ACTIVITY OF LIVER CATALASE AND ITS INHIBITOR IN PERSONS DYING FROM ACUTE LEUKEMIA

A. F. Konyukhov and N. P. Mazurenko

UDC 616.155.392-036.11-07:616.36-008.931:577.158.7-074

Activity of soluble liver catalase from persons dying from acute leukemia amounted on the average to one-third of the liver catalase activity of persons dying accidentally. Alcohol extracts from human leukemic tissue inhibited water-soluble liver catalase of healthy mice to a much greater degree than analogous extracts from organs of clinically healthy persons.

Previous investigations [1, 2] have shown that the development of leukemia induced by Mazurenko's virus in CC57BR mice, and of the same leukemia transplanted with cells, is accompanied by a sharp decrease in the activity of water-soluble (WSC) and lipid-bound liver catalase: WSC activity in the period immediately preceding death of the animals was 20% of normal. It has also been reported that an almost identical result can be obtained if healthy mice are injected with extracts from the tissues and organs of diseased animals. Later, an alcohol preparation, consisting of thermostable toxic factor, was isolated from these extracts. This preparation (catalase inhibitor) has the property of inhibiting liver WSC activity in healthy mice.

In this investigation liver WSC activity was studied in persons dying from acute leukemia and from accidental injury. Alcohol extracts from the liver and spleen of these persons were also obtained and their action tested on mice of line CC57BR.

EXPERIMENTAL METHOD

The test material consisted of the liver and spleen of persons dying from acute leukemia and accidental injury (regarded as clinically healthy). The organs were taken from the cadavers at autopsy and kept at $-25°$.

Liver WSC activity was determined in extracts prepared from the organ by the method of Von Euler and Josephson [4]. The extracts were incubated for 3 min with cold 0.02 N solution of H_2O_2, which was subsequently titrated iodometrically with 0.02 N $Na_2S_2O_3$ solution. Activity was expressed as a monomolecular reaction constant ($K \cdot 10^{-3}$).

Alcohol extracts were obtained from the liver and spleen of these subjects in powder form by the method described previously [3]. The ability of the preparations to inhibit WSC activity was tested on CC57BR mice weighing about 20 g, into which the preparations, dissolved in distilled water, were injected intraperitoneally in a dose of 16 mg per mouse. Each preparation was injected into five mice. The animals were sacrificed 24 h after inoculation of the material, and WSC activity was determined in their liver. The results were analyzed by statistical methods [5].

Laboratory of Virology of Leukemias, Institute of Experimental and Clinical Oncology, Academy of Medical Sciences of the USSR, Moscow. (Presented by Academician of the Academy of Medical Sciences of the USSR A. D. Timofeevskii.) Translated from Byulleten' Éksperimental'noi Biologii i Meditsiny, Vol. 69, No. 6, pp. 49-50, June, 1970. Original article submitted June 12, 1969.

EXPERIMENTAL RESULTS

Individual variations in liver WSC activity were considerable both in patients with leukemia (16) and in clinically healthy subjects (7). Meanwhile, the highest WSC activity in the patients did not exceed the lowest value recorded in healthy subjects: extreme values for the persons with leukemia were $39 \cdot 10^{-3}$ and $129 \cdot 10^{-3}$, and in the healthy subjects $161 \cdot 10^{-3}$ and $406 \cdot 10^{-3}$. On the average, WSC activity in patients with leukemia was one-third ($K \cdot 10^{-3} = 29 \pm 15.2$) that in persons dying accidentally ($K \cdot 10^{-3} = 273 \pm 83.4$). No correlation could be found between the indices of WSC activity in the patients and the diagnosis of their disease, their age, or treatment received.

Alcohol preparations were obtained from the liver and spleen of 13 patients with leukemia and 5 clinically healthy persons. After injection of preparations from the spleen and liver of patients with leukemia into mice, the mean reaction velocity constant was 129 ± 10 and 123 ± 5.4 respectively, while after injection of preparations obtained from the organs of clinically healthy persons the constants were 154 ± 9.2 and 163 ± 5.2, respectively. The reaction velocity constant for the control animals was 180 ± 7.4. Consequently, liver WSC activity of mice receiving injections of alcohol preparations obtained from the spleen and liver of clinically healthy persons was reduced by 14 and 9% respectively compared with the control. Injection of analogous preparations from the corresponding organs of patients with leukemia into the mice reduced their catalase activity by 29 and 32%.

LITERATURE CITED

1. A. F. Konyukhov and N. P. Mazurenko, Byull. Éksperim. Biol. i Med., No. 12, 83 (1968).
2. N. P. Mazurenko and A. F. Konyukhov, Probl. Gematol., No. 7, 31 (1968).
3. N. P. Mazurenko, D. D. Efimov, and A. F. Konyukhov, Vestn. Akad. Med. Nauk SSSR, No. 6, 21 (1969).
4. H. von Euler and K. Josephson, Justus Liebigs Ann. Chem., 452,(1927).
5. J. B. De V. Weir, Nature, 185, 558 (1960).