
Small Nociceptive Neurons in the Superficial Dorsal Horn of the Cat

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9. Small nociceptive neurons in the superficial dorsal horn of the cat

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Horseradish peroxidase (HRP) staining of superficial dorsal horn neurons with identified inputs from the skin has shown a population of nociceptive Waldeyer neurones in lamina I and also a population of neurons with small perikarya situated close to the lamina I/II border (Rethelyi *et al.* 1983). We have studied morphological features and responses to afferent stimulation of these latter neurons.

Adult cats were anaesthetized with chloralose (60 mg kg^{-1}), paralysed with gallamine, and intracellular recordings made in the L6 and L7 segments of the intact spinal cord by using glass microelectrodes filled with HRP (35 g l^{-1}) in 0.5 M KCl . The intact peroneal and tibial nerves were stimulated electrically at the ankle, and electrodes were placed on the ipsilateral L7 dorsal root for stimulating or recording as appropriate. Iontophoresis of HRP, histological processing and reconstruction of the cells from serial sections was carried out as previously described (Molony *et al.* 1981).

Four neurons were reconstructed. They had small fusiform cell bodies located around the border between laminae I and II. A small number of principal dendrites gave rise to dendritic trees which were extensive rostrocaudally and restricted mediolaterally. Three neurones showed the characteristics described by Gobel (1978) for 'stalked' cells, 'en passant' and terminal swellings were observed on their axons in lamina I outwith the cell's dendritic tree, and in one a parent axon was followed into Lissauer's tract. The fourth neuron showed the characteristics described by Gobel for 'islet' cells; its axon remained within lamina II.

Stimulation of the skin revealed excitatory receptive fields responding only to noxious stimulation, and larger, generally overlapping, inhibitory receptive fields sensitive to innocuous mechanical stimulation. Electrical stimulation of peripheral nerves revealed an inhibitory input carried by A β fibres in all neurons, excitatory inputs in A β and A δ fibres and in A δ only in two which responded to noxious mechanical stimulation, and in A δ and C fibres in two which also responded to noxious heat.

These cells form part of the population of small, selectively nociceptive, neurons in the superficial dorsal horn and show a diversity of morphological types. Each was found to have a powerful inhibitory input from cutaneous mechanoreceptors.

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