The First Surgeon General’s Report on Smoking and Health: The 50th Anniversary

Otis W. Brawley, MD; Thomas J. Glynn, PhD; Fadlo R. Khuri, MD; Richard C. Wender, MD; John R. Seffrin, PhD

Introduction
Fifty years ago, on January 11, 1964, Luther L. Terry, MD, then Surgeon General of the United States, announced the release of the Surgeon General’s report on smoking and health.1 This report was the culmination of a process that a group of experts began more than 18 months earlier to assess the science related to tobacco use and its effect on humans. The group came to the conclusion that cigarette smoking causes lung cancer and laryngeal cancer. The report also noted that there was suggestive evidence, if not definitive proof, of a causative role of smoking in other illnesses such as emphysema, cardiovascular disease, and various types of cancer.

The conclusions reached by this report are arguably the most important and far-reaching in the history of public health and are, perhaps, the classic example of science driving public policy. It gave extraordinary momentum to the tobacco control movement and caused public opinion and behavior to change considerably, even though a large part of the population was not initially predisposed to accept the message.

At the time, cigarette smoking was a significant part of America’s culture and the tobacco industry was a significant part of the US economy. In surveys, 52% of American men and 35% of American women were active cigarette smokers. The United States grew, manufactured, and exported more tobacco than any other country. In 1960, tobacco contributed $15 billion in wages to some 660,000 American workers.2,3

Given the numerous medical controversies today, it is of value to explore why this process was so successful and why so many were willing to accept this pronouncement as truth.

The process used to establish and run the group set a precedent for dealing with and interpreting controversial medical and scientific issues. A group of learned individuals was brought together to review the science as a type of grand jury. A critical criterion for committee membership was being capable of reaching beyond one’s own discipline to learn about and consider complex data. The process also set a standard for choosing scholarly individuals who have no financial or emotional conflicts of interest to consider a highly charged controversial issue. They would review more than 7000 papers and intensively study more than 27 case-control and cohort studies and 7 broader cohort studies in order to reach their then-momentous conclusions.

A Brief History of the Science Linking Tobacco to Lung Cancer
Lung cancer was a rare diagnosis in the 19th century. Indeed, several hospitals in Europe and North America reported that it was less than 1% of all cancers diagnosed. Yet diagnosis of, and death from, lung cancer seemed to increase in the first 2 decades of the 20th century. Initially, some thought the increase was not real or that it might be due to better record keeping, the advent of more hospitals, or the development of diagnostic techniques such as the chest x-ray.4

By the 1920s, however, the increase in lung cancer deaths was deemed real and efforts to determine a reason began. Suspected causes included industrial pollution, street pavement products like asphalt, and exposure to chemicals used in World War I. A very few suspected tobacco. In 1929, Fritz Lickint performed the first study giving statistical evidence of a link between lung cancer and tobacco in Dresden, Germany.5 Lickint would also be the first person to use the term “passivrauchen,” or passive smoking, in 1936.6

1Editor-in-Chief, CA: A Cancer Journal for Clinicians; Chief Medical and Scientific Officer, American Cancer Society; Professor of Hematology and Medical Oncology, Medicine, and Epidemiology, Emory University, Atlanta, GA; 2Director, Cancer Science and Trends and Director, International Cancer Control, American Cancer Society, Washington, DC; 3Editor-in-Chief, Cancer; Professor and Chair of Hematology and Medical Oncology, Adjunct Professor of Medicine, Pharmacology, and Otolaryngology, Roberto C. Goizueta Distinguished Chair in Translational Cancer Research, Deputy Director, Winship Cancer Institute, Emory University School of Medicine, Emory University, Atlanta, GA; 4Chief Cancer Control Officer, American Cancer Society, Atlanta, GA; 5Chief Executive Officer, American Cancer Society, Atlanta, GA.

Corresponding author: Otis W. Brawley, MD, Chief Medical and Scientific Officer, American Cancer Society, 250 Williams St, NW, Atlanta, GA 30303-1002; otis.brawley@cancer.org

DISCLOSURES: The authors report no conflicts of interest.

©2013 American Cancer Society, Inc. doi: 10.3322/caac.21210. Available online at cacancerjournal.com
Epidemiology, especially epidemiology of chronic disease, was still an immature science in the 1930s. The investigation of the causes of lung cancer and its rise in incidence and mortality actually drove the development of many of the epidemiologic methods that are commonly used today. Franz Herman Muller of Cologne, Germany, performed the first case-control study in 1939. He used 86 lung cancer cases and 86 matched controls to show that smokers are far more likely to develop lung cancer than nonsmokers.7

Over the next 20 years, the use of case-control methodology would accelerate. Study after study showed a correlation between smoking and lung cancer. However, correlation does not necessarily mean causation and a definitive statement that smoking caused cancer was not reasonable given the state of the science at that time.

Koch’s postulates to determine causality had been developed for infectious disease, but could not be applied in the same way for chronic disease. A definitive study to establish the link between tobacco use and lung cancer would require exposure of humans to the carcinogens in tobacco to determine whether they developed lung cancer. Submitting humans to experiments that might expose them to agents thought to be carcinogenic over prolonged periods was not feasible of course, either ethically or logistically. Several animal studies did suggest that the products of tobacco and cigarette consumption had grown dramatically after the introduction of cigarette-making machinery and improvements in mass production techniques in the 1880s. Per capita cigarette consumption for Americans aged 15 years and older was 747 cigarettes per year in 1920 and 1828 cigarettes per year by 1940. It would rise to 3908 cigarettes per year by 1960 and peak in 1963 at 4345 cigarettes per year.2 Lung cancer, a rare tumor in 1900, would be the most common cancer diagnosed in American men by 1950.

In 1940, Ochsner and DeBakey noted an increase in the number of lung cancers diagnosed at Charity Hospital in New Orleans. They then called attention to the dramatic rise in cigarette sales in the United States, especially since the end of World War I, and contrasted it to the increased prevalence of the disease.8 Indeed, smoking rates and cigarette consumption had grown dramatically after the introduction of cigarette-making machinery and improvements in mass production techniques in the 1880s. Per capita cigarette consumption for Americans aged 15 years and older was 747 cigarettes per year in 1920 and 1828 cigarettes per year by 1940. It would rise to 3908 cigarettes per year by 1960 and peak in 1963 at 4345 cigarettes per year.7 Lung cancer, a rare tumor in 1900, would be the most common cancer diagnosed in American men by 1950.

In 1950, 2 of the largest case-control studies until that time were published. These studies would become landmarks, showing a significant link between cigarette smoking and lung cancer.

Ernst Wynder and Evarts Graham assessed 605 lung cancer cases in US hospitals.9 They found that 96.5% of the 605 men with bronchogenic carcinoma were moderately heavy to chain smokers compared with 73.7% among the general male hospital population without cancer. They also noted that lung cancer in a nonsmoker or minimal smoker was rare.

In the same year, Sir Richard Doll and Sir Bradford Hill reported on a case-control study they had conducted.10 They compared 1357 patients with lung cancer from 20 London hospitals with a group of patients without cancer who were admitted to the same hospitals. Controls were matched by age, sex, and hospital. The study showed that cases had significantly greater odds of having smoked than controls. There was also what appeared to be a dose-response relationship between the number of cigarettes smoked per day and the strength of the association.

As these cohort studies were being published, 2 prospective cohort studies were initiated in the United Kingdom and the United States. While these cohort studies were unable to prove causation, they would become the strongest human data to date suggesting that cigarette smoking caused lung cancer.

Doll and Hill began following 40,637 British physicians.11 Initially, there were 34,445 men and 6192 women. The women were, unfortunately, dropped from the study due to their small numbers. The cohort study found that smoking was associated with an increased risk of developing lung cancer and the more, and the longer, one smoked the higher the risk. The study showed that 1.23 deaths were attributed to smoking per 1000 smokers of all ages each year.

In the United States, the American Cancer Society began enrollment in what became known as the Hammond-Horn Study.12,13 This study enrolled 204,547 white American men aged 50 to 69 years and ultimately followed 187,783 men from 1952 to 1955. There were 11,783 deaths (6.2%) reported during an average of 44 months of follow-up, with only 1.1% of the cohort being lost to follow-up. Death certificates and health records were studied, with preliminary results from the first 20 months of follow-up published in 1954 and final results published in 1958. This study strongly suggested cigarette smoking was a cause of lung cancer. A dose-response relationship was again seen.

Unlike a case-control study, a cohort study can be analyzed to assess multiple outcomes or diseases. These cohort studies actually suggested that more smokers died due to cardiovascular disease than lung cancer, a finding borne out in later studies.

Reaction to the Scientific Findings

There were widespread media reports about the growing number, and the increasing strength, of studies suggesting that smoking was harmful. This led to public concern and resulted in a small drop in American cigarette consumption, primarily among men.

In response to the softening market, the tobacco industry in the 1950s began their now long-standing tactic of questioning the data. They also introduced filtered cigarettes and menthol cigarettes and expanded marketing to women.

As the evidence of harm was accumulating, a number of organizations issued statements declaring that cigarette
smoking was harmful. These included the British Medical Research Council; the American Heart Association; the Joint Tuberculosis Council of Great Britain; the Canadian Department of National Health and Welfare; the cancer societies of Denmark, Norway, Sweden, Finland, and the Netherlands; and the American Cancer Society.

The US Public Health Service established a scientific study group on smoking in 1956. The group consisted of representatives from the National Cancer Institute, the National Heart Institute, the American Cancer Society, and the American Heart Association. They appraised 16 studies that were performed in 5 countries over a period of 18 years and concluded that there is a causal relationship between excessive smoking of cigarettes and lung cancer.

On July 12, 1957, then-Surgeon General Leroy E. Burney issued a statement as a result of the study group’s conclusion. He declared that: “The Public Health Service feels the weight of the evidence is increasingly pointing in one direction: that excessive smoking is one of the causative factors in lung cancer.”

In 1959, the Royal College of Physicians of London formed a committee to appraise the scientific data concerning smoking and health.

On November 28, 1959, Surgeon General Burney reiterated and strengthened his previous statement by saying “The belief of the Public Health Service is that the weight of evidence at present implicates smoking as the principal factor in the increased incidence of lung cancer” and that “Cigarette smoking particularly is associated with an increased chance of developing lung cancer.”

Establishment of the Committee
In June 1961, the leadership of the American Cancer Society, the American Public Health Association, the American Heart Association, and the National Tuberculosis Association sent a letter to President Kennedy urging the formation of a Presidential Commission to study the “widespread implications of the tobacco problem.”

In January 1962, building on the momentum from this letter, Edgar Prina, a reporter with the Washington Star newspaper, asked President Kennedy at his 23rd press conference what he intended to do about “the tobacco problem.” The president cited a lack of knowledge about the issue, but said that he would ask Surgeon General Luther L. Terry to look into the issue. Dr. Terry, citing the president’s request and letters from public health groups, then proposed to the Secretary of Health, Education, and Welfare the formation of an advisory committee of “outstanding experts who would assess the available knowledge in the area of smoking and health and make appropriate recommendations.” The advisory group would reevaluate the position taken by Dr. Burney in 1959.

The committee formed by the Royal College of Physicians of London issued a report just after Dr. Terry’s call for the formation of an American advisory committee.

The report concluded that “Cigarette smoking is a cause of lung cancer and bronchitis, and probably contributes to the development of coronary heart disease and various other less common diseases.”

Shortly thereafter, on July 24, 1962, the Surgeon General met with representatives of the American Cancer Society, the American College of Chest Physicians, the American Heart Association, the American Medical Association, the US Food and Drug Administration, the National Tuberculosis Association, the Federal Trade Commission, the Office of Science and Technology, and a tobacco industry group known as the Tobacco Institute, Inc.

At this meeting, it was agreed that the US Public Health Service would convene an expert scientific advisory

| TABLE 1. The Surgeon General's Advisory Committee on Smoking and Health |
| --- |
| Chairman: Luther L. Terry, MD, Surgeon General of the United States Public Health Service. |
| Vice-Chairman: James M. Hundley, MD, Assistant Surgeon General for Operations, United States Public Health Service. |
| Stanhope Bayne-Jones, MD, LLd, Retired Dean of the Yale University School of Medicine, New Haven, Connecticut. Field: Nature and Causation of Disease in Human Populations. |
| Walter J. Burdette, MD, PhD, Head of Department of Surgery at the University of Utah School of Medicine, Salt Lake City, Utah. Fields: Clinical and Experimental Surgery, Genetics. |
| William G. Cochran, MA, Professor of Statistics at Harvard University, Boston, Massachusetts. Field: Mathematical Statistics With Application to Biological Problems. |
| Emmanuel Farber, MD, PhD, Chairman of the Department of Pathology at the University of Pittsburgh, Pittsburgh, Pennsylvania. Field: Experimental and Clinical Pathology. |
| Louis F. Fieser, PhD, Sheldon Emory Professor of Organic Chemistry at Harvard University, Boston, Massachusetts. Field: Chemistry of Carcinogenic Hydrocarbons. |
| Jacob Furth, MD, Professor of Pathology at Columbia University and Director of Pathology Laboratories, Francis Delafield Hospital, New York City. Field: Cancer Biology. |
| John B. Hickam, MD, Chairman, Department of Internal Medicine at Indiana University, Indianapolis, Indiana. Fields: Internal Medicine, Physiology of Cardiopulmonary Disease. |
| Charles LeMaistre, MD, Professor of Internal Medicine at The University of Texas Southwestern Medical School and Medical Director of Woodlawn Hospital, Dallas, Texas. Fields: Internal Medicine, Pulmonary Diseases, Preventive Medicine. |
| Leonard M. Schuman, MD, Professor of Epidemiology at the University of Minnesota School of Public Health, Minneapolis, Minnesota. Field: Health and its Relationship to the Total Environment. |
| Maurice H. Seevers, MD, PhD, Chairman, Department of Pharmacology at the University of Michigan, Ann Arbor, Michigan. Field: Pharmacology of Anesthesia and Habit-Forming Drugs. |
committee to critically review all available data and produce a technical report on smoking and health. This group would make statements of fact. It would not do any research and would not recommend any specific actions.

The participants of the July meeting compiled a list of more than 150 scientists and physicians with interests and competence in a broad range of disciplines. Each nominee was thought to have the capacity to evaluate complex data concerning the relationship between tobacco, smoking, and health. Care was taken to eliminate anyone who had taken a public position on the issue. Any organization could veto any name on the list with no reason required. From the final list of names, the Surgeon General selected 10 experts. Their expertise included pathology, surgery, chemistry, cancer biology, internal medicine, pharmacology, statistics, and epidemiology. It is of note that only one epidemiologist was on the committee and most were smokers (Table 1).

The committee would meet regularly at the National Library of Medicine on the campus of the National Institutes of Health in Bethesda, Maryland for nearly 18 months. On January 11, 1964, they and Dr. Luther Terry forever changed the course of public health.

References

1. United States Public Health Service. Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service. Washington, DC: US Department of Health, Education, and Welfare; 1964.

2. Economic Research Service, US Department of Agriculture. Cigarette Consumption, United States, 1900-2007. Tobacco Outlook Report. Washington, DC: Economic Research Service, US Department of Agriculture; 2007.

3. US Department of Agriculture. Annual Report on Tobacco Statistics, 1960. Washington, DC: US Department of Agriculture; 1961.

4. Adler I. Malignant Growths of the Lung and Bronchi: A Pathological and Clinical Study. New York: Longman Green and Company; 1912.

5. Lickint F, Buchner M, Pietzsch A, Brehmer C. Experimental contributions to etiological and diagnostic research in the field of malignant diseases, with special reference to lung cancer [in German]. Z Gesamte Inn Med. 1955;10:961-967.

6. Lickint F. Bronchial carcinoma in non-smokers [in German]. Munch Med Wochenschr. 1954;96:1366-1369.

7. Muller FH. Tabakmissbrauch und Lungencarcinom. Z Krebsforsch. 1939;49:57-85.

8. Ochsner A, DeBakey M. Carcinoma of the lung. Arch Surg. 1941;42:209-258.

9. Wynder EL, Graham EA. Tobacco smoking as a possible etiologic factor in bronchiogenic carcinoma; a study of 684 proved cases. J Am Med Assoc. 1950;143:329-336.

10. Doll R, Hill AB. Smoking and carcinoma of the lung; preliminary report. Br Med J. 1950;2:739-748.

11. Doll R, Hill AB. The mortality of doctors in relation to their smoking habits; a preliminary report. Br Med J. 1954;1:1451-1455.

12. Hammond EC, Horn D. The relationship between human smoking habits and death rates: a follow-up study of 187,766 men. J Am Med Assoc. 1954;155:1316-1328.

13. Hammond EC, Horn D. Smoking and death rates; report on forty-four months of follow-up of 187,783 men. I. Total mortality. J Am Med Assoc. 1958;166:1159-1172.

14. Royal College of Physicians of London. Smoking and Health. A Report of the Royal College of Physicians of London on Smoking in Relation to Cancer of the Lung and Other Diseases. London, UK: Royal College of Physicians of London; 1962.