RESPIRATORY HEALTH

Lung Damage Lingers after 9/11

Firefighters and emergency medical services (EMS) workers exposed on 11 September 2001 and in the months thereafter to pulverized building dust from the World Trade Center suffered significant reductions in their lung function—losses that persist 7 years on, according to new research.[1] "Lost lung function in most firefighters who inhale smoke, even from a chemical fire, normally recovers quite quickly," explains study leader David Prezant of Albert Einstein College of Medicine. "Surprisingly, our research shows that the firefighters and EMS workers exposed on 9/11 and thereafter have enjoyed no such recovery."

The researchers examined the FEV_1 of 12,781 firefighters and EMS workers for whom data were available before and several years after 9/11; every 12–18 months the personnel of these corps undergo routine health assessments that include this measurement. FEV_1 refers to the maximum volume of air that can be blown out in 1 second; it is one of the primary markers of lung function.

Exposure was estimated by analyzing when subjects first arrived at Ground Zero on 9/11 itself and for how long they were present in the months thereafter. The subjects were also subdivided into those who never smoked, always smoked, or smoked only after 9/11. The authors predicted the FEV_1 for each subject (adjusted for age-related decline, gender, height and race) for each 6-month period from 12 March 2000 to 11 September 2008, then determined how each actual FEV_1 measurements compared with the predicted values.

A persistent reduction in lung function was seen in all subgroups. Even among never-smokers, large and significant mean reductions in FEV_1 occurred over the first year, with greater reductions among firefighters than EMS workers. Over the next 6 years, FEV_1 failed to ever demonstrate significant recovery.

The results showed that of all the firefighters, those who entered Ground Zero the morning of 9/11 fared the worst. Paul Lioy, an expert on the World Trade Center dust who was not involved in this study, explains these first responders encountered very high levels of a complex mixture comprising glass fibers (from disintegrated windows), high-pH cement particles, unquantified gases, and many other constituents. "It was a sequence of exposures that would depend on the time you were there initially, the time you spent there, and whether you were wearing respiratory protection," he says.

After 7 years, however, time of arrival did not appear to influence eventual loss of lung function. According to the study authors, this suggests "although the intensity of the initial exposure may have been the critical determinant of acute inflammation and early reductions in lung function, the long-term course was more related to the population that was exposed than to the exposure."

"The massive dust concentrations to which these people were acutely exposed has produced significant reduction in lung function, predominantly due to airway inflammation resulting in obstructive airways disease—asthma, chronic bronchitis, bronchiolitis," explains Prezant. "For many, the lungs seem unable to recover from the inflammation caused."

"No other situation has involved this type of dust in such huge, acute exposures," remarks Omar Usmani of the National Heart and Lung Institute, Imperial College London & Royal Brompton Hospital. "Such loss of respiratory function would not be expected in people living in even very highly polluted places; the pollutants are different, and the exposure is chronic rather than massively acute. [Even] rescue workers attending urban earthquake disasters would typically not be similarly exposed. What this research shows is how much more prepared and vigilant we need to be in assessing, managing, and protecting the respiratory function of rescue workers exposed to the most extreme situations."

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Chesapeake Bay Enforcement Actions Now Online

In April 2010, the EPA announced a new effort to provide public online access to its work in enforcing federal pollution laws in the Chesapeake Bay region.[5] The move includes a new focus on targeting the sources responsible for contributing the greatest amounts of nitrogen, phosphorus, and sediment to the watershed. Last year is the first time the agency has compiled enforcement statistics for the Chesapeake Bay region. According to the EPA, actions pursued since 2009 will keep more than 15 million pounds of nitrogen oxides out of the bay airshed along with 2,100 pounds of nitrogen and phosphorus and 82 million pounds of sediment out of the bay watershed once all the required controls are put in place.

Yellow flags indicate sites of enforcement actions taken in the Chesapeake Bay airshed/watershed.

http://www.epa.gov/compliance/civil/initiatives/progress-chesapeakebay.html

NRC Reports on Ocean Acidification

A recent National Research Council report states the increasing acidification of the world's oceans, a result of CO_2 uptake, will continue to worsen if anthropogenic CO_2 emissions are not curbed.[6] Recent legislation calls for establishment of a national program to study and respond to the effects of ocean acidification. To date, the ocean has absorbed about a third of the anthropogenic CO_2 released as a result of human activities. The report describes six elements the authors consider key to a successful National Ocean Acidification Program.

COSMOS Cell Phone Study Launched

More than 250,000 people are expected to be enrolled in a new 30-year European study, COSMOS,[7] the largest of its kind to date, on the effects of cell phone use on human health. Although most of the research to date has found little link between cell phone use and health effects, there is some concern that cell phones have not been in common use long enough for such effects to be determined through studies. The new study will look not only at cancer, but also at stroke, heart disease, neurodegenerative diseases, headaches, sleep disorders, and tinnitus.

■ REFERENCES AND NOTES

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