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# The Properties of Neurons in Trigeminal Subnucleus Oralis Which Respond to Tooth-Pulp Stimulation in the Cat

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In cats prepared with minimal trauma, many neurons at all levels of the trigeminal nuclear complex show responses to thermal stimulation of the teeth at temperatures which would cause pain in man (Clarke & Matthews 1983). We wondered which other types of oro-facial stimuli would excite trigeminal neurons with tooth-pulp input in such minimally traumatized cats. In particular, we were interested in neurons in the rostral divisions of the complex (main sensory nucleus and spinal subnucleus oralis), which are not usually associated with the transmission of impulses related to pain.

Experiments were performed on cats anaesthetized with methohexitone (5 mg $kg^{-1}$ $h^{-1}$), alphaxalone–alphadolone (6 mg $kg^{-1}$ $hr^{-1}$) or α-chloralose–urethane (40/200 mg $kg^{-1}$) and prepared with minimal surgical trauma. The upper and lower canine teeth of the right side were prepared for electrical and thermal stimulation as described previously (Kollman *et al.* 1982). Recordings were made from the brainstem with dye-filled glass micropipettes. Cells were characterized by their responses to electrical and thermal stimulation of the teeth, and low and high intensity mechanical stimulation of the face and oral and nasal cavities. Recording sites were marked by dye ejection. Arterial blood pressure, end-tidal $CO_2$ and core temperature were monitored and kept within normal limits.

One hundred and ninety-nine neurons in trigeminal subnucleus oralis and the adjacent main sensory nucleus responded to electrical stimulation of tooth pulp. Of these 36 (18%) had no oro-facial receptive fields, five responded only to probing within the nares, and 63 cells (32%) responded maximally to light stroking of the face or intra-oral structures. A further 79 units (40%) responded to light mechanical stimulation but showed maximal discharge to noxious stimuli whereas 16 (8%) responded only to intense stimulation of the face or mouth. Appoximately 60% of tested neurons of all types responded to cooling the canine teeth to 10 °C. Receptive fields were predominantly oral and/or peri-oral, with a great deal of convergence from the nasal cavity.

Thus, more than 70% of pulp-driven neurons in rostral trigeminal nuclei received convergent input from the face and mouth and almost 50% responded differentially to unambiguously noxious stimulation of the face and mouth. This data supports the suggestion of Azerad, Woda & Albe-Fessard (1982), that the rostral trigeminal nuclei could be involved in the transmission nociceptive impulses arising from stimulation of oral and peri-oral regions.

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