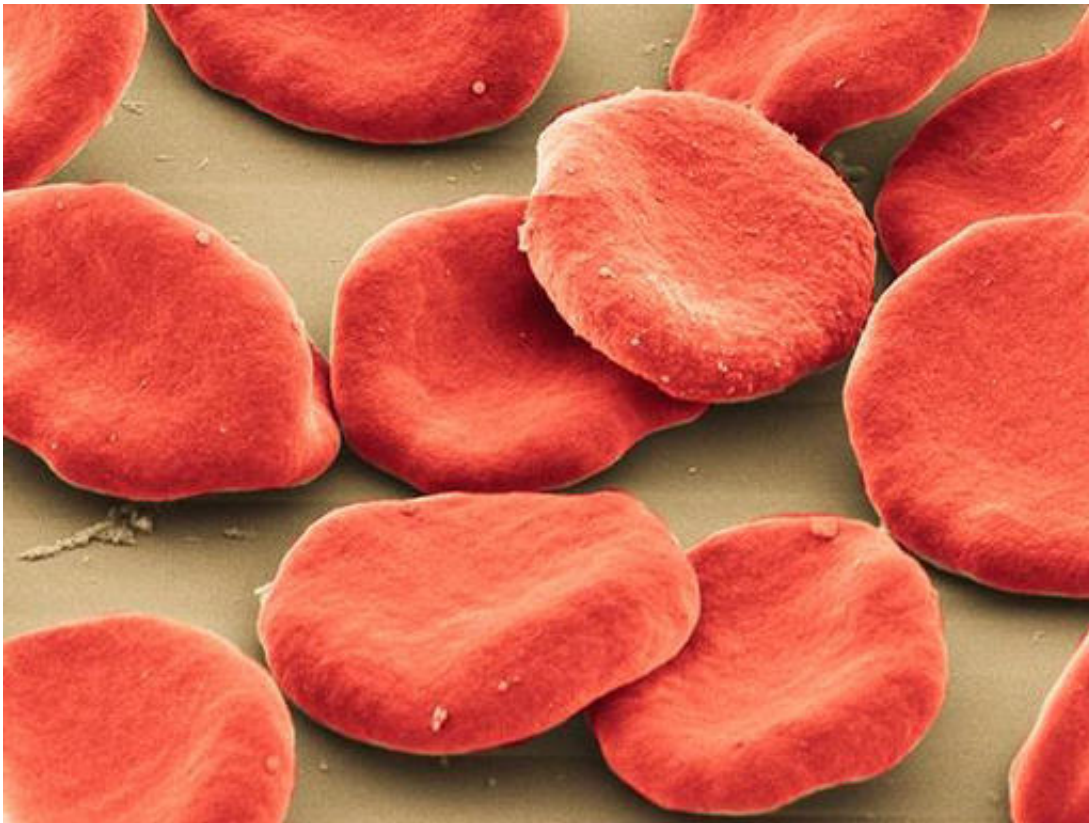


Protect against carbon monoxide as researchers hunt antidote

December 7 2016, by Lauran Neergaard



This photo provided by the University of Pittsburgh, Center for Biologic Imaging shows colorized scanning electron micrograph of red blood cells. Scientists are on the trail of a potential antidote for carbon monoxide poisoning, an injected "scavenger" that promises to trap and remove the gas from blood within minutes. It's very early-stage research, but a reminder that, however it turns out, there are steps people should take now to protect themselves from a silent killer that's far too common. (University of Pittsburgh, Center for Biologic Imaging via AP)

Scientists are on the trail of a potential antidote for carbon monoxide poisoning, an injected "scavenger" that promises to trap and remove the gas from blood within minutes. It's very early-stage research—but a reminder that, however it turns out, there are steps people should take now to protect themselves from this silent killer.

We can't see or smell carbon monoxide as it builds up from car exhaust, a faulty furnace or some other cause. It elbows oxygen out of red blood cells and thus starves the brain and other tissues. Today's only treatment is to get that oxygen replaced in time.

"We have antidotes for cyanide poisoning, for snakebite, but we don't have antidotes for [carbon monoxide poisoning](#) and it's the most common poisoning," lamented Dr. Mark Gladwin of the University of Pittsburgh, who is leading new research to develop one.

His team has engineered a protein that can selectively target carbon monoxide, rapidly binding to it so it can't attach instead to the hemoglobin in red blood cells. The compound saved mice from otherwise lethal doses of carbon monoxide, [Gladwin reported Wednesday](#) in the journal *Science Translational Medicine*.

More research is needed before the approach could be tried in people. Here are some things to know about the work and how to prevent [carbon monoxide exposure](#) in the first place—such as by installing an alarm that warns when the gas is around.

CARBON MONOXIDE POISONING IS FAR TOO COMMON

This colorless, odorless gas is a leading cause of poisoning deaths worldwide. In the U.S. alone, accidental carbon monoxide poisonings that aren't linked to fires cause more than 20,000 emergency room visits a year, and more than 400 people die, according to the Centers for

Disease Control and Prevention. Children especially are vulnerable, and survivors often suffer lasting neurologic problems.

Carbon monoxide is produced when fuel is burned. And while it can be a cause of death during fires, other preventable accidents occur when fumes produced by cars, portable generators, gas stoves or heaters, and other sources build up in enclosed spaces. Winter is a particularly risky time.

SYMPTOMS ARE VAGUE

Symptoms include headache, dizziness, weakness, nausea, vomiting, chest pain or confusion—signs to get into fresh air and seek help.

HOW IT HARMS

Hemoglobin carries oxygen in red blood cells. Carbon monoxide sticks to hemoglobin better than oxygen does. So when someone breathes carbon monoxide, that gas replaces oxygen in the bloodstream. Providing direct oxygen to flush out the toxin can work, depending on how quickly it's started and how severe the poisoning. But there is no true antidote, a compound designed to directly target the carbon monoxide and give oxygen therapy a better chance.

SCAVENGING THE POISON

Gladwin's team started with a hemoglobin-like protein found in the brain

called neuroglobin, and genetically engineered it to snatch up carbon monoxide. This artificial neuroglobin binds to carbon monoxide about 500 times more tightly than the gas normally can attach to hemoglobin. In lab tests using human [red blood cells](#), the researchers reported the antidote eliminated carbon monoxide many times more rapidly than oxygen, as measured by what's called its half-life—the time it takes for half of it to disappear.

That translated into survival for seven of eight mice exposed to usually lethal carbon monoxide doses. Researchers gave additional mice lower doses of carbon monoxide, and measured as the antidote restored blood pressure and improved oxygen levels before being excreted in urine.

WHAT'S NEXT

Mouse studies are very preliminary so more research is needed to be sure the approach is safe before scientists could test if it works in people.

But there's a need for a quick-to-administer antidote, such as by a paramedic on the scene, said resuscitation specialist Dr. Lance Becker, emergency medicine chairman at Hofstra Northwell School of Medicine, who wasn't involved with the new research.

"I'm cautiously very optimistic," Becker said. "It's very early but this is a very novel sort of approach," and a logical one, he added.

He's seen carbon monoxide's devastation too often, including "one of the most upsetting nights of my career" when a family was poisoned while sleeping in their car on a wintry night. Doctors saved the parents but couldn't revive their children.

TAKE PRECAUTIONS AGAINST CARBON MONOXIDE

Among the CDC's safety tips:

- Install a [carbon monoxide](#) detector, that's battery operated or has a battery back-up, where it will wake you if you're sleeping.
- Have your furnace and any other gas and oil appliances inspected every year, as well as your chimney.
- Make sure gas appliances are properly vented.
- Don't run a car or truck inside a garage attached to the house even if the door is open.
- Only use a portable generator outdoors, placed far from windows, doors or vents.
- Never use a gas oven for heating, and never use a charcoal grill or camp stove indoors.

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Citation: Protect against carbon monoxide as researchers hunt antidote (2016, December 7)
retrieved 5 May 2024 from

<https://medicalxpress.com/news/2016-12-carbon-monoxide-antidote.html>

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