

# SEROTONIN METABOLISM IN DUODENAL TISSUE OF INTACT RABBITS

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The concentrations of serotonin and 5-hydroxyindoleacetic acid and monoamine oxidase activity in the duodenal tissue of rabbits are significantly higher than in the kidney. This reflects the greater ability of the intestine to accumulate serotonin and to carry out its catabolism. The opposite relationship was found for 5-hydroxytryptophan decarboxylase, the activity of which was about 12 times higher in the kidney than in the duodenum; this evidently reflects the low ability of the tissue to decarboxylate 5-hydroxytryptophan.

**KEY WORDS:** duodenum; serotonin; 5-hydroxytryptophan decarboxylase; monoamine oxidase; 5-hydroxyindoleacetic acid.

Serotonin (5-hydroxytryptamine) is one of the most important members of the biogenic amines and has a varied action [1-3, 10-13]. The highest concentration of serotonin is found in the intestine, where about 90% of it is concentrated in granules of the enterochromaffin cells [6, 7]. Serotonin metabolism in the intestine has been studied mainly on the basis of determination of the content of the monoamine itself in tissue and blood and of 5-hydroxyindoleacetic acid (5-HIAA), the end product of its metabolism, in the urine without detailed specification of the set of enzymes participating in serotonin metabolism. These indices undoubtedly do not fully reflect the true picture of its metabolism.

These facts thus justify a study of serotonin metabolism in the duodenum of normal rabbits, with special reference to its enzymic characteristics.

## EXPERIMENTAL METHOD

The concentrations of serotonin and 5-HIAA in the rabbits were determined by a spectrofluorometric method [9]. 5-Hydroxytryptophan decarboxylase (5-HTD) activity was studied by the method of Clark et al. [8] in the modification of Pokrovskii and Ermolaev [5]. To determine monoamine oxidase (MAO) activity with serotonin as the substrate a spectrofluorometric method [14] was used.

The numerical results were subjected to statistical analysis [4].

## EXPERIMENTAL RESULTS

The results are given in Table 1.

TABLE 1. Concentrations of Serotonin and 5-HIAA and Activity of 5-HTD and MAO in Duodenal and Kidney Tissues of Normal Rabbits ( $M \pm m$ )

| Organ    | Number of animals | Serotonin, $\mu\text{g/g}$ tissue | 5-HTD, nmoles tryptophan/mg protein/min | MAO, nmoles serotonin/mg protein/min | 5-HIAA, $\mu\text{g/g}$ tissue |
|----------|-------------------|-----------------------------------|---|--------------------------------------|--------------------------------|
| Duodenum | 9                 | $5,27 \pm 0,43$                   | $1,35 \pm 0,27$                         | $2,15 \pm 0,12$                      | $26,0 \pm 5,59$                |
| Kidney   | 6                 | $1,25 \pm 0,03$                   | $16,22 \pm 0,34$                        | $0,18 \pm 0,03$                      | $7,2 \pm 0,38$                 |

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Analysis of the results shows that the serotonin concentration in the duodenal tissue was more than four times greater than in the kidney, in disagreement with data showing that the intestine is one of the main depots of serotonin [2]. A similar pattern also was found with respect to 5-HIAA. More significant differences were found in MAO activity, which was 12 times higher than in the kidney. 5-HTD activity in the duodenum was about one-fifteenth of that in the kidney. These results suggest that serotonin may perhaps be synthesized by hydroxylation of tryptamine.

The results thus confirm the view [2, 3] that the intestine is one of the principal depots of serotonin in the body. They are evidence of the high activity of its catabolism, but at the same time they are also evidence of low activity of decarboxylation of 5-hydroxytryptophan.

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