

Potential new painkiller provides longer lasting effects

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University of Missouri researchers led by George Kracke, Ph.D., have discovered a new compound that offers longer lasting painkilling effects, and shows promise as an alternative to current anesthetics. Credit: Justin Kelley/MU Health System

Medications have long been used to treat pain caused by injury or

chronic conditions. Unfortunately, most are short-term fixes or cause side effects that limit their use. Researchers at the University of Missouri have discovered a new compound that offers longer lasting painkilling effects, and shows promise as an alternative to current anesthetics.

"Because of its versatility and effectiveness at quickly numbing pain in targeted areas, lidocaine has been the gold standard in [local anesthetics](#) for more than 50 years," said George Kracke, Ph.D., associate professor of anesthesiology and perioperative medicine at the MU School of Medicine and lead author of the study. "While lidocaine is effective as a short-term painkiller, its effects wear off quickly. We developed a new compound that can quickly provide longer lasting relief. This type of painkiller could be beneficial in treating sports injuries or in joint replacement procedures."

Painkillers work by interfering with the nervous system's transmission of nerve signals that the body perceives as pain. Lidocaine is used as an injectable pain reliever in minor surgical or dental procedures, or as a topical ointment or spray to relieve itching, burning and pain from shingles, sunburns, jellyfish stings and insect bites. The new compound developed at MU, boronicaine, could potentially serve many of those same functions as an injectable or topical painkiller.

National Academy of Sciences member M. Frederick Hawthorne, Ph.D., director of MU's International Institute of Nano and Molecular Medicine and a pioneer in the field of boron chemistry, synthesized boronicaine as a derivative of lidocaine. By changing aspects of the chemical structure of lidocaine, the researchers found that the new compound provided pain relief that lasted five times longer than lidocaine. In pre-clinical, early stage studies, boronicaine provided about 25 minutes of relief, compared to about five minutes of [pain](#) relief with lidocaine.

"Although some conditions may warrant the use of a short-lasting painkiller, in many cases a longer lasting anesthetic is a better option," Kracke said. "Having a longer lasting anesthetic reduces the dosage or number of doses needed, limiting the potential for adverse side effects." While other types of painkillers can provide longer [pain relief](#) than [lidocaine](#), they can cause heart toxicity, gastrointestinal issues and other side effects. Preliminary findings show no toxicity in single-dose studies of boronicaine, though more studies are needed.

"Boronicaine could have distinct advantages over existing painkilling medications," said Hawthorne, who also serves as the Curators' Distinguished Professor of Chemistry and Radiology at MU. "We're conducting more research into the [side effects](#) of the compound, but in time it could very well become a useful material to use as an anesthetic."

The study, "Carborane-derived Local Anesthetics Show Isomer-dependent Analgesia," was presented on March 29 at the Experimental Biology 2015 conference in Boston, and the research was recently published in the medicinal chemistry journal *ChemMedChem*.

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