ONLINE ISSN : 1880-313X
PRINT ISSN : 0388-6107

Biomedical Research
Vol. 28 (2007) , No. 2 April pp.79-83

[PDF (350K)] [References]

Relationships between insulin release and taste

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(Received December 13, 2006)
(Accepted January 26, 2007)

ABSTRACT

Tasting sweet food elicits insulin release prior to increasing plasma glucose levels, known as cephalic phase insulin release (CPIR). The characteristic of CPIR is that plasma insulin secretion occurs before the rise of the plasma glucose level. In this experiment, we examined whether taste stimuli placed on the tongue could induce CPIR. We used female Wistar rats and five basic taste stimuli: sucrose (sweet), sodium chloride (salty), HCl (sour), quinine (bitter) or monosodium glutamate (umami). Rats reliably exhibited CPIR to sucrose. Sodium chloride, HCl, quinine, or monosodium glutamate did not elicit CPIR. The non-nutritive sweetener saccharine elicited CPIR. However, starch, which is nutritive but non-sweet, did not elicit CPIR although rats showed a strong preference for starch which is a source of glucose. In addition, we studied whether CPIR was related to taste receptor cell activity. We carried out the experiment in rats with bilaterally cut chorda tympani nerves, one of the gustatory nerves. After sectioning, CPIR was not observed for sweet stimulation. From these results, we conclude that sweetness information conducted by thistaste nerve provides essential information for eliciting CPIR.

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doi:10.2220/biomedres.28.79

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