Medical Xpress

Lethal exhaust: Study leads to designation of diesel fumes as a known carcinogen

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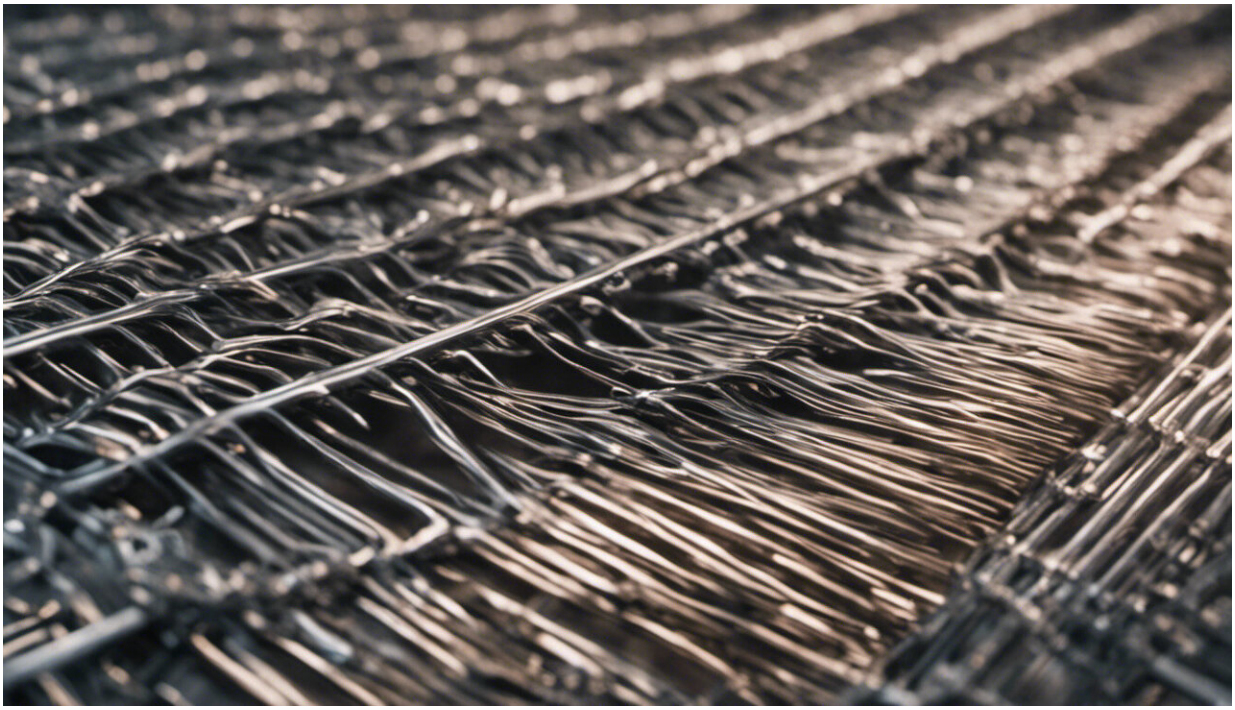

Credit: AI-generated image (disclaimer)

(Medical Xpress)—Squeezed among tractor-trailers creeping through the Callahan Tunnel on the way to East Boston, you know those nasty-smelling diesel fumes can't be good for you. Now a landmark study has found that prolonged exposure to that noxious exhaust increases the risk of developing lung cancer.

The study, co-authored by Mary Davis, an associate professor of urban and environmental policy and planning, was published in Environmental Health Perspectives, the monthly journal of the National Institute of Environmental Health Sciences, in June. The research was so conclusive that later in the summer, the World Health Organization's International Agency for Research on Cancer (IARC) reclassified diesel exhaust from a "probable" to a "known" carcinogen.

"Our study has allowed the IARC to say that now the science is finally there," Davis says. That may lead to changes in the way diesel exhaust is regulated around the world.

"The difference in the designation may seem small, but it is huge when it comes to regulations," says Davis. That's because governments use such classifications to support new emissions standards. In the U.S., for example, the Clean Air Act of 1970 deemed diesel a probable carcinogen, and mandated vehicle emission reductions.

Most of those regulations were in effect by the 1990s and were reinforced by the 2005 Diesel Emissions Reduction Act, which funded development of new clean diesel technologies, including emissions controls, engine and vehicle replacements and alternative fuel options.

So even though you can still detect fuel odors when you're behind a big rig on a U.S. highway, federal regulations have kept diesel fumes from becoming a dire health threat in this country.

But some trouble spots remain, such as the ports in Los Angeles and Long Beach, Calif., where there is tremendous diesel truck traffic, and the sheer volume of vehicles coming and going can create an exposure problem, Davis says.

"The study tells us it's a good thing we didn't wait to pass regulations,

because the health effects are cumulative," Davis says. "The changes we made in the United States likely saved lives."

Greater Likelihood of Cancer

The study's challenge was to determine how lung cancer deaths are linked to diesel exposure. The researchers needed two things—people regularly exposed to diesel fumes and a model to quantify exposure over time. Based on data gathered in field research at 36 truck terminals nationwide, Davis and her colleagues extrapolated how much diesel exhaust 31,150 trucking industry workers nationwide were exposed to between 1985 and 2000, and then cross-referenced the data with death certificates. They counted the incidence of lung cancer as the primary or underlying cause of death, and adjusted to account for cancers caused by smoking.

The results showed that drivers and dockworkers on the job for five to 10 years had their risk for lung cancer increase by 15 to 40 percent above the average person who did not work in the industry. For those with 20 years in the industry, the risk nearly doubled.

Davis first identified the amount of exposure occurring for each kind of trucking job. To do this, the researchers took a series of road trips over several years, making five-day air-quality sampling trips to 36 terminals randomly chosen to represent the 139 large truck terminals owned by the four major trucking companies studied. Davis, who took part in two of the trips, and her colleagues at Harvard monitored the air on the docks, in offices and in truck cabs with windows opened and closed, sometimes attaching monitors to individuals.

She used the data to create a statistical model of the health effects of diesel exposure depending on what jobs workers performed over the course of their careers. In developing the model, Davis factored in

changes in regulation, ambient air pollution and types of fuels and trucks over 50 years—"thousands and thousands of data points to fit a scenario no one had ever tried to model before," she says.

She assigned each individual a number indicating their level of exposure to diesel, and this allowed her colleagues on the study at Harvard to calculate if higher numbers meant a greater likelihood of death by lung cancer. They did.

Disaster in the Developing World

While regulations have reduced the health threat of diesel exhaust in most of the United States, in the developing world—where many old U.S. diesel vehicles end up—it is a different story, Davis says.

"I spent some time in Haiti, for example, and it's a diesel disaster," Davis says, and not just because of vehicle emissions. Because the power grid is unreliable, factories and the wealthy who can afford it use diesel generators. And with few traffic lights to prevent gridlock at intersections, old diesel vehicles often idle and pollute the surrounding areas, she notes.

Throughout Africa, Asia and Latin America, "diesel engines lack even the most basic emissions controls, exposing people to even dirtier, more dangerous fumes—up to 100 times more polluted than exhaust from new diesel engines," Peter Lehner, executive director of the Natural Resource Defense Council, wrote in his June blog.

"The human health impact of exposure to diesel exhaust in the developing world has been largely ignored, as governments and NGOs focus on the immediate public health threats related to water and sanitation, infectious diseases and economic development," Davis says. "I hope to bridge this gap by extending my research to developing

countries such as Haiti, where the risk of exposure and disease is much higher."

More information: www.ncbi.nlm.nih.gov/pubmed/22739103

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