I see your pain

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Illustration incorporating real image of pain MRI scan (far left).

(PhysOrg.com) -- How can some sportsmen and women, in the heat of the moment, play on through pain that would floor anyone else? Bert Trautmann, the Manchester City goalkeeper, famously played on through to the end of the 1956 FA Cup final - holding on for a 3-1 win - despite suffering a broken neck from a collision in the second half.

Similarly, why do some people seem to suffer long-lasting debilitating pain when others are better able to cope? Each of us individually can also experience pain differently at different times.

Pain of course is a subjective, variable and very personal experience that involves far more than a simple reaction to injury or damage. And although doctors can only rely on what each patient says about the pain that they're experiencing, it is important to try and diagnose, monitor and manage that pain effectively.

Professor Irene Tracey's group at the Oxford Centre for Functional Magnetic Resonance Imaging of the Brain has used brain imaging techniques for a number of years, aiming to provide an objective measure of individual experiences of pain.

By understanding how the brain processes the information coming from all the body's senses as pain, they can begin to pick out differences between people.

Their latest results, reported this week in the journal *PNAS*, demonstrate that people's personalities matter in their experience of pain. People that are more anxious, or worried about feeling pain, have differences in connectivity within their brains that make them more susceptible to actually feeling pain.

The team applied short laser pulses to the feet of 16 willing and healthy volunteers just at the point where they started to experience the pulses as being painful ('you can ratchet up the laser pulses so you feel them as warm, then hot, then the point where you say "yeah, actually, that hurts now,"' explains Irene.) These brief laser pulses were applied 120 times to each volunteer, and around half the time the volunteer would declare it was painful and half the time not - even though the pulse was exactly the same every time.

MRI brain scans during these experiments show that the volunteers' brains were more active in pain-processing regions when they described the laser pulses as being painful - so this was a real experience and not down to any report bias or artefact.

But the researchers wanted to understand exactly what made one stimulus painful at one time while the very same stimulus at another time was fine.

‘We looked at the period just before the stimulus and asked “is there a difference in the way certain regions of the brain are connected or communicating before the stimulus is applied?”’ explains Irene. ‘The answer is that there is a striking difference.’

The researchers focused on the connection between ‘higher’ parts of the brain involved in the processing of pain, and part of the brain stem that can powerfully alter the experience of pain - turning its level up or down.

When there was good coupling between the two areas before a laser pulse, the volunteer felt no pain, and when the connectivity was poor, the pulse was experienced as painful.

Most interestingly of all, however, was that people that were more likely to be anxious or vigilant about pain (as scored on their answers to a questionnaire for these traits), showed poorer connectivity in general between these brain regions.

This difference in the hardwiring of the brain could account for how people with different personalities respond to pain, suggests Irene.

‘We now want to know whether we are born with this, or whether the brain becomes wired like this as it develops,’ she says. ‘It’s a chicken and the egg situation. We only have a snapshot in time with this experiment. We can’t tell what comes first.’

More information:
http://www.pnas.org/content/early/2009/11/13/0906186106.abstract

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