

Surgeon General's Perspectives

EXPOSURE TO TOBACCO SMOKE CAUSES IMMEDIATE DAMAGE: A REPORT OF THE SURGEON GENERAL

“How Tobacco Smoke Causes Disease”¹ is the 30th tobacco-related Surgeon General’s report issued since 1964. It describes the specific mechanisms and pathways by which tobacco smoke damages the human body and leads to disease and death. While previous Surgeon General’s reports on tobacco have focused on *which* diseases are caused by tobacco smoke, this report explains in detail *how* tobacco smoke damages every cell in the body.

The 700-page report incorporates the contributions of 64 health experts; its messages are simple and powerful. The report concludes that any exposure to tobacco smoke, even occasional smoking or exposure to secondhand smoke, causes *immediate* damage to your body. That damage can lead to serious illness or death. The report describes in detail how tobacco smoke reaches every organ in the body and how it affects those organs.

Tobacco smoke is a toxic mix of more than 7,000 chemicals and compounds. These chemicals and compounds reach a person’s lungs quickly every time the person inhales. The blood then carries the toxicants to every organ in the body.

Exposure to tobacco smoke quickly damages blood vessels throughout the body and makes blood more likely to clot. The chemicals in tobacco smoke damage the delicate lining of the lungs and can cause permanent damage that reduces the ability of the lungs to exchange air efficiently. This can ultimately lead to chronic obstructive pulmonary disease, including emphysema.

Many Americans have some degree of coronary heart disease, and often they don’t know it until they experience chest pain or present to the hospital. This report found that even brief exposures to tobacco smoke harm blood vessel linings and increase the likelihood of blood clotting. In people with coronary heart disease, this effect could trigger a heart attack.

Chemicals in tobacco smoke cause inflammation and cell damage. The body makes white blood cells to respond to injuries, infections, and cancers. White blood cell counts tend to stay high while a person continues to smoke, as the body is constantly trying to fight against the damage being caused by smoking.



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The chemicals and toxicants in tobacco smoke also damage a person’s DNA, which can lead to cancer. At the same time, however, smoking can weaken a body’s ability to fight cancer. With any cancer—even a cancer not related to tobacco use—smoking can lessen the benefits of chemotherapy. Exposure to tobacco smoke can, therefore, both cause cancer and make it difficult to stop tumors from growing.

Smoking also makes it harder for people with diabetes to regulate their blood sugar. That’s why smokers with diabetes have a higher risk of kidney disease, peripheral arterial disease, eye disease, and nerve damage that can result in amputations, poor vision, and even blindness.

It is never too late to quit smoking. When smokers quit, the risk for a heart attack drops sharply after just one year of not smoking. Stroke risk can fall to about the same level as a nonsmoker’s risk after two to five years of being smoke-free. Risks for cancer of the mouth, throat, esophagus, and bladder are cut in half five years after quitting smoking. And the risk of dying from lung cancer drops by half after 10 years of being smoke-free.

The report confirms that tobacco smoke is addicting, and determines that cigarettes are designed for addiction. Nicotine is the key chemical compound responsible for the powerful addicting effects of cigarettes, but many ingredients (e.g., sugar and moisture

enhancers) are added to reduce harshness and improve taste and consumer appeal. Chemical ingredients (e.g., ammonia) convert the nicotine into what is called "free nicotine," which more quickly crosses the blood brain barrier. Ventilation holes in filters make smoke easier to inhale deeply into the lungs and also convert more of the nicotine into free nicotine. These design features work together to enhance the addictive "kick" and pleasure a smoker feels. Today's cigarettes deliver nicotine and chemicals more quickly to the brain.

Evidence suggests that psychosocial, biological, and genetic factors may also play a role in tobacco addiction. In addition, adolescents may be more sensitive to nicotine and more easily addicted than adults. This helps explain why about 1,000 teenagers become daily smokers each day, and why it often takes several attempts to quit.²

Tobacco use in the U.S. has declined by almost half since the first Surgeon General's report on tobacco was released in 1964. However, since 2003, smoking rates have not declined. One in five American adults continues to smoke, as do one in five adolescents. Tobacco use remains the leading cause of preventable death in the U.S. and is responsible for more than 440,000 premature deaths each year.

Fortunately, there are things we can do. The U.S. Department of Health and Human Services has developed an action plan called "Ending the Tobacco Epidemic: A Tobacco Control Strategic Action Plan,"³ with the goal to reach the *Healthy People 2020*⁴ objective of reducing the adult smoking rate from 18.4% to 12.0% by 2020.

We know what works. When we increase the price of tobacco, smoking rates decline. When we enact smoke-free policies, we reduce exposure to secondhand smoke, prompt smokers to quit, change social norms, support healthy decisions, and reduce heart attacks. And when we educate the public with aggressive media campaigns, we inform them of the risk of smoking, encourage tobacco users to quit, and prevent young people from starting.

Evidence shows that smoking rates decline when states implement comprehensive tobacco-control pro-

grams, and the longer the investment, the greater and faster the impact. For example, California is home to the longest-running state tobacco-control program in the country. Lung cancer incidence has been declining four times faster in that state than in the rest of the nation. California has the potential to become the first state in which lung cancer is no longer the leading cause of cancer death.

It is important for those of us in public health to note that doctors and other clinicians can play an important role in helping people quit smoking. We know that patients who are advised by their doctors to quit smoking have a 66% higher success rate. We have a responsibility to encourage every patient to stop smoking and to tell them ourselves, not rely on others to do it.



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NOTE: Primary references for information in this column can be found in the Surgeon General's Report, except as noted.

REFERENCES

1. Department of Health and Human Services, Public Health Service, Office of the Surgeon General (US). How tobacco smoke causes disease: the biology and behavioral basis for smoking-attributable disease: a report of the Surgeon General. Rockville (MD): HHS, PHS, OSG; December 2010. Also available from: URL: <http://www.surgeongeneral.gov/library/tobaccosmoke/index.html> [cited 2010 Dec 27].
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