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Rate of absorption of hexoses and pentoses from peritoneal cavity.

CARL F. CORI and HILDA L. GOLTZ.

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

It is assumed that the normal mechanism of absorption from the intestine is dependent on the specific function of the epithelial cells. This assumption is based on the observation that a destruction of the epithelial cells by heat or by sodium fluoride changes the mechanism of absorption. The objection to such experiments is the rather crude treatment to which the intestine is subjected.

It has been shown previously^{1, 2} that different hexoses and pentoses are absorbed at widely different rates from the intestine. This has been taken as an indication that the intestinal membrane is possessed of a high degree of selective permeability for sugars. It has also been found that if the amount of sugar absorbed is plotted against time a straight line is obtained. If one ascribes these phenomena to the specific function of the epithelial cells of the intestine, then the peritoneal cavity, which has a very different epithelial lining, should show an entirely different mechanism of absorption of sugars.

Experimental.

Full grown mice, not differing by more than 1 to 2 grams in weight, were used. One cc. of 20 per cent solutions of the different sugars, warmed to 38° C., was injected. By using very fine needles, fluid did not escape from the peritoneal cavity after the injection. The mice were killed by decapitation and completely skinned. The carcass was placed in a beaker, the peritoneal cavity cut open and washed out with successive portions of hot, distilled water. The washings were poured into a 200 cc. volumetric flask and after precipitation with colloidal iron, the sugar was determined in an aliquot part of the filtrate. If the mice were killed immediately after the injection from 95 to 97 per cent of the sugar was recovered from the peritoneal cavity.

¹ PROC. SOC. EXP. BIOL. AND MED., 1925, xxii, 495, 497.

² J. Biol. Chem., in press.

TABLE I.

The rate of absorption of a 20 per cent glucose solution from the peritoneal cavity of mice. 1 cc. or 200 mg. were injected and the animals killed 15, 30 and 45 minutes later.

Length of absorption period.	Amount of glucose absorbed.	Remarks.
minutes.	mg.	
15	74	Average of 20 experiments.
30	101	" " " "
45	108	" " " "

Table I shows that the rate of absorption of sugar from the peritoneal cavity diminishes more and more the longer the absorption is allowed to proceed. This is in marked contrast to the intestine, where the rate of absorption remains entirely constant.

TABLE II.

Comparison of the rate of absorption of hexoses and pentoses from the peritoneal cavity of mice. 1 cc. of 20 per cent sugar solutions or 200 mg. were injected and the animals killed 15 minutes later.

Type of sugar.	Amount of sugar absorbed	Ratio (Glucose=100)	Remarks.
	mg.		
d—Galactose	73	98	Average of 8 exper.
d—Glucose	74	100	Average of 20 exper.
d—Fructose	71	96	Average of 9 exper.
d—Mannose	72	97	Average of 13 exper.
l—Xylose	75	101	Average of 7 exper.
l—Arabinose	76	102	Average of 10 exper.

It is evident from Table II that the different sugars investigated are absorbed at the same rate from the peritoneal cavity. This is again in contrast to the intestine, where, if glucose is taken as 100, galactose gives a ratio of 110, fructose of 43, mannose of 19, xylose of 15 and arabinose of 9.

Conclusions.

1. Sugar is absorbed from the peritoneal cavity at a diminishing rate.
2. The peritoneal cavity is equally permeable for the different sugars investigated.
3. It is suggested that the different mechanism of absorption of sugars from the intestine and the peritoneal cavity is due to the different epithelial lining of these two membranes.