Selective C-fiber blockade by pulsed radiofrequency stimulation at DRG in the naïve and nerve-injured rats

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Abstract

Background: Pulsed radiofrequency (PRF) is better acceptable than conventional radiofrequency in treating peripheral neuropathic pain due to its less destructive character and preserving motor functions. However, how PRF alters the peripheral nerves is largely unknown.

Methods: Using a field potential technique, repeated conditioning electrical stimuli were delivered to the sciatic nerve to evoke electrical potential responses in the spinal dorsal horns. The recordings were identified as A and C-components to represent conditioned inputs mediated thru large A- and small C-fiber activations, respectively. PRF stimulation, by 2Hz trains of 250 MHz radiofrequency waves with a 25 ms train-width, 5V intensity for duration for 5 min, was applied at the L5 dorsal root ganglion in naïve rats or in L5 ligation rats at 7 days after the injury. Recordings were conducted before PRF as baselines, and persisted for 2 h after PRF. Alterations of A and C-component were compared between PRF and sham PRF applications in either naïve or neuropathic pain conditions.

Results: In neuropathic pain study, C-component showed remarkable increase in nerve-injured rats in comparison with that of the sham-operated rats. In particular, PRF treatment selectively reversed spinal C-sensitization, and the suppression persisted for 2 h. In normal rat study, selective blockade of C-fiber was similarly shown following PRF treatment. In contrast, PRF did not alter peripherally evoked spinal A-responses under two conditions.

Conclusion: The study demonstrates a lasting inhibitory effect of PRF on evoked spinal C-responses, which suggests that PRF selectively modulates C fiber-mediated noxious inputs to the spinal cord.