The work of N. V. Puchkov, G. V. Golodets, and others [3, 6, 8] has shown that mediators can exert a significant action on the phagocytic activity of leucocytes: sympathicotropic substances stimulate phagocytosis, while vagotropic ones (acetylcholine) depress it. M. Ya. Mikhelson's experiments [7] showed that narcotic substances exert a powerful inhibitory action on cholinesterase, both in vivo and in vitro. It might be supposed that anesthetics cause a rise in the acetylcholine content of the tissues, and hence to an inhibition of phagocytosis. When the blood samples were taken during the stage of excitation, in which the tonus of the sympathetic system was raised, the increased production of sympathicotropic substances heightened the phagocytic activity of the leucocytes.

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EFFECT OF BARBITURATES ON THE DIFFERENTIAL CELL COUNT OF PERIPHERAL BLOOD OF NORMAL ANIMALS AND IN EXPERIMENTAL ANEMIA

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The present paper gives the results of an investigation into the effects of some bartiturate hypnotics on the differential cell count of peripheral blood. It is a continuation of earlier published researches [1].

*In Russian.

**Original Russian pagination. See C. B. Translation.

Effect of Noctal and Sonbutal taken over a long time on the differential cell count of peripheral blood

Groups of 10 mice each were given daily subcutaneous injections of 0.5% Noctal or Sonbutal solutions, to which a few drops of 1 N NaOH had been added to dissolve the drug.

The dosage levels were such as to cause sleep lasting from 2 to 5 hours, viz., 0.5–0.7 mg of Noctal or 0.6–0.7 mg of Sonbutal per 10 g body weight.

The blood examinations (hemoglobin, erythrocytes, leucocytes, differential cell count, reticulocytes, thrombocytes) were done twice before the administration of barbiturates, and twice during administration. The mice were weighed before and during the experiment. The results of the experiments were subjected to biometrical evaluation, and are presented in Figure 1.

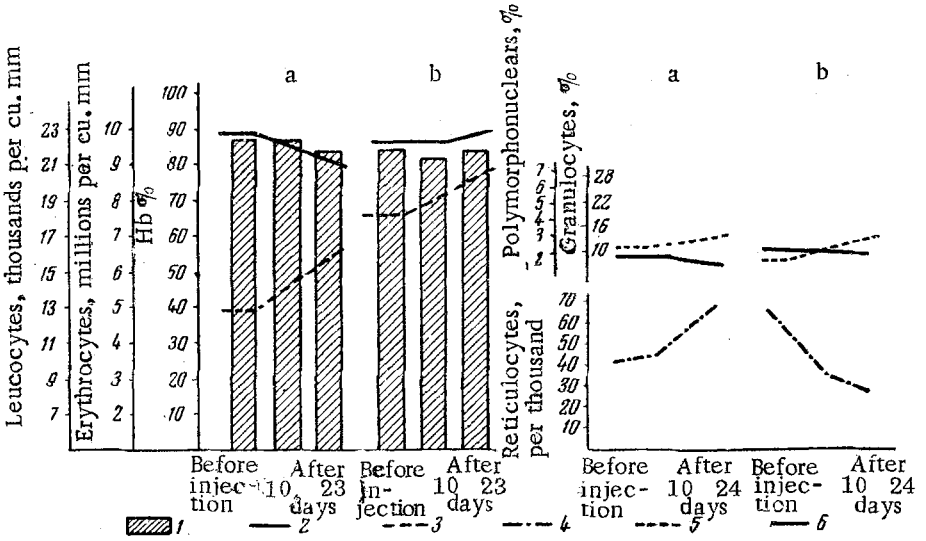

Fig. 1. Effect on the blood of prolonged administration of Noctal and Sonbutal to normal mice. a) Noctal; b) Sonbutal; 1) hemoglobin; 2) erythrocytes; 3) leucocytes; 4) reticulocytes; 5) granulocytes; 6) polymorphonuclears.

The only changes seen during prolonged administration of barbiturates were a slight reticulosis with Noctal, and a slight fall in reticulocyte count with Sonbutal.

A comparison of these results with those found earlier [1] for other barbiturates (Barbamyl, Nembutal, and Medinal) shows that the greatest effect on the blood is exerted by Barbamyl, prolonged administration of which lowers the hemoglobin and erythrocyte count, and raises the reticulocyte count.

Effect of a single dose of Noctal or Sonbutal on the differential cell count of peripheral blood

The animal material consisted of mice (10 for each drug), rabbits, and dogs.

The blood examinations were done before administering the drug, during profound sleep, and 3 and 24 hours after wakening.

The leucocyte count fell by an average of 52.7% during Noctal-induced sleep, and rose at the moment of wakening, although still remaining 36.6% below the initial value, which was found 24 hours after wakening. The differential cell count showed a small increase in granulocytes. The reticulocyte count did not vary.

The leucocyte count fell only very slightly during Sonbutal sleep, and was above the initial value by an average of 37% at the moment of wakening. The differential cell count showed a small rise in the proportion of granulocytes (Figure 2).

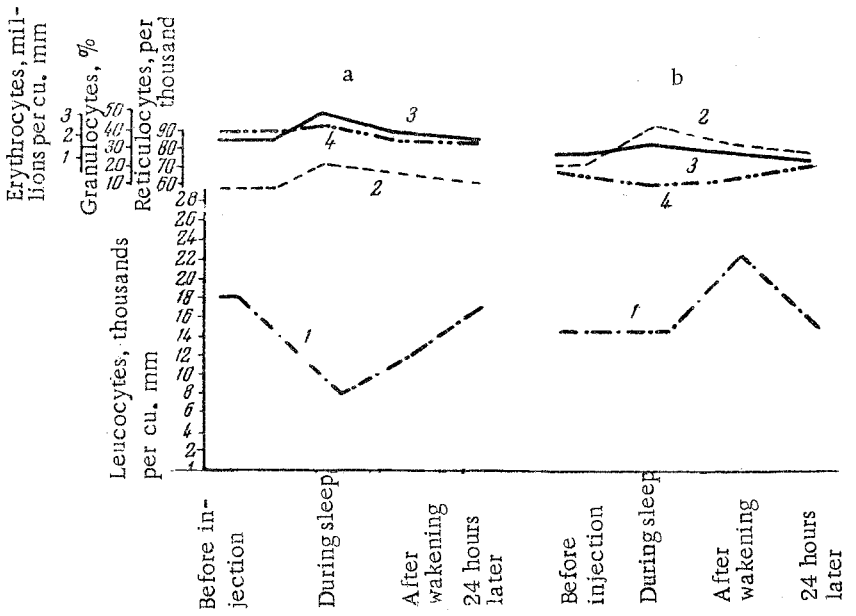

Fig. 2. Effect of sleep induced by Noctal and Sonbutal on blood cell morphology. a) Noctal; b) Sonbutal; 1) leucocytes; 2) granulocytes; 2) polymorphonuclears; 4) reticulocytes.

Comparison of these results with those of our earlier investigations [1] again show that Barbamylhas a more powerful effect than do the other barbiturates on the leucocyte count, which it depresses by an average of 63.5%.

Effect of Noctal and Sonbutal on peripheral blood cells in experimental anemia

The drugs were injected into groups of 10 mice each, leaving a control group of 10 mice. Anemia was produced by bleeding from a severed tail tip. The mice were bled daily for 4-5 days, withdrawing 0.3 ml of blood on each occasion. Over this period the hemoglobin content fell from 90% to an average of 35-40%, and the erythrocyte count from 9 to 4 million; anisocytosis and polychromatophilia, with Howell-Jolly bodies, were seen. The reticulocyte count rose from 30-40 to 240 per thousand. The leucocyte count fell in most of the animals, as did the thrombocyte count. Bleeding was then stopped, and the hypnotics were administered for 23 days, in the same dosage as before. The blood was examined before bleeding, after bleeding, but before administration of the drugs, and on the 7th and 23rd days of administration. The hemoglobin content and the reticulocyte and erythrocyte counts were determined.

Over this period of 23 days the blood picture reverted to normal in the control group and in those given Noctal or Sonbutal (Figure 3); the same findings were obtained with Medinal and Nembutal. As was found in our earlier experiments [1], anemia persisted in mice given Barbamyl, with only a slight rise in hemoglobin content and in erythrocyte count; the reticulocyte count remained high. The morphological changes also persisted, in the form of anisocytosis, polychromatophilia, and Howell-Jolly bodies.

It thus appears that prolonged administration of Noctal and Sonbutal does not cause blood changes in experimental animals, other than a reticulocytosis with No tal and a slight fall in reticulocyte count with Sonbutal; Medinal and Nembutal had also been found to have little effect on the blood.

The leucocyte count fell during barbiturate-induced sleep, to an extent proportional to the profoundness of the latter. The leucocyte count rises at wakening, gradually reverting to the initial value over the following 24 hours. The Arneth index shows a granulocytosis, with a slight shift to the left. The reticulocyte count falls. These effects are greatest for Barbamyl, less so for Noktal and Nembutal, and least for Medinal and Sonbutal.

It may be supposed that the changes found in the peripheral blood during sleep are due not only to redistribution of formed elements, but also to alterations in the hemopoietic processes, as is evidenced by the changes

in the Arneth index (granulocytosis, with a shift to the left, and a fall in the reticulocyte count).

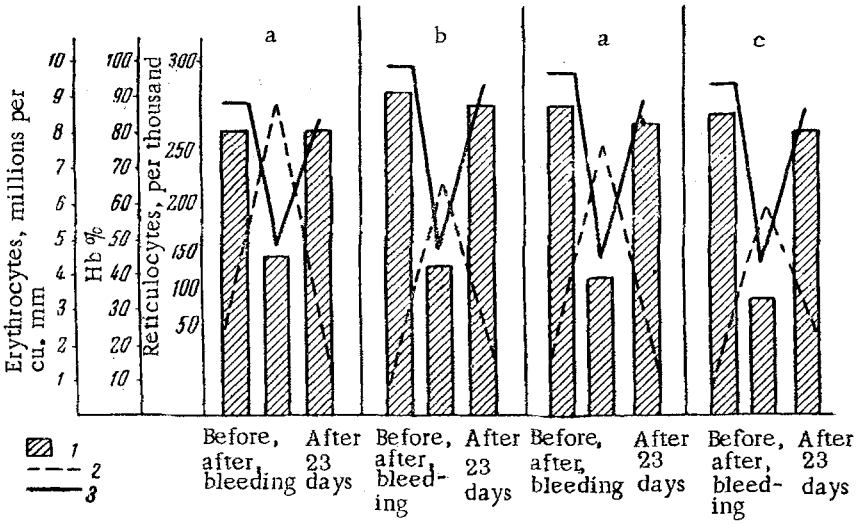

Fig. 3. Effects on the blood of prolonged administration of Noctal and Sonbutal to mice suffering from experimental anemia. a) controls; b) Noctal; c) Sonbutal; 1) hemoglobin; 2) erythrocytes; 3) reticulocytes.

In experimental anemia, produced by repeated bleeding, administration of Noctal and Sonbutal was, similarly to Medinal and Nembutal, without effect on the rate of recovery (the normal blood picture was restored equally soon in the experimental and control groups). Administration of Barbamyl, on the other hand, prolonged the time needed for recovery; the signs of anemia persisted over the 23 days of administration, at about the same level as immediately after bleeding.

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UDDER RECEPTION IN COWS AND GOATS, AND THE COMPOSITION OF THE BLOOD

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Alterations affecting the whole of the organism take place during lactation. Lactation, like any other process taking place in the organism, is under the control of the central nervous system. Our knowledge of how this nervous control of secretion and ejection of milk is achieved, and by which pathways, is, however, far from being complete.

A number of authors [2, 3, 4, 6] have indicated a reflex connection between the receptor apparatuses of the udders and the alimentary tract.