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The Invisible Environment Fact Sheet Series

Environmental Tobacco Smoke

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A substantial body of evidence built up over the last forty years indicates that smoking tobacco is a major cause of illness and premature death. In recent years, several reports have also emphasized that exposure to environmental tobacco smoke (ETS) can cause lung cancer in people who have never smoked. In 1993, the Environmental Protection Agency (EPA) classified ETS as a known human carcinogen and estimated that ETS exposure is responsible for about 3,000 lung cancer deaths each year among adult nonsmokers. The EPA's findings have received much support from some in the scientific community, but they have been criticized by other scientists, statisticians, and the tobacco industry.

This fact sheet will describe what ETS is, the controversy that surrounds the studies regarding ETS, and measures you can take to minimize your exposure.

What Is ETS?

Environmental tobacco smoke is the combination of two forms of smoke from burning tobacco products:

- **Sidestream smoke (SS)**—smoke emitted between the puffs of a burning cigarette, pipe, or cigar
- **Mainstream smoke (MS)**—the smoke exhaled by the smoker

When a tobacco cigarette is smoked, about one-half of the smoke generated is sidestream smoke. This form of smoke contains essentially all of the same carcinogenic (cancer-causing) and toxic agents that have been identified in the mainstream smoke inhaled by the smoker. Exhaled mainstream smoke, which can contribute up to 43 percent of the particulate matter in ETS, has yet to be

characterized. There is also little data on the impact of dilution on sidestream smoke. During ETS formation, both SS and exhaled MS are diluted by many orders of magnitude. In the body, they also both subsequently undergo physical transformation and alterations in chemical composition.

More than 4,000 individual compounds have been identified in tobacco and tobacco smoke. Among these are about 60 compounds that are carcinogens, tumor initiators (substances that can result in irreversible changes in normal cells), and tumor promoters (substances that can lead to tumor growth once cell changes begin). Some of the known compounds include tar, carbon monoxide, hydrogen cyanide, phenols, ammonia, formaldehyde, benzene, nitrosamine, and nicotine. The composition of ETS can be highly variable depending on how much smoke is present (smoking rate), the amount and type of ventilation, contact with indoor surfaces, and a host of other environmental conditions.

The exposure of nonsmokers to ETS is referred to as involuntary smoking, passive smoking, and secondhand smoke. Nonsmokers who are exposed to ETS absorb nicotine and other compounds just as smokers do. The greater the exposure to ETS, the greater the level of these harmful compounds in the body.

Although an involuntary smoker is exposed to less concentrated smoke than that inhaled by smokers, research has demonstrated that health risks can arise from inhaling this form of smoke. Much of the controversy involving ETS is centered on this research and the questions, "what are the risks?" and "how strong is the evidence linking ETS with these risks?"

The History and Controversy of ETS Research

The health effects of tobacco cigarette smoking have been the subject of intensive scientific investigation since the 1950s. Smoking is linked to leading causes of chronic illness and premature death, including lung cancer and other malignancies, heart disease, stroke, and chronic obstructive pulmonary disease (for example, bronchitis and emphysema). The public health service estimates that smoking accounts for 87 percent of all lung cancer deaths, 80 to 90 percent of all deaths from chronic obstructive pulmonary disease, and 21 percent of all coronary heart disease.

More recently, there has been concern that nonsmokers may be at risk when exposed to environmental tobacco smoke (ETS) in indoor environments occupied by smokers. Researchers often refer to the involuntary inhalation of ETS by nonsmokers as “passive smoking.” In 1986, the National Research Council (NRC) and the Surgeon General of the U.S. Public Health Service both released reports on the health effects of passive smoking. Both reports concluded that ETS can cause lung cancer in adult nonsmokers. In 2006 the Surgeon General released another report on ETS this time stating the following major conclusions:

1. Secondhand smoke causes premature death and disease in children and in adults who do not smoke.
2. Children exposed to secondhand smoke are at an increased risk for sudden infant death syndrome (SIDS), acute respiratory infections, ear problems, and more severe asthma. Smoking by parents causes respiratory symptoms and slows lung growth in their children.
3. Exposure of adults to secondhand smoke has immediate adverse effects on the cardiovascular system and causes coronary heart disease and lung cancer.
4. The scientific evidence indicates that there is no risk-free level of exposure to secondhand smoke.
5. Many millions of Americans, both children and adults, are still exposed to secondhand smoke in their homes and workplaces despite substantial progress in tobacco control.
6. Eliminating smoking in indoor spaces fully protects nonsmokers from exposure to secondhand smoke. Separating smokers from nonsmokers, cleaning the air, and ventilating buildings cannot eliminate exposures of nonsmokers to secondhand smoke.

A review of the health effects of passive smoking in the workplace conducted by the National Institute for Occupational Safety and Health determined that “the collective weight of evidence” indicates that ETS poses an increased risk of lung cancer and possibly heart disease in occupationally exposed workers. An extensive analysis of the health effects of ETS was released by the Environmental Protection Agency (EPA) in January 1993. In its report, EPA classified ETS as a Group A (known) human carcinogen under its carcinogen assessment guidelines and concluded that widespread exposure to environmental tobacco smoke presents a substantial public health risk. Several studies, including those mentioned above, have found the following linkages:

- ETS is responsible for approximately 3,000 lung cancer deaths each year.
- ETS exposure has subtle, but significant respiratory health effects among nonsmokers, including chest discomfort and reduced lung function.
- ETS exposure causes more than 35,000 heart disease deaths each year.
- ETS exposure results in 150,000 to 300,000 cases of bronchitis and pneumonia annually among young children up to 18 months of age.
- ETS exposure in children irritates the upper respiratory tract and reduces lung function.
- ETS exposure increases the prevalence of fluid in the middle ear and contributes to middle ear infection.
- Breathing the smoke of ten cigarettes a day raises a child’s chances of getting asthma.
- Between 200,000 and 1,000,000 asthmatic children are affected by ETS.
- ETS can triple an infant’s risk of sudden infant death syndrome.

What Is Risk?

The risks estimated from secondhand smoke are based mostly on epidemiological studies. Although the dictionary defines “risk” as the possibility of loss, injury, or disease, epidemiologists think of risk in terms of the probability of loss, injury, or disease. Statistically, a probability is a calculation supported by evidence strong enough to establish presumption but not proof. This is usually established by estimating what may happen in the future based on studying what has happened in the past. This means that epidemiologists examine patterns of illness

among people and identify how some factor, such as ETS, points to some association between it and disease, rather than proving cause-and-effect in experiments.

Another way to judge this argument is to look at the raw numbers. For instance, more than 100,000 deaths are attributed to smoking each year, while only 3,000 are blamed on ETS. In the case of heart disease, if you smoke, your risk doubles or increases 100 percent—with ETS it only increases 30 percent. These numbers suggest that there are some risks involved with ETS, but it is substantially lower than those associated with smoking.

What You Should Know About ETS

Most researchers agree that your risk of disease increases as your exposure does. If an individual has lived a lifetime with a smoker or worked near a heavy smoker for many years, it is likely that person inhaled enough ETS to be concerned. This does not mean absolutely that the individual will acquire any health problems, but the risk compared to those who have not been in these situations is much greater. As for exposure through such environments as restaurants, and similar conditions, there is no clear evidence of how much these exposures contribute to overall long-term risk of disease. Yet, it is known that passive smoke can trigger asthma, allergies, and other respiratory problems in people sensitive to smoke.

Although researchers do not know the lowest level of ETS exposure that renders someone safe, most people breathe more secondhand smoke than they realize. Ventilation can help remove some of the contaminants and erase odor, but research shows that many pollutants still remain. As a result, even nonsmoking sections and other areas deemed “nonsmoking” do not offer complete protection.

Minimizing Your Exposure

While arguments continue to be raised, there is enough evidence to suggest that there is some danger involved in being exposed to ETS. Here are some ways to minimize your exposure as well as your risk of disease:

- Adopt a nonsmoking policy in your home. Do not smoke or let anyone else smoke there, especially around children.
- If you live or work with a smoker, work together to make changes. Start by being positive and supportive. Let the smoker know that you care about him or her.
- Let people know when their smoke is causing immediate problems. If it is making your allergies worse, making you cough or wheeze, or making your eyes sting, say so. Some smokers may put their cigarettes away when they see the discomfort it causes.
- Avoid areas where you know there is a chance for smoke to irritate your allergies or sensitivities.
- Help children avoid secondhand smoke of smokers who use tobacco around them. Have them leave the room or play outside while an adult is smoking. Air rooms out after smoking occurs. Keep smokers away from children’s sleeping areas.

Many cities have become completely smoke-free in public areas. Several states, including Ohio have enacted comprehensive, statewide smoke-free laws. Florida, Idaho, and Utah have passed statewide smoke-free laws that exempt only stand-alone bars. Hundreds of cities and counties have taken action as well, as have whole countries including Ireland, Norway, Sweden, Italy, and New Zealand.

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