THE RESPONSE OF PLASMA MONOSACCHARIDES IN NURSING PIGLETS TO COMBINATIONS OF DIETARY GALACTOSE AND GLUCOSE

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Different dietary sugars can have different influences on monosaccharide metabolism. Furthermore, there are differences in these influences between man, guinea pigs, rats and mice (Williams and Owens 1984). This study investigated the influence of combinations of ingested monosaccharides on the metabolism of galactose and glucose in nursing piglets.

Equivalent doses of galactose (0.675 g), galactose (0.675 g) + glucose (0.675 g), lactose (1.35 g), glucose (0.675 g) and water (15 ml) were given orally to 2-, 10- and 20-day-old fasted piglets. Blood samples were then taken from the piglets' ear veins at 5 min intervals to 40 min and then at 60 and 90 min after the dose. The plasma concentrations of galactose and glucose were assayed and the areas under the curves (AUC) for galactose and the changes in the base to peak concentration for glucose were determined. All values were then adjusted to the calculated plasma volume of each piglet. The same sampling protocol, without the administration of a sugar or water dose, was used as a control study. The AUC of plasma galactose and the increase in the plasma concentration of glucose after each of the doses is shown for each age group in the table below. The results are presented as mean ± SEM (n = 6).

*Dose	(A)	(B)	(C)	(D)	(E)	(F)
Age (d)			Galactose (AUC)			
2	0.3 ± 0.1	0.6 ± 0.1	2.6 ± 0.6^{ab}	2.4 ± 0.1^{ab}	1.8 ± 0.2^{ab}	1.1 ± 0.3^{cd}
10	0.5 ± 0.1	0.5 ± 0.1	2.6 ± 0.3^{ab}	3.0 ± 0.3^{ab}	1.8 ± 0.3^{abcd}	0.6 ± 0.1^{cde}
20	1.6 ± 0.3	0.8 ± 0.1	6.3 ± 1.9^{ab}	5.7 ± 1.1^{ab}	2.7 ± 0.2^{c}	0.8 ± 0.1^{cd}
			Glucose increase (mM)			
2	0.1 ± 0.1	0.2 ± 0.1	0.3 ± 0.1^{a}	0.6 ± 0.1^{abc}	0.6 ± 0.1^{abc}	0.6 ± 0.1^{abc}
10	0.3 ± 0.1	0.6 ± 0.1	0.6 ± 0.1^{a}	0.8 ± 0.1^{a}	0.7 ± 0.2^{a}	1.3 ± 0.2^{abcde}
20	0.7 ± 0.2	0.4 ± 0.4	0.8 ± 0.1	1.0 ± 0.3^{b}	0.5 ± 0.1	1.3 ± 0.2^{abe}

*(A) No dose, (B) Water, (C) Galactose, (D) Galactose + glucose, (E) Lactose, (F) Glucose. Values with the same superscript letters, in each age group, are significantly different ($P < 0.05$) from the value denoted by the equivalent capital letter.

While the effects of dosing and sampling did not alter the concentration of plasma galactose, they did result in an increase in plasma glucose which masked the changes in the plasma concentration of glucose after a lactose dose in 10- and 20-day-old piglets. This highlights the inadequacy of using plasma glucose measurements to determine lactose intolerance after a lactose dose. Two-day-old piglets experienced a significantly lower increase in the plasma concentration of glucose, from the effects of handling and sampling (column A in the above table), than the 10- and 20-day-old piglets. This suggests a lower response in the younger piglets to the stress of the experimental procedure.

Glucose, present with a galactose dose, did not affect the subsequent concentration of plasma galactose. Hence the metabolism of galactose in the presence of ingested glucose is similar to rats and mice and unlike guinea pigs and man (Williams and Owens, 1984). This indicates that pigs may not be a suitable model for investigations into galactose metabolism in man.

WILLIAMS, C.A. and OWENS, A.M. (1984). Proc. Nutr Soc. (UK). 38: 38A.

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