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THE ABSORPTION OF PENTOSES FROM THE SMALL INTESTINE OF THE RAT UNDER URETHANE ANAESTHESIA

By J. N. DAVIDSON and R. C. GARRY

From the Physiology Department, University College, Dundee, the University of St Andrews

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Such hexoses as glucose and galactose are known to be absorbed from the small intestine of the rat more rapidly than the pentoses xylose and arabinose [Davidson & Garry, 1940]. These hexoses, moreover, are known to be capable of phosphorylation *in vivo*, while there is no evidence for a similar process with xylose and arabinose. Such findings, along with other evidence, suggest that the absorption of glucose and galactose is accelerated by phosphorylation, while the absorption of the pentoses depends on simple diffusion [Verzár & McDougall, 1936].

Wilbrandt & Laszt [1933] found that xylose and arabinose are absorbed relatively slowly and at the same rate from the intestine of the rat. Cori [1925], on the other hand, found that xylose was absorbed more rapidly than arabinose by the rat. Similar observations were made by McCance & Madders [1930] in human beings, by Westenbrink [1936] in the rat and pigeon, and by Westenbrink & Gratama [1937] in the frog. Westenbrink alone [1936] compared the two optically active forms of the same sugar, finding that the pigeon absorbed the naturally occurring *d*(+)xylose more rapidly than *l*(−)xylose.

We have extended these observations in the rat, using the *d* and *l* forms of both xylose and arabinose. We also used the naturally occurring *d*(−)ribose whose absorption rate has not so far been determined, although it is present in phosphorylated form as a constituent of the ribo-nucleic acid derivatives.

We adapted the two-loop technique, already described for cats, to the rat [Davidson & Garry, 1940]. In one series the *d* form was placed in the cranial loop, and the *l* form of the same sugar in the caudal loop. In the other series the positions of the optical isomers were reversed. When

d(−)ribose was used in one loop, xylose, in default of the optical isomer of *d*(−)ribose, was present in the other loop.

1·5 c.c. of a 4·5% solution of the sugar was run into each loop and the amount remaining after 90 min. estimated. The sugars used were *d*(+)xylose ($[\alpha]_D$+18·3°), *l*(−)xylose ($[\alpha]_D$−19·3°), *d*(−)arabinose ($[\alpha]_D$−108°) and *l*(+)arabinose ($[\alpha]_D$+106°), all supplied by Roche Products, Ltd. *d*(−)Ribose was prepared from guanosine by the method of Levene & Clark (1921) and had $[\alpha]_D$−19·9°.

The averages of the results obtained from several experiments in the case of each sugar are as follows:

	Mg. absorbed in 90 min. per g. gut
d(+)Xylose	17·3
l(−)Xylose	10·1
d(−)Arabinose	9·5
l(+)Arabinose	8·6
d(−)Ribose	10·7

The absorption rate of any one sugar was essentially the same whether it was in the cranial or caudal loop.

In agreement with the findings of the majority of other workers, *d*(+)xylose was absorbed more rapidly than arabinose. In addition, the rat absorbed *d*(+)xylose more rapidly than its optical isomer, as was found by Westenbrink for the pigeon. The other four sugars, however, *l*(−)xylose, *d*(−)arabinose, *l*(+)arabinose and *d*(−)ribose, were absorbed at about the same rate. It thus appears that there must be some special property of *d*(+)xylose which renders it more susceptible to absorption than the other pentoses. It is known, too, that *d*(+)xylose is absorbed, rather unexpectedly, as rapidly as glucose from the small intestine of the cat [Davidson & Garry, 1940]. It may be that some special significance attaches to the fact that *d*(+)xylose is the only pentose to have the same configuration as *d*(+)glucose at carbon atoms 2, 3 and 4.

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