Are There Objective Measures for Pain?

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"The patient's report" has long been considered the most valid measure of human pain. Can fMRI replace that?

Of the holy grails in the field of pain management, the 2 that are probably at the top of the list are a treatment that would completely alleviate pain and an objective measure of pain.

Although we haven't yet come up with a cure for pain, we have long had effective treatments. Some, such as opium and acupuncture, date back centuries, and more continue to be developed. However, when it comes to being able to move pain from a solely subjective complaint to one that can be objectively identified and measured, we are, despite many attempts, essentially still at square one.

One attempt to find an objective measure recently appeared in an article in The New England Journal of Medicine that examined whether functional magnetic resonance imaging (fMRI) could provide such information.¹

The paper reported the results of a sequence of 4 studies on a total of 114 healthy subjects that examined whether changes on fMRI correlated with pain complaints. The first study examined whether certain brain patterns occurred in response to heat-induced pain and whether these patterns could be separated from those induced by non-painful warmth, pain anticipation, and pain recall. The second sought to determine if this pain pattern caused by heat could be separated from brain patterns caused by stimuli of 6 temperatures that induced warmth without pain. The third study compared the brain responses of subjects who had experienced the thermal pain to fMRI patterns of what the authors considered to be "social pain"—brain reactions to images of an ex-partner in participants who had recently experienced a romantic breakup. The fourth looked at whether there was a change on fMRI when subjects experiencing heat-induced pain received the analgesic agent remifentanil.

In all the studies, thermal stimuli were applied to the forearms of the subjects and they were asked to report the level of pain based on a visual analogue scale, a commonly used clinical measure of pain.

In the first 2 studies, specific changes in the fMRI were identified in several areas of the brain in subjects who reported experiencing heat-induced pain but were not seen in brains of those only reporting the non-painful warmth. In the third, the fMRI changes shown in those reporting the physical pain were not demonstrated in those who had social pain. The fourth study found that the fMRI changes seen in those reporting heat-induced physical pain were reduced after remifentanil was administered.

A clear pain signal?
How much do these studies advance our ability to objectively measure pain? An accompanying editorial notes that their are a number of limitations.² Of greatest significance is that the study focused on acute pain, not the more vexing problem of chronic pain; in addition, this was only one type of experimental pain and not related to any disease. The editorial also notes that the fMRI used had limited resolution calling into question its accuracy in detecting the reported changes.

It should be noted there have been studies that have shown that changes in the brain may occur in patients suffering from chronic pain. We don't yet know, however, if these changes are a factor in causing the pain or whether they develop in response to the pain.

We also know that over time patients who suffer chronic pain may adapt and go on with there lives despite the pain. Unfortunately, in clinical settings this perseverance is often interpreted as the pain...
not being a problem and when these patients still report having severe pain, they may be accused of exaggeration. What patterns would fMRI reveal during an episode of chronic recurring severe pain? Common sense alone would indicate that someone who suffered an injury or illness several years previously might not demonstrate the same emotional intensity over the associated pain as they did when it first occurred. It would be interesting to know whether or not this occurrence—dampening of response to pain—reflects changes in the brain.

I also feel that the authors of the study avoided a very important issue by choosing to use social pain as opposed to pain apparently secondary to depression, anxiety disorders, or somatization disorder. We know that when people say they are "broken hearted" they are not describing anything close to the experience of people suffering myocardial infarctions or other cardiac disease. However, for example, patients suffering panic disorder can describe chest pains that would be impossible to separate from acute cardiac disease based on their complaints alone. It would be interesting to know if the brains of these people suffering the pain secondary to psychological factors are different from those whose pain has clear physical etiologies.

The results of the study do suggest that fMRI may be useful in helping us better understand the nature of pain and why it occurs. The clinical usefulness of the results is much less clear. The authors suggest that fMRI might be helpful in identifying pain in patients who have difficulty communicating their pain or “when self-reports are otherwise suspect.”

Identifying pain in groups that may have verbal limitations, most notably geriatric patients who, as a result of disorders such as strokes and dementia, may be unable to communicate their pain and very young children, is certainly an important issue. This is especially so as the size of our geriatric population continues to grow, augmented by the ageing baby-boom generation and by improved treatments for cardiac disease and many forms of cancers that once were associated with high rates of mortality.

However, I doubt that an fMRI would become a test of choice to identify pain in the elderly. In many cases, health care professionals could do an adequate job by simply observing a patient in discomfort. Cooperation with a test such as fMRI would also be an issue with both the very old and very young populations.

As to utility of the test for patients whose self-reports of pain might be suspect, I believe that the authors may be entering an area filled with pitfalls. A number of tests and measures have previously been proposed to help identify those patients who might be malingering or exaggerating their pain. Virtually all have been found to have so many exceptions that their clinical usefulness has been severely limited.

I concur with the editorialists who note that, in the end “Being doctors…we may ultimately have to acknowledge that ‘pain is pain’ and can be reported only by the patient.” At least for the foreseeable future.

References
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