THE EFFECT OF PENICILLIN ON THE BLOOD SYSTEM

COMMUNICATION II. THE CHARACTER OF THE LEUCOCYTE REACTIONS IN ANIMALS DURING PROLONGED ADMINISTRATION OF PENICILLIN

T. A. Bogordskaia

From the Laboratory of Physiology of Receptors (Head - Active Member of the AMN SSSR V. N. Chemigovskii) of the I. P. Pavlov Institute of Physiology of the AN SSSR (Director - Academician K. M. Bykov) and the Department of Propaedeutic Therapy (Head - Active Member of the AMN SSSR M. D. Tushinskii) of the I. P. Pavlov First Leningrad Medical Institute

(Received September 29, 1956. Presented by Active Member of the AMN SSSR V. N. Chemigovskii)

As our investigations have shown, penicillin, when administered to healthy persons and animals, produces no essential changes in the peripheral blood but in a number of cases it accelerates the maturation of eosinophils in the bone marrow. In addition, reports in the literature and our own personal experience clearly indicate a comparatively high incidence of eosinophilia during penicillin therapy. In this connection we decided to study the character of the leucocyte reactions to various stimuli during the prolonged administration of penicillin. As suitable stimuli we used the intramuscular injection of 3 ml of skimmed milk. According to N. I. Veshchezerov, R. I. Volynskaia and A. Ia. Iaroshevskii [1, 2, 3], in cats the injection of milk always causes a pronounced neutrophilic leucocytosis with a marked shift in the leucocytic formula to the left. Another stimulus was distension of the stomach of cats through a fistula; it is well known at the present time that this type of manipulation leads, after a transient leucopenia, to leucocytosis without any marked changes in the leucocytic formula. Thus, the use of the first stimulus combined both nervous and humoral factors, whereas stretching of the mechanoreceptors of the stomach is an example of reflex action.

EXPERIMENTAL METHOD

At the beginning of the experiments the leucocyte reaction to the intramuscular injection of milk or to stimulation of the stomach was studied on two occasions in two weeks; during the next 14-28 days an injection of 50,000 units of penicillin was given every 4 hours, and the stimuli were repeated on the 7th-9th-14th and 27th days of administration, and also a week after the injections had been discontinued. Blood was taken from the ear of the animals before stimulation and 30 minutes, 1, 2, 3 and 4 hours after stimulation.

Altogether 78 experiments were carried out on 12 cats (in four of these animals a gastric fistula was created 3 months beforehand).

EXPERIMENTAL RESULTS

In 6 our of 8 animals, in response to the injection of 3 ml of milk a marked leucocytosis was observed, appearing usually after a transient ($\frac{1}{2}$-1 hour) leucopenia. The maximum increase in the white cell count took place in the 2nd and 3rd hours of the experiment. After only 2 hours a marked shift was observed in the leucocytic formula with an increase in the content of stab cell forms to 9-16%.

The content of eosinophils under these circumstances was essentially unchanged (Fig. 1, a and b and Fig. 2). It can be seen from the Table that in two experiments (November 13 and 26) carried out before administration of
Fig. 1. Changes in the number of eosinophils during penicillin administration after injection of milk.
a, b) Before giving penicillin; c) on the 2nd day of penicillin administration; d) on the 7th day of penicillin administration; e) 9 days after discontinuing penicillin. The arrows indicate injection of milk.

Fig. 2. Changes in the eosinophil content after injection of milk and distension of the stomach.
a, b, c) Before injection of penicillin; d) on the 10th day after injection of penicillin; e) on the 16th day; f) on the 28th day of penicillin administration; g-h) on the 8th-9th days after discontinuing penicillin; ↓ injection of milk; ↓ distension of stomach.

Penicillin, during investigation of the blood a shift of the leucocytic formula to the left, without any notable increase in the eosinophil content, was clearly observed in response to the injection of milk. After preliminary injections of penicillin (see Table - experiments on December 10 and 28, Fig. 1, c and d and Fig. 2), on the 2nd and 7th days the injection of milk leads to a sharp increase in the eosinophil content; 9 days after discontinuing