

A DEPRESSION OF SHORT-TERM FOOD INTAKE IN RATS

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A previous study has shown that a mixture of selected amino acids (L-trp, L-phe, L-met, L-val, in the ration 1:3:2:2) given prior to a meal can reduce voluntary food intake in human subjects (Butler et al. 1981). The extent to which this phenomenon may be associated with competition between amino acids or be related to specific individual amino acids is not clear.

To establish a possible role for L-phenylalanine, a comparison of food intake in rats was made following the administration of L-phenylalanine, or a placebo. Ten male rats with a mean body weight of 300 g (Group I) were gavaged with 54, 108 and 216 mg L-phenylalanine in 2, 4 and 8 mL 0.9% NaCl, respectively. At the same time, 10 male rats of similar body weight (Group II) were gavaged with a 0.9% NaCl placebo. Each rat was trained to eat between 0900 and 1700 hours on a normal 12-h light/dark cycle. The experimental period consisted of a gavage of approximately 30 min before food presentation on 2 consecutive days for each dose. Food intake was measured for the first hour of feeding and also at the end of the feeding period. The same experimental protocol was followed using intraperitoneal injection of 54, 108 and 216 mg L-phenylalanine in 2, 4 and 8 mL 0.9% NaCl instead of a gavage. Seven days after the conclusion of the first period, each group of rats was crossed over to be placed on the alternate treatment.

In the gavage experiment a significant dose-related decrease in food intake ($P < 0.01$) was shown in the first hour. Both a volume effect and an effect of L-phenylalanine were also noted. On the other hand no difference in food intake was observed following the intraperitoneal injection. The effects seem to be confined to the first hour of feeding.

These observations indicate that a specific amino acid (L-phenylalanine) administered to rats via the alimentary tract before food is offered can influence voluntary food intake. Considerable interest has recently been shown in studies on satiety proposing a central role for monoamines, eg. dopamine, of which L-phenylalanine is a precursor, and for the gastrointestinal hormone cholecystokinin. The efficacy of alimentary tract administration of the amino acid compared with the intraperitoneal route provides circumstantial evidence for a role mediated via the gut. Whether the effect is subsequently dependent on gastrointestinal hormone influence or brain amine levels is being further explored.

BUTLER, R.N., DAVIES, M., GEHLING, N.J. and GRANT, A. Kerr. (1981).
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