

Nutrition, companionship reduce pain in mice with sickle cell disease, study finds

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Researchers from the University of California, Irvine and the University of Minnesota have found that an enriched diet and companionship can reduce pain in mice with sickle cell disease by increasing serotonin.

They also discovered that duloxetine, an antidepressant that boosts serotonin levels, could be an alternative to opioids in treating chronic pain.

"Finding safe and effective alternatives to opioids is a research priority, especially for patients with [sickle cell disease](#)," said Dr. Keith Hoots, director of the Division of Blood Diseases and Resources at the National Heart, Lung, and Blood Institute. "It's encouraging to see a dose-response relationship to nutrients and companions in mice, which guides future research about the role foods and friends may have in helping humans manage [chronic pain](#)."

Scientists have long suspected that feeling pain is connected to a person's mood or state of mind, but the link has never been proven beyond doubt. This study, published Feb. 1 in *Scientific Reports*, supports that connection.

"Part of pain is perception," said Kalpna Gupta, a visiting professor of medicine at UCI and the study's lead author. "For instance, if I start watching a comedy, suddenly I might forget that I was hurting; mood and a feeling of well-being block pain from being perceived."

Sickle cell disease is a painful, lifelong condition that affects about 100,000 Americans, according to the Centers for Disease Control and Prevention, the majority of whom are African American. Opioids are the most common method of treating their pain. But because they're addictive, and overdoses are a leading cause of death in the United States, Gupta's team has been investigating alternatives.

"By suggesting a safe alternative to opioids for pain control, the findings of this study have the potential to change the practice of pain management and save lives," said study co-author Dr. Rajendra Badgaiyan, a professor of psychiatry at the University of Minnesota at

the time who's now at the University of Texas Health Science Center in San Antonio.

Love conquers pain

The researchers found that mouse models of sickle cell disease in a "happy environment" experienced less pain from the disorder. Over a four-week period, pain was reduced for male mice that were placed with female companions and received a diet rich in protein, [fatty acids](#) and amino acids.

Their pain decreased as the diet and companionship caused their brains to secrete serotonin. Researchers quantified the mice's pain according to the frequency with which they lifted their paws in response to stimuli and by their ability to exert force.

To confirm that serotonin caused the reduction in pain, the mice were given duloxetine, an antidepressant that works by raising the amount of serotonin in the brain. The drug decreased pain levels for both male and female mice.

The researchers believe that adapting these conditions for humans would produce the same results. Gupta is recommending that duloxetine be used in clinical trials for sickle cell patients as an alternative to opioids for pain relief.

Combating pain and prejudice

In the United States, the stigma associated with opioids can make it difficult for sickle cell patients to lessen their pain.

"Patients with sickle cell disease often have to navigate the complex social prejudices of the healthcare system in addition to dealing with

severe pain," said Varun Sagi, a medical student at the University of Minnesota and a contributing author on the study. "Finding alternatives to opioids could help alleviate this burden."

Duloxetine could provide an easier-to-obtain alternative. Likewise, as in the mice, building strong relationships and improving nutrition might also stimulate serotonin production in humans and thus reduce their pain.

As the COVID-19 pandemic persists, social isolation can make relationship-building a challenge, and as unemployment continues to hover around 7 percent, many Americans lack food security. As the study suggests, this can impact [pain](#) for sickle cell patients and others, so Gupta stressed the importance of developing strategies to enhance social interaction and nutrition for those affected.

Provided by University of California, Irvine

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