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Comparative study of the blood sugar concentration in the liver vein, the femoral artery and the femoral vein during insulin action.

By CARL F. CORI, GERTY T. CORI and HILDA GOLTZ (by invitation).

[*From the State Institute for the Study of Malignant Disease, Buffalo, N. Y.*]

A new method has been developed for the collection of blood from the liver vein, whereby admixture of blood from the *vena cava* is avoided. The puncture of the liver vein requires no narcosis of the animal and can be repeated several times.

The normal sugar values for different blood vessels obtained on rabbits which were previously starved for 24 hours were as follows:

1. For the difference in blood sugar concentration of the liver vein and the neck vein: 28 mg. (average of 9 experiments).
2. For the difference in the blood sugar concentration of the femoral artery and femoral vein: 8 mg. (average of 20 experiments).
3. For the difference in blood sugar concentration of the liver vein and the femoral artery: 23 mg. (average of 9 experiments).

The following two questions were studied:

1. Does the liver show a diminished output of sugar into the bloodstream during insulin action?
2. Are the muscles as well as the liver influenced by insulin?

Simultaneous analysis of the blood of the liver vein, the femoral artery and the femoral vein showed that the factors causing the fall of the blood sugar during insulin action are:

1. A diminished output of sugar by the liver into the blood stream.
2. A larger intake of sugar than normal by the muscle from the blood stream.

Insulin may cause a fall of blood sugar in three ways:

a. By its action on the liver (diminished output of sugar).

b. By its action on the muscle (increased intake of sugar).

c. By its combined action on both the liver and the muscle, the former showing diminished output and the latter simultaneously increased intake of sugar.

57 (2289)

Comparative study of the blood sugar concentration in the arterial and venous blood of diabetic patients during insulin action.

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The conclusions reached in the preceding abstract led to the study of the differences in blood sugar concentrations in arterial and venous blood of normal and diabetic subjects during the action of insulin.

The arterial blood was collected from the finger according to the technique of Foster.[1] Sugar was determined by the Hagedorn and Jensen method.[2]

The difference in the sugar concentration in arterial and venous blood of normal fasting individuals was found to be 5.5 mg. (average of 16 cases). For diabetic patients the difference in sugar content of the artery and vein was very variable ranging from 0-28 mg., the difference being in general higher than for normal persons.

During insulin action 6 out of the 7 diabetics examined showed a larger intake of sugar by the muscle. The highest observed difference was 35 mg. One case showed a diminished intake of sugar by the muscle during insulin action dropping to 0 three hours after the insulin injection. This indicates, as in the case of animals, that diabetic patients may react in several ways tow-

[1] Foster, *J. Biol. Chem.*, 1923, lv, 291.

[2] Hagedorn and Jensen, *Biochem. Z.*, 1923, cxxxv, 46.