Carrageenan evoked P-Akt in deep dorsal horn neurons is prevented by loss of neurokinin1 positive neurons in superficial dorsal horn

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Paw inflammation with carrageenan elicits phosphorylation of Akt in spinal cord neurons with an unusual time course (Choi et al., 2010). Activation of Akt is seen first in neurons of the superficial dorsal horn and in α-motor neurons, followed by its appearance as much as 2 hrs after injection in large, deep (lamina V) dorsal horn neurons. P-Akt is thought to be an indicator of neuronal activity and a marker of sensitization. In the present study, we determined whether carrageenan-induced expression of P-Akt in the deeper lamina of the dorsal horn and in ventral horn α-motor neurons required a linkage through neurons in the superficial laminae (I-III).

Rats were given a spinal injection of 100 ng of either non-

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Panels A, C, E and G are spinal cord sections taken from SAP-treated animals; B, D, F and H are from SSP-SAP-treated animals.
Panel A vs. B shows loss of NK1 receptor (green) from the superficial, but not deep, dorsal horn, with SSP-SAP treatment.
Panels C/D (dorsal horn) and G/H (ventral horn) were obtained 45 min after paw carrageenan. In SAP, but not SSP-SAP animals, carrageenan induces an increase in P-Akt (green-for C-H) compared to BSA.
The same pattern of carrageenan-induced P-Akt prevented by SSP-SAP pretreatment was seen in deeper laminae of the dorsal horn.
Bar in A applies to Panels A-F = 100 mm; Bar in G applies to G-H = 50 mm; Red staining = NeuN.