CIX. THE "URICOLYTIC INDEX" IN DIABETIC DOGS.

BY EINAR LANGFELDT AND JÖRGEN HOLMSEN.

From the University Physiological Institute, Oslo, Norway.

(Received June 5th, 1925.)

THE term "uricolytic index" was introduced by Hunter and his co-workers in their extensive investigations of uric acid and allantoin excretion in different animals (literature in the preceding paper). The term expresses the percentage of the total of uric acid N plus allantoin N represented by the allantoin N.

In normal dogs Hunter and Givens calculated an index of 98.

In the preceding paper we have shown that the validity of the "uricolytic index" as a physiological constant is doubtful.

However, assuming that allantoin is the terminal product of purine metabolism in dogs and that the conversion of uric acid into allantoin is due to oxidation, this index still must give information about this oxidation process when feeding or injecting purines.

In two diabetic dogs we have determined this index in feeding experiments with nucleic acids. For control we gave nucleic acid in the same quantities to two normal dogs. The normal dogs were dog *C* and dog *E* in the preceding paper.

Table I.

I. Dog *C*. Normal, female, weight 17.9 kg.

Date	Total N g.	Uric acid mg.	Allan- toin g.	Uric acid N mg.	Allan- toin N g.	Uricolytic index	Remarks
12. v. and 13. v.	19.9	198	1.37	66	0.47	87	700 g. horse-flesh Average for 24 hours
14. v. and 15. v.	22.1	291	1.71	97	0.60	87	700 g. horse-flesh 5 g. nucleic acid* Average for 24 hours

II. Dog *E*. Normal, male, weight 19.4 kg.

12. v. and 13. v.	20.2	167	1.27	56	0.45	89	700 g. horse-flesh Average for 24 hours
14. v. and 15. v.	21.7	229	1.56	76	0.55	88	700 g. horse-flesh 5 g. nucleic acid*

* Merck's commercial preparation.

The experiments show that feeding 5 g. nucleic acid does not alter the uricolytic index in these dogs. The uric acid and allantoin excretion increase proportionally.

The diabetic dogs suffered from a heavy glycosuria. They had a moderate acidosis with increased ammonia production and positive ferric chloride reaction.

They were kept on a diet consisting of 500 g. of horse-flesh and 50 g. emulsified fat. The urine was collected in a metabolic cage during three days. During the three days following the dogs received in addition to the same diet 5 g. nucleic acid per day and thereafter during the next three days the same diet without nucleic acid. The total N, uric acid and allantoin were estimated and the average calculated for 24 hours. The methods used were the same as in the preceding paper. The results appear in Table II.

Table II.

III. *Dog K. Diabetic, weight 8.00 kg.*

Period	Total N g.	Uric acid mg.	Allan- toin g.	Uric acid N mg.	Allan- toin N g.	Urico- lytic index	Remarks
1	14.18	292	1.63	97	0.57	85	500 g. horse-flesh 50 g. fat per day
2	15.04	516	1.99	172	0.67	81	500 g. horse-flesh 50 g. fat, 5 g. nucleic acid
3	14.28	232	1.27	77	0.45	85	500 g. horse-flesh 50 g. fat

IV. *Dog L. Diabetic, weight 8.70 kg.*

1	14.07	131	1.18	43	0.41	90	500 g. horse-flesh 50 g. fat
2	14.91	286	1.33	95	0.46	83	500 g. horse-flesh 50 g. fat 5 g. nucleic acid
3	14.17	254	0.91	84	0.32	79	500 g. horse-flesh 50 g. fat

The findings in these diabetic dogs are different from those in the normal dogs. The "uricolytic index" decreases when feeding nucleic acid, indicating a diminished power to destroy uric acid.

This diminished power to oxidise uric acid must be due either to general diminution of the oxidative power of the body, or to lack of the special uric acid-oxidising agent.

The conception of a general diminution of the oxidation power of the body would be in accordance with the concept of the nature of diabetes as a diminution of the carbohydrate-oxidising processes.

However, Folin, Berglund and Derick [1924] have recently demonstrated that the pancreas has nothing to do with the oxidation of uric acid. Into a dog whose pancreas had been removed about 5 hours before and whose blood-sugar had risen to 0.3 % they injected intravenously 100 mg. of uric acid per kg. The injected uric acid disappeared from the blood just as quickly as in normal dogs.

The disturbance of the carbohydrate metabolism *per se* cannot therefore be the cause of the diminished oxidation of uric acid found in our dogs.

We are inclined to conceive the increase in the uric acid excretion as caused by liver insufficiency. The uric acid-oxidising enzyme, uricase, is probably

formed in the liver—the presence of it in the liver is shown by Wiechowski. Moreover, the large increase in the uric acid concentration of the blood after liver extirpation in dogs, as demonstrated by Mann and Magath [1921], also makes it probable that the uric acid-destroying agent is formed in the liver. Pathological conditions, however, arise in the liver during the disease, as shown by the formation of ketones, the lack of glycogen formation and the fatty infiltration of the liver cells.

As a consequence of such an insufficiency the uric acid-destroying agent is probably produced in less amount, or the milieu is not favourable to its action.

REFERENCES.

- Folin, Berglund and Derick (1924). *J. Biol. Chem.* **60**, 395.
Mann and Magath (1921). *Amer. J. Physiol.* **55**, 286.