zones as a rule does not increase, except in the zone of globulins with average mobility, where a slight tendency can be seen for the number of fractions to increase (the maximal range is 8%).

It will be clear from Fig. 1 that the two densitograms of the plasma protein spectrum from the same animal (before connection to MO and after its operation for 2.5 h) do not differ from each other significantly. It must be pointed out that even during very brief operation of bubble oxygenators considerable disturbances are observed in the composition of the plasma protein fractions, manifested as a change in electrophoretic mobility of individual fractions, with the disappearance of some and the appearance of the so-called extracorporeal circulation protein, which is absent under physiological conditions [9, 10].

It can be concluded on the basis of these data that during adequate perfusion and satisfactory compensation of hypoxia by means of the Sever-OMR MO for 3 h, the use of the oxygenator has no deleterious effect on the blood plasma proteins. Protein denaturation products — low-molecular-weight fragments of protein molecules — do not appear in the plasma during this period as a result of its contact with the surfaces of the fluoroplastic plates of the MO.

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COLONY-FORMING ACTIVITY OF STROMAL PRECURSORS OF BONE MARROW MECHANOCYTES IN LEUKEMIA AND HYPOPLASIA OF HEMATOPOIESIS

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KEY WORDS: fibroblast cultures of bone marrow; acute leukemia; idiopathic triple hypolasia of hematopoiesis; stromal precursors of bone marrow mechanocytes.

It has been suggested [4, 5] that the polypotent hematopoietic stem cell receives inducing information (determining the direction of differentiation) from adjacent stromal cells either by direct contact or through their microenvironment.

The most likely cells to transmit the inducing effect of the microenvironment are fibroblast precursors of stromal mechanocytes [2].

The method of obtaining discrete colonies of fibroblasts in monolayers by culturing a bone marrow cell suspension [1, 3] enables the state of the stromal precursors of the bone marrow mechanocytes or, in other words, the stromal microenvironment of the hematopoietic stem cells, to be assessed quantitatively.

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TABLE 1. Number of Fibroblast Precursors of Mechanocytes in Bone Marrow Cultures

Disease	Number of investigations	CFU · 10^6				CFU in 1 mm^3				Myelokaryocytes in 1 mm^3 bone marrow			
		M	±σ	±*m*	limits of variation	M	±σ	±*m*	limits of variation	*M*	+σ	±*m*	limits of variation
Control	10	1,5	1,05	0,32	0,2—3,07	2,4	1,9	0,59	0,28—6,4	163 800	60 725	18 978	104 000—317 000
Hypoplasia:													
severe	24	0,46	0,29	0,096	ед. — 1,9	0,075	0,052	0,017	ед. — 0,4	14 460	9 084	4 660	1 200— 33 000
moderately severe	11	2,6	3,5	1,1	0,4—12,2	1,4	1,6	0,53	0,02—5,6	55 200	16 100	4 800	37 000— 90 000
foci of "hot hematopoiesis"	6	1,9	0,6	0,3	0,4—6,0	3,8	1,9	1,1	0,6—18,0	196 000	57 000	28 500	100 000—244 000
Acute leukemia:													
acute period	23	0,9	0,8	0,18	0,02—3,0	2,7	2,6	0,6	0,06—9,0	287 456	203 960	46 780	25 250—553 000
recurrent	12	0,8	0,7	0,2	0,02—2,2	0,9	0,5	0,14	0,06—5,2	239 450	192 045	55 632	50 000—520 000
beginning of remission	12	0,5	0,3	0,09	1,15—4,0	0,095	0,068	0,02	0,01—1,0	36 820	28 519	8 125	9 750—110 000
complete remission	9	1,58	1,17	0,39	0,1—3,06	2,24	1,52	0,5	0,08—4,5	153 998	72 190	24 063	85 000—329 000

The writers were interested in studying the presence, degree, and character of involvement of the stromal microenvironment in children with hypoplasia of hematopoiesis and with acute leukemia, i.e., blood diseases connected with pathological changes in polypotent precursor cells of hematopoiesis, expressed as a decrease in the total number of disturbances of their ability to differentiate normally. In addition, these pathological processes, opposite in their final manifestation (hyperplasia of myeloid cells in acute leukemia and depopulation of the bone marrow in hypoplasia) offer wide opportunities for studying quantitative relations between hematopoietic cells and their stromal precursors.

EXPERIMENTAL METHOD

In total, 39 children with idiopathic triple hypoplasia of hematopoiesis, 38 children with acute leukemia, and 10 children with intact hematopoiesis were investigated. In total 124 bone marrow fibroblast cultures with discrete colonies were grown.

Discrete colonies of fibroblasts were grown from sternal marrow biopsy material obtained from the children by the culture method [1, 3]. The highest efficiency of colony formation without confluent growth was observed after explantation of $0.5 \cdot 10^7$ cells in 100-ml Roux flasks and $1.0 \cdot 10^7$ cells in 200-ml Roux flasks. Effective colony formation from hyperplastic bone marrow in acute leukemia required explantation of a larger number of cells, namely $1.5 \cdot 10^7$ and $3.0 \cdot 10^7$, respectively. To estimate the number of fibroblast precursors two values were used: colony-forming units (CFU) per 10^5 explanted cells (CFU concentration) and CFU in 1 mm^3 of explant (absolute number of CFU).

EXPERIMENTAL RESULTS

The efficiency of colony formation in the control (10 children) varied within wide limits; the number of myelokaryocytes in 1 mm^3 bone marrow biopsy material varied within relatively narrow limits, however (Table 1).

In idiopathic triple hypoplasia of hematopoiesis, focal in character, several investigations of the bone marrow were carried out in order to obtain a more accurate estimation of the area of active hematopoiesis in the patients. Depending on the number of myelokaryocytes in the bone marrow tests were divided into three groups: foci of severe hypoplasia — with fewer than 35,000 myelokaryocytes in 1 mm^3 bone marrow; foci of moderately severe hypoplasia — with 35,000-100,000 myelokaryocytes in 1 mm^3 bone marrow; foci of persistent hematopoiesis — with over 100,000 myelokaryocytes in 1 mm^3 bone marrow.

In hypoplasia of hematopoiesis of different degrees of severity the limits of variations of both concentration and absolute number of fibroblast precursors were considerably wider than normally. In foci of severe hypoplasia both the concentration and the absolute number of CFU were sharply reduced compared with the control (Table 1). In foci of moderately severe hypoplasia of hematopoiesis the concentration of CFU was increased but the absolute number of CFU was slightly reduced compared with the control. In areas of bone marrow with a high myelokaryocyte population both the concentration and the absolute number of CFU showed a tendency to increase. These observations show that in hypoplasia of myelopoiesis the fibroblast precursors of mechanocytes suffer much less injury than the myeloid cells. A marked decrease in the number of CFU was observed only in foci with severe impairment of myelopoiesis.

Children with acute leukemia were divided into four groups (Table 1). All children in the acute period of acute leukemia were tested before the beginning of active polychemotherapy. In children of this group characterized by hyperplasia of the bone marrow, a significant decrease was observed in the concentration of CFU of fibroblasts, although their absolute number (compared with the control) was preserved. In the group of patients with the beginning of a remission children with marked drug-induced hypoplasia of hematopoiesis were included. These patients characteristically showed a sharp decline in the absolute number of CFU coupled with a very small decrease in their concentration (stromal mechanocytes and leukemic cells were about equally affected by the treatment). Similar changes in CFU also were observed in the course of the disease in seven children. With the onset of a complete remission of acute leukemia the stromal precursors of the mechanocytes recovered. The same dynamics also was observed during repeated investigations of three patients. During recurrence of the disease hyperplasia of the bone marrow of the same degree of intensity was observed as in the acute period. Both the concentration and the absolute number of CFU fell

compared with the control. A decrease in the absolute number of CFU also was observed during repeated tests on seven patients during progression of the disease.

It can be concluded from the results of this quantitative study of stromal precursors of bone marrow mechanocytes in different periods of idiopathic triple hypoplasia of hematopoiesis and acute leukemia in children that stromal precursors of mechanocytes do not remain intact in diseases involving the hematopoietic stem cells in the pathological process. Fibroblast precursors of the stroma are most severely damaged in severe hypoplasias of hematopoiesis, whether idiopathic or drug-induced (the beginning of remission of acute leukemia). The results showing the inhibitory action of chemotherapy of acute leukemia on fibroblast precursors of stromal mechanocytes must be regarded as important. Drug-induced inhibition of precursors of stromal mechanocytes differs from that observed in idiopathic hypoplasia of hematopoiesis in the much greater severity of the process despite an equal degree of reduction in the bone marrow cell population.

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DYNAMICS OF THE LYMPH CIRCULATION AND PROTEIN–CELL REACTION OF THE CENTRAL LYMPH DURING THE EARLY POSTRESUSCITATION PERIOD

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Experimental and clinical studies in the last decades have demonstrated the principles and led to the recognition of a new nosological entity – postresuscitation sickness [6]. However, many aspects of its pathogenesis still remain unexplained. In particular, our knowledge of the pathophysiology of the lymphatic system in the course of the postresuscitation period is quite inadequate. Yet the lymphatic system, an inseparable part of the cardiovascular system and a connecting link for all the body fluids, plays an important role in the maintenance of homeostasis and it largely determines the intensity of metabolic processes in the microcirculatory system as well as the specific and nonspecific resistance of the body to injury and stress [1, 2].

The object of the present investigation was to study the state of the lymphatic circulation and the biochemical and cytological composition of the lymph in the course of the early postresuscitation period.

EXPERIMENTAL METHOD

Experiments were carried out on 27 dogs of both sexes weighing 10-23 kg. Exteriorization of the thoracic duct at the point where it enters the left venous angle, and of the femoral

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