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Effect of Diet on Insulin Response in Normal and Hypophysectomized Dogs.

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In another paper[1] are described the effects of high fat-low carbohydrate and low fat-high carbohydrate diets on the glucose tolerance in normal and hypophysectomized dogs. We report here the effect of similar diets on the insulin response of such animals.

Ten normal dogs were fed from one to 3 weeks on a diet consisting of 100 gm. of fat and 350 gm. raw lean meat daily. The animals were then given 0.5 units of insulin per kilo of body weight intravenously and their response to insulin determined by blood sugar determinations made at the intervals indicated in the table. The same animals were then given a low fat-high carbohydrate diet consisting of 100 gm. cane sugar, one liter of skimmed milk and 300 gm. of whole wheat bread daily for a similar time period. Their insulin response was again determined.

TABLE I.
Effect of Diet on Insulin Response in Normal Dogs.
Figures represent mg. of glucose per 100 cc. blood.

Dog No.	Date	Time in min. after administration insulin 0	30	60	90	120	180	240	300	360	Diet	Insulin Response
A.1	4/7/36	82	68	49		59	73	91			High CHO	Decreased
	4/1	90	49	48		41	59	92			" Fat	
105	4/23	83	56	54		53	54	62			" CHO	Improved
	5/7	66	48	42		60	89	89			" Fat	
106	4/23	86	51	64		71	88	107			" CHO	Decreased
	5/7	71	33	44		55	70	73			" Fat	
107	3/2	88	35	44		42					" CHO	Improved
	2/21	86	63	47		48						
108	4/1	88	56	56		67	73				" CHO	Decreased
	4/7	72	61	44		46	64				" Fat	
110	4/1	98	49	54		79	90				" CHO	"
	4/7	77	47	50		55	64				" Fat	
04	1/29/37	80	45	46	58	73	83	87	87	84	" CHO	Improved
	2/15	73	58	53	73	81	87	83	83	82	" Fat	
B.38	1/29	77	64	43	52	63	83	82	84	84	" CHO	No difference
	2/15	71	52	40	49	67	74	78	75	78	" Fat	
016	3/8	69	67	31	37	46	63	82	86	84	" CHO	Improved
	3/30	76	43	40	53	65	76	82	79	76	" Fat	
08	1/29	78	47	54	66	83	83	89	80	82	" CHO	No difference
	2/15	73	49	53	55	70	82	86	87	83	" Fat	

[1] Weichselbaum, T. E., Somogyi, M., and Heinbecker, P., PROC. SOC. EXP. BIOL. AND MED., 1937, **36**, 802.

The results are presented in Table I. Their analysis shows no consistent effect of change in diet on insulin response.

Six hypophysectomized dogs within 2 months following the operation were given the above diets for similar time periods and their insulin response again determined. Three of the dogs of this series had been used before in the normal series.

The results are presented in Table II. The animals studied show definitely without exception better insulin response after the low fat-high carbohydrate than after high fat-low carbohydrate diet.

TABLE II.
Effect of Diet on Insulin Response in Hypophysectomized Dogs.
Figures represent mg. of glucose per 100 cc. blood.

Dog No.	Date	Time in min. after administration insulin 0	30	60	90	120	180	240	300	360	Diet	Insulin Response
B.37	6/1/36	72	38	31		36	58	82	82	88	High CHO	Improved; 0.25U/kg. (Mild convulsions)
	5/7	62	32	30		49	62	68			" Fat	0.5 U/kg.
A.5	4/1	93	41	43		35	33				" CHO	Improved: (Violent convulsions)
	4/7	79	70	46		44	53				" Fat	
B.38	3/8/37	52	45	24	27	34	50	57	56	61	" CHO	Improved
	3/30	69	39	55	65	73	73	73	69	75	" Fat	
016	3/8	70	29	22	33	37	63	69	80	79	" CHO	Improved
	3/30	68	29	27	47	63	76	78	72	72	" Fat	
08	3/8	58	32	30	26	23					" CHO	Improved; (Violent convulsions)
	3/30	71	32	25	28	37	53	72	83	77	" Fat	

A comparison of the effect of similar diets on glucose tolerance in normal and in hypophysectomized dogs shows a definite correlation. In normal animals a change from a high fat-low carbohydrate to a low fat-high carbohydrate diet results either in no change or an occasional instance of improvement of glucose tolerance. The same change of diet produces no clear cut or consistent effect on insulin response. In hypophysectomized animals, on the other hand, there is a markedly increased glucose tolerance after a high carbohydrate-low fat diet and also a consistent and definite improvement in insulin response.