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Observations on the Locus of Deamination.*

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It has been shown by Kisch^{1, 2} that both the oxygen consumption and ammonia production of surviving slices of rat kidney cortex are greater than that of liver slices in the presence of various added amino acids. Krebs^{3, 4} has also shown that kidney cortex is the most actively deaminating tissue per unit weight by use of the tissue slice technique. These data suggest that in spite of the much larger mass of liver tissue, the kidneys may participate to a considerable extent in deamination occurring in the normal intact animal. It is the purpose of this report to give the results of experiments designed to measure deaminative activity by the kidney of the intact, unanesthetized dog.

The dogs employed were prepared several months previously by unilateral nephrectomy with explantation of the remaining kidney into the flank by the technique of Rhoads.⁵ At the time of the experiment blood samples were drawn simultaneously from the renal vein and femoral artery without aid of anesthesia. Samples were taken under fasting conditions and at various times following feeding of from one to 2 pounds of lean meat. These samples were analyzed for amino acid amino nitrogen. This determination was performed on picrate filtrates of whole blood or serum by the manometric measurement of CO₂ evolved from the carboxyl groups of the amino acids upon heating with an excess of ninhydrin.⁶ The details of this method which seems more specific than those methods based on the determination of primary amino nitrogen will be given in a subsequent publication. The values of amino acid amino nitrogen were calculated on the assumption that one millimole of CO₂ is equivalent to 14 mg. amino acid amino nitrogen. The fact that this

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¹ Kisch, Bruno., *Biochem. Z.*, 1935, **280**, 41.

² Kisch, Bruno., *Biochem. Z.*, 1935, **280**, 55.

³ Krebs, H. A., *Biochem. J.*, 1935, **29**, 1620.

⁴ Krebs, H. A., *Chem. and Ind.*, 1935, **54**, 172.

⁵ Rhoads, C. P., *Am. J. Physiol.*, 1934, **109**, 324.

⁶ Van Slyke, D. D., and Dillon, R. T., *Proc. Soc. Exp. Biol. and Med.*, 1936, **34**, 362.

TABLE I.

Dog	Whole Blood or Serum	Fasting Amino Acid —NH ₂ N		Post-prandial Amino Acid —NH ₂ N		Time of drawing of post-prandial blood samples
		Arterial mg. %	Renal Vein mg. %	Arterial	Renal Vein	
1	whole blood	5.43	5.50	—	—	—
1	serum	—	—	5.58	5.59	3 hr. after 1 lb. of meat.
2	"	3.63	3.53	7.41	7.98	6 " " 2 " " "
2	"	—	—	6.84	6.68	5 " " 1 " " "
3	"	2.65	2.63	5.34	5.41	5 " " 2 " " "
4	whole blood	5.07	5.00	7.37	7.46	6 " " " " " "
5	"	4.45	4.56	8.18	8.33	4½ " " " " " "
6	serum	3.63	3.74	—	—	—
7	"	3.85	4.09	5.89	5.84	3 " " " " " "
7	whole blood	—	—	6.73	6.84	9½ " " " " " "

assumption is not strictly true is immaterial as far as the conclusions to be drawn from these results are concerned.

The results of 10 experiments performed on 7 dogs are given in Table I. Neither in the fasting state nor at various intervals following feeding of meat was there any appreciable consistent arterio-renal venous difference in amino acid amino nitrogen in either serum or whole blood. It can be calculated that if as much as 10% of the total deamination of absorbed amino acids took place in the kidney, an arterio-renal venous difference in amino acid amino nitrogen would be readily detected by the method employed. It seems likely that sufficiently long intervals had elapsed after feeding to make certain that an active metabolism of the absorbed amino acids was taking place at the time blood samples were taken, *e. g.*, specific dynamic action is exhibited within the limits of such periods. Further experiments including longer post-absorptive periods prior to sampling, similar experiments following intravenous injection of individual amino acids, and the effects of systemic acidosis will be reported later.

These results indicate that the kidney plays a minor rôle as a locus of deamination in intact unanesthetized dogs under the conditions of these experiments. Presumably this physiological function is performed almost entirely in the liver⁷ in accordance with classic theory, although the results of London⁸ indicate that considerable deamination may take place in the intestinal wall. Whether or not the mechanisms for deamination existing in the kidney take over this function to a quantitatively large degree under certain unusual circumstances remains to be investigated.

Conclusions. The absence of a demonstrable arterio-renal venous difference in amino acid amino nitrogen at various intervals following feeding of meat to dogs indicates that the kidney does not play a *quantitatively* important rôle in the deamination of absorbed amino acids in the normal intact animal.

⁷ Neber, M., *Z. Physiol. Chem.*, 1936, **240**, 59.

⁸ London, E. S., Dubinsky, A. M., Wassilewskaja, N. L., and Prochorowa, M. J., *Z. Physiol. Chem.*, 1934, **227**, 223.