REACTIVITY OF THE LIVER IN EXPERIMENTAL STAPHYLOCOCCAL INFECTION

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Experiments on albino rats showed that in infection produced by a staphylococcus of strain Wood-46 the functional reserves of the liver are sharply reduced and its reaction to dehydrocholic acid is phasic in character. The cholate-stimulating action of this compound in a dose of 10 mg/100 g is more marked than in a dose of 30 mg 3 days after infection. The action of the compound is independent of dose 7 days after infection, while on the 14th day the cholate-stimulating effect is replaced by a cholate-inhibitory effect.

Earlier investigations by Drogovoz [1, 2] have shown that during prolonged staphylococcal infection in albino rats, the synthesis and excretion of bile acids are considerably inhibited. Staphylococcal toxin inhibits those processes in the liver which are responsible for the synthesis of primary bile acids from cholesterol and also for the conjugation of cholic acid with glycocol and taurine [3].

The object of the present investigation was to study the functional reserves of the liver in staphylococcal infection with reference to reactivity of the organ to dehydrocholic acid.

EXPERIMENTAL METHOD AND RESULTS

Experiments on 120 adult male albino rats showed that dehydrocholic acid stimulates bile secretion not only in healthy, but also in infected animals. In the first (three days) and second (seven days) periods after intravenous injection of a 24-h culture of Wood-46 staphylococcus, the cholagogue response to oral administration of the compound in doses of 10 and 30 mg/100 g body weight was more marked and more prolonged than in intact rats. The total volume of bile rose during the 6 h of the experiment, depending on the time of observation of the dose of the compound, by 47-59 and 32-45%, compared with an increase in the control by 4-27%. On the 14th day of infection (the third period of observation), when the general manifestations of the infection had sharply subsided, the reactivity of the liver to dehydrocholic acid in a dose of 30 mg/100 g body weight fell sharply, so that the increase in the secretion of bile did not exceed 10-22%.

Significant changes also took place in the synthesis of bile acids. Under the influence of dehydrocholic acid, the concentration of cholates in the bile fell by a greater degree than in the control. As a result, in the first period of observation, the total quantity of cholates excreted with the bile was increased if the compound was given in a small dose, but showed no significant change if the dose was increased to 30 mg/100 g body weight; whereas in healthy animals, it increased in both cases. In the second period this index increased equally regardless of the dose of the compound given, while in the 3rd period, the synthesis of bile acids was inhibited although, admittedly, only by a small amount.

The results of chromatographic analysis of the bile showed that in the early stages of infection, dehydrocholic acid stimulates the conjugation of cholic acid with glycocol and taurine. Evidence of this is given by an increase in the ratio between the concentration of conjugated and free bile acids from 11 to 16 in the first period and from 9 to 20 in the second. Admittedly, two weeks after infection, the ratio fell from 14 to 11.

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The action of dehydrocholic acid in staphylococcal infection promotes the stabilizing properties of the bile. This is shown both by the increase in the ratio of conjugated to free bile acids and by the increase in the cholate-cholesterol ratio at all times of observation.

It was concluded from the results of these experiments that the most vulnerable link in the functional activity of the liver in staphylococcal infection is the synthesis of bile acids. During two weeks of observation, the outstanding feature was a sharp decrease in the functional reserves of the liver and the phasic character of its reaction to administration of dehydrocholic acid as a cholagogue substance. In the third period of observation,the paradoxical feature of its action was the more marked reaction of the liver to a minimal dose; while in the 2nd period,the reaction was equalized, and in the 3rd stage instead of stimulation, cholate formation was inhibited.

LITERATURE CITED

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