

# EFFECT OF THE STATE OF THE LIVER FUNCTION ON ASSIMILATION OF PARENTERALLY ADMINISTERED NITROGENOUS SUBSTANCES

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The effect of the state of the liver function in rats on the nitrogen balance was investigated during parenteral administration of a placental digest. Parenterally administered nitrogenous substances were found not to be assimilated in the presence of severe experimental liver pathology induced by  $\text{CCl}_4$  administration.

Previous investigations demonstrated the importance of the functional state of the adrenals, the endocrine system of the pancreas, and other systems of the body in the assimilation of parenterally administered nitrogenous substances [1-4].

The object of this investigation was to study the role of the state of liver function in the assimilation of parenterally administered nitrogen.

## EXPERIMENTAL METHOD

Experiments were carried out on 25 male albino rats weighing 220-420 g. The efficiency of nitrogen utilization by the animals was assessed from the state of the nitrogen balance. This was studied while the animals were on a balanced protein diet or on a protein-free diet and during parenteral administration of a placental digest [5-7] coupled with a protein-free diet. The balanced protein diet consisted of casein, starch, sugar, sunflower oil, mixed salts, brewers' yeast, and a full range of vitamins [12]. While on the protein-free diet, protein was excluded, but the total calorific value of the diet was maintained by increasing the weight of starch and sugar. In the third period, while the rats remained on the protein-free diet, subcutaneous infusions were given of placental digest (from a 54% hydrolysis batch) at the rate of 0.3 g conventional protein/100 g body weight. Each period lasted 7 days. On the 14th day of the experiment (corresponding to the beginning of the period of parenteral nitrogen feeding) 15 rats received subcutaneous injections of  $\text{CCl}_4$  in a dose of 0.5 ml/100 g body weight [13], and five of them were killed 24 h after the injection of  $\text{CCl}_4$  to study the histological picture of the liver (these investigations were carried out by L. M. Burman).

TABLE 1. Effect of the State of Liver Function on Assimilation of Parenterally Administered Nitrogenous Substances (in mg)

Group of animals	Statistical index	Balanced protein diet	Protein-free diet	Protein-free diet + digest
Control	$M \pm m$	$+260,6 \pm 11,5$	$-89,2 \pm 9,0$	$+19,3 \pm 5,4$
Experimental	$M \pm m$	$+273,2 \pm 13,3$	$-76,6 \pm 5,2$	$-81,7 \pm 14,9$
	P	$>0,05$	$>0,05$	$<0,05$

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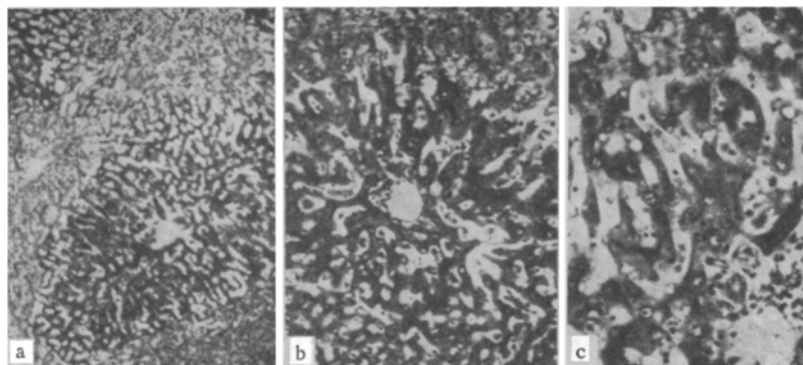


Fig. 1. Destruction of hepatic lobules with marked proliferation of connective-tissue cells (a), hyperplasia of Kupffer cells in modified hepatic lobules (b), deformation of hepatocytes with severe vacuolation of cytoplasm and karyolysis of nuclei (c). Hematoxylin-eosin: a, b) 160 $\times$ , c) 320 $\times$ .

The nitrogen balance (in mg/day) was determined during each period of the experiment by determining the total nitrogen of the urine and feces by the micro-Kjeldahl method.

### EXPERIMENTAL RESULTS

As Table 1 shows, during the period on a balanced protein diet no difference was found between the values of the nitrogen balance in the experimental (subsequently receiving  $\text{CCl}_4$ ) and control animals. With the change to the protein-free diet the nitrogen balance of the rats of both groups became negative.

Different results were obtained in the third period of the experiment – the period of parenteral feeding; during this period the state of the experimental animals differed from that of the control. They received injections of the digest when the state of their liver function was definitely impaired. To judge from the histological picture (Fig. 1), 24 h after the subcutaneous injection of  $\text{CCl}_4$  the experimental rats had developed productive inflammation of the liver, in agreement with data in the literature [12].

During parenteral feeding the principal index of anabolic efficiency is the nitrogen balance [8-12]. The investigations showed that the nitrogenous substances of the placental digest, when injected parenterally into animals with experimental toxic hepatitis, were not assimilated, for not only did the negative nitrogen balance not change to positive, as it did in the control animals, but it actually increased by comparison with the nitrogen balance during the period that the experimental rats were on the protein-free diet (Table 1).

These results are further experimental evidence in support of the advisability of giving remedies improving the liver function (insulin, glucose, vitamins of the B group, etc.) in order to increase the efficiency of parenteral nitrogenous feeding.

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