



# Navy researcher links toxins in war-zone dust to ailments

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By **Kelly Kennedy**, USA TODAY

U.S. troops in Iraq, Afghanistan and Kuwait have inhaled microscopic dust particles laden with toxic metals, bacteria and fungi — a toxic stew that may explain everything from the undiagnosed Gulf War Syndrome symptoms lingering from the 1991 war against Iraq to high rates of respiratory, neurological and heart ailments encountered in the current wars, scientists say.



David Furst, AFP/Getty Images  
Marines in Afghanistan are engulfed in dust researchers

say could contain harmful particles. [Enlarge](#)

By David Furst, AFP/Getty Images

Marines in Afghanistan are engulfed in dust researchers say could contain harmful particles.

"From my research and that of others, I

really think this may be the smoking gun," says Navy Capt. Mark Lyles, chair of medical sciences and biotechnology at the Center for Naval Warfare Studies at the Naval War College in Newport, R.I. "It fits everything — symptoms, timing, everything."

Lyles and other researchers found that dust particles — up to 1,000 of which can sit on the head of a pin — gathered in Iraq and Kuwait contain 37 metals, including a luminum, lead, manganese, strontium and tin. The metals have been linked to neurological disorders, cancer, respiratory ailments, depression and heart disease, according to the [Environmental Protection Agency](#). Researchers believe the metals occur both naturally and as a byproduct of pollution.

Researchers in and out of the military say the particles are smaller and easier to inhale than most dust particles, and that recent droughts in the region have killed desert shrubs that helped keep down that dust. The military's heavy vehicles have pounded the desert's protective crust into a layer of fine silt, Lyles says. Servicemembers breathe the

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dust — and all it carries — deeply into their lungs.

The dust contains 147 different kinds of bacteria, as well as fungi that could spread disease, Lyles found. Since the wars began in Iraq in 2003 and in Afghanistan in 2001, the military has seen a 251% increase in the rate of neurological disorders per 10,000 active-duty servicemembers, a 47% rise in the rate of respiratory issues and a 34% increase in the rate of cardiovascular disease, according to a USA TODAY analysis of military morbidity records from 2001 to 2010. Those increases have researchers seeking possible causes.

Despite the research by Lyles and others, and the documented spikes in respiratory illnesses, [Defense Department](#) officials contend there are no health issues associated with the dust.

"The (Defense Department) has examined the concerns raised by the studies accomplished by Capt. Lyles," says Craig Postlewaite, who heads up the Secretary of Defense's Force Readiness and Health Assurance Office. He said the military found the dust is "not noticeably different from samples collected in the [Sahara Desert](#) and desert regions in the U.S. and China."

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Lyles initially analyzed dust samples from Iraq and Kuwait in 2003 to help determine a way to keep the grit from rendering medical equipment useless.

"When I saw the data, I said, 'Oh my God. This can't be right,'" Lyles says.

Harry Fannin, a chemistry professor at [Murray State University](#), analyzed the dust for Lyles in late 2004.

"It was a little bit unusual," he says, citing high levels of chromium, nickel and other metals.

"You wouldn't see metal like that in the U.S.," he says, adding he was most concerned about the tiny size of the particles. "Any time you have respirable particles, it's bad."

Scientists know fine particulate matter — that smaller than 10 micrometers, or about one-fourth the size of a single grain of table salt — can cause lung and respiratory problems.

Catherine Cahill, associate professor at the [Geophysical Institute](#) at the University of Alaska, began collecting airborne dust for the military with the Army Research Lab in Baghdad in 2008.

"I've done sampling since 1986, and I've never seen anything that bad — not even in China," she says, referring to China's

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extreme levels of pollution. The everyday fine particulate matter levels in Iraq were about three times greater than what the EPA says is healthy within a 24-hour period, she says — and those levels should not be exceeded more than once per year. "We're blowing that standard out of the water."

She called the abundance of aluminum and lead she found "our worst-case scenarios." Cahill says her research mirrors the work done by Lyles.

"Most things are high is the bottom line," she says. "I would expect chronic coughs, asthma, respiratory disease in the short term; and (chronic obstructive pulmonary disease), heart problems and hypertension long-term. Mark's theory, to me, makes perfect sense."

Lyles' team found almost 150 kinds of bacteria, 25% of which may cause diseases such as meningitis, cystic fibrosis, septic arthritis, gastroenteritis, staph infections, diarrhea and food poisoning.

The Defense Department says it hasn't linked any illnesses among servicemembers to bacteria in the soil.

"All soil, no matter where it is found, has germs present, so this finding is not unusual," Postlewaite says. "We have closely examined our medical surveillance data for those personnel who have deployed — some multiple times — and we have not been able to identify any increased disease that could be associated with the germs that were identified in the soil."

But Lyles found others who saw anomalies.

**Bob Miller**, a pulmonologist at [Vanderbilt](#)

[University Medical Center](#), worked with 101st Airborne soldiers at [Fort Campbell](#), Ky., after they complained of being short of breath and unable to run as fast as they had before they deployed.

Many had been exposed to a sulfur fire in Mosul, Iraq. They also had been exposed to burn pits — the military disposes of trash at bases in Iraq and Afghanistan by burning as much as 240 tons of it a day in open pits. All of them came through chest X-rays and CT scans with clean bills of health. The soldiers volunteered for a procedure to obtain lung cell samples, and when Miller examined the biopsies, 50 of 54 showed constrictive bronchiolitis — a rare lung disease that closes the tiniest airways.

Those biopsies also turned up dust.

"A polarizing lens shows sparkling — that's the dust," Miller says. "It is a concern."

He plans to analyze that dust, as well as a brown pigment mixed with it.

"(Lyles) has pretty convincing evidence that

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the dust is a carrier of toxins," Miller says. "But we need more information before we can make any sweeping generalizations."

**Veterans Affairs** researcher Anthony Szema found that about 7% of veterans who had deployed to Iraq from 2004 to 2007 had asthma, compared with about 4% who did not deploy. Then he heard about the burn pits, as well as Lyles' theories.

"Lyles gave a lecture in Denver," Szema says. "Everyone's jaw was falling on the floor."

The range of respiratory disease he saw didn't appear to be caused by one problem. And it seems to be getting worse: About 11% of soldiers returning from Iraq have respiratory problems, he says.

Ronnie Horner, chairman of the Department of Public Health Sciences at the **University of Cincinnati**, saw clusters of servicemembers with **ALS**— or Lou Gehrig's Disease — after the 1991 war in Iraq.

ALS affects about 1 to 2 people per 100,000 — usually men older than 55. Half the Desert Storm veterans diagnosed with ALS were younger than 25, and 98% were younger than 55.

"We know that aluminum has been associated with ALS, as well as lead," Horner says. "We were definitely interested in Lyles' work."

And early heavy-metal poisoning symptoms also look the same as post-traumatic stress disorder (PTSD), he says. "It's all speculation," he says. "But it's very intriguing, especially when there are such high levels of PTSD."

Former Army specialist Jeremy Bowman, 33, worked as a mechanic in Baghdad in 2003. While he was still in theater, his hands began to shake as if he were nervous. Now the shaking shimmies up his arms, into his legs and sometimes into his face. He takes medication to prevent the shaking from interfering with his daily life. His legs often feel numb or tingly, his back hurts and his leg muscles feel weak.

"It all falls under 'neurological signs and symptoms,' but nobody knows what it is," he says. "Everything new that comes out — burn pits, dust, depleted uranium — I think, 'Maybe that's it.'"

Bowman also has troubles breathing since he deployed and must use an inhaler.

Capt. J.A. "Cappy" Surette, spokesman for the Navy Bureau of Medicine and Surgery, said Navy researchers investigated to see whether the dust in Iraq and Afghanistan is toxic. The Navy has no record of troops complaining of cognitive difficulties unrelated to traumatic brain injuries, he says.

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However, he says the Naval Health Research laboratory found that trace metals in the dust showed levels of toxicity.

"There is no definitive basis to say the sand is harmful to people or animals," he says.

However, one Navy study is examining the toxicity of sand from Afghanistan to see how it affects cell death, he says. A second is looking at whether Afghanistan dust contributes to brain trauma pathology in animals.

Navy Petty Officer 2nd Class Rob Erckenbrack, 40, of [West Fargo](#), N.D., deployed at Taqaddum, Iraq, in 2006, and guarded the perimeter at Taji, Iraq, in 2008. He began losing weight, and having respiratory problems and migraines. He also dealt with short-term memory loss but says he was not in an incident that would have caused a traumatic brain injury. In June 2010, he had a stroke.

"My doctors were surprised because I'm a healthy, active, adult," he says. "Then another guy from my unit went through the same thing."

Dale Griffin, an environmental public health microbiologist with the U.S. Geological Survey, also found metals and bacteria in the dust.

"We know that certain metals are toxic," he says. "I believe there is a risk there."

**'It's a very complex problem'**

Early in the 2003 Iraq War, a rare flu — eosinophilic pneumonia — infected 18 and killed two servicemembers in Iraq, according to a military study. Researchers theorized

that the bacteria entered troops' lungs through the dust or through bacteria picked up from the ground from tobacco in foreign cigarettes.

In 2003, Richard Stumbo worked as a civilian contractor for the Department of the Army when he became sick with a flu so bad he had to be airlifted out of Iraq.

"My doctor said he thought it was some kind of bacteria in the dust that I picked up," Stumbo says. "My boss called me after I got home and told me a couple of the guys had died."

It took Stumbo two months to recover.

Geoff Plumlee, a research geochemist with the U.S. Geological Survey, sifted through dust samples in the aftermath of the [World Trade Center](#) attacks in 2001 to determine what in that particulate matter might affect first responders. His work led to legislation meant to take care of people with respiratory problems and cancers who had breathed in the dust.

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After looking at Lyles' work, as well as military-sponsored and EPA research, Plumlee said he wants to see more.

"It's a very complex problem," he says. "I think all of the different studies are pointing to a need for a very detailed look."

Richard Meehan, chief of rheumatology at National Jewish Health in Denver, assisted the Army's Public Health Command with a particulate matter study.

National Jewish had received several cases similar to those of Miller's at Vanderbilt, and Meehan began to think it might be more than simply the burn pits. "We wanted to know why we were seeing these rare injuries that Bob Miller was finding," Meehan says.

He is part of a team working on a study to determine how to address the problem. "We need to see this in peer-reviewed journals," Meehan says. "I'd like to have this done correctly upfront so we don't end up with another Agent Orange."

Meehan emphasized that the dust isn't the only problem: Stress causes post-traumatic stress disorder. Explosions cause traumatic brain injuries. And burn pits shape yet another piece of the puzzle.

"I don't want a false cause," he says. "You miss really discovering what else is out there."

Meanwhile, Lyles says he wants samples taken in several places to determine hot spots in Iraq, Kuwait and Afghanistan. He wants to follow people in units to see how they fare after exposures. He wants toxicology studies and more animal studies. And he wants the military to take notice.

"This has to be confronted," he says.

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