The Effect of Inanition on Liver Catalase Activity in Mice.* (20159)

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Greenstein(1) reported that a 3-day starvation period caused no decrease of rat liver catalase, whereas Miller(2,3) showed a definite lowering of the liver enzyme level in rats after a 7-day period. Rats on a protein-free diet for 7-10 days had a liver catalase activity of approximately 50% of normal(4). Begg (5) has recently reported that force-fed, tumor bearing rats still showed a decrease in liver catalase. The present study shows an effect of food and water withdrawal on mouse liver catalase.

Methods. Twenty C3H mice and 26 C57 black mice, 3 to 4 months of age of both sexes, were maintained on Purina Laboratory Chow and water *ad libitum*. Since the animals often reduced their food consumption when taken out of their regular cages, it was measured for 3 days before the experimental period. The mice were then separated into the following categories: 1) animals receiving food and water *ad libitum*, 2) animals receiving food *ad libitum* with water withheld, 3) animals receiving water *ad libitum* with food withheld, and 4) animals receiving neither food nor water. The group was maintained in this manner for 24 hours, after which they were killed. Catalase activity in the livers was determined by our modification(6) of the manometric method of Perlmann and Lipmann(7). Calculations were made on both a wet weight and a dry weight basis. Erythrocyte catalase had no significant effect since it is much less active than liver catalase. The values are reported as the evolution of O_2 per 44 x 10^{-8} g of liver, which is the actual amount of tissue used for assay.

Results and discussion. Experimental results are summarized in Table I. Following a 24-hour period of food and water deprivation, liver catalase was lowered by approximately one-fourth in both strains. A somewhat greater lowering occurred in the C3H strain, which had higher normal values. The difference between groups receiving water but no food and the group receiving neither, was not statistically significant.

The decrease in animals deprived of water alone was about one-half of that in animals deprived of food or food and water, probably because they voluntarily restricted their intake to about one-half the normal.

Summary and conclusions. 1. A 24-hour withdrawal of food and/or water results in a lowering of liver catalase activity in mice of both C3H and C57 black strains. 2. Liver

TABLE I. Effect of Inanition on Liver Catalase Activity.

Strain	No. of mice	Diet	Catalase activity: Wet tissue	Catalase activity: Dry tissue	Avg of % of normal food intake
C3H	5	Food and water	2.15 ± .34	6.98 ±1.24	
57b*	7	*ad lib.*	1.61 ± .14	4.89 ± .42	
3H	5	Food *ad lib.*,	1.91 ± .22	5.94 ± .70	51.8% ± 7.6
57b*	7	no water	1.50 ± .19	4.42 ± .60	63.1% ± 13.4
3H	5	Water *ad lib.*,	1.69 ± .22	4.81 ± .67	
57b*	5	no food	1.31 ± .15	3.52 ± .48	
3H	5	No food, no	1.70 ± .17	4.75 ± .51	
57b*	7	water	1.35 ± .11	3.71 ± .40	

* b = black.

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catalase measurements in tumor bearing or treated mice are significant only if food and water intake are controlled.

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Effect of Complete Hepatic Vein Ligation on Portal Pressures and Ascites Formation in Dogs with Porta-Caval Shunts.* (20160)

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Bollman(1) stated, "Because of the anatomic relation of the liver to the inferior vena cava, no suitable technic has been devised for direct constriction of the hepatic veins." Simonds and Brandes(2) and Brandes(3) studied the effects of obstructing the hepatic veins by use of a mass ligature technic employing a soft rubber tube as a tourniquet to occlude the veins. Child and associates(4) occluded the hepatic veins in the *Macaca mulatta* monkey by placing a polythene tube in the inferior vena cava held in place by a ligature above and below the entrance of the hepatic veins. Most investigators have relied on supra-diaphragmatic constriction of the inferior vena cava to produce increased intrahepatic and portal pressures in the study of ascites production. The purpose of this study was to develop a technic for complete individual occlusion of the hepatic veins, and to determine the effects of such occlusions on portal pressures, liver function, pathologic changes in the liver, and ascites formation.

Methods. Healthy mongrel dogs were used. Preliminary efforts showed that total ligation of the hepatic veins resulted in 100% mortality. Immediately after occlusion of the last hepatic vein the inferior vena cava collapsed almost completely and the animals died in acute shock from pooling of blood in the portal system in a period of 5 to 30 minutes. If the compression of the portal outflow was released just before the heart stopped, the dogs recovered completely. In each case the last vein to be occluded was the large proximal vein just below the diaphragm which drains all of the liver except the right lateral lobes (Fig. 1). If this vein was left untied, dividing all of the others, the dogs survived indefinitely with no ill effects. To attain survival in dogs with total ligation of the hepatic veins a porta-caval shunt had to be done in conjunction with the ligation. This allows portal blood to flow directly into the inferior vena cava, and the hepatic artery inflow to the liver then escapes into the inferior vena cava in a retrograde manner through the proximal segment of the portal vein and the porta-caval anastomosis. Fifteen dogs weighing 11 to 22 kg were prepared and studied in this manner. A thoracoabdominal approach through the right tenth interspace, dividing the diaphragm from its costal attachment to the hiatus of the inferior vena cava, was employed to divide the hepatic veins. The vena cava in this area not only is intimately adherent to the diaphragm, but also is surrounded by liver, and must be dissected from these attachments before the division of the individual hepatic veins is begun (Fig. 2).

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