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Effect of Diet on Glucose Tolerance of Normal and Hypophysectomized Dogs.

T. E. WEICHSELBAUM, PETER HEINBECKER AND MICHAEL SOMOGYI.

From the Laboratories of the Jewish Hospital and the Department of Surgery, Washington University School of Medicine, St. Louis, Missouri.

Kageura[1] reported that dogs utilized glucose at a slower rate than normal following a high fat-low carbohydrate diet. Certain of the animals showed diabetic glucose-tolerance curves. The bearing of the results on problems of therapy in diabetes mellitus seemed of sufficient import to warrant repetition of the experiments.

Accordingly 9 normal dogs were fed for 7 to 14 days on a diet consisting of 100 gm. of fat and 350 gm. raw lean meat daily. Six of the animals were then given 0.85 gm. of glucose *per os* and 3 of them 1.5 gm. of glucose intravenously per kilo of body weight and their glucose tolerance determined by blood analyses made according to the method of Shaffer and Somogyi[2] at the intervals indicated in

TABLE I.
Effect of Diet upon Glucose Tolerance in Normal Dogs.
Figures represent mg. of glucose per 100 cc. blood.

Dog No.	Date	Time in min. after administration glucose 0	30	60	90	120	180	240	300	360	Diet	Glucose Tolerance
105*	4/24/36	81	111	108	89	82	83	81	87		High CHO	No difference
	5/8	77	97	101	87	80	77	76	83		" Fat	
106*	4/24	85	130	110	82	75	88	87	87		" CHO	" "
	5/8	80	101	118	92	77	74	81	77		" Fat	
107*	2/11	84	116	99	82	92	84	80			" CHO	Improved
	2/17	91	112	155	135	104	93	92			" Fat	
108*	3/30	89	98	97	87	89	85	76			" CHO	No difference
	4/6	75	95	85	79	65	81	78			" Fat	
110*	3/30	88	103	98	88	93	92	94			" CHO	Improved
	4/6	81	113	137	154	142	78	83			" Fat	
A.1*	3/30	93	95	85	88	94	92	91			" CHO	"
	4/6	87	128	144	106	79	90	94			" Fat	
A.5*	2/11	88	93	103	110	99	87	91			" CHO	No difference
	2/17	73	94	106	112	97	77	76			" Fat	
B.38†	2/1/37	76	159	58	83	87	85	83	82	82	" CHO	Improved
	2/16	76	285	185	96	73	65	78	79	80	" Fat	
016†	2/1	80	209	62	71	77	79	81	80	77	" CHO	No difference
	2/16	69	114	72	73	71	80	73	74	73	" Fat	
08†	2/1	76	238	106	82	81	76	73	71	73	" CHO	" "
	2/16	76	225	120	76	72	76	78	78	81	" Fat	

*0.85 gm. of glucose per kg. body weight given *per os*.
†1.5 gm. of glucose per kg. body weight given intravenously.

1 Kageura, *J. Biochem.* (Japan), 1922, **1**, 333.

2 Shaffer, P. A., and Somogyi, M., *J. Biochem.*, 1933, **100**, 695.

the table. The same animals were then given a low fat diet consisting of 100 gm. cane sugar, one liter skimmed milk and 300 gm. whole wheat bread daily for 14 days. Then their glucose tolerance was again determined.

The results are shown in Table I. They demonstrate that American dogs do not exhibit any consistent difference in their glucose tolerance after a high fat-low carbohydrate diet as contrasted with a low fat-high carbohydrate diet. In no instance in this small series was there any decrease in glucose tolerance on a high carbohydrate diet. In some of the animals there was a definite improvement. The suggestion that the difference in response of Japanese and American dogs may be related to a normal difference in their diets naturally presents itself. Japanese dogs are fed on a relatively high carbohydrate diet.

The effect on glucose tolerance of a high fat-low carbohydrate and a low fat-high carbohydrate diet was determined in 8 hypophysectomized animals within 2 months following the operation in the same manner as outlined above for normal dogs. Four of these animals had been previously studied as normal dogs.

TABLE II.
Effect of Diet upon Glucose Tolerance in Hypophysectomized Dogs.
Figures represent mg. of glucose per 100 cc. blood.

Dog No.	Date	Time in min. after administration glucose 0	30	60	90	120	180	240	300	360	Diet	Glucose Tolerance
111*	2/11/36	88	151	119	73	79	86	83			High CHO	Improved
	2/17	88	143	150	101	85	81	75			" Fat	
B.37*	2/11	69	70	72	74	65	69	68			" CHO	"
	2/17	71	82	93	88	71	61	65			" Fat	
114*	3/30	77	91	94	77	73	76	78			" CHO	"
	3/16	76	112	116	81	74	67	70			" Fat	
A.5*	3/30	89	115	120	71	75	80	85			" CHO	"
	4/6	71	129	156	137	100	69	64			" Fat	
B.38†	3/15/37	58	293	144	57	55	67	71	74	76	" CHO	"
	4/5	72	366	256	151	101	66	64	73	83	" Fat	
016†	3/15	69	169	60	68	68	66	67	70	71	" CHO	"
	4/5	66	251	79	59	68	77	75	72	77	" Fat	
08†	3/15	70	199	49	55	77	73	77	74	81	" CHO	"
	4/5	72	320	189	94	70	65	68	69	70	" Fat	

*Glucose *per os.*
†Glucose intravenous.

The results show a striking change from those obtained on normal dogs. (Table II.) All the hypophysectomized animals showed a decreased glucose tolerance on a high fat-low carbohydrate diet.