SHORT COMMUNICATION

Responses of inferior salivatory nucleus neurons to stimulation of chorda tympani nerve in the cat

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Introduction

Parotid salivation can be induced by various stimulations of the oral-facial area in various animals¹⁻⁸⁾. Our previous study demonstrated that a majority of inferior salivatory nucleus (ISN) neurons (54 %) innervating the parotid gland were activated by stimulation of trigeminal sensory branches in the cat⁶⁾. However, there has been no detailed report so far on the inputs to ISN neurons from the gustatory afferents. In this study, we investigated the responses of single ISN neurons to stimulation of the chorda tympani nerve, and compared them with those to stimulation of the inferior alveolar nerve.

Materials and Method

The experiments were carried out in 9 adult cats under urethane-chloralose anesthesia (500 and 40 mg/Kg, i.v., respectively). The right tympanic and chorda tympani nerves were exposed in the tympanic cavity. These nerves were mounted on bipolar silver-wire stimulating electrodes. A pair of screw electrodes was inserted and attached to the ipsilateral inferior alveolar nerve through a pair of holes drilled in the mandible and fixed with acrylic resin. The remaining experi-

mental procedures were the same as those described elsewhere⁶⁾.

Results and Discussion

Forty-seven ISN neurons were identified by antidromic spike responses to stimulation of the tympanic nerve. The identified neurons were recorded in the ipsilateral reticular formation, as described in our previous paper⁶⁾; the site of recording corresponded to the location revealed in a histological study⁹⁾. The responsiveness of all the identified neurons were tested to stimulation of the chorda tympani nerve. Thirty-one neurons (66 %) responded with spikes to stimulation of the chorda tympani nerve. Figure 1A-B show an example of collision between antidromic spikes evoked by the tympanic nerve stimulation (open triangle) and the orthodromic spikes evoked by stimulation of the ipsilateral chorda tympani nerve. The latency of responses to the chorda tympani nerve stimulation was 7.0-15.0 msec (mean $\pm$ S.D. = 10.6 ± 2.0 msec, $n = 31$). Figure 1C illustrates the latency distribution of these responses.

The identified ISN neurons were also tested to stimulation of the inferior alveolar nerve. Twenty-three (49 %) of them responded to stimulation of inferior alveolar nerve after

Fig. 1 Histogram showing the latency distribution of responses of inferior salivatory nucleus neurons to stimulation of chorda tympani nerve (C). Abscissa, latencies of initial spike of reflex responses. Ordinate, number of neurons activated by stimulation of chorda tympani nerve. A and B: collision between the antidromic spikes evoked by tympanic nerve stimulation (0.1ms, 0.87mA) and the orthodromic spikes evoked by chorda tympani nerve stimulation (0.1ms, 500Hz, 3 pulses, 0.22mA). In B, antidromic spikes were abolished by collision with preceding orthodromic spikes. Spikes in B were recorded from the same neuron; the trace consists of five superimposed sweeps. Open and filled triangles denote onset of antidromic and orthodromic stimulations, respectively. Voltage calibration and time base in B also apply to A.

a latency of 4.0-23.5 msec (10.1 ± 5.4 msec, $n=23$).

All the neurons that responded to stimulation of the inferior alveolar nerve were also activated from the chorda tympani nerve. Eight neurons responded to stimulation of only the chorda tympani nerve. There were no neurons that responded to stimulation of only the inferior alveolar nerve. Sixty-six percent of the identified neurons were excited by stimulation of the chorda tympani nerve, while 49 % of them were activated by stimu-

lation of the inferior alveolar nerve. In our previous study, 44 % of ISN neurons were excited by stimulation of either the infraorbital or the inferior alveolar nerves⁶.

In conclusion, it is suggested that the gustatory afferent via chorda tympani nerve is more effective for activation of ISN neuron than the trigeminal general somatic afferent.

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