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Influence of Thiourea on Organ Weights of Rats as Related to Food Intake.

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Thyroid hypertrophy is invariably observed following the administration of antithyroid drugs but the influence on other body organs is not definitely established.¹ Since it is known that thiourea or thiouracil will reduce food intake²⁻⁶ and since inanition alone will alter organ weights, the present investigation was undertaken to determine the influence of reduced food intake alone on organ weights. Therefore, organ weights of thiourea-fed,

pair-fed and ad-libitum-fed rats were compared.

Male rats of the Long-Evans strain, ranging from 139 to 162 days in age, were used. These animals were kept in metabolism cages for the measurement of daily food intake. Thiourea was fed as half of one percent of the stock diet for a period of 20 to 27 days. At autopsy, the fresh weight of the pituitary, adrenals, thyroid, seminal vesicles (including the coagulating gland and any contained fluid), kidneys and liver was recorded. The anterior pituitary was assayed for gonadotropic hormone content in the same manner as reported previously.³

Average food consumption per rat during the first 20 days totaled 258 g for the thiourea-fed rats as compared with 340 g for normal rats eating ad libitum. Furthermore, the thiourea-fed rats exhibited a body weight

¹ Riker, W. F., and Wescoe, W. C., *Am. J. Med. Sc.*, 1945, **210**, 665.

² Williams, R. H., Weinglass, A. R., Bissell, G. W., and Peters, J. B., *Endocrinology*, 1944, **34**, 317.

³ Leatham, J. H., *Endocrinology*, 1945, **36**, 98.

⁴ Astwood, E. B., Sullivan, J., Bissell, A., and Tyslowitz, R., *Endocrinology*, 1943, **32**, 210.

⁵ Hughes, A. M., *Endocrinology*, 1944, **34**, 69.

⁶ Gordon, A. S., Goldsmith, E. D., Charipper, H. A., *Fed. Proc.*, 1945, **4**, 25.

TABLE I.
Influence of Thiourea on Organ Weights of Rats.

Treatment (No. of rats)	Avg organ wt g		Avg organ wt g per 100 g body wt		
	Thiourea fed (20)	Normal pair-fed (20)	Thiourea fed (20)	Normal pair-fed (20)	Normal ad. lib. fed (20)
Pituitary	0.009	0.009	0.004	0.003	0.003
Adrenals	0.025	0.030	0.010	0.011	0.010
Thyroid	0.036	0.022	0.014	0.008	0.008
Testes	2.899	2.856	1.126	1.020	1.063
Seminal vesicles	0.694	1.082	0.267	0.382	0.377
Kidney	2.533	2.545	0.977	0.919	0.891
Liver	10.082	10.525	4.057	3.772	3.984

TABLE II.
Gonadotrophic Potency of Rat Pituitaries.

Donors		Recipients			
		No. of rats	Avg body wt	Avg organ wt — mg	
Treatment	Amt A.P.			Ovaries	Uteri
	mg		g		
—	—	10	55.1	13.4 ± 1.0*	24.7 ± 1.4
Thiourea	8.9	13	59.4	91.0 ± 7.5	72.1 ± 7.2
None—pair fed	8.5	13	57.2	94.0 ± 6.5	68.7 ± 4.2

$$* \text{ Mean deviation of mean } = \epsilon = \sqrt{\frac{\sum d^2}{n(n-1)}}$$

loss averaging 46 g whereas the normal rats gained 17 g. The pair-fed normal controls lost only 19 g in weight although food intake was restricted to that of thiourea-fed rats.

Examination of organ weights revealed the anticipated thyroid hypertrophy but the weights of the adrenals, testes, kidney and liver were not affected. The pituitaries were slightly heavier following thiourea feeding but the increase was not significant. Furthermore, the degree of food restriction imposed on the rats pair-fed with the thiourea-fed rats was not sufficient to alter the normal organ weight/body weight ratio (Table I). Other investigators have also indicated that the above organs do not change in weight in animals receiving antithyroid drugs.^{2,3,7-9} However, Baumann and Marine¹⁰ have re-

ported a definite decrease in adrenal weight due to cortical atrophy in the presence of slight medullary hypertrophy whereas Kennedy and Purves¹¹ observed adrenal hypertrophy. An increase in pituitary, kidney and liver size has also been reported to occur when thiourea or thiouracil is administered.⁸ Although our data do not reveal an influence of thiourea on most organs over the 20-day period we have consistently obtained a reduction in seminal vesicle weight (Table I). It was of interest to find that gonadotropic hormone of the anterior hypophysis of thiourea-fed and pair-fed rats did not differ although the decrease in seminal vesicle weight suggested a decrease in release of luteinizing hormone (Table II).

Summary. The reduction in food intake caused by the addition of a half of one percent of thiourea to the diet for 20 days did not influence organ weight/body weight ratios in spite of a body weight loss. In addition to thyroid hypertrophy, a decrease in

⁷ Richter, C. P., and Clisby, K. H., *Arch. Path.*, 1942, **33**, 46.

⁸ Leblond, C. P., and Hoff, H. E., *Endocrinology*, 1944, **35**, 229.

⁹ Goldsmith, E. D., Gordon, A. S., and Charipper, H. A., *Endocrinology*, 1945, **36**, 364.

¹⁰ Baumann, E. J., and Marine, D., *Endocrinology*, 1945, **36**, 400.

¹¹ Kennedy, J. H., and Purves, H. D., *Brit. J. Exp. Path.*, 1941, **22**, 241.

seminal vesicle weight was evident after feeding thiourea, although the gonadotropic hormone content of the pituitary of thiourea-fed and pair-fed rats did not differ. Pituitary, testis, adrenal, kidney and liver weights were not significantly changed.

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Temperature Coefficients of Hemolysis of a Few Types of Nucleated Erythrocytes.*

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Jacobs *et al.*¹ have presented a series of hemolysis of various types of mammalian data giving temperature coefficients for the erythrocytes in non-electrolytes. These data

TABLE I.
Temperature Coefficients for Hemolysis in Isosmotic Solutions.

Type of blood	Penetrating substance	Time in seconds for 80% hemolysis					Mean Q_{10} 10°-50° (except when enclosed in parentheses)
		10°	20°	30°	40°	50°	
Turtle	H ₂ O	6.4	5.5	4.6	4.0	2.8	1.23
	Urea	9.9	8.8	8.7	7.2	5.3	1.17
	Ethylene glycol	107.0	41.4	22.2	11.6	6.7	2.00
	Methyl alcohol	7.4	8.0	6.4	5.2	3.8	(1.28)
	Ethyl "	8.5	7.0	5.3	5.0	3.9	1.22
	Propyl "	9.7	9.6	7.8	6.1	4.8	(1.26)
Chicken	H ₂ O	38.2	21.3	13.6	8.5	5.0	1.66
	Urea	879.0	476.0	322.0	134.0	71.4	1.87
	Ethylene glycol	85.8	42.2	23.6	12.2	7.2	1.86
	Glycerol		1456.0	455.0	150.0	81.5	(2.61)
	Methyl alcohol	34.8	20.8	13.1	8.0	4.6	1.66
	Ethyl "	35.7	20.5	14.1	7.4	4.4	1.69
	Propyl "	37.4	21.2	13.5	8.4	4.4	1.70
	H ₂ O	116.0	73.7	62.3	48.5	6.5	2.06
Monk Fish	Urea	1623.0	551.0	299.0	178.0	75.3	2.16
	Glycerol	2625.0	905.0	342.0	143.0	61.9	2.55
	Methyl alcohol	449.0	346.0	103.0	23.2	10.9	2.53
	Propyl "	171.0	107.0	79.2	11.3	5.2	2.39
	H ₂ O	50.0	24.8	15.4	8.4	5.1	1.77
Dog Fish	Urea	1030.0	518.0	264.0	128.0	65.7	1.99
	Ethylene glycol	117.0	55.3	25.8	13.8	8.3	1.94
	Glycerol	2515.0	1114.0	724.0	293.0	141.0	2.05
	Methyl alcohol	41.7	27.8	14.4	7.9	5.1	1.69
	Ethyl "	43.8	27.6	13.7	7.6	5.1	1.71
	Propyl "	50.9	29.3	15.3	7.0	4.2	1.87
	H ₂ O	65.4	32.8	19.7	10.7	4.7	1.93
	Urea	1132.0	309.0	163.0	78.2	16.8	2.87
Briar Skate	Ethylene glycol	169.0	47.6	33.6	14.0	7.6	2.17
	Glycerol	2593.0	599.0	287.0	138.0	44.3	2.77
	Methyl alcohol	45.2	19.8	14.0	85.0	4.0	1.83
	Ethyl "	57.5	25.0	14.2	9.1	3.1	2.08
	Propyl "	57.7	28.9	9.9	4.9	1.8	2.38
	H ₂ O	113.0	46.6	24.7	14.3	6.7	2.03
	Urea	753.0	393.0	142.0	69.4	27.5	2.29
	Ethylene glycol	183.0	75.7	42.7	27.1	11.2	2.01
Barn door Skate	Glycerol	2756.0	883.0	315.0	194.0	80.2	2.42
	Methyl alcohol	81.9	50.1	25.3	13.9	5.6	1.96
	Ethyl "	86.6	42.5	22.1	12.2	5.1	2.03
	Propyl "	103.0	56.8	25.0	9.7	3.8	2.28
	H ₂ O						

Avg values based on 1,421 individual observations.

* The experiments herein reported were performed in the Zoology Department, Rhode Island State College, Kingston, R. I.
¹ Jacobs, M. H., Glassman, H. N., and Parpart,