254 (2214)

Studies on the physiology of the liver. VII. The effect of insulin on the blood sugar following total and partial removal of the liver.

By FRANK C. MANN and THOMAS B. MAGATH.

[*From the Division of Experimental Surgery and Pathology, The Mayo Foundation, and Section on Clinical Laboratories, Mayo Clinic, Rochester, Minnesota.*]

Previously we have shown that the total removal of the liver is followed by (1) a rapid decrease in blood-sugar, (2) always accompanied by a characteristic group of symptoms, and (3) the administration of glucose which abolishes the symptoms, temporarily restoring the animal to the normal state. All of this is comparable to what happens when a large dose of insulin is administered to a normal animal.

The problem investigated is the rôle the liver plays in the effect of insulin. Therefore, insulin was administered before and after the total removal of the liver in dogs. Removal of the liver did not affect the sharp precipitate drop in the blood-sugar after administration of insulin. Whereas injecting glucose in an animal with its liver intact during the condition of insulin hypoglycemia restores the sugar level permanently, after the liver is removed no permanent level can be maintained despite frequent large doses of glucose.

The same experiments were carried out on dogs before and after partial removal of the liver. While the same sharp drop in blood-sugar occurs after giving very small doses of insulin, there is a slow restoration of the curve, even though only 20 per cent. by weight of the liver remains.

From these experiments we conclude that the symptoms associated with hypoglycemia following the administration of insulin do not differ essentially from those we noted in association with the total removal of the liver, and the action of glucose seems to be identical in the two conditions. The effect of large doses of insulin in producing hypoglycemia is not changed by the total removal of the liver, nor is the hypoglycemic action of small doses of insulin modified by partial (60 to 80 per cent.) removal of this organ. However, the liver is necessary for the permanent restoration of the sugar level.