

HEMOPOIETIC REACTION TO THE INJECTION OF CAMPOLON UNDER DIFFERENT PHYSIOLOGICAL CONDITIONS

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Many workers have shown [2, 3, 5] that the nervous system exerts a continuous and active control over the details of processes occurring in the hemopoietic system.

In the present study we set out to determine the effect on the hemopoietic system, under different physiological conditions, of a certain preparation known to have an effect on it.

The substance chosen was campolon, which is widely used in clinical medicine. It was chosen because several authors had demonstrated the direct utilization of hemopoietic substances by the reticular tissue of the bone marrow [4]. We were also influenced by results which we had obtained earlier [1], concerning the part played by the nervous system in mediating the effect of campolon on hemopoiesis. The response of the hemopoietic tissue to campolon injections was studied under normal physiological conditions, and after severe hemorrhage.

METHOD

Two sets of observations were made. In the first, the experiments were carried out on 3 male dogs. An injection of 0.2 ml per kg of campolon was given. The effects were noted by studying the condition of peripheral blood before the injection, and 1, 2, 3, 4, 5, and 6 hours after it. Blood samples were taken from a small cut in the ear. Erythrocyte, leukocyte, and differential white cell counts were made. Severe anemia was induced by bleeding 300–400 ml of blood from a vein.

The second set of observations was made on human subjects clinically. There were 12 patients with acute anemia following childbirth, abortion, etc., and they had been treated by a single injection of 3–4 ml of campolon. Their hemoglobin varied from 40–60 %, and the erythrocyte count from 2.5 to 3.5 million. As a control, simultaneous observations were made on 6 patients with normal blood (hemoglobin from 75% upwards, erythrocyte count higher than 4 million). They were also given the same dose of campolon. Blood samples were taken before giving the injection, and 3 and 5 hours afterwards.

RESULTS

Campolon injection almost always increased the production of blood cells in the experimental animals. An increase in the number of leukocytes in the peripheral blood occurred after approximately 3 hours. There was a further increase subsequently. In some experiments, 5 hours after the injection, the leukocyte count had more than doubled (Fig. 1). The differential white cell count showed an increased number of neutrophils,

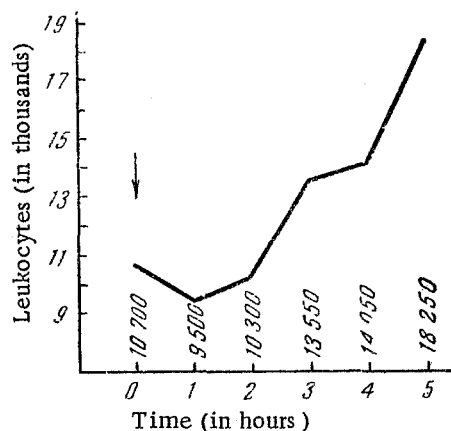


Fig. 1. Change in the number of leukocytes following an injection of campolon (↓) into the dog Orel, under normal conditions.

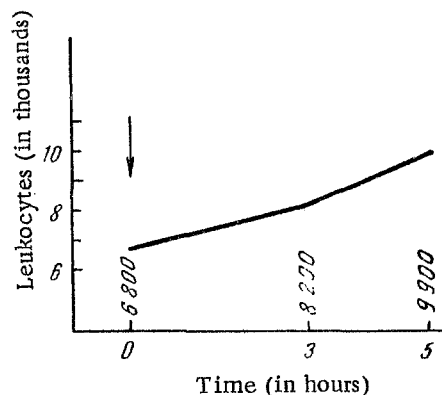


Fig. 2. Change in the number of leukocytes after giving an injection of campolon (↓) to the patient S. V., having a normal blood count.

with a shift to the left. A single injection caused no reproducible changes in the number of red cells.

Similar results were obtained in patients with normal blood. A single campolon injection caused a marked increase in the number of leukocytes. The increase occurred 3 hours after the injection, and after 5 hours, the number still continued to increase (Fig. 2). The differential white cell count showed some increase in the number of neutrophils, with a shift to the left. It must be noted that the change in the number of white cells was not so well shown in the patients as in the animals. This effect is no doubt due to the smaller amount of campolon given to the human subjects.

Having determined the effect of campolon on the blood under normal conditions, we then proceeded to find the effect produced in anemia.

The animals were bled as follows. In the dog Sokol, before bleeding, the blood count showed 5,680,000 erythrocytes and 13,300 leukocytes per ml, with a hemoglobin of 82. On the day after withdrawing 350 ml of blood, the corresponding figures were 4,085,000 erythrocytes, 20,500 leukocytes, and a 61% hemoglobin. In the dog Orel, the normal blood count was 4,870,000 erythrocytes, 12,400 leukocytes, with a hemoglobin of 76%, and on the day after bleeding these figures had changed to 3,400,000 erythrocytes, 14,500 leukocytes, and a hemoglobin of 54%.

Giving campolon after bleeding produced a characteristic reaction from the bone marrow, and after 2 or 3 hours, the number of leukocytes had been reduced. The leukopenia was long lasting, and continued to increase in the following hours. It was found that the reduction in the number of leukocytes was well shown for the first few days after the bleeding. Later, as the blood count returned to normal, the reaction of the bone marrow to campolon injections gradually returned to normal. Fig. 3 shows the change in the number of leukocytes in the experiment in which campolon was injected.

Observations on patients with acute anemia gave similar, but less well shown results, as shown in Fig. 4.

In this way, it was shown that the response of the hemopoietic system to campolon injections depends on the physiological condition of the animal. Normally, it causes an activation, but in acute anemia it inhibits hemopoiesis.

We suggest the following interpretation of the results. Normally, when the bone marrow functions in accordance with the level of vital activity of the organism, a specific stimulant such as campolon will increase its activity.

After severe blood loss, hemopoiesis is increased, because the bone marrow is stimulated by erythrocytic and metabolic and breakdown products. Consequently, the hemopoietic system is maximally activated. The

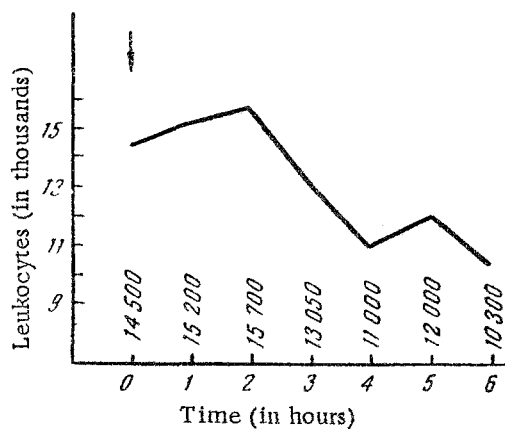


Fig. 3. Change in the number of leukocytes on giving the dog Orel a campolon injection (↓) following large blood loss.

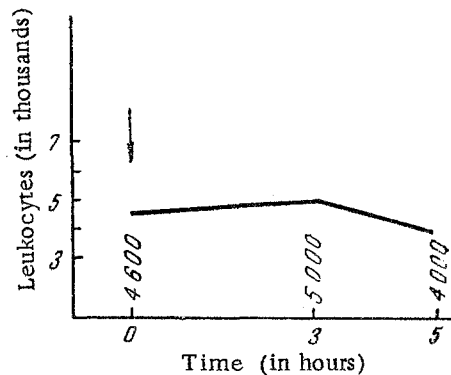


Fig. 4. Change in the number of leukocytes on giving the patient G. F., with acute anemia, an injection of campolon (↓).

superimposition of the strong chemical stimulus exerted by campolon, which stimulates hemopoiesis, brings about unfavorable conditions, with the result that hemopoiesis is actually reduced.

SUMMARY

A study was made of the specific reaction of the hemopoietic system to the injection of campolon in normal animals and in those which had suffered severe blood loss. Two sets of experiments on animals were carried out, and clinical studies of human patients were made. In almost every case, campolon injection induced a hemopoietic response. The number of leukocytes in the peripheral blood began to rise about 3 hours after the injection. There was an increase in the number of neutrophils, with a shift to the left. When there had already been a severe blood loss, campolon caused a definite leukopenia, which was especially evident in cases with acute anemia. The results show that there are two possible reactions of the hemopoietic system to stimuli of different intensities.

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