

Targeting Trends

Reporting the latest news in Molecular Surgery



Ablation of GRPR⁺ Neurons in the Spinal Cord by Bombesin-Saporin Knocks Out Itch Sensation in Mice Without Affecting Pain Circuit

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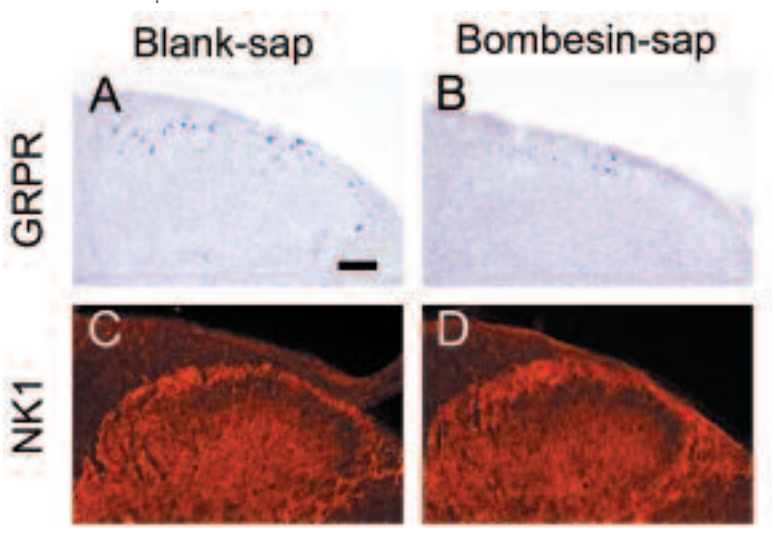
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Unlike pain, itch sensation evokes scratching response instead of withdrawal behavior. However, itch and pain sensations share many similarities. Like chronic pain, chronic itch is a major clinical problem that affects the quality of life of millions of people and the underlying mechanisms are poorly understood. During the past decade, the concept that itch and pain are two distinct sensations has been increasingly appreciated and accepted. Nonetheless, itch-specific neurons are yet to be convincingly identified, raising the doubt about their very existence in the nervous system. In the spinal cord, spinothalamic tract (STT) neurons represent a key station for relaying both itch and pain sensations from the skin to the brain. Using electrophysiological recording, Andrew Craig's group found that a few mechanically insensitive STT neurons in cat spinal cord responded to histamine but not to mustard oil, a noxious chemical stimulus, and claimed that they represent a central pathway for itch.¹ However, these "histamine-selective neurons" were not examined for their responsiveness to other noxious chemical stimuli, such as capsaicin. Indeed, more recent studies in primates (Glenn Giesler and colleagues) found the itch-responsive STT neurons recorded were all

Figure 1. Selective ablation of GRPR⁺ neurons in the spinal cord. (A-B) GRPR expression detected by *in situ* hybridization was significantly reduced in lamina I of mice treated with Bombesin-SAP compared with mice treated with Blank-SAP. (C-D) NK1 receptor expression detected by immunocytochemistry in the dorsal horn was similar between the two groups. Scale bar: 100 μ m.



responsive to capsaicin.² Therefore, whether there is an itch-specific circuit in the spinal cord remains unsettled.

We previously found that gastrin-releasing peptide receptor (GRPR) is specifically expressed in lamina I of the spinal cord.³ GRPR is a mammalian homolog of bombesin receptor, and a G-protein coupled receptor. Bombesin is a 14-amino acid peptide that was originally isolated from the skin of a frog, and gastrin-releasing peptide (GRP) is a mammalian homolog of bombesin. We found that mice lacking GRPR showed a significant reduction of scratching behavior to intradermal injection of a variety of pruritogenic (itchy) substances

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Denise Higgins, Editor

