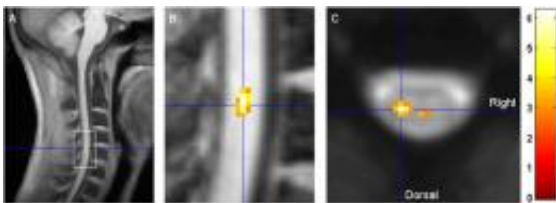


# Pain relief through distraction -- it's not all in your head

May 17 2012

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This figure shows pain-Related BOLD responses during the Low Working Memory Load Condition. (A and B) Pain-related BOLD responses are overlaid on the mean structural image of all participants and display the spinal level of pain-related responses (segment C6, approximately at the border to C5). The white box indicates the sagittal section (B) and the blue line indicates the transverse section (C). Credit: Sprenger et al. *Current Biology*

Mental distractions make pain easier to take, and those pain-relieving effects aren't just in your head, according to a report published online on May 17 in *Current Biology*.

The findings based on high-resolution spinal fMRI ([functional magnetic resonance imaging](#)) as people experienced painful levels of heat show that mental distractions actually inhibit the response to incoming pain signals at the earliest stage of central pain processing.

"The results demonstrate that this phenomenon is not just a psychological phenomenon, but an active neuronal mechanism reducing

the amount of [pain signals](#) ascending from the spinal cord to higher-order [brain regions](#)," said Christian Sprenger of the University Medical Center Hamburg-Eppendorf.

Those effects involve endogenous opioids, which are naturally produced by the brain and play a key role in the relief of pain, the new evidence shows.

The research group asked participants to complete either a hard or an easy [memory task](#), both requiring them to remember letters, while they simultaneously applied a painful level of heat to their arms.

When study participants were more distracted by the harder of the two memory tasks, they did indeed perceive less pain. What's more, their less painful experience was reflected by lower activity in the spinal cord as observed by fMRI scans. (fMRI is often used to measure changes in [brain activity](#), Sprenger explained, and recent advances have made it possible to extend this tool for use in the spinal cord.)

Sprenger and colleagues then repeated the study again, this time giving participants either a drug called naloxone, which blocks the effects of opioids, or a simple saline infusion. The pain-relieving effects of distraction dropped by 40 percent during the application of the opioid antagonist compared to saline, evidence that [endogenous opioids](#) play an essential role.

The findings show just how deeply mental processes can go in altering the experience of pain, and that may have clinical importance.

"Our findings strengthen the role of cognitive-behavioral therapeutic approaches in the treatment of pain diseases, as it could be extrapolated that these approaches might also have the potential to alter the underlying neurobiological mechanisms as early as in the spinal cord,"

the researchers say.

**More information:** Sprenger et al.: "Attention modulates spinal cord responses to pain." *Current Biology*, [DOI:10.1016/j.cub.2012.04.006](https://doi.org/10.1016/j.cub.2012.04.006)

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