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Pain Assessment in Patients: Will Objectifying Pain Ever Be Possible?

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ABSTRACT

Current methods of assessing pain in patients include standardized questionnaires, numeric scales, and face scales. New methods of quantifying nociception are on the horizon, stemming from the discovery that numerous molecular markers of nociception correlate well with the many parameters of pain. However, it is questionable whether or not these techniques can eventually replace current methods of pain evaluation in patients. This commentary argues for the merit of pain scales and questionnaires in assessing the multidimensional phenomenon of pain even if the quantification of nociception, currently done primarily in animal studies, should someday be made feasible in humans.

KEYWORDS: *pain, assessment, evaluation, nociception, measurement*

INTRODUCTION

The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage."[1] As opposed to nociception, which describes the neural pathways and biochemical events that arise from noxious stimuli, pain is a complex quality affected by many psychological factors.[1] In the clinic, patients are often asked to rank their level of perceived pain on a standardized scale and to give a verbal, qualitative description of their pain. Despite their subjectivity, these questions are easy to ask, eliciting quick responses from patients who are able to communicate their pain. Nevertheless, scientists have experimented with more objective methods of assessing pain down to its nociceptive, molecular level. For instance, c–Fos is a protein marker that has been shown in animal studies to correlate well with many parameters of pain, including its location, duration, intensity, and quality.[2] Another example is pERK, the product of ERK (extracellular–signal–regulated kinase) phosphorylation, which, like c–Fos, is expressed after a noxious stimulus is administered.[2] The expression of both c–Fos and pERK is topographically organized within the spinal cord, enabling

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scientists to trace their appearance back to the actual site of pain. Their quantity also corresponds with the intensity of the stimulus, reflecting their versatility as tools to study various parameters of pain in animal models. Currently, these studies cannot be extended to clinical practice as they require the immunological staining of isolated spinal cord and brain slices. Even if nociceptive assays can somehow become feasible in humans, it is debatable whether they can replace the merit of simple face–to–face communication between health care providers and patients.

MEASURING NOCICEPTION: IS IT NECESSARY IN ASSESSING PAIN?

While pain questionnaires and rating scales are subjective in nature and may not accurately reflect a patient's level of physical pain, they do account for a patient's individual perception of pain, a perspective that is shaped not only by complex psychological factors and experience, but also by circumstance and time. For example, repeated stimulation has been shown to increase the level of responsiveness in neurons in the wind-up phenomenon, while other stimuli unrelated to the site of injury can also modify pain.[3] Thus, measurements cannot be meaningfully compared when taken under different circumstances, and the perceived intensity of pain is likely to change from the time a measurement is taken to when the pain is actually treated. Though it is possible to trace the expression of c–Fos and pERK back to the original site of injury in rats, with patients it may be more practical and much easier to locate and assess the quality of pain based on how it is actually perceived in a given moment.[4] Indeed, this assumes that there are no communication barriers between the patient and the clinician, since nociceptive assays may arguably be helpful in evaluating pain in patients unable to verbalize their experience.

In addition to the psychological and behavioural factors that influence pain, there exist many nociceptive and neuronal properties that collectively contribute to a unique profile of pain. The net result of subjective pain can hardly be probed by any assay given the intricate interconnectivity of these physical properties and pathways. Additionally, the body has various homeostatic mechanisms to control pain, just as there are many psychological and behavioural factors that also contribute to the perception of pain.[5] One powerful psychological phenomenon important in pain treatment is the placebo effect, in which a patient's expectations about a treatment can serve as a self-fulfilling prophecy that provides real relief from pain.[6] Acknowledging that the examples provided here are very limited in number, to state that there is no one–to–one correspondence between molecular nociception and a patient's perception of pain would be an great understatement. Even if nociceptive assays can someday be made feasible in clinical practice, they cannot address all of the different factors that play a crucial role in a patient's perception of pain.

That is not to discredit the numerous and valuable contributions neurological research has made in advancing our understanding and treatment of pain. For example, the aforementioned protein marker, pERK, can be quickly induced in isolated spinal cord slices by bathing them in capsaicin, so that the effectiveness of an applied analgesic can then be tested by measuring the decrease in pERK levels.[2] Empirical research has also revealed much of the pathophysiology and mechanisms underlying different types of pain, such as nerve injury–related neuropathic pain and acute inflammatory pain. Recent studies have shown that opioids can bind to peripheral opioid receptors in treating neuropathic pain, though they were previously thought ineffective in treating it.[7] Thus, empirical testing remains central to our understanding of the mechanisms and pharmacotherapy of pain, as much as the myriad of scientific findings reinforce the idea that pain is incredibly complex.

It may be possible to trace select nociceptive pathways and to quantify the concentration of protein markers to obtain a crude profile of pain, but it may be impossible to address all of the intricacies and minute factors that make up subjective pain. To conclude with an analogy, the complexity of subjective pain can be related to the field of bionics, where a finely engineered robotic arm may never achieve the same dexterity of a moving human arm whose motions are kept precise and fluid by infinitesimally intricate workings of the human brain. From the perspective of the individual, both the full capacity of a moving limb and the experience of pain are viewed less as objectified and more as private qualities that only the patient alone can fully command or interpret. Ultimately, if pain is just as individual as the words a patient chooses to describe it, standardized questionnaires and pain scales may remain among the most practical methods to assess pain in a clinical setting, despite certain drawbacks. More importantly, as healthcare providers, having precise knowledge of the mechanisms behind pain is only second to understanding the needs of a patient, as inherent in that understanding is the perspective that pain is not simply a biological manifestation as a result of pathology, but a real suffering to be ameliorated out of respect for a patient's personhood.

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