

The tracings speak for themselves. The mixture of adrenalin with spinal fluid in proportion of 1:20 when kept on ice caused a considerable rise of blood-pressure by a dose of 0.5 c.c., while when this mixture was incubated for an hour in the thermostat at 37° C. even 4 times the dose caused no change in blood-pressure.

10 (629)

Glucuronic acid determination (Tollens) in duodenal obstruction.¹

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While the liver generally plays a subordinate part in the synthesis of glucuronic acid, it would seem from the experiments of Pohl (1), that upon the incorporation of chloral-hydrate or camphor, the conjugation of these substances with glucuronic acid does take place largely in that organ.

We have been interested in seeking a measure of the functional activity of the liver before and after experimental duodenal obstruction. By giving a dog camphor and determining the output of camphor-glucuronic acid, both before and after obstruction, we hoped to measure at least in a relative way any impairment in liver function which may follow this intestinal lesion.

The experiments were carried out on dogs—the operative portion under complete ether anesthesia. The animals were fed for fully a week on an exclusive meat diet in order to free the urine as much as possible from pentoses.

For the glucuronic acid determinations we employed one of the two methods described by C. Tollens (2, 3), viz., distillation of the glucuronic acid lacton with dilute hydrochloric acid, and precipitation of the resulting furfurol with phlorglucin. This method seems open to less objection than most of the other quantitative methods which have been proposed. In the hope of further determining the accuracy of our results, we are now experimenting with the CO₂ method described by Tollens.

¹ Studies from the Laboratory of the Department of Physiology, University of Minnesota, Minneapolis, and from the Laboratory of Surgical Chemistry and Physiology, Rochester, Minnesota.

The experiments here reported were carried out as follows: The glucuronic acid excreted during one or two 24-hour periods was determined and used as a normal. According to Tollens, the variations in the daily quantities of glucuronic acid are very slight, if the diet is uniform.

From 2 to 5 gm. of commercial camphor dissolved in olive oil were given subcutaneously and the camphor-glucuronic acid excretion in the urine determined for three to four 24-hour periods. The duodenum was then obstructed by cross section and infolding at a point just aboral to the greater pancreatic duct. From 12 to 24 hours after obstruction, determined by the first indication of marked clinical symptoms, the same dose of camphor was again given and the camphor-glucuronic output determined in 24-hour periods until death ensued.

Including a report made by Draper (4) on one dog, we have completed experiments on three dogs. The results, expressed in per cent. of recovered camphor-glucuronic acid, are as follows: From Dog No 30, before obstruction, 41.76 per cent. of a theoretical total was recovered. From Dog No. 124, 44.00 per cent., and from Dog No. 128, 43.47 per cent. After obstruction, from Dog No. 30 was recovered 27.19 per cent. of a theoretical total; from Dog No. 124, 19.29 per cent. and from Dog No. 128, 18.05 per cent. Somewhat less than one half the camphor given during the normal period was recovered in the urine as camphor-glucuronic acid. What becomes of the balance is a matter of conjecture. The results obtained by Schlutz (5) in an earlier study differ from the above but this can probably be accounted for by the inferiority and uncertainty of the polarimetric method. This was at the time considered the method of choice.

The histological examination of the livers, hearts, spleens and kidneys of the animals cited in this report was negative except for a moderate capillary dilatation in a few of the sections. The nitrogen metabolism remained unchanged in Nos. 30 and 124. It was not determined in No. 128.

The above results from their uniformity suggest accuracy for the method so far as it goes and the marked decrease after operation implies possible diminution of certain liver functions after duodenal obstruction.

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II (630)

The convulsant effect of the removal of the heart upon frogs which had injections of morphin. A demonstration.

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Last April it was reported from this laboratory that (1) substances which are capable of causing a definite biological reaction in frogs cause the characteristic reaction also when injected after the removal of the heart, and (2) that some substances, like morphin and acid fuchsin, appear to be even more effective in cardiectomized than in normal frogs. The first phenomenon was explained by the theory that distribution in frogs deprived of the cardio-vascular circulation is accomplished by a peripheral mechanism, namely, by the tissue spaces, which present a connected system throughout the body. The second phenomenon was interpreted by the hypothesis that the fresh blood in the cardio-vascular mechanism continually antagonizes the convulsant action of such substances as morphin and acid fuchsin. The study of the last mentioned hypothesis and the underlying phenomenon has been hampered by the fact that the distribution by the peripheral mechanism is necessarily a slow one and since, at the warmer seasons, frogs survive cardiectomy only a short time, it happens that the animals die before the convulsant effect could make its appearance. We have therefore tried to study the hypothesis by the reversed method, that is, morphin injected first and the heart removed later. This was carried out in several series, the doses varying from 0.1 to 0.5 mg. of morphin per gram frog, and the intervals between the injection and the subsequent removal of the heart varying from a few minutes to 4 hours. We shall not enter