

activated in the course of these processes by IL-1, secrete IL-2, which itself maintains proliferation of Ly-1- and Ly-2-positive cells of both helper and suppressor types.

On the basis of views developed along these lines, IP-induced lymphocyte-dependent salivary gland hyperplasia in mice can be interpreted as an analog of syngeneic mixed lymphocyte culture in vivo. The G₀/G₁-transition, stimulated in gland cells by IP, leads to definite changes in these cells, which are transmitted by Ly-1-positive T helper cells with the participation of IL-1 (evidently with the participation of A cells), which triggers proliferation of Ly-1-positive T helper cells and secretion by them of stimulating factors, including IL-2, which maintains proliferation of T cells of both helper and suppressor types. As was shown previously [2], Ly-1-positive T helper cells are essential for development of the hyperplastic response of the submandibular salivary glands in mice, whereas the accumulation of T suppressor cells evidently arrests the process.

It can be tentatively suggested that reactions of syngeneic mixed lymphocyte culture in vitro, recently described, reflects important processes of regulation of cell division in the multicellular organism in vivo.

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INTERSPECIFIC SIMILARITY IN THE TRAJECTORY OF REACTIVE LEUKOCYTOSIS

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KEY WORDS: uncomplicated postoperative period; reactive leukocytosis

The writers suggested previously that fluctuations of the leukocyte count during reactive leukocytosis in dogs are not random in character but obey a definite rule [6]. On the basis of data in the literature [8] it was postulated that this rule also extends to reactive leukocytosis in man.

The object of the investigation described below was to test this hypothesis, by studying the peripheral blood leukocyte count in patients in the course of an uncomplicated postoperative period.

EXPERIMENTAL METHOD

Observations were made on 60 patients (26 men and 34 women) aged from 18 to 48 years after appendectomy, who volunteered to take part in the clinical investigation. An appendix abscess was present in 45 patients (75%), catarrhal appendicitis in 15 (25%). All patients were admitted to hospital 2-48 h after the onset of the illness. The postoperative period

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TABLE 1. Leukocyte Count (in thousands) in Peripheral Blood of Patients after Appendectomy

Statistical parameter	Before operation	Postoperative period, days								
		1	2	3	4	5	6	7	8	9
<i>M</i>	13 000	9 000	7 700	6 080	7 000	6 580	6 800	6 210	7 260	7 800
<i>m</i>	0,66	0,29	0,31	0,25	0,29	0,26	0,26	0,34	0,37	0,32
<i>σ</i>	2,42	1,92	2,1	1,6	1,12	1,6	1,5	1,4	1,2	1,28

of all patients was uncomplicated. Blood was taken daily for investigation at the same time of day from the middle and ring fingers. The leukocyte count was determined in a Goryaev's chamber. The numerical data were subjected to statistical analysis [3].

EXPERIMENTAL RESULTS

The results are shown in Fig. 1, in which the trajectories of reactive leukocytosis in 60 patients (continuous line) and in 87 dogs (broken line) are compared. The beginning of counting for the leukocyte reaction in man was the time of appendectomy, and for animals it was the time of injection of turpentine emulsion and (for some dogs) whole-body cooling. Coincidence of the trajectories of reaction leukocytosis in the human patients and dogs was not random in character but reflected a general rule for the temporal organization of the leukocytic response of the body to the action of the stimulus. Before this investigation we had already found an analogy between the trajectories of reactive leukocytosis in dogs and albino rats. A characteristic feature of this interspecific trajectory of reactive leukocytosis thus revealed was the existence of oscillations with a constant period of 48 h. During 14 days of observation five such periods were recorded. The mechanism of these oscillations has been explained by A. M. Zhabotinskii [2]: they were found to be connected with rhythmic changes in the concentration of chemical compounds. According to Zhabotinskii, concentration fluctuations lie at the basis of the mechanism of temporal organization of biological processes.

The interspecific similarity of the trajectories of reaction leukocytosis with an equal period of consecutive oscillations revealed by this investigation suggests that the trajectory of postoperative leukocytosis is only a special case of a general rule of the leukocytic reaction in man. In this case the trajectory of reactive leukocytosis in the subjects in this investigation was evidently in contradiction to the generally accepted graph of reactive leukocytosis, consisting of a sloping curve, which is given in textbooks and scientific works. As an example, the dynamics of the leukocyte count in pneumonia and acute respiratory virus infection is described in [5]. This description was made with the use of a complex mathematical apparatus and it repeats the traditional sloping curve in leukocytosis. In our opinion, this contradiction is not connected with the method (methods of counting the blood leukocytes are

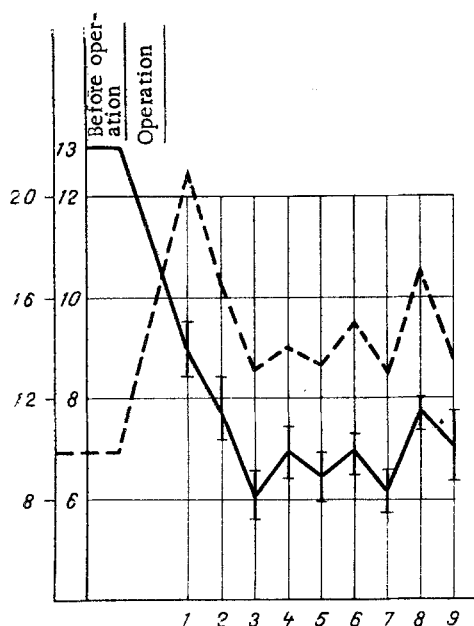


Fig. 1. Comparison of trajectories of leukocytic reactions in human patients (continuous line) and animals (broken line). Ordinate, number of peripheral blood leukocytes (in thousands); abscissa, time of observation, in days.

standard), but with the methodology of the study of the reactive leukocytosis. This methodology was precisely expressed by Kryzhanovskii [4] in the form of the law of biological structural-functional temporal discreteness, incorporating structural-temporal "quantification" of biological processes and the intermittent activity of functioning structures. In cases when "quantification" of biological processes (in our case, variations in the concentration of blood leukocytes) is ignored, the trajectory of reactive leukocytosis may in fact have the appearance of a sloping curve. Yet this disregard already conflicts with the modern level of knowledge of how the number of leukocytes depends on the function they perform, at least on the example of the inflammatory response and capillary permeability. Moreover, the trajectory of reactive leukocytosis is formed from definite trajectories of different specialized blood cells, and for each time interval chosen (24 h) there is a characteristic spectrum of the relative numbers of these cells. Such a spectrum reflects the measure of activity of the different systems of the body [1, 7] and it cannot be recommended that this information be disregarded.

To conclude, the interspecific similarity of the trajectory of reactive leukocytosis revealed by this investigation and determination of the period of oscillations of the leukocyte count may at least help to predict and study human reactive leukocytosis by testing it in laboratory animals.

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