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Portal and Hepatic Blood Sugar After Glucose Administration.

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Olmsted and Read[1] found that in the decapitate cat there was more glucose in hepatic than in portal blood at a time when glycogen was being deposited in the liver. At the same time Tsai and Yi[2] obtained similar results, and also reported[3] that even during absorption of sugar after its injection into the stomach, the concentration of sugar in portal blood in the decapitate cat falls short of that in hepatic blood. We had at the same time completed a similar investigation of the decapitate cat, and had extended our experiments to the amytalized dog, taking into account the behavior of lactic acid in the blood. The data are as follows.

We injected 0.5 gm. glucose per kilo body weight into the duodenum of 2 decapitate cats, the hepatic artery having been ligated in each. Total reducing substance was estimated by Folin-Wu tungstate precipitation; glucose by Somogyi's zinc precipitation; 0.1 cc. samples were used.

In these 2 preparations, blood taken from the portal vein within half an hour after glucose injection contained more glucose than hepatic blood. But within an hour the situation was reversed (Table I).

TABLE I.

Total reducing substance and glucose in hepatic and portal blood of decapitate cat with hepatic artery tied.

6.5 cc. of 40% glucose sol. injected 4 hr. after decapitation.	Hepatic		Portal	
	"Blood Sugar"	Glucose	"Blood Sugar"	Glucose
20 min. after glucose	216	190	247	229
1 hr. " "	260	237	240	220
2 hr. " "	325	300	306	290
4 hr. " "	211	186	200	178

In a third preparation, in which the hepatic artery was not tied, there was delay in absorption and more glucose was found in hepatic than in portal blood in every case (Table II).

[1] Olmsted, J. M. D., and Read, L. S., *Am. J. Physiol.*, 1934, **109**, 303.

[2] Tsai, C., and Yi, C. L., *Chinese J. Physiol.*, 1934, **8**, 245.

[3] Tsai, C., and Yi, C. L., *Chinese J. Physiol.*, 1934, **8**, 273.

TABLE II.
Total reducing substance and glucose in hepatic and portal blood of decapitate cat, hepatic artery not tied.

	Hepatic		Portal	
	"Blood Sugar"	Glucose	"Blood Sugar"	Glucose
4 hr. after decapitation	120	103	99	90
½ hr. after glucose	122	114	99	90
1 hr. " "	157	147	151	140
1½ hr. " "	215	195	169	158

Three dogs under amytal anesthesia were given a solution containing 10 gm. glucose by subcutaneous injection, the hepatic artery being tied. Total blood sugar was determined by the Folin-Wu method, using 1 cc. samples. Lactic acid was determined by the Friedemann, Cotonio, and Shaffer method. Rose, Giragossintz, and Kirstein[4] found that although fructose caused a great increase in blood lactic acid, glucose brought about little, if any, change in lactic acid in portal blood. We find a slight but significant increase in lactic acid after glucose injection. The results are averaged in Table III. It will be noted that the sugar plus one-half the lactic acid (since we may consider 2 molecules of lactic acid equivalent to one of glucose) in hepatic and portal blood do not balance, *i. e.*, the extra amount of sugar in hepatic blood is not balanced by an equivalent amount of lactic acid in portal blood, although there is more lactic acid in portal than in hepatic blood.

In 7 amytalized dogs 10 gm. of glucose were injected into the

TABLE III.
Average hepatic and portal "blood sugar", lactic acid, and liver glycogen in 3 dogs after subcutaneous injection of 10 gm. of glucose.

Hr. after Glucose	Hepatic		Portal		Liver Glycogen
	Sugar	Lactic Acid	Sugar	Lactic Acid	
1	170	27	130	35	1.15
2	207	24	152	42	1.31
3	127	20	101	37	1.45

TABLE IV.
Glucose and lactic acid in hepatic, portal, and femoral artery blood of amytalized dog.

	Hepatic		Portal		Femoral Artery	
	Glucose	Lactic Acid	Glucose	Lactic Acid	Glucose	Lactic Acid
Before glucose	90	20	76	27	80	25
1 hr. after glucose	141	20	130	32	135	27
2 hr. " "	135	28	120	39	120	32

[4] Rose, M. I., Giragossintz, G., and Kirstein, E. L., PROC. SOC. EXP. BIOL. AND MED., 1930, **27**, 523.

duodenum. The hepatic artery was not tied. The results of a typical experiment are given in Table IV.

TABLE V.
Average hepatic and portal "blood sugar" and lactic acid in 7 amytalized dogs.

Hr. after Glucose	Hepatic		Portal	
	"Blood Sugar"	Lactic Acid	"Blood Sugar"	Lactic Acid
1	152	22	120	30
2	240	34	180	51
5	122	18	90	26

We find, therefore, that shortly after injection of moderate amounts of glucose there may or may not be more glucose in portal than in hepatic blood; after an hour, however, while absorption is still proceeding, there is more glucose in hepatic than in portal blood, and at the same time there is more lactic acid in portal than in hepatic blood, although not enough to account for the differences in the sugar content of blood entering and leaving the liver.

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Effect of Intravenous Acacia on Physio-Chemical Properties of the Blood.

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(Introduced by C. D. Leake.)

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Stimulated by the reports of Hartmann[1] on the intravenous use of acacia, we were encouraged to give a clinical trial to certain cases of intractable nephrotic edema. This was followed by such marked diuresis and unusual reactions that it was deemed advisable to accumulate further knowledge on the subject. Extensive observations of these phenomena have been recorded by Bayliss,[2] Henderson,[3] and Hanzlik[4] but with few observations on the oxygen content of the blood.

This preliminary report of the effects of intravenous acacia solu-

[1] Hartmann, A. F., Senn, M. J. E., Nelson, M. V., and Perley, A. M., *J. Am. Med. Assn.*, 1933, **100**, 251

[2] Bayliss, W. M., *J. Am. Med. Assn.*, 1922, **78**, 1885.

[3] Henderson, Y., and Haggard, H. W., *J. Am. Med. Assn.*, 1922, **78**, 697.

[4] Hanzlik, P. J., De Eds, F., and Tainter, M. L., *Arch. Int. Med.*, 1925, **36**, 447.