SENSORY SYSTEMS

Chemokines inflame the pain

A point of convergence between neuropathic and inflammatory pain states that might be exploited therapeutically has been identified by C. Abbadie *et al.* By tracking the nociceptive responses of chemotactic cytokine (chemokine) receptor 2 (CCR2)-knockout mice to the induction of inflammation or neuropathy, the team highlighted an important role for G-protein-coupled chemokine receptors in the processing of chronic pain signals.

In wild-type mice, mechanical allodynia — a state in which ordinarily non-noxious stimuli cause pain — develops after experimental induction of either neuropathy, by partial ligation of the sciatic nerve, or inflammation, by intraplantar injection of Freund's adjuvant. By contrast, mice lacking CCR2 were not hypersensitive to the same stimuli following the same treatments. This result was specific for chronic pain — there were no differences between wild-type and CCR2-deficient mice, in response to acutely painful stimuli.

These behavioural data indicate that CCR2 participates in the relay of chronic pain signals, but at which point in the processing pathway does it do so? Abbadie *et al.* used real-time polymerase chain reaction and immunohistochemistry to address this question. In wild-type mice, mechanical allodynia resulting from nerve damage was accompanied by an increase in the number of CCR2-positive monocytes/macrophages, both in the affected nerve and in the dorsal root ganglion. Activated microglia in the spinal cord were also found to express CCR2.

As monocyte chemoattractant protein 1 preferentially binds to CCR2, the authors suggest that the inhibited pain response of mice that lack this receptor might be a consequence of reduced macrophage infiltration at the injured site. This in turn would slow the rate of Wallerian degeneration, the process by which myelin and axonal material are removed from nerves, and which thereby contributes to neuropathic pain. So, targeting chemokine receptors might lead to new treatments for chronic pain syndromes.

Suzanne Farley

References and links

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FURTHER READING Tran, P. B. & Miller, R. J. Chemokine receptors: signposts to brain development and disease. *Nature Rev. Neurosci.* **4**, 444–455 (2003)

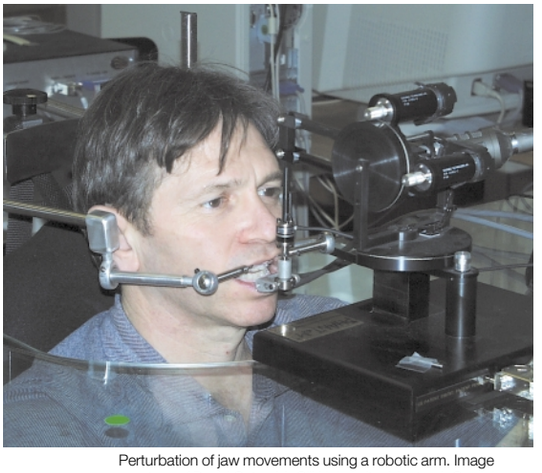
WEB SITE

Encyclopedia of Life Sciences: http://www.els.net/Chemokines

MOTOR CONTROL

Mouthing off

It is probable that most people can recall moments of embarrassment when something that they said "didn't quite come out right". Generally, though, our brains are very good at ensuring that what comes out of our mouths corresponds to what we were intending to say.



Perturbation of jaw movements using a robotic arm. Image courtesy of David Ostry, McGill University, Montreal, Canada.

Until recently, this process was believed to rely largely on auditory feedback, but as D. Ostry and colleagues report in *Nature*, somatosensory input might have an equally important role in speech production.

In their study, Tremblay *et al.* instructed their subjects to practice saying an unfamiliar 'word' ("siat" — pronounced "see-at"). Then, a mechanical load was placed on the jaw using a robotic arm. This perturbed the movement of the jaw, but had no discernable effect on the acoustic properties of the subjects' speech. The authors found that over time, the jaw movements adapted to the perturbation and reverted to the path that was associated with the utterance before the load was applied.

To confirm that auditory feedback was not contributing in any way to this adaptation, Tremblay *et al.* asked a different group of subjects to mouth "siat" without vocalization. They found that adaptation still occurred, even though there was no acoustic goal. In addition, the authors trained a third group of people to make an unfamiliar non-speech jaw movement. Intriguingly, no adaptation was observed in this case, indicating that the jaw could only compensate for the load if its movements were relevant to speech.

Tremblay *et al.* have shown that the generation of speech relies not only on auditory information, but also the brain's ability to track the position of the jaw. This might explain why people who become deaf in adulthood often retain the ability to speak long after they have been deprived of auditory feedback. This research could have important implications for speech therapy; for example, it would be interesting to find out whether therapeutic strategies that focus on somatosensory goals rather than acoustic goals can facilitate speech in people who have been deaf from birth.

Heather Wood

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