



How Do We Conclude That Smoking is a Cause of Disease?

Since the first Surgeon General's report on smoking and health in 1964, 27 additional reports have concluded that tobacco use is the single most avoidable cause of disease, disability, and death in the United States.

These reports have assembled the scientific data on smoking and many related diseases and then evaluated the data to assess whether or not smoking could be classified as the cause of a particular disease. Using this approach, almost every report since 1964 has expanded the list of diseases caused by tobacco use.

Since the first causal conclusions in 1964, there has been increasing evidence to support those earlier conclusions. The 2004 report of the surgeon general, *The Health Consequences of Smoking*, updates the evidence and conclusions of the impact of smoking on health.

Using terminology already in use by the Institute of Medicine and the International Agency for Research on Cancer, this methodology clarifies what is meant by each conclusion in this Surgeon General's report. Conclusions on whether smoking causes diseases are classified in the following way:

Evidence is sufficient to infer a causal relationship. → **Proven to cause the disease.**

Evidence is suggestive but not sufficient to infer a causal relationship. → **May cause the disease.**

Evidence is inadequate to infer the presence or absence of a causal relationship. → **There is not enough proof that smoking does or does not cause the disease.**

Evidence is suggestive of no causal relationship. → **Probably does not cause the disease.**

For the Surgeon General to conclude that smoking is proven to cause a particular disease, there must be enough scientific evidence that smoking either increases the overall number of cases of the disease or makes the disease occur earlier than it otherwise would. The reports use a number of criteria to guide their judgment:

- ▶ Do multiple high-quality studies show a consistent association between smoking and disease?
- ▶ Are the measured effects large enough and statistically strong?
- ▶ Does the evidence show that smoking occurs before the disease occurs (a temporal association)?
- ▶ Is the relationship between smoking and disease coherent or plausible in terms of known scientific principles, biologic mechanisms, and observed patterns of disease?
- ▶ Is there a dose-response relationship between smoking and disease?
- ▶ Is the risk of disease reduced after quitting smoking?

As a companion resource for scientists, medical students, and others, a new interactive database of more than 1,600 articles cited in the Surgeon General's report is available through the Internet at <http://www.cdc.gov/tobacco>. The database is easily accessible and can serve as a primary source of information about smoking-related disease research. The user can select search criteria to see results from the key studies cited in this report on topics such as cancer, cardiovascular diseases, respiratory diseases, reproductive effects, and other health effects. The user also can develop customized analyses, tables, and figures by using the interactive features of the database.

Citation

U.S. Department of Health and Human Services. *The Health Consequences of Smoking: A Report of the Surgeon General*. 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, 2004.

Smoking remains the leading cause of preventable death and has negative health impacts on people at all stages of life. It harms unborn babies, infants, children, adolescents, adults, and seniors.

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