	liver	spleen
Anticancer serum	1 : 40	++++	-	-	-	-	-	-	-	-
No. 203 (against cancer No. 48)	1 : 80	++++	-	-	-	-	-	-	-	-
	1 : 160	++++	-	-	-	-	-	-	-	-

Remark: In this and in the following Tables the following designations are used for the complement-fixation reaction: +++, ++, +, ±) to denote different degrees of positive reaction; -) negative reaction.

TABLE 2. Results of Experiments Concerning Adsorption of Sera by Tumor Tissue and Leucocytes from Patients Suffering from Leucemia

Specific serum	Tissue used for the adsorption of the serum	Serum dilution	Antigens from crude cells and tissues				
			of cancer no. 48	of leucocytes from patients suffering from leucemia		from healthy human tissues	
				no.1	no.2	liver	spleen
Anticancer serum No. 212 (against cancer No. 48)	-	1 : 40	++++	-	-	-	-
		1 : 80	++++	-	-	-	-
		1 : 160	+++	-	-	-	-
	Crude leucocytes of No. 1 patient suffering from leucemia	1 : 40	++++	-	-	-	-
		1 : 80	+++	-	-	-	-
		1 : 160	+	-	-	-	-
	Formalinized tumor No. 48.	1 : 40	-	-	-	-	-
		1 : 80	-	-	-	-	-
		1 : 160	-	-	-	-	-

Table 1 shows that the anticancer serum was specific, i.e., it did not react with antigens from normal tissues and at the same time gave a well marked reaction with antigen prepared from the cancer. None of the six antigen samples prepared from leucocytes of patients suffering from leucemia reacted with this serum. This shows that the leucocytes of patients suffering from leucemia do not contain antigenic substances specific for human cancer.

The results of these investigations were confirmed in the adsorption experiments. Table 2 shows the results of adsorption experiments with anticancer serum No. 212, leucocytes and tumor cells.

Table 2 shows that the treatment of the serum with leucocytes of patients suffering from leucemia did not remove the specific anticancer antibodies, whereas adsorption of the second portion of the same serum with the tumor cells led to the complete adsorption of the anticancer antibodies. Unlike the leucemic cells, only the cancer cells were capable of extracting the specific antibodies from the serum, a fact which shows that the leucocytes of patients suffering from leucemia do not contain the antigens, specific for human cancer tissue.

TABLE 3. The Results of Studies of Human Cancer and Leucemic Tissues

Immune serum	Tissue used for the adsorption of the serum	Serum dilution	Antigens from crude tissues				
			cancer No. 1	of a patient suffering from leucemia		a healthy person	
				spleen	liver	spleen	liver
Anticancer serum No. 114 (against cancer No. 1)	Formalinized spleen of a healthy person	1 : 40	++++	-	-	-	-
		1 : 80	++++	-	-	-	-
		1 : 160	+++	-	-	-	-
		1 : 320	±	-	-	-	-
	Crude spleen tissue of a patient who died of leucemia	1 : 40	++++	+	±	+	+
		1 : 80	++++	-	-	±	-
		1 : 160	+++	-	-	-	-
		1 : 320	+	-	-	-	-
	Formalinized tissue of cancer No. 1	1 : 40	-	-	-	-	-
		1 : 80	-	-	-	-	-
		1 : 160	-	-	-	-	-
		1 : 320	-	-	-	-	-
Antispleen serum No. 57	Formalinized tissue from the liver of a healthy person	1 : 160	-	++++	-	±+++	-
		1 : 320	-	+++	-	++++	-
		1 : 640	-	++	-	+++	-
		1:1280	-	±	-	++	-

TABLE 4. Comparative Study of Human Sarcoma Tissue and Leucemic Tissue

Specific serum	Serum dilution	Antigens prepared from crude tissues and cells								
		of a sarcoma	of leucocytes from patients suffering from leucemia			of leucocytes from healthy donors			of healthy human tissues	
			no.29	no.24	no.20	no.1	no.2	no.3	liver	spleen
Antisarcoma serum No. 971	1 : 20	++++	—	—	—	—	—	—	—	—
	1 : 40	++++	—	—	—	—	—	—	—	—
	1 : 80	+++	—	—	—	—	—	—	—	—
	1 : 160	++	—	—	—	—	—	—	—	—

Similar results were obtained in studies of the antigens extracted from the tissues of patients who had died of leucemia. Table 3 shows that aqueous-saline extracts, prepared from the liver and spleen of a patient, failed to react with specific anticancer serum similar to the antigens, prepared from the same tissues of a healthy person (serum adsorbed with the spleen of a healthy person). After adsorption of the serum with tissue from the spleen of the patient himself, the tissue preserved its full activity with regard to the cancerous antigen. After treatment of the serum with cancer cells, however, no complement-fixation reaction took place in the presence of the tumorous antigen. The results of the above experiments show that not only the leucocytes, as has been shown above, but also the liver and spleen of patients suffering from leucemia do not contain the specific antigens characteristic for human cancer.

The antigens prepared from the material collected from patients suffering from leucemia were also tested in the complement-fixation test with specific serum against human sarcoma tissue. The results of these investigations are set forth in Table 4.

Table 4 shows that antisarcoma immune serum failed to react both with antigens, prepared from normal human organs, (liver, spleen) and antigens, prepared from the leucocytes of patients suffering from leucemia, whereas it was fairly active with regard to the antigen present in sarcoma tissue. Consequently, the leucocytes of patients suffering from leucemia do not contain the antigen specific for sarcomas.

The results obtained by us are not in agreement with the findings of V. A. Parnes and D. M. Levina [6] which authors established a relation between leucemic antigens and sarcoma antigens.

Comparative studies of the antigenic properties of human cancer-sarcoma- and leucemic tissues thus showed that they were different from an antigenic point of view. The antigens characteristic for cancer tissue and sarcoma tissue are absent from the leucocytes, the liver and the spleen of patients suffering from leucemia.

#### SUMMARY

As shown by immunological methods of investigation (complement fixation reaction and selective absorption) leucocytes, liver and spleen of leucemic patients contain no specific antigenic substances, characteristic of human cancer and sarcoma.

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.

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