A Variation of Diastase Content in Rabbit’s Urine on an Administration of Morphinum Hydrochloricum. A Contribution to the Repressive Secretory Centre of External Secretion of the Pancreas.

By

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Introduction.

As to the innervation of external secretion of the pancreas, the double innervation of vagus and splanchnicus has been published in many text books of physiology. Recently, Fujie\(^1\) reported in detail that these two nerves consist each of sympathetic and parasympathic nerve filament, and that the former acts repressively, the latter promotively. But the secretory centre of external secretion of the pancreas has been unknown so far I am aware. On the other side, the salivary gland has its secretory centre in fossa rhomboidea.

With a possible expectation that the secretory centre of the pancreas might exist also in the brain, I injected subcutaneously morphinum hydrochloricum, a narcotic of central nervous system, into rabbits in such an amount as caused scarcely any serious symptoms. In spite of an apparently large dose of the alkaloid, rabbits continued to hold the normal posture and ate food, though of course they were very calm. And I investigated the diastase in daily total urine. An intimate relationship between diastase content in urine and a number of diseases of the pancreas, for example acute pancreatic necrosis, have repeatedly been reported. It was with good reason that I wanted to study the external secretory mechanism of the pancreas by means of estimation of the diastase content in urine.

\(^1\) M. Fujie, Tokyo Igakkai Zassi, 1932, 47, 1249.
Method of Experiment.

Animals:—I used healthy young rabbits fed on tofukara; water was not given as such. Their body weight was approximately 3 kilograms and their daily total urine or its aliquot part was used for my examination.

Morphinum hydrochloricum:—1% solution was injected subcutaneously.

Method:—I used Fischer's colorimetric method.

Rabbits' urine shows generally the diastase content of about 2000 to 4000 units per minute in daily total urine, and the daily and individual variations of the content are very small. I occasionally observed their suppression of urine before the proper experiment (Cf. Case 3). I injected 1% solution of morphinum hydrochloricum subcutaneously into rabbits in the amount of about from 10 to 20 c.c. per

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kilogram of their body weight, or in such an amount as did not provoke serious symptoms. The injection was repeated once a day for two consecutive days.

Result of Experiment.

In all the cases, diastase content in urine increased after an injection of morphinum hydrochloricum. In all the cases except Case 1, the diastase content began to increase remarkably on the day after the first injection. Then it increased gradually and attained the maximum, namely two or three times the content before experiment, the maximum falling on the third or fourth day after the first administration in Cases 1, 2, 3 and 4. But in these cases, the rabbits showed suppression.

![Fig. 3. Case 3.](image)

![Fig. 4. Case 4.](image)
of urine on the next day (Cf. Case 4) or the next two days (Cf. Cases 1, 2 and 3) after the first injection. So I obtained the urine by catheterisation in Cases 5 and 6 on the days of urine suppression, and found that the diastase content in it reached the maximum even on the next day (Cf. Case 6) after the first administration. Suppression of urine in the cases of intoxication and infection was reported also experimentally by Grünke and Lotze.3)

The increased diastase content decreased gradually and was restored to the normal value in about a week after the second administration of morphinum hydrochloricum (Cf. Fig.). It was very interesting that the diastase content showed a temporary decrease (below the content before the injection) before it was restored to the normal value (Cf. Cases from 3 to 6).

The amount of urine and the body weight showed no remarkable variation except a slight decrease during a few days after the first administration of the alkaloid.

**Discussion.**

I injected subcutaneously into rabbits morphinum hydrochloricum, a narcotic of the central nervous system, with an expectation that the secretory centre of the external secretion of the pancreas would exist in the brain. Soon after the injection, the diastase content in urine began to increase gradually and amounted to two or three times the value before the administration of morphinum hydrochloricum—an enormous amount never seen in physiological variation,—and then it decreased until after about a week the content was restored to the normal value obtaining before the experiment.

From this experiment, I believe it probable that the repressive secretory centre of external secretion of the pancreas would exist in the brain. As a result of the administration of morphinum hydrochloricum, the narcotic of the brain which will be anaesthetise in the order of the cerebrum, cerebellum and medulla oblongata, that centre became paralysed, giving free vent to the secretion of the pancreatic diastase without any restriction. And after the action of morphinum hydrochloricum was over, the diastase content in urine began to decrease again. A temporary remarkable decrease—the decrease below the diastase content before injection—prior to recovery would illustrate the above-mentioned hypothesis.

**Conclusion.**

I observed a very remarkable decrease of the diastase content in rabbits' urine on a subcutaneous administration of morphinum hydrochloricum and considered on the basis of this result that the repressive secretory centre of external secretion of the pancreas would most likely lie in the brain, the cerebrum probably.