

Pain reliever linked to kidney injury in endurance runners

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Grant Lipman (above) and his colleagues found that ultramarathoners who took ibuprofen for pain relief during the strenuous races doubled their risk for kidney injury. Lipman, who also competes in endurance races, says he's switched to acetaminophen and post-race ice baths to treat his pain. Credit: Paul Sakuma

The common practice of taking ibuprofen for pain relief while competing in ultramarathons causes a large increase in acute kidney injury, a Stanford study says.

People who take the painkiller ibuprofen while running very long distances double their risk of [acute kidney injury](#), according to a study by researchers at the Stanford University School of Medicine and several other institutions.

As many as 75 percent of ultramarathoners use the nonsteroidal anti-inflammatory drug, or NSAID, in this fashion, according to Grant Lipman, MD, clinical associate professor of [emergency medicine](#) at Stanford and director of Stanford Wilderness Medicine. And while most cases of acute [kidney](#) injury appear to resolve spontaneously, the condition has the potential to progress to renal failure, he said.

Lipman is lead author of the study, which was published online July 5 in *Emergency Medical Journal*. Brian Krabak, MD, a sports and rehabilitation medicine specialist at the University of Washington-Seattle, is the senior author.

"Running these races tends to hurt," said Lipman, who has served as the medical director of RacingThePlanet ultramarathon events, which are held in various parts of the world, including China, Antarctica and Chile. Lipman said he has seen firsthand how common it is for runners to take ibuprofen both before, during and after these races to relieve pain and reduce joint swelling.

Decreasing blood flow to kidneys

"In medical school, we were all taught to be careful of ibuprofen because it decreases [blood flow](#) to the kidneys," he said. However, almost all previous studies looking at the effect of the drug on the kidneys in running events have shown no negative effects, he said.

Lipman and his colleagues conducted the first randomized, placebo-controlled, double-blinded study to test the use of ibuprofen in ultramarathoners. They hypothesized that ibuprofen would not result in an increased rate of acute kidney injury compared to placebo.

The 89 participants who completed the trial were randomized to take either ibuprofen or a placebo during a 50-mile section of one of four different seven-day, 155-mile ultramarathons. They were required to refrain from taking ibuprofen at least 12 hours prior to the 50-mile section of the race. They ran in ultramarathons either in China, Chile, Ecuador or Sri Lanka. They ran through wilderness terrain with few roads and varying topography, and they carried all their personal items for the duration of the race, including all their gear, food and clothing.

"The morning of this 50-mile section of the race, the participants came to the medical tent," Lipman said. "We weighed them and gave them a baggie and said to take these pills every four hours. They were given either 400 milligrams of ibuprofen or sugar pills. Nobody knew which. And instructed to take one every four hours. And they ran off."

Twelve- to 36-hours later, depending on the speed of the runners, the participants were met by the researchers at the medical tent. There, they were weighed and their electrolyte levels and renal functioning were measured.

Rates of kidney injury

Forty-seven percent of the participants took ibuprofen, and 53 percent took the placebo. Results showed that about 39 of the 89 participants had acute kidney injury at the end of the 50-mile section of the race. There was an 18 percent higher rate of kidney injury among those who took the drug compared to those who didn't, the study found.

Lipman called this an impressive difference.

"Basically, for every five runners who took ibuprofen, there was one additional case of acute kidney injury. That's a pretty high rate," he said.

Ultramarathon races have increased in popularity in recent years. The number of races worldwide reached 1,357 in 2015, with over 70,000 runners finishing these races every year, the study said.

"With ultramarathon running increasing in popularity, it is important to study how commonly used medications may affect physiology and performance in this population," said Brandee Waite, MD, associate professor of sports medicine at UC-Davis, who was not connected with the study. "This information can help runners make an informed choice about whether or not to use an NSAID for pain management during an ultramarathon and is a step toward helping physicians establish evidence-based recommendations for their ultra-running patients."

This study should cause endurance athletes and distance runners pause before taking ibuprofen

while competing, but does not infer that the average athlete would necessarily face similar effects from taking the drug, Lipman said.

"I would generalize to say, yes, caution should be warranted taking ibuprofen during long distance runs or other endurance sports events," he said. "But I would not push that caution to the general lay population. This study's conclusions are for endurance athletes."

Risks for distance runners

Acute kidney injury is common in these athletes due to the high rates of dehydration that cause reduced blood flow and rhabdomyolysis—a breakdown of muscle tissue that leads to the release of muscle fiber contents into the blood, which is harmful to the kidney and often causes kidney damage, Lipman said. In fact, acute kidney injury has been recorded in 34 to 85 percent of all ultramarathoners, the study said.

This study shows that adding ibuprofen into this mix further increases the danger of [kidney damage](#), Lipman said.

"Studies show that for most people, this acute kidney injury is usually resolved within a day or two after the race," he said. "However, numbers of runners have ended up being hospitalized from renal failure."

Two years ago, an athlete participating in the Boulder Ironman triathlon died three days later due to kidney failure caused by dehydration and rhabdomyolysis associated with excessive exercise. He was 40 years old.

"We hypothesized that we were going to say [ibuprofen](#) is safe," said Lipman, an endurance runner himself who regularly used the pain reliever during races. "We thought we'd be able to say 'Go forth and run and have no pain.'"

"I felt surprised and a little shocked that it really is as bad for you as we found," said Lipman, who has now switched to using acetaminophen, such as Tylenol, for pain relief and taking ice baths after racing. "I feel it's ironic to preach moderation in

extreme sports, but moderation is probably a safe approach. If something hurts, these athletes might want to consider taking acetaminophen instead."

Other Stanford co-authors were wilderness medicine fellows Kate Shea, MD, clinical instructor of emergency medicine and Mark Christensen, DO, clinical instructor of emergency medicine; and Rebecca Higbee, MD, Stanford-Kaiser emergency medicine resident.

Researchers at the University of Colorado, Harvard University and Washington University in St. Louis, also contributed to the study.

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More information: Grant S Lipman et al. Ibuprofen versus placebo effect on acute kidney injury in ultramarathons: a randomised controlled trial, *Emergency Medicine Journal* (2017). DOI: [10.1136/emered-2016-206353](https://doi.org/10.1136/emered-2016-206353)

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