

# Traffic's true toll: Researchers explore the health effects of vehicle exhaust

May 22 2009, by Tom Vasich

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Southern California's crowded freeways provide ample opportunities for UCI researchers to study the health effects of vehicle pollution. (Hoang Xuan Pham)

(PhysOrg.com) -- When Dr. Ralph Delfino and Michael Kleinman look at Southern California's gridlocked freeways, they don't just see traffic. They see research opportunities.

The UC Irvine School of Medicine colleagues are on the forefront of efforts to understand how vehicle exhaust contributes to lung and cardiovascular illnesses. Their work confirms what most Southern Californians know intuitively: Living by a freeway isn't a very good idea.

Diesel-engine exhaust is largely the reason why.

Along with pumping out soot and other noxious chemicals, [diesel](#)

[engines](#) emit high concentrations of dangerous ultrafine particles. When inhaled, these lodge deep in bronchial airways and are absorbed into the blood.

Kleinman, co-director of UCI's Air Pollution [Health Effects](#) Laboratory, discovered that ultrafine-particle levels within 50 yards of a freeway can be as much as 10 times normal. His studies show that exposure to these particles worsens such lung ailments as asthma and accelerates the development of atherosclerosis.

Delfino, epidemiology associate professor, oversees a \$3 million National Institutes of Health effort tracking elderly individuals with heart disease to see how daily exposure to traffic-related ultrafine particles affects their condition. His research team has linked these pollutants to significant increases in cardiovascular inflammation, blood-clotting platelets and blood pressure, especially after physical activity.

"Mitigating these health effects remains a challenge, since diesel trucks - which make up 20 percent to 30 percent of freeway traffic - do not face the same exhaust standards in California that cars do," Kleinman says.

The researchers remain busy in 2009 with new projects and studies:

- Kleinman recently received \$300,000 from the California Air Resources Board to investigate a possible link between air-pollution exposure and brain inflammation. Air samples from New York, Detroit, Seattle and Los Angeles, all of which have different pollutants, will be analyzed.
- Delfino and UCI colleague Jun Wu are using a \$500,000 California Air Resources Board grant to conduct the most comprehensive study to date on how exposure to air pollution inside vehicles varies depending on driving patterns. "We hope to uncover the possible health effects of air

pollutants on pregnant women and newborns and on the development of asthma and allergies in children," says Delfino, who in 2005 won a Clean Air Award from the South Coast Air Quality Management District.

- In a study published earlier this year, Delfino found that children who lived near busy freeways visited the hospital significantly more often for asthma-related illnesses than children with asthma who didn't.
- And in research currently appearing in the online version of *Environmental Health Perspectives*, Delfino and his UCI colleagues provide some of the first evidence that air-pollution particles, especially unregulated ultrafine particles, may be involved in deactivating antioxidant enzymes in red blood cells. The associated oxidative stress, they say, can trigger inflammation in arteries and veins and can activate platelets that cause blood clots in people with a history of coronary heart disease.

Along with increasing knowledge about the health effects of vehicle exhaust, Kleinman's and Delfino's efforts have broad policy and industry implications, from the enactment of more stringent air-pollution regulations to the creation of cleaner-burning gasoline- and diesel-powered vehicles.

"Because of its traffic and smog levels, Southern California is a perfect place to conduct these studies," Delfino says. "But they shouldn't be seen as relevant only to this area. The health effects of fossil-fuel combustion are found nearly everywhere in this country, and you'll be exposed to these pollutants one way or another. This is a national health issue."

Provided by University of California, Irvine

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