Air Quality Index

News media regularly gives us the air quality index (AQI). But what exactly is it? And who, other than people with asthma and other serious respiratory conditions, needs to pay attention to the warnings? The answer is everyone. Five major air pollutants are measured at over 1000 locations in the US each day: ground-level ozone, particle pollution, carbon monoxide, sulfur dioxide, and nitrogen dioxide. Then, AQI values are calculated using a formula developed by EPA. The EPA considers a value under 100 “satisfactory” and values over 100 as “unhealthy, at first for certain sensitive groups of people, then for everyone as AQI values get higher.” The highest AQI value among the five measured pollutants is the AQI value for the day.

While some pollutants — such as sulfur dioxide — result from power plants and industry and remain fairly consistent, others vary according to season and time of day. Carbon monoxide, for example, comes primarily from car exhaust, so levels are higher during morning and evening rush hour. Because cold weather inhibits emission control systems, carbon monoxide levels are also higher in winter. Ground-level ozone, however, forms when pollutants emitted by cars, power plants, industrial boilers, and other sources are exposed to heat and sunlight. Consequently, the highest levels of ozone tend to occur during summer afternoons.

Long-term exposure to ozone, sulfur dioxide, and particle pollution can permanently damage the lungs. EPA suggests that people look for signs of respiratory or cardiovascular discomfort when working, exercising, or playing outdoors when pollution levels are elevated. Unusual coughing, chest discomfort, wheezing, or breathing difficulty are signals that exertion should be reduced. Ozone, however, can damage the epithelial lining of the lungs without any noticeable sign. People who are exposed to high ozone levels for several days may find that their initial discomfort goes away; yet lung damage continues. When ozone levels are high, it is best for everyone to avoid vigorous physical activity that will cause deep breathing, drawing damaging ozone deep into the lungs, during afternoon hours when ozone levels are particularly high.

Ozone, sulfur dioxide, and particle pollution can aggravate asthma and chronic illnesses like emphysema and bronchitis. People with heart disease are at risk when particle pollution, carbon monoxide, and sulfur dioxide levels are over 100 on the AQI. Particle pollution can be a problem at any time of day and any time of year. It consists of particles, emitted during any form of combustion, that measure less than 10 micrometers in diameter. If it is severe enough, particle pollution for as little as an hour can be life-threatening and mean a trip to emergency room or even death — especially for older adults. When exposed to particle pollution, people with heart disease may experience chest pain, palpitations, shortness of breath, and fatigue. Particle pollution has also been associated with cardiac arrhythmias and heart attacks. Unlike the other pollutants, carbon monoxide poses the greatest threat to people with cardiovascular disease, such as angina. It causes chest pain. Healthy people may notice a decrease in mental alertness and impaired vision when carbon monoxide levels are high.

New View of Cystic Fibrosis

Medical perception of cystic fibrosis (CF) is that the body overproduces a thick mucus in the lungs, plugging up airways and digestive systems; but new research from Wake Forest Baptist Medical Center (Winston-Salem, North Carolina) shows that people with this genetic illness produce too little mucus rather than too much. Normal mucus is thin and slippery and acts as a lubricant. In people with CF, mucus is thick and sticky. It blocks tubes, ducts, and passages in the lungs and, also, in the pancreas and other digestive organs.

In this study, published in the American Journal of Respiratory Cell and Molecular Biology (July 2004), the North Carolina researchers collected sputum samples from 12 CF patients and 11 people without lung disease. The samples from those with CF showed significantly lower amounts of two proteins used to produce mucus (70% and 93%, respectively) than the samples taken from those with healthy lungs. Without those proteins, healthy mucus cannot form. The researchers determined that pus, produced during chronic infection, accounts for the thick stickiness of mucus in CF.

The researchers believe that infection, so common in CF, may decrease if mucus production increases. They are collaborating on an animal study to see if mucus can prevent bacterial infection. Although increasing mucus production would not cure CF, it could increase quality of life.

Chemtrails: Another Source of Pollution

Once upon a time, the only contrails in the sky were thin lines, high in the air, that quickly disappeared. These contrails form when the warm vapor trail produced by airplane engines meets the cold air found at high altitudes, over 30,000 feet. Since the early 1990s, a different type of vapor trail has become commonplace in the US, Canada, England, and Spain. These chemtrails, reportedly emitted from unmarked air force tankers, typically create varying...