



PAIN

How to understand (and manage) your body's most important warning system—and what to do when it goes awry.



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YOU'RE HIKING in the mountains when you hit a muddy patch. Suddenly you're flat on your back and a jolt of pain shoots down your spine. You yell "Owww!" (OK, maybe a few other choice words) as you pray that the searing sensation will pass. And that unbearable feeling? It's your body's personal alarm system, and it's sending a rallying cry through your body that may help you make your way back down the mountain on your own instead of on a stretcher.

If you're fortunate, your problem will be short-lived: The immediate pain will subside, and while you might be sore for a week or two, you'll heal and life will move on. But if you're not so lucky, your back may continue to hurt for weeks, months—even decades to come.

While unpleasant, pain is actually a crucial biological mechanism that protects you by making harmful activities hurt (think sticking your hand in a fire), and therefore things you don't want to do. It also motivates you to treat injuries and triggers a cascade of physiological reactions that spur healing, which ups the odds that you'll recover and survive. But too often what should be a brief injury or illness becomes the catalyst for a long-term problem.

About 100 million Americans—a majority of whom are women—suffer from some sort of chronic pain, meaning persistent discomfort that lasts for longer than three months, according to the Institute of Medicine of the National Academies. That's part of the reason that prescription-painkiller use has risen dramatically in the United States since 1999, according to the Centers for Disease Control.

Why can short-term pain become seemingly endless? Put simply, your body may not always do what it should. "When pain sets off an alarm in the brain, your nervous system is hardwired to protect you by reacting. Over time, particularly in the wake of untreated pain, that system can become hypersensitized," says Beth Darnall, Ph.D., an associate professor in the division of pain medicine at Stanford University and the author of *Less Pain, Fewer Pills*. Hypersensitivity causes the brain to magnify pain sensation. "The response that at first protects you begins to work against you," says Darnall. But there's much you can, and should, do to reduce your risk of getting stuck in a cycle of hurt.

A MIND-BODY PROBLEM

Experts don't know for certain why one woman develops chronic pain while another with similar experiences, habits, and even genetics does not. Past painful experiences increase the risk, as does a history of trauma—but, again, not for everyone. What researchers do know is that ongoing pain occurs when something in the central nervous system goes awry. With acute pain, the central nervous system stops sending pain signals up the spinal cord and to the brain once the injury heals. But with chronic pain, those signals continue to fire long after the injury is gone. As a result, "nerve cells become responsive to incoming pain signals and more sensitive to weaker ones or even non-pain signals, like touch," says Paul J. Christo, M.D., an associate professor at the Johns Hopkins University School of Medicine, in Baltimore. "It's like the whole nervous system is hyper-aroused." That's why you could have a "normal" X-ray—of your knee, say—yet be in anguish.

Imaging studies show that the brains of people with chronic pain are structurally different from those of nonsufferers. "Chronic pain shrinks neurons [nerve cells] in the brain's gray matter—that is, the thinking, emotion, and motivational centers of the brain," says Tor Wager, Ph.D., a professor of psychology and neuroscience at the Institute for Cognitive Science at the University of Colorado, in Boulder. In a landmark 2004 study, researchers at Northwestern University found that people who had suffered from back pain for more than a year had up to 11 percent less gray matter in certain areas compared with those who did not have back pain.

Thinning gray matter is linked to emotional distress and difficulty thinking, moving, and sleeping, which might explain why about a quarter of chronic-pain patients are clinically depressed. "The regions of the brain that light up when people experience anxiety or depression are some of the same regions that process pain," says Darnall. "When those brain-signaling systems go awry, people are vulnerable to both." And so pain experienced when you're feeling stressed, depressed, tired, or anxious seems stronger than pain experienced when you're hopeful, upbeat, or encouraged. Easing pain, however, can improve your mood—and if you do have depression, treating that often reduces pain, too.

THE X FACTOR

One of the biggest risk factors for both acute and chronic pain is one you can't control: simply having two X chromosomes. A study published in *European Journal of Pain* showed that 37 percent of women experience pain of some sort on any given day, compared with 21 percent of men. While it is true that women are more likely than men to report pain and seek treatment, hormones also come into play. "Testosterone protects against pain," says

Christo. But estrogen can limit the activity of a gene called COMT, causing stress hormones to accumulate and triggering nerves to intensify pain. What's more, fluctuations of hormones—such as progesterone during the menstrual cycle, pregnancy, and perimenopause—may predispose women to experience discomfort.

Women are particularly prone to chronic pain, including some of the most common conditions, such as lower-back pain, arthritis, and headaches, says Afton Hassett, Psy.D., a clinical psychologist and an associate research scientist in the department of anesthesiology at the University of Michigan Medical School, in Ann Arbor. We're also more likely to develop fibromyalgia (widespread and persistent muscle pain), irritable bowel syndrome, and interstitial cystitis (bladder pain) than men.

Gender aside, surgery increases your risk of developing chronic pain, since it's essentially a controlled injury. "Whenever we introduce trauma—and cutting through tissue and nerves is traumatic—there's a real risk of prolonging pain," says Darnall. Studies show that almost a third of women who have a hysterectomy or a mastectomy experience persistent pain more than a year after surgery and that nearly a third of people who have a total hip replacement are in near constant pain months later. Dental work can be risky, too, with post-procedure pain rates as high as 13 percent.

The upshot: Using adequate pain control—such as epidurals, nerve blocks, local anesthetic, and oral and IV pain medication—during and after surgery can reduce the risk of developing chronic pain by 25 percent, suggest studies. If you're undergoing a surgery associated with a high risk of post-operative pain (for example, breast surgery or a Cesarean delivery), ask your surgeon and anesthesiologist to detail the pain-control protocol for during and after the procedure. You want to



be certain that both physicians have a plan and be confident that they're willing to try different approaches—quickly—if the pain control they're using isn't working.

STOP THE CYCLE

You can reduce and even eliminate pain, and doing so can have positive long-term effects on your health and well-being. First, remember that medication is your friend—up to a

point. If your head is throbbing, don't try to tough it out, which may increase the odds that the pain sticks around. Instead, take an over-the-counter (OTC) pain medication. For both acute and chronic pain, you can safely take acetaminophen (such as Tylenol) or ibuprofen (Advil) according to the package directions for several weeks. But—and this is key—use the lowest dose that brings relief and take the medicine for the shortest period of time possible. "Use of acetaminophen



should not exceed 4,000 milligrams a day," says Christo. (And if you have liver disease, check with your doctor.) Nonsteroidal anti-inflammatory drugs, or NSAIDs, such as aspirin, ibuprofen, and naproxen (Aleve), are also safe for acute pain at the recommended doses. These drugs can be used regularly, but let your doctor know how often you're taking them, because they can lead to health issues, such as heart problems and impaired kidney function, and your body can become dependent on them.

If you've had ongoing pain for two weeks, see a doctor, to ensure that you are best treating your pain. "Doing so may prevent your pain from becoming chronic," says Darnall. A pain specialist—typically an anesthesiologist, a neurologist, a physiatrist, or an orthopedic surgeon who has received extra medical training in pain management—is crucial if you are coping with chronic pain. (Ask your physician for a recommendation.) The reality is, many doctors don't understand how to treat pain effectively. Medical students receive limited training in pain, according to a 2011 *Journal of Pain* study. As a result, doctors may prescribe opioids, such as Vicodin and OxyContin (now some of the most widely prescribed drugs in the United States), instead of exploring other forms of relief. And although opioids can be remarkably effective in treating acute pain, they don't cure chronic pain and should be used only with close supervision by a doctor.

An increasing number of experts believe opioids actually make matters worse by creating an altered state in the brain that numbs the pain—along with everything else. "Over time, you develop a tolerance to opioids and an insensitivity to naturally rewarding events," says Wager. And that sets a person up for addiction.

As for other prescription medications that can help with chronic pain, there's no magic bullet. But there are

options. "Antiseizure and antidepressant medications work on the same neurotransmitters—serotonin, norepinephrine, and glutamate—involved in anxiety and depression, so they can, in effect, treat both pain and depression," says Hassett. Ask your doctor about these medications if you have chronic pain—and know that there are other ways to find relief beyond a prescription.

THINK ABOUT IT

Pain isn't all in your head, but it does start there, which is why mind-centered techniques can go a long way toward easing aches. Here are six to consider.

1. BELIEVE THAT YOU'LL FEEL BETTER SOON. Defaulting to the worst-case scenario ("I'll never be OK again") is associated with experiencing more intense pain, developing chronic pain after surgery or an injury, and having reduced response to painkillers, research shows.

Conversely, simply anticipating relief can make you feel better. "Research has shown that a placebo can be as effective as a strong dose of morphine," says Daniel Clauw, M.D., a professor of anesthesiology at the University of Michigan School of Medicine, in Ann Arbor. Placebos activate the internal pharmacy by releasing pleasure-increasing, pain-relieving endorphins in the brain. So if you believe a therapy will work—whether it's a pill, a procedure, or a technique, such as meditation—chances are, you're right.

2. CONSIDER THERAPY. If you're having trouble moving past worst-case scenarios, a form of psychotherapy called cognitive behavioral therapy (CBT) can teach you to swap negative thought patterns for more positive thoughts and behaviors. According to a 2012 study published in *Archives of Internal Medicine*, CBT reduced pain in 30 percent of British patients with

chronic, widespread pain, compared with just 8 percent of those using only conventional pain treatments, like medication.

3. REFRAME YOUR PAIN. Christo encourages people with chronic pain to change the way they think about their experiences. Instead of focusing on the sting of a burn, for example, try viewing it as a warm, tingly sensation. Discomfort won't magically disappear, but you'll have more control over your emotional response, which can reduce the pain's intensity.

4. DISTRACT YOURSELF. Your brain can focus on only so much at once. Concentrate on pain and you'll increase the agony; divert your attention and the pangs will diminish, says Christo. While listening to music, seeing friends, and exercising are all effective, mind-body practices are among the best ways to self-distract, according to recent evidence from the National Institutes of Health. Yoga, mindfulness-based stress-reduction programs, and similar techniques can counteract the brain changes that stem from chronic pain.

5. MEDITATE. In a 2011 study from the Wake Forest University School of Medicine, in Winston-Salem, North Carolina, patients experienced a 40 percent reduction in pain intensity and 57 percent less distress from pain while meditating. (That's more effective than morphine.) Mindfulness meditation may influence the brain in ways that make the body less sensitive to pain.

6. GET STUCK. Sticking needles in your skin when you're already hurting may seem counterintuitive, but studies show that acupuncture works. People who received 12 acupuncture treatments over the course of two months relieved headache pain during treatment and for several months afterward, according to a 2005 study in *British Medical Journal*. Acupuncture reduces stress levels, which may reduce pain, researchers believe. ●