UCH! I have just been stabbed with a pin in the tender skin between my thumb and index finger. But instead of snatching my hand away, I lie still and carefully rate the experience, as instructed. Despite the initial shock, the discomfort is minimal and I score it a mere 1 out of 10.

I am lying on my back with a Darth Vader-like helmet immobilising my head. An MRI scanner is recording the blood flow in the different parts of my brain, while a team of researchers from the University of Oxford inflict pain on me.

What’s their agenda? Most of us might assume that when we feel pain, its intensity is determined by the amount of injury to the body: how hard we were hit or how badly we were burned. But unconscious and conscious processing in the brain can also amplify or dampen the incoming pain signals, making an injury more or less painful. In the past decade or so, advances in brain scanning techniques have led to a wealth of new insights into these ways in which our mind shapes our suffering. The results of my scan will join this growing body of research.

This line of enquiry could lead to some novel forms of pain treatment. The most obvious application is to develop better pain-relieving drugs that directly target the brain regions involved. But the Oxford group and others around the world are also investigating more unusual approaches, to gain control of the neural processes that govern painful feelings. Ultimately, it may even be possible to train people to switch off their suffering at will.

Pain is seen as one of the banes of human existence. Yet its harsh lessons are essential for teaching us to safeguard our fragile flesh. The uncomfortable or agonising sensations warn us to leap back from danger and to rest and guard our injured body parts while they recover. Those with rare genetic conditions who feel no pain suffer repeated injuries and occasionally die young from infected wounds they hadn’t noticed.

This evolutionary rationale is cold comfort to anyone actually experiencing pain, however, especially for those with long-term, or chronic, conditions like backache, arthritis or nerve damage. These disorders are surprisingly prevalent – according to several studies, between 10 and 20 per cent of adults in the west are in some kind of chronic pain. Backache is particularly difficult for doctors to treat, as in most cases a physical cause cannot be identified.

Current analgesics like paracetamol (acetaminophen), codeine and morphine offer some respite. These drugs act through a variety of mechanisms that block pain signals from being transmitted through the brain. Their value for certain complaints is questionable, though. “Nearly everything that’s prescribed for chronic back pain is no better than placebo at the moment,” says Vania Apkarian, a neuroscientist at Northwestern University in Chicago.

To make matters worse, these drugs often come with undesirable side effects. As a result, neuroscientists are always on the lookout for new ways to fight pain. Brain scans are proving to be a vital tool in this hunt, as they illuminate the various neurological and psychological processes that affect how much we suffer.

The idea that our minds control what we feel certainly fits with the anecdotal evidence. We have all heard tales of a soldier in the heat of battle only noticing their injury after reaching safety, for example. More commonly, we may be so absorbed in a good book we forget about a nagging toothache, say. Although these experiences are not the norm, they hint at the possibility of hijacking certain brain processes for pain relief. That’s partly what is motivating tren...
The team were considering rubbing my hand with capsaicin, the chemical that gives chilli peppers their heat. In the end, they settle on sticking pins into me, which apparently gives more consistent results. MRI scanning could clearly give someone a visual read-out of one of the pain matrix that are close enough to the surface of the brain to control it, suggests Tracey. As a result, these approaches are generally considered a last resort.

A newer technique does exist, though, that uses simpler equipment and seems to be relatively safe. Direct cortical stimulation involves implanting electrodes on the scalp and passing a current that stimulates the brain without the need for using a magnetic field close to the head, which has been used experimentally on people with intractable pain. A few successes have been reported but both methods have severe limitations: DBS requires a risky operation, while TMS can only be performed in a lab. As a result, these approaches are generally considered a last resort.

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