IDENTIFICATION OF THOMSEN'S ANTIGEN IN LEUKOCYTES OF LEUKEMIC PATIENTS

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Thomsen's antigen was first found in human erythrocytes [8, 9, 13]. It was later shown that it is a special antigen, which arises de novo not only in the erythrocyte stroma, but also in fixed cells of human organs and tissues (lung, liver, kidney, spleen) as a result of glycosidase activity of viruses and bacteria, which is accompaned by inactivation of group-specific antigens of the MN system in the cell [1-3, 5-7, 14].

The presence or absence of Thomsen's antigen in human tumors is a particularly interesting problem. It has not been found in human tumors with the aid of heteroimmune (rabbit) sera [6]. However, using specific anti-T sera of isogeneic origin, Springer et al. [10-12] discovered Thomsen's antigen in carcinomas of the breast and gastointestinal tract. It was not found [10-12] in benign human tumors (fibroma, fibroadenoma). These results were confirmed by the present authors' experiments [4], in which isogeneic sera also were used. Thomsen's antigen was found not only in the tumors mentioned above, but also in carcinomas of the lung. It must be pointed out that, unlike in the experiments of Springer et al., we analyzed genetically homogeneous material, namely tumor and normal tissues taken from the same patient during operation. The normal tissues of these patients did not contain Thomsen's antigen.

The problem of whether blood leukocytes from patients with leukemia contain Thomsen's antigen has not previously been studied. It was therefore the basis for the present investigation. The search for Thomsen's antigen in patients with various forms of leukemia — acute or chronic — must be regarded as a matter of special clinical importance.

EXPERIMENTAL METHOD

Peripheral blood leukocytes from 19 leukemic patients were studied: six patients had acute leukemia (AL), eight had chronic myeloid leukemia (CML), and five had chronic lymphatic leukemia (CLL). Of this total number of patients 17 were seen before treatment, whereas two (with the diagnosis of chronic myeloid leukemia) had received a course of treatment. The diagnosis of the disease was based on a clinical and laboratory investigation of the patients at the Research Institute of Hematology and Blood Transfusion, Ministry of Health of the USSR. The number of blast cells in the patients' blood was 5-99% (as revealed by cytochemical and morphological tests).

Peripheral blood leukocytes from 10 healthy blood donors were used as the control.

The total pool of blood leukocytes, isolated with the aid of 0.83% NH_4Cl solution, was investigated. Before testing, the leukocytes (experimental and control) were sonicated on an "Ultrasonic Devices" apparatus for 2 min. The presence or absence of Thomsen's antigen was judged from the results of specific adsorption experiments. Sera from heathly group IV (AB) blood donors containing anti-T agglutinins were used for this purpose. The leukocyte homogenate and serum were mixed in the ratio of 0.2 ml of residue to 0.35 ml of serum, and the mixture was stirred and allowed to stand at room temperature for 30 min. After centrifugation the adsorbed serum was titrated in the hemagglutination test (HAT). Human group I (0) erythrocytes, treated with neuraminidase from a noncholera vibrio (strain Nag, produced

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TABLE 1. Serologic Activity of Leukocytes from Leukemic Patients and Healthy Blood Donors

Test object	Titer of specific anti-T serum			p
	before adsorption	after adsorption by leukocyte homogenates from		
		leukemic patients	healthy blood donors	
Leukocytes from patients with AL:	1:32	—	—	
Patients Nos. 1 and 2	—	1:4	—	
Patients Nos. 8 and 12	—	1:8	—	<0,0001
Patients Nos. 15 and 16	—	1:16	—	
Leukocytes from healthy blood donors Nos. 20-22	—	—	1:32	
Leukocytes from patients with CLL:	1:32	—	—	
Patients Nos. 5 and 6	—	1:2	—	
Patients Nos. 7 and 9	—	1:8	—	
Patient No. 18	—	1:16	—	<0,0001
Leukocytes from healthy blood donors Nos. 23-25	—	—	1:32	
Leukocytes from patients with CML:	1:32	—	—	
Patients Nos. 3, 4, and 7	—	1:2	—	
Patients Nos. 10, 13, and 19	—	1:4	—	
Patients Nos. 4 and 11	—	1:8	—	<0,0001
Leukocytes from healthy blood donors Nos. 26-29	—	—	1:32	

Legend. Its highest dilution giving agglutination was taken as the titer of the specific serum.

by the Gor'kii Research Institute of Epidemiology and Microbiology), were used as test erythrocytes. For this purpose the neuraminidase preparation (1 ml) with specific activity of 5.5 IU, dissolved in 10 ml of physiological saline containing 0.1% $CaCl_2$, was added to 0.5 ml of erythrocyte residue, and the mixture was kept for 1 h at 37°C, washed with physiological saline by centrifugation, and used in the tests.

The experimental results were subjected to statistical analysis by the Student–Fisher test.

EXPERIMENTAL RESULTS

Table 1 shows that the titer of specific serum to Thomsen's antigen (anti-T) was 1:32 before adsorption. Leukocytes from leukemic patients specifically bound anti-T agglutinins. This property was shared by cells from patients with both acute and chronic leukemia. The serologic activity of leukocytes from different patients varied, but they all lowered the titer of specific anti-T serum after adsorption by 2-16 times, evidence that they contained Thomsen's antigen. Leukocytes from healthy blood donors did not react with anti-T serum, i.e., they did not contain Thomsen's antigen. The experimental results are statistically significant. The titer of T antigen was the same in patients with different forms of leukemia (the group of patients with AL was compared with patients with CLL and CML).

It was shown previously [4, 10-12] that T antigen is a marker of cells of certain malignant neoplasms (carcinoma of the breast, lung, and gastrointestinal tract). Leukemias were found to be no exception in this respect. Our investigations showed that Thomsen's antigen is present in the blood leukocytes of patients with both acute and chronic forms of leukemia.

It has been suggested [10-12] that the appearance of Thomsen's antigen in human carcinomas is evidence either of the incompleteness of antigen biosynthesis in cells of malignant tumors or of intensified degradation of normal antigenic components of the cell membrane, which distinguishes cancer tissues from normal tissues.

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MODEL OF MALIGNANT LYMPHOMA PRODUCED IN RABBITS WITH PRIMATE ONCOGENIC VIRUSES.

PRELIMINARY COMMUNICATION

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It was reported previously that lymphoid cell lines producing B-lymphotropic herpesvirus (HVP) had been obtained from baboons [1, 3], and also that an analogous cell culture (MAL-1), producing a similar virus, described as HVMA, had been obtained from peripheral blood lymphocytes of a stumptailed macaque (*M. aretoides*) [4]. Later, the authors obtained a further two lymphoid cell lines MAL-2 and MAL-3, also producing HVMA, from the same species of macaque. Both HVP and HVMA are related to, but not identical with, human B-lymphotropic Epstein–Barr herpesvirus (EBV). Electronmicroscopic studies have shown that cells of some baboons and stumptailed macaques (in particular, MAL-3) produce not only HVP and HVMA, but also C-type retroviruses (Fig. 1).

The aim of this investigation was to obtain a model of a virus-associated malignant lymphoma, investigated by the authors previously in primates, in rabbits. This is an important task at the moment because modeling diseases in primates is complicated by the long incubation period, sometimes measured in years, and other associated difficulties. Rabbits seemed to be promising animals for these purposes because of reports in the literature that rabbit lymphocytes may be transformed in vitro under the influence of human T-lymphotropic virus (HTLV-I) [5] and that a retrovirus (STLV-I), closely related to HTLV-I, has been found in stumptailed macaques [2, 6].

EXPERIMENTAL METHOD

Cells of strains MAL-1, MAL-2, and MAL-3 were injected intramuscularly into the lateral surface of the middle third of the right thigh of gray rabbits weighing 500-600 g (from the nursery of the Research Institute of Experimental Patholgoy and Therapy, Academy of Medical Sciences of the USSR). Two rabbits were inoculated with each strain. The control group was identical (six animals), but the rabbits received injections of cells heated to 56°C for 1 h. Histological, cytogenetic, and electronmicroscopic investigations were carried out by

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