Researchers see promise in light therapy to treat chronic pain

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Chronic pain afflicts over 100 million people across the United States. It diminishes their productivity and their quality of life and costs hundreds of billions of dollars each year to medically manage. It shatters people's emotional wellbeing, tears apart families and claims lives through suicides and accidental drug overdoses.

But now researchers at the University of Arizona have found promise in a novel, non-pharmacological approach to managing chronic pain—treating it with green light-emitting diodes (LED).

Results of the study appear in the February 2017 issue of the journal *Pain*.

In the study, rats with neuropathic pain that were bathed in green LED showed more tolerance for thermal and tactile stimulus than rats that were not bathed in green LED.

In both cases, and of note, no side effects from the therapy were observed, nor was motor or visual performance impaired. The beneficial effects lasted for four days after the rats' last exposure to the green LED. In addition, no tolerance to the therapy was noted.

"Chronic pain is a serious issue afflicting millions of people of all ages," says Mohab Ibrahim, UA assistant professor of Anesthesiology and Pharmacology and lead author of the study. "Pain physicians are trained to manage chronic pain in several ways including medication and interventional procedures in a multimodal approach. Opioids, while having many benefits for managing pain, come with serious side effects. We need safer, effective and affordable approaches, used in conjunction with our current tools, to manage chronic pain. While the results of the green LED are still preliminary, it holds significant promise to manage some types of chronic pain."

To receive the green LED exposure, one group of rats were placed in clear plastic containers that were affixed with green LED strips, allowing them to be bathed in green light. Another group of rats was exposed to room light and fitted with contact lenses that allowed the green spectrum wavelength to pass through. Both groups benefitted from the green LED exposure. However, another group of rats was fitted with opaque contact lenses, which blocked the green light from entering their visual system. These rats did not benefit from the green LED exposure.

"While the pain-relieving qualities of green LED are clear, exactly how it works remains a puzzle," says Rajesh Khanna, UA associate professor of Pharmacology and senior author of the study. "Early studies show that green light is increasing the levels of circulating endogenous opioids, which may explain the pain-relieving effects. Whether this will be observed in humans is not yet known and needs further work."

Todd Vanderah, professor and chair of Pharmacology and co-author of the study stated that novel non-pharmacological methods are

desperately needed to help the millions of individuals suffering from chronic pain. The initial results hint of green LED altering the levels of endogenous substances that may inhibit pain and possibly decrease inflammation of the nervous system is a great breakthrough, he says. Such therapy is inexpensive and can easily be used worldwide.

Other researchers involved in the study include Kerry Gilbraith, Amol Patwardhan, Aubin Moutal, Xiaofang Yang, Lindsey Chew, Tally Largent-Mines, T. Philip Malan and Frank Porreca.

The researchers are now conducting a clinical trial using green LED therapy in people with fibromyalgia, a common source of chronic pain.

The hope is that green LED light therapy will alleviate the participants' pain when used alone or in combination with other treatments including physical therapy or low-dose analgesics.

More information: Mohab M. Ibrahim et al, Long-lasting antinociceptive effects of green light in acute and chronic pain in rats, *PAIN* (2017). DOI: 10.1097/j.pain.0000000000000767

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