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SECTION MEETINGS

CLEVELAND	
Western Reserve University	May 13, 1938
MINNESOTA	
University of Minnesota	April 20, 1938
MISSOURI	
St. Louis University Medical School	April 13, 1938
NEW YORK	
New York Academy of Medicine	May 18, 1938
PEIPING	
Peiping Union Medical College	April 6, 1938
SOUTHERN	
Tulane University	May 13, 1938
SOUTHERN CALIFORNIA	
University of California, Los Angeles	May 2, 1938

9885

Effects of Thyroid, Dinitroörthocresol on Urine Output of Thyroidectomized Dogs with Moderate Diabetes Insipidus.

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In an earlier report[1] we raised the question whether the ability of thyroid to render effective the diuretic action of anterior lobe is specific or is due only to its effect on general metabolism. This matter has been investigated as follows: Two dogs were rendered polyuric by hypothalamic puncture; they were thyroidectomized at

1 White, H. L., and Heinbecker, Peter, *Am. J. Physiol.*, 1937, **118**, 276.

20 and at 30 days after puncture. In both cases daily urine output fell to about 40% of its prethyroidectomy level but was still about 3 times normal. On two occasions with each dog desiccated thyroid (0.1 g per kilo per day) was given for a 7- to 10-day period; on all 4 such occasions daily urine output increased 2 to 3 fold.

Not enough determinations of the effect of this dose of thyroid on the basal metabolic rate were made to permit a definite quantitative statement. There were considerable variations in results but our observations justify the statement that such dosage for such a period elevates oxygen consumption by not more than 50% and probably considerably less. The dosage may be continued for even longer periods without any toxic symptoms, significant loss of weight or increase in urine output in the normal dog. The above statement is borne out by the findings of the much more extensive series of determinations by Kunde.[2] She found that 0.25 g desiccated thyroid per kilo daily produced an increase in BMR of 33% on the fifth day and 50% on the seventeenth day. In another of her experiments 0.4 g per kilo daily had the same effect, *i.e.*, 30% increase on the fifth and 50% on the seventeenth day.

Our BMR determinations were carried out with a modified Roth-Benedict spirometer, using a metal cone and heavy rubber dam mask, with dead space reduced to a minimum. Our average on 3 normal dogs is 850 calories/M^2/24 hours, with a probable error of about 10%. We have not obtained the high degree of reproducibility attained by Kunde[3] and by Kunde and Steinhaus;[4] such reproducibility requires long and careful training and was not considered essential to our purpose.

We next established the dosage of dinitroörthocresol required to produce approximately a 50% elevation of BMR in normal dogs. This was found to be 1 mg per kilo 3 times daily at 8-hour intervals. On such a regime, basal oxygen consumption determined at various times of day was increased on the average about 50%, with variations from +20 to +70. If the diuretic effect of the dosage of thyroid employed is due merely to its effect on metabolic rate, our dosage of DNC should have a similar diuretic effect. No diuretic effect was obtained, however, in 3 periods of 6 days on the 2 operated dogs. The results on 1 dog are shown in Fig. 1.

In these dogs thyroidectomy resulted in an immediate drop in

[2] Kunde, M. M., *Am. J. Physiol.*, 1927, **82**, 195.

[3] Kunde, M. M., *J. Metab. Res.*, 1923, **3**, 399.

[4] Kunde, M. M., and Steinhaus, A. H., *Am. J. Physiol.*, 1926, **78**, 127.

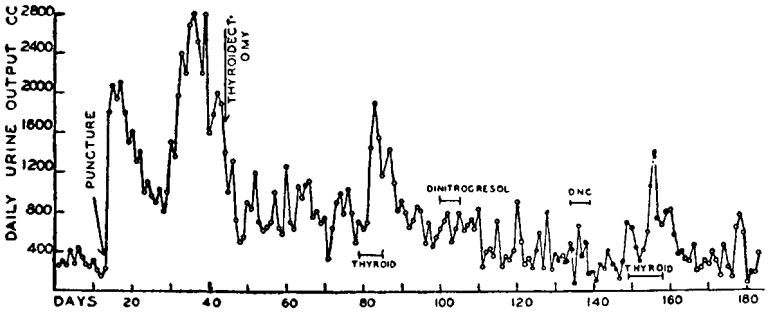

FIG. 1.
Effect of thyroidectomy and of thyroid and dinitrocresol administration on daily urine output of polyuric dog.

urine output, although not to the normal level; in the course of a few months the output slowly declined to normal. The transitory polyurias of hypophysectomy (removal of anterior lobe, pars intermedia, infundibular process and part of stalk) or of stalk section are usually immediately abolished by thyroidectomy. The high and permanent polyurias of complete hypophysectomy, including pars tuberalis and median eminence, may be unaffected by thyroidectomy (unpublished observations). We believe that the extent of the effect of thyroidectomy on the polyuria is proportional to the residual amount of pitressin-forming tissue.

Summary. The diuretic action of thyroid synergistic with anterior lobe is probably not due to its effect in elevating metabolic rate, as is indicated by the finding that a dosage of DNC producing a similar elevation of BMR has no diuretic effect.

9886

Adrenal Weights in Tumor-Bearing Rats.*

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The adrenal cortex has repeatedly been shown to be implicated in response of the body to toxins and infections. (Lewis,[1] Perla and

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1 Lewis, J. T., *Am. J. Physiol.*, 1923, **64**, 506.