ADDENDA

Volumen III, núm. 3

Página 207, nota: *(1) Sols, A. and Ponz, F.* — «*Nueva técnica para el estudio de la absorción intestinal y datos para la mejor interpretación del mecanismo de la absorción selectiva de glúcidos en relación con la fosfatasa de la secreción intestinal*», *R. esp. Fisiol., 2, 283-384 (1946).*

» 209, nota: *(1) Sometimes the descent of the liquid from the funnel to the loop is slow and may even require manual interventions by interposition of bubbles of air or compression of the intestine. In these cases we must consider as a beginning the moment when about half the liquid has descended.*

» 210, 1. 1: us *(1).*

» » nota: *(1) Sols, A., R. esp. Fisiol., 1, 355 (1945), and 2, 167 (1946) and An. Fis. Quim. (Madrid), 42, 855 (1946).*

of differences in the rate of absorption of different sugars placed in turn in the loop of intestine utilized; or the study, still by means of succesive tests with the same loop, of the influence of any substance or any change in the experimental conditions on the absorption of a certain sugar.

This constancy in the rate of absorption lasts at least three hours in rats anaesthetized with uretane and allow the carrying out of, from three to five successive experiments.

The method is very simple in operation and assures the recovery of the substance not absorbed.

The most adequate conditions as to the amount of solution to be employed will of course vary according to the size of the animal. It must be taken into account that the greater the volume of the liquid, the better will be accomplished the substitution of the saline solution by it, but at the same time, it must be considered that thus the evaluation of absorption will be more difficult. *The smallest volume necessary to permit a practically quantitative renovation must therefore be employed, this being certainly greater than possible absorption.*

Another important factor to be considered is the duration of each single experiment. This may be either of half an hour or one hour, unusually it may last from a quarter of an hour to two hours. We take these time limits as an exception because, in the case of a quarter of an hour's duration, any errors in the appreciation of the beginning and the end of the experiment can easily be of importance, whilst in experiments of two hour's duration, the possibility of several experiments in succession is seriously limited, when we take into account that the constancy of absorption capacity lasts about three hours only.

The sizes of canules and further dispositives will also vary according to the size of the animal.

We shall describe an example: that of the white rat, which animal, possessing excellent conditions, has been used by us in preference.

Independently of individual variations, standard conditions may and should be adopted.

Canules are prepared of glass tubing about 3 mm. in diameter, in lengths of about 6 cm., bent at right angles and with an upper part disposed in such a way that two prolongations

remain slightly inclined towards the axis of the canule. These prolongations prevent the intestinal wall from obstructing the orifice of the canule. A slight tightening between this top and the elbow secures the connection of the canule to the intestine. A soft rubber tube of about 6 to 8 cm. in length connects the opposite top to a funnel of about 30-40 ml. capacity with key and a very short issue tube. This canule is placed in the jejunum as high up as possible ; about 30 cm. further is placed an issue canule connected with a rubber tube of about 20 cm. in length, the extremity of which is introduced into the recipient destined to collect the liquid not absorbed, and provided with a clamp for opening and closing.

We have used volumes of 10 to 5 ml. With isotonic solutions of sugar at 0. 3 molar concentration, those of 10 being preferable for hexoses and 5 for pentoses. We advise 7.5 ml. in all cases.

We carry out experiments of one hour excepting in the case of glucose and galactose, for which the time should be reduced to half an hour at most unless we are working in conditions seriously affecting the selective absorption.

It is most advisable to operate with two animals at the same time. We utilize for this purpose a dispositive as presented in Fig. 1.

We begin by washing the intestinal loop twice, filling the funnel with physiological solution at 38° and letting it circulate. The loop being flushed, the key is closed and the issue tube is introduced into the volumetric flask. 7.5 ml. solution to be absorbed, at 38°, is placed into the funnel. The key is opened and the liquid allowed to descend to the level of the key, at which moment the issue tube is closed by means of a clamp and the time noted (1). One minute before the time planned for absorption, the key is closed, the funnel filled with physiological solution at 38° and, at the exact moment, the clamp is loosened and the key re-opened when the physiological solution will carry away what has not been absorbed, into the volumetric flask. When the liquid ceases to flow, the volumetric flask is withdrawn and another experiment may be carried out in the same way.

For evaluation of non-absorbed sugar we deproteinize with copper tungstate and apply Folin's copper colorimetric method

with the two-standard colorimetry of one of us. For this purpose we dilute the hexoses up to one liter and the pentoses up to 500 ml. using volumetric flasks of the mentioned capacities for collecting the residual and washing fluids. Other quantities of 7.5 ml. of each sugar solution are pipetted into analogous flasks; of every one of theese dilutions 2 ml. are placed into a tube gauged at 25 ml. and 1 ml. plus 1 ml. of water into another, as basic and auxiliary standards respectively.

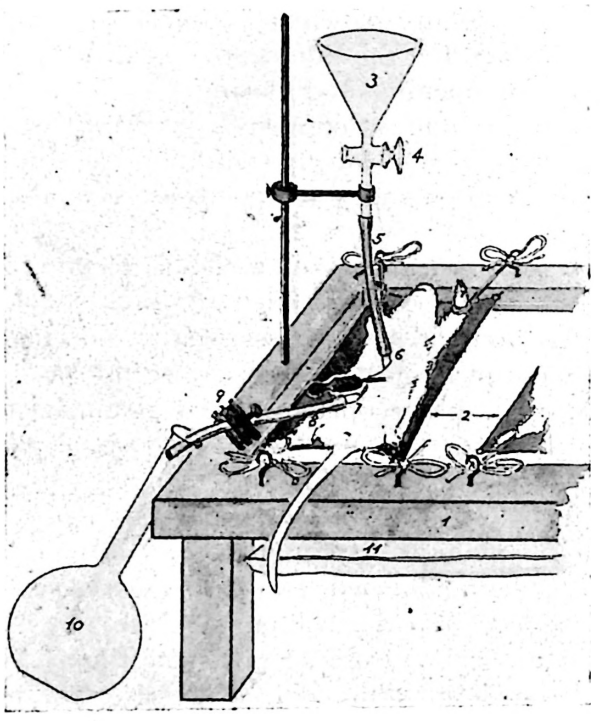

Fig. 1

1) Wooden frame of 32 by 28 cm provided with legs of 20 cm in length and two stems of 25 cm.
2) Pieces of canvas in the shapes of hammocks for the rats.
3) Funnel with key (4).
5) Rubber tube connecting funnel with canule of entrauce (6)
7) and 8) Canule and issue tube, the latter provided with a clamp (9).
10) Volumetric flask.
11) Electric pillow.

The best way of expressing the results is, in our opinion, to employ terms of micromols absorbed per each centimeter of intestine and to measure the latter after it has been extracted

from the animal and suspended from one of its extremities. This result we refer to a time of 30 minutes.

In these conditions we have compared absorption of various sugars (1) in the rat, carrying out three or four experiments with different sugars for each animal. A typical experiment is shown in table I.

TABLE I. — *Two rats in duplicate experiment. Concentration of sugars 0,3 M. 7,5 ml. in each experiment corresponding to 2.250 µM sugar.*

SUGAR	TIME Minutes	ABSORTION µM / cm and 30'	
		I	II
Glucose	30	40,0	45,5
Arabinose	60	5,85	6,0
Rhamnose	60	4,1	4,15
Glucose	30	38,5	46,0

Averages of all our experiments in adult rats giving the following values (Table II).

SUGAR	µ M absorbed by cm and 30'	Relations taking glucose as 100
Galactose	41,3	106
Glucose	39,0	100
Fructose	15,6	40
Xilose	9,3	24 *
Sorbose	9,0	23 *
Arabinose	5,9	15
Rhamnose	4,1	10,5

(1) Glucose, fructose, xylose *Merck;* galactose *Kahlbaum;* l-sorbose *Roche;* rhamnose *Fraenkel;* d-arabinose *British Drug House*. We are indebted to Messrs. Hoffmann La Roche, Basel, for the gift of a sample of l-sorbose.

(*) Calculating by starting from miligrams absorbed, a greater absorption of sorbose than of xylose would result (23 and 20 respectively) however a greater number of molecules of xylose are really absorbed and we therefore consider this absorption preferable.