THE GENDER DYNAMICS OF PAIN

Study shows women and men react differently to physical aches

Chronic pain is one of Canada's leading health problems. About one in five people suffers from chronic pain, and its economic toll surpasses that of cancer, heart disease and HIV combined.

But what if we could erase our memories of acute pain, which is thought to be a key driver of chronic pain?

That question intrigues Loren Martin, an assistant professor of psychology at the University of Toronto Mississauga and a Tier II Canada Research Chair in Translational Pain Research. Recently, he and colleagues at McGill University in Quebec and the University of Zurich conducted a study that suggests that men and women react differently to pain.

The team tested pain memory in people and mice. Initially, men and women were tested for their sensitivity to heat pain. "We placed heat sensors on their arm and asked them to rate how painful that was on a scale of 0 to 100," says Martin. The average rating was about 40. Participants were then fitted with a tightly inflated blood pressure cuff for 20 minutes and asked to squeeze hand weights 20 to 30 times to intensify their already significant pain. They rated their pain between 80 and 100, typically.

The next day, the participants returned. Some were led to the same testing room as the first day (with the blood pressure cuff in plain view), while others were led to a different building. The heat sensitivity test was repeated on the subjects, but not the cuff test.

The men in the same room on the first day reported more pain than they had experienced from the initial heat sensitivity test and, interestingly, more pain and stress than the women. "The pain ratings by the females didn't change even though they were in the same [environment]," says Martin, who believes the men reported greater pain sensitivity because they were more stressed than the women by the possibility of another cuff test.

The research team hypothesized that the men's response was linked to sex and stress hormones, so they performed similar, or translational, experiments on mice. In one experiment, both male and female mice were exposed to mild heat and each was given an injection to produce mild stomach pain. When heat was applied in the same environment the next day, the male mice showed an increased pain response, but not the female mice. "Their heat pain thresholds changed and their stress hormones skyrocketed," says Martin.

In another of the team's experiments, female mice given testosterone showed heightened sensitivity to pain, while castrated mice did not. And when the researchers injected a peptide into the brains of the male mice to block communication between neurons, which is important to memory, the mice didn't appear to remember their earlier pain.

These are important findings for scientists who want to better understand the neurobiological mechanisms of the brain and how chronic pain develops. Says Martin: "We are now looking at whether or not there are brain regions that hold pain memories and whether we can target those neurons to erase pain memories."—**Sara Bedal**

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