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Functional Characteristics of Dorsal Horn Neurons in Adult Rats Treated at Birth with Capsaicin

M. B. Plenderleith

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By M. B. Plenderleith

Department of Physiology, Medical School, University Walk, Bristol BS8 1TD, U.K.

Systemic administration of capsaicin to neonatal rats results in the permanent destruction of up to 90% of their unmyelinated afferent (C) fibres (Nagy *et al.* 1983). In this study, the properties of type 2 dorsal horn neurons, which normally receive a convergent input from both myelinated (A) and unmyelinated (C) afferent fibres, have been examined in adult rats treated at birth with capsaicin.

Wistar rats were injected 72 hours after birth with a single subcutaneous dose (50 mg kg^{-1}) of capsaicin as previously described (Cervero & Plenderleith 1983). A second group of untreated rats acted as controls. Acute experiments were performed on rats between the ages of 3 and 6 months, anaesthetized initially with 40 mg kg^{-1} (i.p.) sodium pentobarbitone and maintained with 10 mg kg^{-1} h^{-1} (i.v.) of the same anaesthetic. A low cervical laminectomy allowed reversible spinalization of these animals to be produced by the cold block technique (Handwerker *et al.* 1975). For each type 2 neuron the extent of the excitatory receptive field was carefully mapped and their response to high-intensity (75 T) electrical stimulation of the sural nerve in the intact neuraxis and spinalized state was analysed.

For 34 type 2 neurons in control and 30 neurons in capsaicin-treated animals the mean receptive field areas were 94 $mm^2 \pm 11$ (s.e.m.) and 170 $mm^2 \pm 16$ (s.e.m.) respectively. This increase in receptive field sizes in capsaicin rats was significant ($p < 0.05$). In this study the longer latency burst of spikes (less than 70 ms), which appeared with high intensity electrical stimulation of the sural nerve, was considered to be due to an input from afferent C fibres and was thus used as an indicator of the postsynaptic effectiveness of these fibres. The mean number of spikes occurring between 70 ms and 270 ms was, however, not significantly different for type 2 neurons recorded in control and capsaicin treated rats ($p > 0.05$). The increase in the size of this long latency response commonly observed after spinalization in control animals was, however, reduced in capsaicin treated rats. Sixty-two per cent of the units recorded in control rats showed an increase in the size of this late response of greater than 100%, as opposed to only 32% in the capsaicin group. Thus, although only 10% of afferent C fibres remain in neonatally capsaicin treated animals, their post-synaptic efficacy in the intact spinal cord appears to be the same as that in controls. Receptive field sizes of type 2 neurons also appear to be larger in neonatally capsaicin treated animals. Both observations could be accounted for by a decrease in tonic descending inhibitory influences following neonatal capsaicin treatment.

References

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