Medical Xpress

The benefits of meditation: Neuroscientists explain why the practice helps tune out distractions and relieve pain

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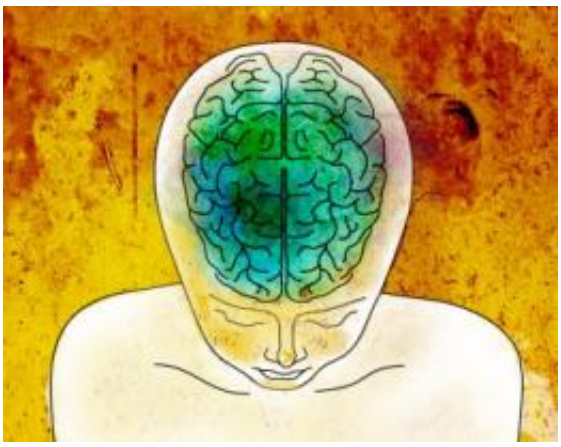

Studies have shown that meditating regularly can help relieve symptoms in people who suffer from chronic pain, but the neural mechanisms underlying the relief were unclear. Now, MIT and Harvard researchers have found a possible explanation for this phenomenon.

In a study published online April 21 in the journal *Brain Research Bulletin*, the researchers found that people trained to meditate over an eight-week period were better able to control a specific type of brain waves called alpha rhythms.

"These activity patterns are thought to minimize distractions, to diminish the likelihood stimuli will grab your attention," says Christopher Moore, an MIT neuroscientist and senior author of the paper. "Our data indicate that meditation training makes you better at focusing, in part by allowing you to better regulate how things that arise will impact you."

There are several different types of brain waves that help regulate the flow of information between brain cells, similar to the way that radio stations broadcast at specific frequencies. Alpha waves, the focus of this study, flow through cells in the brain's cortex, where sensory information is processed. The alpha waves help suppress irrelevant or distracting sensory information.

A 1966 study showed that a group of Buddhist monks who meditated regularly had elevated alpha rhythms across their brains. In the new study, the researchers focused on the waves' role in a specific part of the brain — cells of the sensory cortex that process tactile information from the hands and feet.

For this study, the researchers recruited 12 subjects who had never meditated before. Half of the participants were trained in a technique called mindfulness-based stress reduction (MBSR) over an eight-week period, while the other half were told not to meditate.

The MBSR program calls for participants to meditate for 45 minutes per day, after an initial two-and-a-half-hour training session. The subjects listen to a CD recording that guides them through the sessions.

The first two weeks are devoted to learning to pay close attention to body sensations. "They're really learning to maintain and control their attention during the early part of the course. For example, they learn to focus sustained attention to the sensations of the breath; they also learn to engage and focus on body sensations in a specific area, such as the

bottom of the feet, and then they practice disengaging and shifting the focus to another body area," says Catherine Kerr, an instructor at Harvard Medical School and lead author of the paper.

The researchers did brain scans of the subjects before the study began, three weeks into it, and at the end of eight weeks. At eight weeks, the subjects who had been trained in meditation showed larger changes in the size (amplitude) of their alpha waves when asked to pay attention to a certain body part — for example, "left foot." These changes in wave size also occurred more rapidly in the meditators.

The study is a "beautiful demonstration" of the effects of meditation training, and of the ability to cultivate an internal awareness of one's own bodily sensations, says Clifford Saron, associate research scientist at the Center for Mind and Brain at the University of California at Davis, who was not involved in the research.

Subjects in this study did not suffer from chronic pain, but the findings suggest that in pain sufferers who meditate, the beneficial effects may come from an ability to essentially turn down the volume on pain signals. "They learn to be aware of where their attention is focused and not get stuck on the painful area," Kerr says.

The subjects trained in meditation also reported that they felt less stress than the non-meditators. "Their objective condition might not have changed, but they're not as reactive to their situation," Kerr says. "They're more able to handle stress."

The researchers are now planning follow-up studies in patients who suffer from chronic pain as well as cancer patients, who have also been shown to benefit from meditation.