



Physicians for
Social Responsibility



United States Affiliate of International Physicians for the Prevention of Nuclear War

How Air Pollution Contributes to Lung Disease

When we breathe in dirty air, we bring air pollutants deep into our lungs, so it's no surprise that air pollution causes serious damage to the respiratory tract. Air pollution exposure can trigger new cases of asthma, exacerbate (worsen) a previously-existing respiratory illness, and provoke development or progression of chronic illnesses including lung cancer, chronic obstructive pulmonary disease, and emphysema. Air pollutants also negatively and significantly harm lung development, creating an additional risk factor for developing lung diseases later in life.

Asthma

Over 20 million people in the U.S., including six million children now gasp for breath due to asthma. Asthma, a chronic disease of the lungs characterized by inflammation and narrowing of the airways, causes a sensation of tightness in the chest, shortness of breath, wheezing, and coughing. If untreated, asthma episodes can be near-fatal or even fatal. Asthma is not currently curable, and damage that is done to lung tissue during asthma attacks may lead to permanent damage. Nearly 1.8 million emergency room visits were attributed to asthma in 2005. There are many triggers to asthma attacks, including dust, smoke, pollen, and volatile organic compounds. Common outdoor pollutant triggers include ozone, carbon monoxide, sulfur dioxide and nitrogen oxides.

The Asthma-Ozone Connection

Ozone, one of the most widespread air pollutants in the US, is formed when volatile organic compounds react with nitrogen oxides in the presence of sunlight. Ozone irritates the lungs at concentrations which are fairly common in urban settings, particularly in summer months. Increases in ozone are linked to asthma and other lung diseases. For those with severe asthma, symptoms increase even when ambient ozone levels fall under the thresholds set by the EPA. Elevated ozone levels also aggravate pre-existing heart problems, like angina.

Chronic Obstructive Pulmonary Disease (COPD), chronic bronchitis and emphysema

Chronic Obstructive Pulmonary Disease (COPD) is another condition characterized by narrowing of the airways, but these changes are permanent rather than reversible. COPD is caused by exposure to pollutants that produce inflammation, an immunological response. In larger airways, the inflammatory response is referred to as chronic bronchitis. In the tiny air cells at the end of the lung's smallest passageways, it leads to destruction of tissue, or emphysema. Although current and ex-smokers account for most patients with COPD, exposure to air pollutants plays an important role in the development of COPD and the origin and development of acute exacerbations.

Lung Cancer

Lung cancer, the leading U.S. cancer killer in both men and women, is often (and accurately) associated with smoking tobacco. While that's true, there are multiple other risk factors for developing lung cancer, including air pollution. Particulate matter and ozone in particular may affect mortality due to lung cancer.

Children are Especially Vulnerable

Children are particularly susceptible to the effects of air pollution. They breathe through their mouths, bypassing the filtering effects of the nasal passages and allowing pollutants to travel deeper into the lungs. They have a large lung surface area relative to their weight and inhale relatively more air, compared to adults. They also spend more time out of doors, particularly in the afternoons and during the summer months when ozone and other pollutant levels are at their highest. And, children may ignore early symptoms of air pollution effects, such as an asthma exacerbation, leading to attacks of increased severity. Combine those factors with the adverse impact of some pollutants on lung development and the immaturity of children's enzyme and immune systems that detoxify pollutants, and you have a series of factors that contribute to children's increased sensitivity to air pollutants.