EFFECT OF DEPRESSED PHAGOCYTIC FUNCTION OF THE RETICULO-ENDOTHELIAL SYSTEM ON SENSITIVITY OF ALBINO MICE TO PLAGUE TOXIN

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It was not until recently that the importance of the functional state of the cells of the reticulo-endothelial system (RES) in the pathogenesis of plague infection was finally elucidated. Since the endotoxin Baker's fraction II is one of the factors determining virulence of the plague microorganism, the present investigation was carried out to study the sensitivity of albino mice with depressed phagocytic activity of the RES to plague toxin.

EXPERIMENTAL METHOD

Experiments were carried out on albino mice weighing 18-20 g. Blocking agents to depress the phagocytic activity of the RES were ink (0.3 ml of suspension per animal), collargol (0.1 ml of solution), and hens' yolk (0.5 ml of emulsion) as a preparation increasing the sensitivity of laboratory animals to plague [1, 3]. The ink and collargol were injected intravenously into the mice, the yolk intraperitoneally.

The effect of hens' yolk was studied in 114 albino mice, that of collargol in 70, and of ink in 60 mice.

The phagocytic function of the RES of the mice was investigated 1, 4, and 20 h after injection of the preparations. Intact mice not receiving the preparations were used as controls.

The degree of depression of the phagocytic function of the RES was determined by a microbiological method [2]. Mice were injected intravenously with 10^6 cells of Staphyloccus aureus (strain 209-P) suspended in 0.1 ml physiological saline. At intervals of 5 and 15 min after injection of the microorganisms, 0.015 ml blood was taken from the mouse's tail, mixed with physiological saline, and seeded on Hottinger's agar, pH 7.2. The seeded plates were incubated for 24 h at 37°, when the growing colonies were counted. In subsequent experiments LD_{50} was determined for mice receiving plague toxin and injections of yolk, collargol, and ink.

The toxin was injected intraperitoneally into the mice along with the preparation and at times when the phagocytic function of the RES was clearly inhibited. In each experiment 4 doses of toxin were used—2, 4, 8, and 16 μg. Each dose was injected into 10 mice. In the control the toxin was injected by the same method into intact animals.

EXPERIMENTAL RESULTS

Depression of the phagocytic function of the RES was observed 4 h after injection of yolk and collargol, as shown by the statistically significant increase in the number of colonies of staphylococci in blood cultures from the experimental mice compared with those from the intact animals.

When the animals were investigated 1 and 20 h after injection of hens' yolk and collargol, and also at all periods after injection of ink, no statistically significant difference was found between the results of seeding the staphylococci (compared with the controls).

The results showing the sensitivity of albino mice to plague toxin are illustrated in the figure, which shows the increased sensitivity to plague toxin was found only in those animals which received yolk or collargol 4 h before injection of the toxin (LD_{50} for these animals was much lower than the corresponding value for the controls; the difference was statistically significant). If toxin was injected at the same time as yolk,

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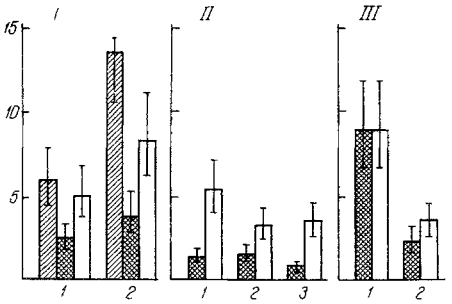

Sensitivity of albino mice to plague toxin after administration of hens' yolk (I), collargol (II), and ink (III). Obliquely shaded columns) toxin injected along with preparation; cross-hatched columns) toxin injected 4 h after injection of preparation; unshaded columns) toxin without preparation (control). Ordinate) LD_{50}; abscissa) experiment No.

and also if toxin was injected 4 h after ink, the sensitivity of the mice to toxin was practically identical in the experimental and control series.

As these results show, ink had no significant effect on the functional state of the RES or on the sensitivity of albino mice to plague toxin.

Four hours after injection of hens' yolk and collargol, slowing of the rate of clearance of the injected staphylococci from the blood was observed, and was associated to some degree with depression of the phagocytic function of the RES. In these conditions the sensitivity of the mice to plague toxin was increased.

Very probably depression of the phagocytic activity of the RES cells is one of the factors increasing the sensitivity of mice receiving injections of yolk to Pasteurella pestis.

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