

Secondhand Smoke and Cancer

Key Points

- Secondhand smoke (also called environmental tobacco smoke, involuntary smoke, and passive smoke) is the smoke given off by a burning tobacco product and the smoke exhaled by a smoker (see Question 1).
- At least 69 chemicals in secondhand smoke are known to cause cancer (see Question 3).
- Secondhand smoke causes lung cancer in nonsmokers (see Question 4).
- Secondhand smoke has also been associated with heart disease in adults and sudden infant death syndrome, ear infections, and asthma attacks in children (see Question 5).
- There is no safe level of exposure to secondhand smoke (see Question 6).

1. What is secondhand smoke?

Secondhand smoke (also called environmental tobacco smoke, involuntary smoke, and passive smoke) is the combination of “sidestream” smoke (the smoke given off by a burning tobacco product) and “mainstream” smoke (the smoke exhaled by a smoker) (1–4).

People can be exposed to secondhand smoke in homes, cars, the workplace, and public places, such as bars, restaurants, and recreational settings. In the United States, the source of most secondhand smoke is from cigarettes, followed by pipes, cigars, and other tobacco products (4).

The amount of smoke created by a tobacco product depends on the amount of tobacco available for burning. The amount of secondhand smoke emitted by smoking one large cigar is similar to that emitted by smoking an entire pack of cigarettes.

2. How is secondhand smoke exposure measured?

Secondhand smoke exposure can be measured by testing indoor air for nicotine or other chemicals in tobacco smoke. Exposure to secondhand smoke can also be tested by measuring the level of cotinine (a by-product of the breakdown of nicotine) in a nonsmoker’s blood, saliva, or urine (1). Nicotine, cotinine, carbon monoxide, and other smoke-related chemicals have been found in the body fluids of nonsmokers exposed to secondhand smoke.

3. Does secondhand smoke contain harmful chemicals?

Yes. Among the more than 7,000 chemicals that have been identified in secondhand tobacco smoke, at least 250 are known to be harmful, for example, hydrogen cyanide, carbon monoxide, and ammonia.

At least 69 of the toxic chemicals in secondhand tobacco smoke cause cancer (1, 5, 6). These include the following:

- Arsenic
- Benzene
- Beryllium (a toxic metal)
- 1,3-Butadiene (a hazardous gas)



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- Cadmium
- Chromium (a metallic element)
- Ethylene oxide
- Nickel (a metallic element)
- Polonium-210 (a radioactive chemical element)
- Vinyl chloride

Other toxic chemicals in secondhand smoke are suspected to cause cancer, including (1):

- Formaldehyde
- Benzo[a]pyrene
- Toluene

Many factors affect which chemicals are found in secondhand smoke, such as the type of tobacco, the chemicals added to the tobacco, the way the tobacco product is smoked, and, for cigarettes and cigars, the material in which the tobacco is wrapped (1, 3, 4).

4. Does exposure to secondhand smoke cause cancer?

Yes. The U.S. Environmental Protection Agency, the U.S. National Toxicology Program, the U.S. Surgeon General, and the International Agency for Research on Cancer have all classified secondhand smoke as a known human carcinogen (a cancer-causing agent) (1, 3, 5, 7).

Inhaling secondhand smoke causes lung cancer in nonsmoking adults (4, 5). Approximately 3,000 lung cancer deaths occur each year among adult nonsmokers in the United States as a result of exposure to secondhand smoke (2). The U.S. Surgeon General estimates that living with a smoker increases a nonsmoker's chances of developing lung cancer by 20 to 30 percent (4).

Some research also suggests that secondhand smoke may increase the risk of breast cancer, nasal sinus cavity cancer, and nasopharyngeal cancer in adults and the risk of leukemia, lymphoma, and brain tumors in children (4). Additional research is needed to learn whether a link exists between secondhand smoke exposure and these cancers.

5. What are the other health effects of exposure to secondhand smoke?

Secondhand smoke is associated with disease and premature death in nonsmoking adults and children (4, 5). Exposure to secondhand smoke irritates the airways and has immediate harmful effects on a person's heart and blood vessels. It may increase the risk of heart disease by an estimated 25 to 30 percent (4). In the United States, secondhand smoke is thought to cause about 46,000 heart disease deaths each year (8). There may also be a link between exposure to secondhand smoke and the risk of stroke and hardening of the arteries; however, additional research is needed to confirm this link.

Children exposed to secondhand smoke are at increased risk of sudden infant death syndrome, ear infections, colds, pneumonia, bronchitis, and more severe asthma. Being exposed to secondhand smoke slows the growth of children's lungs and can cause them to cough, wheeze, and feel breathless (4, 5).

6. What is a safe level of secondhand smoke?

There is no safe level of exposure to secondhand smoke. Even low levels of secondhand smoke can be harmful. The only way to fully protect nonsmokers from secondhand smoke is to completely eliminate smoking in indoor spaces. Separating smokers from nonsmokers, cleaning the air, and ventilating buildings cannot completely eliminate exposure to secondhand smoke (4).

7. What is being done to reduce nonsmokers' exposure to secondhand smoke?

On the national level, several laws restricting smoking in public places have been passed. Federal law bans smoking on domestic airline flights, nearly all flights between the United States and foreign destinations, interstate buses, and most trains. Smoking is also banned in most federally owned buildings. The Pro-Children Act of 1994 prohibits smoking in facilities that routinely provide federally funded services to children.

Many state and local governments have passed laws prohibiting smoking in public facilities, such as schools, hospitals, airports, bus terminals, parks, and beaches, as well as private workplaces, including restaurants and bars. Some states have passed laws regulating smoking in multiunit housing and cars. More than half of the states have enacted statewide bans on workplace smoking.

To highlight the health risks from secondhand smoke, the National Cancer Institute, a component of the National Institutes of Health, holds meetings and conferences in states, counties, cities, or towns that are smoke free, unless specific circumstances justify an exception to this policy. More information is available at <http://meetings.smokefree.gov/> on the Internet.

The U.S. Department of Health and Human Services Healthy People 2020, a comprehensive, nationwide health promotion and disease prevention agenda, includes the goal of reducing illness, disability, and death related to tobacco use and secondhand smoke exposure. Currently, most Americans are exposed to secondhand smoke, and children are at greatest risk. For 2020, the goal is to reduce the proportion of people exposed to secondhand smoke by 10 percent. To assist with achieving this goal, Healthy People 2020 includes ideas for community interventions, such as encouraging the introduction of smoke-free policies in workplaces and other public areas.

More information about this program is available on the Healthy People 2020 Web site at <http://www.healthypeople.gov/> on the Internet.

Internationally, a growing number of nations, including France, Ireland, New Zealand, Norway, and Uruguay, require all workplaces, including bars and restaurants, to be smoke free.

Selected References

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5. U.S. Department of Health and Human Services. *How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2010.
6. National Cancer Institute. *Health Effects of Exposure to Environmental Tobacco Smoke*. Bethesda, MD: National Cancer Institute; 1999. Smoking and Tobacco Control Monograph 10.
7. U.S. Environmental Protection Agency. *Respiratory Health Effects of Passive Smoking (Also Known as Exposure to Secondhand Smoke or Environmental Tobacco Smoke—ETS)*. U.S. Environmental Protection Agency, 1992.
8. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. *Proposed Identification of Environmental Tobacco Smoke as a Toxic Air Contaminant: Part B Health Effects*, 2005.

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Related NCI materials and Web pages:

- National Cancer Institute Fact Sheet 10.15, *Smokeless Tobacco and Cancer* (<http://www.cancer.gov/cancertopics/factsheet/Tobacco/smokeless>)
- National Cancer Institute Fact Sheet 10.17, *"Light" Cigarettes and Cancer Risk* (<http://www.cancer.gov/cancertopics/factsheet/Tobacco/light-cigarettes>)
- National Cancer Institute Fact Sheet 10.22, *How To Handle Withdrawal Symptoms and Triggers When You Decide To Quit Smoking* (<http://www.cancer.gov/cancertopics/factsheet/Tobacco/symptoms-triggers-quitting>)
- National Cancer Institute Fact Sheet 10.23, *Where To Get Help When You Decide To Quit Smoking* (<http://www.cancer.gov/cancertopics/factsheet/Tobacco/help-quitting>)
- *Clearing the Air: Quit Smoking Today* (http://www.smokefree.gov/pubs/clearing-the-air_acc.pdf)

How can we help?

We offer comprehensive research-based information for patients and their families, health professionals, cancer researchers, advocates, and the public.

- **Call** NCI's Cancer Information Service at 1-800-4-CANCER (1-800-422-6237)
- **Visit** us at <http://www.cancer.gov> or <http://www.cancer.gov/espanol>
- **Chat** using LiveHelp, NCI's instant messaging service, at <http://www.cancer.gov/livehelp>
- **E-mail** us at cancergovstaff@mail.nih.gov
- **Order** publications at <http://www.cancer.gov/publications> or by calling 1-800-4-CANCER
- **Get help** with quitting smoking at 1-877-44U-QUIT (1-877-448-7848)

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