National Institute of Environmental Health Sciences
Your Environment. Your Health.

Lung Health and Your Environment

The health of our lungs depends on a healthy environment. Research supported by the National Institute of Environmental Health Sciences (NIEHS) shows that protecting lung health requires strategies to improve our environment and lifestyle choices.

Many environmental factors can affect the health of your lungs. Air pollution and cigarette smoke are the greatest threats. Some lung diseases are caused by bacterial, viral, or fungal infections.

Air quality

Studies linking air quality to health effects are numerous and important. Pollution can be found outdoors, from vehicle exhaust, industrial emissions, or wildfires, but also indoors. Outdoor pollution can enter a building. At home, indoor pollutants can come from gas stoves, tobacco smoke, or fireplaces.

Air pollution comes in many forms and can be present anywhere. Airborne pollutants are substances, such as chemicals in smoke or exhaust, that can reduce air quality and harm health. These pollutants can contribute to lung diseases such as asthma,[1] emphysema,[2] chronic obstructive pulmonary disease (COPD), and lung cancer.[3]

Improving air quality may lead to health benefits. Large studies show an association between decreases in levels of outdoor air pollutants and improvement in lung function, including reductions in asthma symptoms.[4] Former smokers with COPD who used portable air cleaners with high-efficiency particulate air (HEPA) filters in their homes had improved respiratory symptoms.[5] Interventions that improve indoor air quality may be a way to improve respiratory health.

Weather and natural disasters

Weather conditions can affect air quality and increase the likelihood of respiratory diseases.

Warm temperatures trap ozone and particles in the air and promote pollen production, which increase the occurrence of allergies and respiratory diseases.[6] Hot, dry temperatures contribute to wildfires and smoke-related ailments that can reduce lung function for up to two years.[7]

Heavy rainfalls can trigger airway inflammation and stimulate or worsen incidences of asthma.[8] Large floods, like the one in the aftermath of Hurricane Harvey in 2017, have been associated with a significant increase in respiratory diseases and deaths.[9]

Mold

Often thriving in the aftermath of severe wet weather, most types of molds are harmless, but some produce compounds that trigger allergies or asthma attacks. Studies show that mold exposure can worsen asthma symptoms, especially in young children.[10]

Tobacco smoke

Cigarette smoking is the leading cause of lung cancer, which is the leading type of cancer-related death worldwide, according to the World Health Organization. Research shows that smoking just a few cigarettes a day causes long-term lung damage.[11] Breathing secondhand smoke also increases a person's chance of developing respiratory disease.[12]

Electronic cigarettes

Using electronic cigarettes, also called vaping, can lead to lung injury, according to the American Thoracic Society. Aerosols from these devices are complex and contain many different ingredients in varying amounts. NIEHS-funded researchers found exposure to electronic cigarette aerosols with nicotine could lead to increased cell death in the lungs and weaken disease-fighting white cells that are essential for healthy lungs.[13]

PO Box 12233 • Research Triangle Park, NC 27709
Phone: 919-541-3345 • **https://www.niehs.nih.gov**

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Radon

Radon is a naturally occurring radioactive gas that is colorless and odorless. In the U.S., radon exposure is the second leading cause of lung cancer after cigarette smoking, according to the Centers for Disease Control and Prevention. Outdoors, radon disperses quickly, reducing the chance for it to harm health.

Radon can seep indoors and accumulate inside buildings and homes. Testing is the only way to know whether indoor radon levels are high. If levels are high, a qualified professional can install special vents to make a home safer.

Types of respiratory disease

Airway diseases that affect breathing involve reduced or blocked air flow. Asthma is an example. COPD includes chronic bronchitis and emphysema. It is often caused by smoking and indoor or outdoor air pollution. People can have a mix of asthma and COPD.

Interstitial lung diseases reduce the lungs' ability to hold air. For example, pulmonary fibrosis is a scarring of lung tissue.

Lung cancer, an abnormal growth of cells, usually starts in the lungs, but can start elsewhere and spread to the lungs. It can have environmental and genetic causes.

Lung infections are caused by microorganisms (i.e., bacteria, viruses, or fungi) that damage lung tissue. Pneumonia is an infection that causes air sacs to fill with fluid. Pollution can increase the chance that lungs are more susceptible to infections, such as COVID-19.

Other NIEHS research

- More than 50 genetic changes that affect the risk of pulmonary disorders have been identified. One change occurs in lung cells from drinking water contaminated with hexavalent chromium, an industrial chemical and human carcinogen.[14] This information could improve drug development to treat lung function problems.[15]
- The NIEHS Matrix Biology Group has found a potential therapy in hyaluronan, a substance secreted by living tissue that acts as a biological scaffold for cells. It improved lung function in patients suffering from severe COPD.[16]
- Non-small-cell lung cancer is often resistant to chemotherapy; however, NIEHS found silencing a gene called INO80 led to reduced tumor growth, potentially leading to better treatments and improved patient outcomes.[17]
- Many tumors in the 10-20% of lung cancer sufferers who have never smoked arise from the accumulation of mutations caused by natural processes in the body.[18] This finding may help researchers identify risk factors for lung cancers.

Where can I go for more information?

Learn more about lung diseases from the National Library of Medicine's MedlinePlus: https://medlineplus.gov/lungdiseases.html

Find information for all ages in English and Spanish.

For more information on the National Institute of Environmental Health Sciences, go to **https://www.niehs.nih.gov**.

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