

CARTA AL EDITOR

Effect of Calcium Omission on Active Transport in Suckling Rats

It has been shown recently that the active transport of galactose and leucine in the rat small intestine changes with age, with maximum transport rates in the suckling period (3). Calcium omission reduces the *in vitro* absorption of sugars and aminoacids in young chicks (5). However, this effect is not observed in adult rats or hamsters (1). The possible relation between increased ability to transport non electrolytes and calcium was studied. This study describes the effects of calcium omission from the external medium on galactose and leucine transport in the developing rat small intestine.

Male Wistar rats 9 to 45 days old were used. Everted intestinal sacs were prepared according to the technique described by WILSON and WISEMAN (7), and incubated in 10 ml Krebs-Henseleit bicarbonate buffer (4) containing either galactose (5 mM) or leucine (5 mM). Calcium concentration in control experiments was 2.5 mM in both mucosal and serosal bathing solutions. Sacs were bubbled with carbogen throughout incubation (45 min). Galactose was determined by the SOMOGYI method (6) and leucine (L-U-¹⁴C-leucine, Amersham) by liquid scintillation counting.

Figure 1 shows that calcium omission markedly inhibits the galactose final serosal concentration in the younger animals. The observed inhibition was 43 %,

33 % and 23 % in the groups of rats 9-10, 11-14 and 15-21 days old, respectively. Calcium absence had no effect on

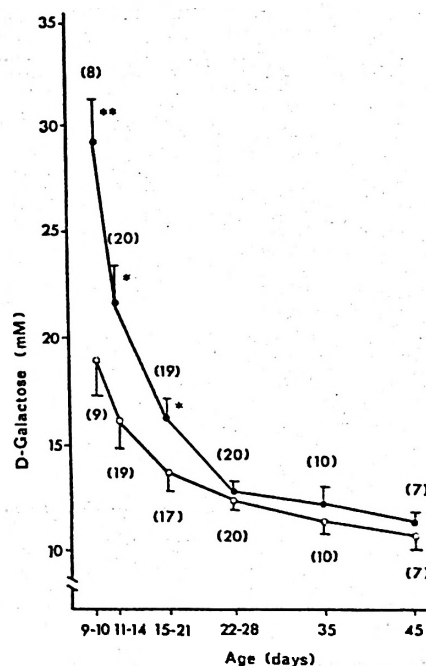


Fig. 1. Effect of calcium omission on the final serosal concentration of L-leucine in everted sacs from rat small intestine.

Abscissa shows the groups of age studied. Number of experiments in brackets. The mean \pm S.E. of mean is indicated. (●) control (calcium 2.5 mM). (○) calcium omitted. Statistical significance (t-test): ** $p < 0.01$, * $p < 0.05$.

22 day-old animals or older, in accordance with previous results (1). Figure 2 shows the effect of external calcium omission on leucine transport and the results are similar to those described for galactose, i.e. a significant effect of low calcium in the younger animals which becomes non-significant in the groups of rats older than 20 days.

Since the effects of calcium withdrawal might be due to disruption of the structural integrity of the mucosa (2), experiments in young rats comparing galactose and leucine transport using either 0.1 mM or no calcium in the external medium were carried out. The results showed that there were no statistical differences in either condition.

Therefore, the overall results suggest that the younger the rats the more the transport system is affected by calcium

omission. It is noteworthy that galactose and leucine transport patterns in the developing intestine are similar with either calcium present or absent from the external medium. Likewise, transport becomes both age and calcium independent at the same age period (20-22 day-old rats). In view of these findings, the possible role of calcium in the increased transport rates observed in the intestine of rats during the first three weeks after birth can not be excluded.

In conclusion, in the small intestine from suckling rats, calcium has to be present in the external bathing solutions to enable the tissue to establish (or maintain) high serosal to mucosal ratios with actively transported substrates.

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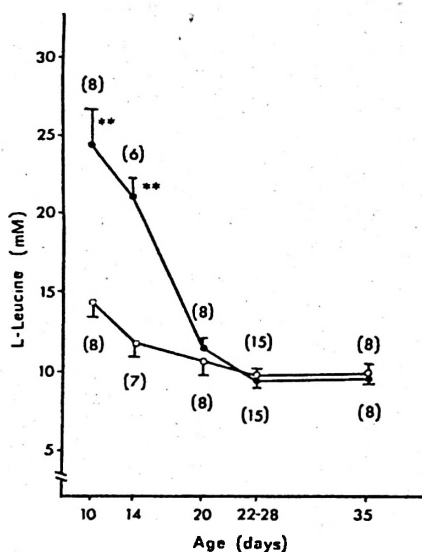


Fig. 2. Effect of calcium omission on the final serosal concentration of D-galactose in everted sacs from rat small intestine.

Other conditions like in figure 1.