TABLE IV. Liver Glycogen Concentration in Fasting and Dextran Fed Rats.

	Alkali soluble, mg/100 g	TAA soluble, mg/100 g
10 fasting rats	130 ± 13*	31 ± 8
14 fasted rats 4 hr after dextran feeding		
Immediate analysis	751 ± 106	469 ± 66
Aliquot at room temp. 2 hr	71 ± 13	10 ± 2

* Stand. error.

TABLE V. Recovery of Added Dextran from Livers Undergoing Glycogenolysis.

No. of livers analyzed	Dextran added, mg/g	Dextran recovered, mg/g	
		Alkali soluble	TAA soluble
6	644	517 ± 31*	610 ± 8
8	736	720 ± 22	683 ± 20

* Stand. error.

The dextran was added to each of two samples, one of which was digested with alkali, the other of which was extracted with trichloroacetic acid. Time of incubation at room temp. was 2 hr.

for 2 hours at room temperature results in the disappearance of most of the glycogen. Dextran added to aliquots of the liver tissue and determined either as alkali-soluble or trichloroacetic acid-soluble anthrone-reacting substance, is recovered without substantial loss, so that no significant dextranolysis seems to occur under these conditions in liver tissue (Table V).

Discussion. The data show that in both rat and man the oral administration of dextran leads to a significant and sustained increase in blood reducing substance, most of which is fermentable. In the rat, this increase in blood sugar is accompanied by a significant increase in liver glycogen 4 hours after feeding. Dextran is therefore capable of being broken down in the intestine to products which yield glucose and glycogen in the animal. The early increase in blood sugar in both rat and man indicates that the intestinal breakdown of dextran may be a relatively rapid process, and it suggests that this may not be ascribable merely to bacterial action but more probably to an action of an enzyme or enzymes of the intestinal tract. Experiments now under way in this laboratory indicate that the latter possibility may be realized: suspensions of rat duodenal mucosa have been found to liberate glucose from dextran at rates which can account satisfactorily for the increases in blood sugar seen after feeding.

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Plasma Volume Determination in the Hypovolemic State Produced by Intraperitoneal Injection of a Non-Electrolyte Solution. (19923)

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It was noted in previous work(1), that following the subcutaneous injection of non-electrolyte containing fluids there were certain discrepancies in plasma volumes as determined by the RIHSA* method. These were manifested by failure to obtain reduction in plasma volume commensurate with the rise in hematocrit, and clinical signs of hypotension and dehydration. One of the possible factors considered was an abnormal rate of disappearance of the radioactive albumin in this pathophysiologic state. It was thought to be worth-

* Radioactive Iodinated Human Serum Albumin.

while to investigate the disappearance of radioactive iodinated protein under controlled conditions in the dog when a non-electrolyte carbohydrate solution was given intraperitoneally.

Methods. Six mongrel dogs weighing 18 to 20 kg on the standard kennel diet were studied. Control plasma volumes were obtained utilizing the radioactive iodinated albumin method previously described(2). The radioactive I^{131} protein was prepared from dog plasma according to the method of Fine and Seligman(3). In unanesthetized animals a polyvinyl catheter was introduced into the external jugular vein through a No. 13 needle and taped in position. A short No. 18 needle was wedged into the lumen of the catheter for convenience in sampling. Twenty cc of the radioactive plasma were injected into the opposite external jugular vein and periodic samples were withdrawn from the catheter for 30 minutes. The blood samples were placed in heparinized tubes and centrifuged at 2500 rpm for 30 minutes. The radioactivity of the supernatant plasma was determined and expressed as counts per minute. Plasma volumes were calculated from the 10 minute sample(2). After 30 minutes a 10% invert sugar solution,† 25 ml/kg, was introduced into the peritoneal cavity through a No. 18 needle. This infusion required 10 to 15 minutes. At 1, 2, 3, and 4 hours after the intraperitoneal injection simultaneous blood and peritoneal fluid samples were obtained. The radioactivity of one cc aliquot of these samples was determined as described above. In addition, the following chemical determinations were made on the samples: sodium and potassium concentration using a Barclay flame photometer and chloride concentration by the method of Schales and Schales(4). Four hours after the intraperitoneal infusion, 20 cc of radioactive plasma were again injected into the external jugular vein after obtaining a control blood sample, and periodic blood samples were collected from the polyvinyl catheter for 30 minutes.

† The 10% invert sugar in distilled water (Travert) employed in this study was kindly supplied by Dr. Robert P. Herwick, Medical Director of the Baxter Laboratories, Morton Grove, Ill.

TABLE I. Changes in Plasma Volume and Hematocrit 4 Hours Following Intraperitoneal Infusion of 10% Invert Sugar.

Dog		Plasma vol	Hematocrit
3	Control	1200	45.2
	4 hr PI*	1088	53.4
4	Control	1102	34.9
	4 hr PI	925	42.5
5	Control	908	49.8
	4 hr PI	655	55.6
6	Control	772	49.2
	4 hr PI	672	52.9
8	Control	903	41.9
	4 hr PI	975	47.7
9	Control	849	50.1
	4 hr PI	725	54.8

* PI = Post infusion.

TABLE II. Changes in Electrolyte Concentrations in Peritoneal Fluid Following Intraperitoneal Infusion of 10% Invert Sugar.

Dog No.	Time, hr	Electrolytes in meq/l Na	K	Cl
P–5	1			73.1
	2			91.6
	3			95.2
	4			97.4
	4½			102.2
–6	1	79.6		
	2			
	3	117.8	3	80.8
	4	120	3.18	103
–8	1	60.8	1.5	
	2	103.7	2.5	
	3	109.6	2.8	
	4	116	2.9	
–9	1	65.2	1.95	
	2	94	2.76	
	3	105	3.04	
	4	110	3.21	

Results and discussion. Table I summarizes the change in plasma volume 4 hours after the intraperitoneal injection. The average decrease in plasma volume was 145.5 cc or 16.7%. The average rise in the hematocrit was 15.3%. It may be noted that a decrease in plasma volume occurred in all but one animal. There was a uniform rise in the hematocrit determinations. The changes in plasma volume and hematocrit following intraperitoneal injection of the non-electrolyte solution indicates a significant shift of fluid from the intravascular compartment. This is in accord with the results of other investigators (5) who have demonstrated this fluid shift.

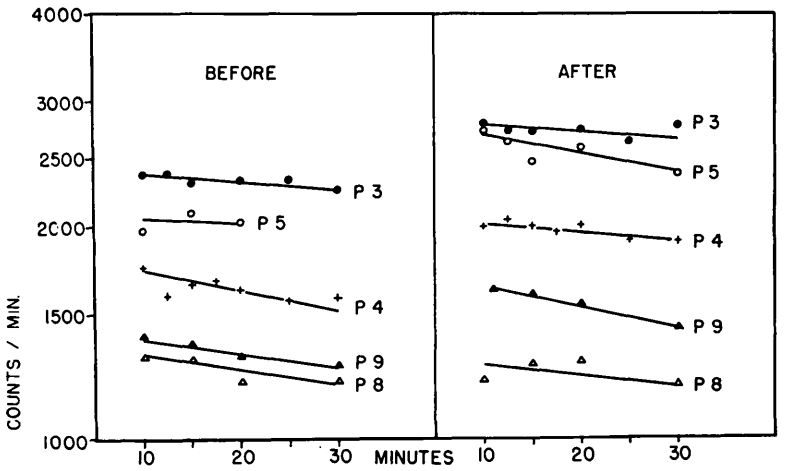

FIG. 1. One half hour disappearance curve of radioactive iodinated protein before and after peritoneal inj. of Travert.

It has been previously demonstrated that there is a transfer of electrolytes into peritoneal fluid when a non-electrolyte solution is injected into the peritoneal cavity(5). Table II indicates the electrolyte concentrations in the peritoneal fluid at various times following the injection.

Fig. 1 is a comparison of the ½ hour disappearance curves for 5 dogs before and 4 hours after the intraperitoneal injection. The slopes show little difference before and after the injection. The radioactivity of peritoneal fluid at intervals up to 4 hours after the injection averaged 10 to 33 counts per minute. These values are insignificant when compared to the activity of the plasma at the same time intervals. It would be logical to conclude that under the conditions of this experiment: 1. There is no significant change in the rate of disappearance of radioactive iodinated albumin from the blood stream in 30 minutes when a nonelectrolyte fluid (10% Travert) is injected into the peritoneal cavity in sufficient amounts to cause a significant fluid shift from the intravascular compartment. 2. Under these conditions intravenous radioactive protein did not enter the peritoneal fluid in significant amounts over a 4-hour period.

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