

SMOG AND OTHER AIR POLLUTANTS

Smog refers to the airborne pollutants that fill the air in nearly every major city in nearly every country. There are basically two types of smog. One has sulfur dioxide as the main component and is the result of burning coal, oil, and other fossil fuels for heat and in manufacturing processes. This type, which resulted in the deaths of over four thousand people in London during a two-week period in 1952, is often referred to as London smog. Sulfur dioxide smog is more common in the major Midwestern and northeastern industrial centers in Illinois, New York, New Jersey, and Pennsylvania.

The other type, called Los Angeles, or photochemical, smog, is mainly produced by automobile emissions, power plants, and other industrial processes. It contains hydrocarbons, nitrogen dioxide, and carbon monoxide. Nitrogen dioxide and hydrocarbons react chemically when they are "cooked" by sunlight and convert oxygen into ozone. Ozone is the major ingredient of photochemical smog, accounting for 95 percent of its composition. It is a colorless, pungent, toxic gas. Most of what you see as smog is the particulate matter that is the result of incomplete combustion. However, what you cannot see does the most damage to your lungs.

What health problems can smog cause?

Breathing smoggy air can result in eye, nose, and throat irritation, acute and chronic bronchitis, asthma, headache, and malaise. The typical symptoms are burning, itching eyes and throat, cough, and shortness of breath. Smog can cause reduced lung function that may last for as long as a week after exposure.

Exercising in smoggy air can make these effects even worse. A spectator at an athletic event during a first-stage smog alert may not notice the effects. However, the athletes participating in the event may have as much as a 25 percent decrease in lung function.

Children and older adults are usually more susceptible to the deleterious effects of smog, as are people with asthma, bronchitis, and other chronic lung and heart disease. For someone with asthma or bronchitis, the air pollution that necessitates an alert can bring on an attack. Chronic exposure to ozone, one of the primary components of automobile smog, has damaged lung structure in test animals.

In addition to the respiratory system, smog affects the cardiovascular system. This is primarily the result of breathing carbon monoxide. Because it is produced by automobiles, the levels are highest near expressways, in underground parking garages, etc. Carbon monoxide reduces the oxygen-carrying ability of the blood and therefore the amount of oxygen supplied to the heart.

If the air pollutants include lead, the result can be anemia. Severe lead poisoning can cause heart, brain, lung, and blood damage. Learning disabilities and central nervous system disorders, particularly in children, may result from lead accumulation in the body.

What does it mean when there is a smog alert?

The Environmental Protection Agency (EPA) monitors the levels of six different substances in the air of most major cities-sulfur dioxide, particulates, nitrogen dioxide, ozone, lead, and carbon monoxide. They are regulated under the Clean Air Act of 1970. When the levels of these substances, primarily ozone, exceed a certain standard, EPA announces a first-stage smog alert. The air is unhealthy for everyone.

A second-stage smog alert indicates the air is hazardous and exercise should be avoided entirely.

How can you avoid smog?

Exercise in the morning hours, when ozone levels are low. Exercise away from automobile traffic. Try to avoid driving during the heavy commuting times. Your automobile provides little protection from smog.

If there is a smog alert where you live, minimize your driving as much as possible and stay indoors. This will reduce your exposure by as much as 50 percent as well as reduce your contribution to the problem. If you are susceptible to the effects



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of smog, it is a good idea to reduce your exposure. Approximately half of the photochemical smog is produced by automobiles.

Because photochemical smog depends on sunlight to produce ozone, smoggy conditions usually begin to increase around 1 p.m. They don't start to dissipate until after 7 p.m., when most commuters are home and the sun is going down. If you must commute during rush hours, be aware that you may return home with a headache that could be the result of breathing smoggy air.

How can you help with the air pollution problem?

You can contribute to cleaner air by using public transportation, riding a bicycle, or even walking whenever possible. Driving an economy car or an electric car will also lead to less air pollution. Make sure that your car is properly tuned and that air pollution control devices are properly functioning.

Are there other types of air pollution besides smog?

Many other substances are released into the air by chemical manufacturers, municipal incinerators, and even fireplaces. They are called "point source" air pollutants and can be extremely caustic and threatening to health. The Union Carbide disaster at Bhopal, India, is an example of a point source air pollutant. Other examples are the Three Mile Island and the Chernobyl nuclear power plant radioactive discharges.

Many chemical manufacturing plants emit air pollutants through their manufacturing processes. These may not be quite so dramatic as the Chernobyl and Bhopal discharges, but in the long run, exposure to some of these chemicals may be just as deadly. These pollutants, including dioxins and furans, can be lethal in minute doses, and they do not remain in the air forever. When they settle, a few yards or hundreds of miles away, they can be absorbed into the groundwater and begin the slow process of moving up the food chain until they reach our dinner table. Many of these chemicals accumulate in the body and may be the cause of various cancers.

Chemicals such as benzene, chlordane, xylene, toluene, lead, mercury, cadmium, selenium, arsenic, tetrachloroethylene, chlorophenols, dioxins, furans, and hundreds of others are present at detectable levels in human body tissue. There is not a person alive today who will not have some synthetic substance show up in the blood if it is looked for.

These substances tend to collect in the fatty tissue of the body. Many are potent carcinogens (agents that cause cancer) and mutagens (agents that cause birth defects). They may be slowly ticking time bombs waiting 20, 30, or 40 years after entry to confront the body with a cancer of some type. They may be silent cofactors in causing disease, along with well-known cancer-causing substances like tobacco, asbestos, and others. Their effects may not even show up until we have children with birth defects such as spina bifida, cleft palate, Down's syndrome, or heart abnormalities. And they can increase the rate of miscarriage and stillbirth.

TCDD, a form of dioxin, is considered by many experts to be the most toxic chemical ever created. EPA experts believe that exposure to dioxins already in the environment may be causing 1 cancer per 10,000 people.

In the near future, research will demonstrate more clearly the relationship between cancer and environmental pollution. In 1964 the World Health Organization estimated that 60 to 80 percent of all cancers were environmentally caused.

