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USC study links smoggy air to lung damage in children

BY **Alicia Di Rado** [\[/author/alicia-di-rado/\]](#) SEPTEMBER 17, 2004

By age 18, the lungs of many children who grow up in smoggy areas are underdeveloped and will likely never recover, according to a study by Keck School of Medicine researchers in the *New England Journal of Medicine*.

The research is part of the Children's Health Study, the longest investigation ever into air pollution and kids' health. Between 1993 and 2001, study scientists from the Keck School tracked levels of major pollutants in 12 Southern California communities while following the pulmonary health of 1,759 children as they progressed from 4th grade to 12th grade. The 12 communities included some of the most polluted areas in the greater Los Angeles basin, as well as several low-pollution sites outside the area.

Keck School researchers previously found that children who were exposed to more air pollution scored more poorly on respiratory tests. In this latest study, published in the Sept. 9 issue of the journal, researchers analyzed the same children's respiratory health at age 18, when lungs are almost completely mature.

"Teenagers in smoggy communities were nearly five times as likely to have clinically low lung function, compared to teens living in low-pollution communities," explained W. James Gauderman, associate professor of preventive medicine at the Keck School and lead author of the study.

He said that people with clinically low lung function have less than 80 percent of the lung function expected for their age—a significant deficit that would raise concerns during a doctor's exam.

"When we began the study 10 years ago, we had no idea we would find effects on the lung this serious," said John Peters, Hastings Professor of Preventive Medicine at the Keck School, director of the Southern California Environmental Health Sciences Center, and senior author of the study.

Study technicians traveled to participating schools every year and tested children's lung function, a measure of how well their lungs work. As an example, someone with sub-par lung function cannot exhale and blow up a balloon as quickly or as big as someone with good lung function.

Researchers correlated the students' lung health measurements with levels of air pollutants monitored in the communities during the same time period.

They found greater deficits in lung development in teenagers who lived in communities with higher average levels of nitrogen dioxide, acid vapor, particulate matter with a diameter of less than 2.5 micrometers (about a tenth the diameter of a human hair) and elemental carbon.

"These are pollutants that all derive from vehicle emissions and the combustion of fossil fuels," said Gauderman.

Deficits in lung function have both short- and long-term effects. "If a child or young adult with low lung function were to have a cold, they might have more severe lung symptoms, or wheezing," Gauderman said. "They may have a longer disease course, while a child with better lung function may weather it much better."

And potential long-term effects are more alarming. "Low lung function has been shown to be second only to smoking as a risk factor for all-cause mortality," Gauderman explained.

Lung function grows steadily as children grow up, peaking at about age 18 in women and sometime in the early 20s in men. Lung function stays steady for a short time and then declines by 1 percent a year throughout adulthood. As lung function decreases to low levels in later adulthood, the risk of respiratory diseases and heart attacks increases.

Researchers are unsure how air pollution may retard lung development. Gauderman believes chronic inflammation may play a role, with air pollutants irritating small airways on a daily basis. Scientists also suspect that pollutants might dampen the growth of alveoli, tiny air sacs in the lungs.

The research team will continue to follow the study participants into their early 20s, when their lungs will mature and stop developing entirely. They seek to find out if the participants begin to experience respiratory symptoms and if those who moved away from a polluted environment show benefits.

The California Air Resources Board, National Institute of Environmental Health Sciences

and Hastings Foundation supported the research.

W. James Gauderman, Edward Avol, Frank Gilliland, Hita Vora, Duncan Thomas, Kiros Berhane, Rob McConnell, Nino Kuenzli, Fred Lurmann, Edward Rappaport, Helene Margolis, David Bates and John Peters, “The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age.” *New England Journal of Medicine*, Vol. 351, No. 11, Sept. 9, 2004.

Media play up USC study’s warning on smog danger

The release of a study in the *New England Journal of Medicine* on smog’s effects on children’s lungs culminated in a press conference on Sept. 8 that has since generated a tremendous amount of media coverage.

The study’s lead author, environmental health researcher James Gauderman, discussed the study’s findings at a press conference covered by KCBS-TV Channel 2, KABC-TV Channel 7, KTLA-TV Channel 5, KNBC-TV Channel 4, KTTV-TV Fox 11, KVEA-TV Telemundo Channel 52, KPCC-FM, KFI-AM, KFWB-AM, *Los Angeles Times*, *Daily Breeze*, *Inland Valley Daily Bulletin*, *Chinese L.A. Daily News*, *Sing Tao Daily* and the *Chinese Daily News*.

The story appeared on the front-page of 14 newspapers nationwide including the *Los Angeles Times*, *Sacramento Bee*, *Fresno Bee*, *Baltimore Sun*, *Los Angeles Daily News*, *Orange County Register* and *San Diego Union Tribune* and has since led to editorials in the *Los Angeles Times*, *Long Beach Press Telegram*, *Merced Sun Star*, *Minnesota Daily*, *Sarasota Herald Tribune* and the *Cleveland Plain Dealer*.

Stories also appeared in the *Wall Street Journal*, *New York Times*, *Chicago Tribune*, *WebMD*, on NPR’s ‘*All Things Considered*’, *USA Today*, *Reuters*, *Pasadena Star-News*, *Associated Press*, *Contra Costa Times*, *Newsday*, *Atlanta Journal-Constitution*, *MSNBC* and more than a hundred other publications and Web sites.

Gauderman also appeared on KPCC-FM’s “*Airtalk with Larry Mantle*” and on KCRW-FM’s “*Which Way L.A.*” radio programs while co-author Ed Avol appeared live on KPFK-FM radio and in a Sept. 15 *Daily Trojan* story.



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