

## Presidential Address

# Of Cigarettes and Surgeons

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**A**T SOME POINT in the high of being president of a surgical organization comes a dreadful low: thoughts of a presidential address. Review of prior presidential addresses reveals a variety of topics, including socioeconomics, critiques of the medical and surgical education process, research, both basic and clinical, and historic topics. Having long been interested in the effect of cigarettes on vascular disease and the surgeon's role in this area, I have taken the president's prerogative today to review some thoughts about cigarettes and surgeons.

The magnitude of the tobacco problem is truly enormous. Michael Gartner, my neighbor and friend, has used his evocative way with words to put the numbers in perspective. He says that "A wall built to list the names of all United States residents who die from the effects of cigarette smoking in a single year would be seven times the size of the Vietnam War memorial." Three years ago the number of annual deaths from smoking reached 434,175. That is more than the United States losses in World War II. During the last 2.5 hours, more United States residents died

from smoking than lost their lives in combat in the recent Gulf war. In comparison to the AIDS epidemic, this year 45,000 will die of that disease; that many United States residents will die of the effects of smoking in the next 38 days. Michael Gartner concludes: "Smoking cigarettes might be the single, dumbest, legal thing a person can do."<sup>1</sup>

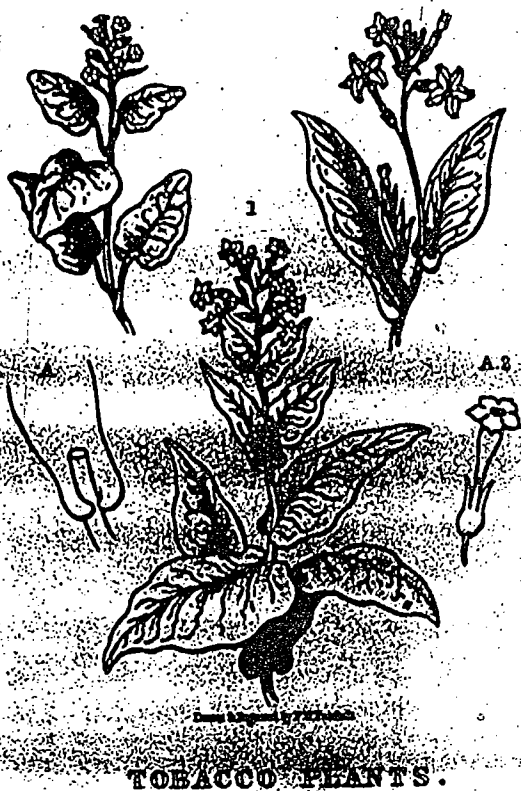
Following is another perspective on the problem: A 25-year-old man who smokes one pack of cigarettes per day for a lifetime loses 4.6 years of life. If the cigarettes smoked are increased to two packs per day, 8.3 years of life are lost. Each cigarette smoked results in an average of 5.5 minutes loss of life.<sup>2</sup> One in six deaths in the United States is caused by cigarette smoking.

What about dollars and cents? Smoking-related illnesses in the United States result in direct health care costs of over \$16 billion per year.<sup>3</sup> The tobacco business ranks in the top five United States industries, with \$60 billion contributed to the national economy annually. Two million jobs are connected, directly or indirectly, with the tobacco industry in the United States alone.<sup>4</sup>

How did all of this get started? Robert Sobel in his book, *They Satisfy*,<sup>5</sup> writes, "When Columbus landed on San Salvador in 1492, the natives offered him food and drink, artifacts, and a few handfuls of dried leaves. The Spaniards consumed the first, kept

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TOBACCO PLANTS.

1. *Nicotiana Tabacum*, 2. *N. Rustica*, 3. *N. Persica*.

STILL LIFE BY WILLIAM B. HALL. CIVILIZATION 1859

FIG. 1. Varieties of tobacco plants, 1859.

the second to show Queen Isabella and her Court, and discarded the leaves, thinking them worthless. A few days later the explorer was offered additional leaves and this time shown how they could be smoked in long pipes. As most everyone knows, Columbus took tobacco leaves back to Europe where in time the habit caught on and became the basis for a major colonial export industry."

In a fascinating volume entitled *Tobacco: Its History and Associations*<sup>6</sup> published in London in 1859, the frontispiece shows the three varieties of tobacco plants: 1) *Nicotiana tabacum* from South America, 2) *Nicotiana rustica* from North America, and 3) *Nicotiana persica* (Fig. 1). The earliest printed illustration of the tobacco plant appeared in the *New Notebook of Plants*<sup>7</sup> published in London in 1570 (Fig. 2). The cone-shaped object this gentleman has in his mouth is supposed to be a cigar, described in the text as a funnel into which sailors and Indians inserted the plant to smoke it.



FIG. 2. Tobacco plant, 1570.

The Indians had probably first tried tobacco through chewing, a primitive reflex to try a leaf for taste practiced by children everywhere. An oily, colorless, and highly volatile substance later called nicotine seemed to be the substance that distinguished tobacco from other plants. Smoking of the leaf followed. How smoking began is still speculative; initially, however, it was a priestly right and function. In North America, ceremonial use predominated. A war pipe, a true tomahawk, was smoked through the reed handle, with the tobacco placed in a receptacle above the hatchet. The peace pipe, or calumet, is better known. It was a sacred pipe used only when making peace.

The smoking of tobacco via a pipe caught on rapidly in Europe, and Sir Walter Raleigh was given credit for popularizing the custom. Raleigh is reputed to have taught Queen Elizabeth to smoke a pipe. A print from a volume published in Rotterdam in 1623 shows "the fashionable mode of thus inhaling tobacco smoke and exhaling it by the nose." (Fig. 3)

At the time of Columbus, Indian consumption of tobacco existed in three forms: the pipe, the cigar, and the reed-cigarette. Europeans "invented" the cigarette independent of the Indians but for the same general purpose, to create a cheap smoke. Early on, European cigarette smoking was, in general, for the lower classes,



FIG. 3. Rotterdam print, 1623.

while the upper and middle classes smoked cigars or pipes. These distinctions rapidly blurred, however, with war time and later advertising being the most important methods of spreading the use of cigarettes. Middle-class Europeans learned to smoke a variety of cigarettes in the Crimean War, and in the United States Union soldiers learned to smoke cigarettes while at war in the South. Soldiers from opposing sides would mingle during lulls in the action, and frequently Northern food supplies were traded for Virginia and Carolina tobacco.

In the early centuries after its introduction to Europe, tobacco was used in medical practice. It was prescribed for a multitude of problems from halitosis and tetanus to corns and cancer. In the late 1500s, tobacco was used as an "ungent, a gargle, an emetic, a cathartic, and a remedy for coughs, colds, sores, headaches, gangrene, and paralysis."<sup>7</sup> In the Great Plague of 1664 to 1666, school children were forced daily to take what was called a "medicinal pipe." Curiously, the medicinal uses of tobacco were almost entirely confined to western Europe. The North and South American Indians, Turks, Chinese, Africans, and other users of tobacco virtually never made medicinal claims for the leaf.

Science and technology helped explain the further widespread growth of the cigarette after the middle of the 19th century. Chewing tobacco and the smoke from pipes and cigars is alkaline, and nicotine absorption across the oral mucosal membrane is

enhanced in an alkaline environment where nicotine is in a nonionized form. However, this alkalinity irritates the pharynx, making inhalation unpleasant. So-called blonde tobaccos, which burned with acidic smoke, were developed in the late 19th century. The acidic smoke was much less irritating, and the inhaled nicotine was effectively absorbed by the respiratory epithelium, even though ionized.

Match developments further fostered cigarette use. The practical friction match was invented in 1827, and safety matches were introduced in 1845. By the 1870s, matches were in mass production, which allowed cigarettes to be smoked anywhere.

In the 1880s, Virginian James Bonsack introduced the mechanical cigarette rolling machine, which increased production of cigarettes from the 2,000 to 3,000 produced by hand in a day to 120,000 cigarettes per machine per day.

Lucy Page Gaston of Illinois was an early crusader against cigarettes. As a somewhat peculiar Midwesterner, she may be of interest to the members of the Midwest Surgical Association. Born in 1860 to a family of activists in the anti-slavery and temperance movements, she was described as "not particularly attractive physically. She was tall, ungainly, and rather bony, both in face and figure. She had a high forehead, large upper lip, and mouse-colored hair. Throughout her life she would talk of her resemblance to Abraham Lincoln, physically as well as ideologically."<sup>8</sup> Gaston founded the Chicago anti-cigarette league in 1899, and this became a national organization by 1903. Many cities developed clinics for "curing smokers." The league's general secretary, Dr. D. H. Cress, took out a patent on a mouthwash that was a weak solution of silver nitrate. Cigarette craving was allegedly cured by gargling with this solution after meals for 3 days, plus use of a bland diet and warm baths.

Their campaign was remarkably effective, particularly in the Midwest. Several cities, in fact, banned cigarettes in the late 1890s. Annual cigarette production, which had peaked at nearly 5 billion in 1897, fell to 3.5 billion by 1901.

Gaston's and the league's work faltered during World War I. The league broke up in 1917, and four state legislatures, including Iowa, in 1921, repealed previous anti-smoking laws. Lucy Gaston died in 1924. Annual United States cigarette consumption had climbed during the 25 years of her active campaigning from 4.4 billion in 1899 to 73 billion in the year of her death. Ironically, Lucy Gaston died of laryngeal cancer.

World War I was a watershed for cigarette consumption. When asked what Americans could do to help the war effort, General Jack Pershing remarked, "You asked me what we need to win this war . . .

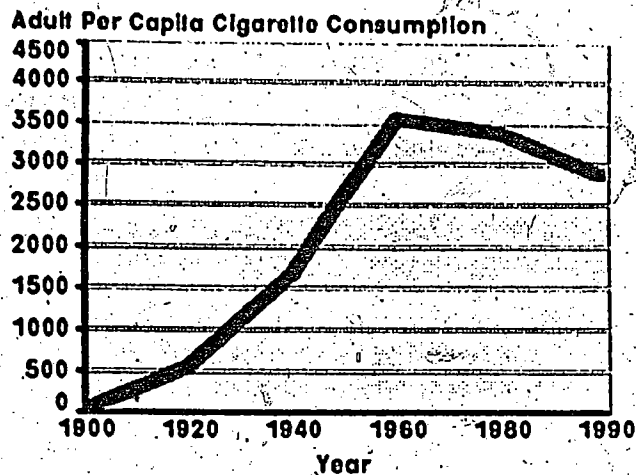


FIG. 4. U.S. adult per capita cigarette consumption.

I answer tobacco as much as bullets." Free coffee, cigarettes, and doughnuts were part of the scene in any canteen, either stateside or abroad. This practice continued during World War II; cigarettes were included with K-rations. Again, American generals touted cigarettes as a necessity for the fighting men. Like Pershing earlier, General Douglas MacArthur suggested using private money raised for the war effort to purchase cigarettes. He stated, "The entire amount should be used to buy American cigarettes which, of all personal comforts, are most difficult to obtain here." Tobacco was declared an essential crop by President Roosevelt. Deferments were given by draft boards to tobacco growers just like corn and wheat farmers. A glance at the cigarette consumption data graphically shows the effects of war (Fig. 4).

The health consequences of smoking were a part of Lucy Page Gaston's campaign, but scientific data came later. A landmark paper was published in 1950 by Midwestern surgeon Evarts Graham from Washington University in St. Louis, with data contributed from thoracic surgical colleagues across the nation. He reported on 684 cases of proven bronchogenic carcinoma and found almost that all of these patients had smoked more than one-half pack of cigarettes per day for 20 years. Only eight were nonsmokers.<sup>8</sup>

The medical profession began to pick up on these messages, but the public remained unaware. This changed dramatically in 1952. Roy Norr was editor of *Smoking and Health News*, a virtually unknown paper sold primarily in health food stores. His expose-style writing was described as usually "more sensational than illuminating." In October 1952, Norr published

an article in the *Christian Herald* entitled "Smokers are Getting Scared." DeWitt and Lila Wallace, the editors and publishers of the *Reader's Digest*, were interested in the anti-smoking crusade. You may recall that in those days their magazine carried no advertising, which they felt helped ensure their independence. Though scorned by intellectuals, the magazine had the largest circulation in the nation.

*Reader's Digest* picked up the Norr article, and it appeared heavily rewritten and with a new title in the December 1952 issue. "Cancer by the Carton," while just two pages in length, was the opening salvo in a barrage of articles in the lay press.<sup>9</sup> In 1954, the *New York Times* reprinted in full a comprehensive study of 187,766 men published by Dr. E. Cuyler Hammond of the American Cancer Society, which reported "a strong statistical correlation between heavy cigarette smoking and lung cancer."<sup>10</sup>

Another voice that crossed over from medical to lay literature was that of surgeon Alton Ochsner. His *Smoking and Cancer* was published in 1954, and *Smoking and Health* followed in 1959.<sup>11</sup> Both began with the stark statement, "Cigarettes cause cancer" and had a significant impact on growing public awareness.<sup>11</sup> Thereafter, cigarette sales would never be the same. Filter tips and king-size cigarettes were just part of the cigarette industry response.

The battle soon shifted to Washington. In 1961 the American Cancer Society, the American Public Health Association, the American Heart Association, and the National Tuberculosis Association petitioned President Kennedy for the establishment of a Presidential commission to study "the widespread implications of the tobacco problem." After many delays, the White House announced the formation of the Surgeon General's Advisory Committee on Smoking and Health. Surgeon General Luther Terry chaired the committee, which included representatives from many leading medical schools.

The Committee report, entitled *Smoking and Health*,<sup>12</sup> was issued on January 11, 1964. The report was lengthy, 387 pages, but the message was short and to the point. "Cigarette smoking is causally related to lung cancer in man . . . Cigarette smoking is a health hazard of sufficient importance in the United States to warrant appropriate remedial action."<sup>12</sup>

Immediate consequences included an order from the Surgeon General to end the free distribution of cigarettes in all hospitals under Public Health Service control. Played out over a much longer course of time was the result of the Federal Trade Commission's indication that it would proceed with steps to limit cigarette advertising. Starting on January 1, 1966, all cigarette packages had to carry a label stating:

TABLE 1. Cigarette Smoking and Aortic Graft Patency

Series/Yr.	No. of Grafts	Follow-up in Yrs.	% Patency	
			Nonsmokers	Smokers
Wray, 1971	100 (50)	1.5-3	100	69
Meyers, 1978	193	4	90	75
Provan, 1987	209	5	77	42

"Caution-Cigarette smoking may be hazardous to your health." Ironically, the package warning is now used by the cigarette industry to defend itself in court cases filed by families of lung cancer victims. Starting January 2, 1972, televised cigarette commercials were banned. Once again, even the January 2 date represented a compromise with the cigarette industry, which successfully lobbied to allow their January 1 football bowl game advertisements to be aired. This ban of televised cigarette commercials, however, carried a distinct down side in that it meant the end of free commercial anti-smoking messages, a modality clearly demonstrated to have been a powerful tool in the anti-smoking crusade.<sup>13</sup>

With this historic review as background, I will now look at cigarette smoking from my perspective as a vascular surgeon, focusing specifically on arterial occlusive disease, abdominal aortic aneurysms, and cerebrovascular disease.

Simply stated, smoking is the single greatest risk factor for peripheral arterial occlusive disease. Numerous studies document this fact. In a classic early (1960) study, Juergens et al.<sup>14</sup> reported on 520 nondiabetic patients with atherosclerosis obliterans of the lower extremities. In a 10-year follow-up, 11 per cent of those who continued to smoke lost their limbs, while none of those who stopped smoking required amputation.

Ninety per cent of patients with aortoiliac and 91 per cent of those with femoral popliteal disease are smokers.<sup>15</sup> The Framingham Study, which began in 1948, showed smoking to be more directly correlated with claudication than serum cholesterol, hypertension, diabetes, or left ventricular hypertrophy.<sup>16</sup> Cigarette smoking roughly doubles the risk of developing intermittent claudication.

TABLE 2. Cigarette Smoking and Infrainguinal Graft Patency

Series/Yr.	No. of Grafts	Follow-up in Yrs.	% Patency	
			Nonsmokers	Smokers
Meyers, 1978	124	2	90	60
Wiseman, 1989	157	1	84	62

TABLE 3. Components of Cigarette Smoke

Categories	Examples
Carcinogens	Nitrosamines
Cocarcinogens	Naphthalene
Carcinogen and toxin combinations	Acetaldehyde/phenol
Toxins	Nicotine
	Carbon Monoxide

Finally, and this is where a surgeon's intervention may play a role, stopping smoking at the time of surgery dramatically improves patency of arterial reconstructions. Multiple series where this holds true are summarized in Tables 1 and 2.<sup>17-20</sup>

Abdominal aortic aneurysm statistics are almost as dramatic. The 1983 Surgeon General's report demonstrated a two-to-three-times increased incidence of death from abdominal aortic aneurysm for smokers compared to nonsmokers.<sup>21</sup> Those who smoked two packs of cigarettes per day have an eight-fold greater prevalence of abdominal aortic aneurysm than nonsmokers.

In cerebrovascular disease, the role of smoking and stroke is only slightly less striking. The Framingham Study again showed that smoking was significantly and independently related to stroke.<sup>22</sup> This effect is directly related to the number of cigarettes smoked. Once again, as in the lower extremities, continued smoking after carotid endarterectomy may increase the risk of restenosis.<sup>23</sup>

Let me now focus on the mechanisms by which cigarette smoking affects peripheral vascular disease.<sup>24</sup> It must be emphasized that cigarette smoke is a complex mixture. Four basic components can be sorted out, however (Table 3). Although all of these components may have some effect on vascular endothelium, the critical players in atherogenesis are nicotine and carbon monoxide.

Nicotine affects blood vessels in three ways: cardiovascular, histologic, and biochemical changes. Increased catecholamine discharge results in an increase in heart rate and systolic blood pressure. Vasoconstriction predominates, and increased myocardial oxygen demand is the result.

The endothelial cell demonstrated multiple histologic changes from nicotine exposure. Endothelial cells desquamate more rapidly, light microscopy shows morphologic changes, and electron microscopy shows ultrastructure changes. Nicotine stimulates myointimal thickening after arterial injury.

Biochemical changes induced by nicotine include increased free fatty acid release and decreased

endothelial cell synthesis of prostacyclin, with platelet aggregation thereby increased.

Carbon monoxide makes up 4 per cent of cigarette smoke and combines in the blood to form carboxyhemoglobin. Carboxyhemoglobin in turn reduces myocardial oxygen delivery with negative inotropic effects, increased left ventricular end diastolic pressures, and decreased cardiac indices. Carboxyhemoglobin and carbon monoxide have deleterious effects on endothelial cells, with increased permeability and hypoxia of vessel walls.

In addition to the direct contributions of nicotine and carbon monoxide, multiple hematologic effects of cigarette smoke have been documented. These include, among others, an increase in hemoglobin concentration and hematocrit, an increase in aggregation and a decrease in survival of platelets, an increase in blood viscosity, an increase in fibrinogen, and a decrease in erythrocyte deformability. The combined hematological effect is obviously one of an increased tendency for thrombosis.

Last, cigarette smoke affects lipids. Multiple studies have been somewhat confusing, but in general there is a distinct trend in smokers toward an increase in total cholesterol and a decrease in HDL cholesterol.

How has this volume of compelling scientific evidence regarding the harmful effects of cigarettes changed physician attitudes over the years? Let me use the example of a Des Moines hospital, Iowa Methodist Medical Center, a 710-bed tertiary care teaching hospital. When my father, a now retired thoracic surgeon, became convinced of the cancer risk of cigarettes in the early 1950s, he, in conjunction with the new hospital administrator, campaigned for the removal of cigarette machines from the hospital stairwells where they had been placed by the fund raising auxiliary of the hospital. These ultimately successful efforts were condemned by the auxiliary leadership who felt physicians and administrators had no business interfering with what was their most lucrative source of funds. As of January 1, 1991, Iowa Methodist Medical Center declared its entire campus a smoke-free environment with no exceptions. Times do change.

As a young surgical resident at the University of California assigned to the Fort Miley Veterans Administration Hospital in San Francisco in 1968, I suggested to an American Legion auxiliary member that distribution of cigarettes on a vascular surgery ward seemed inappropriate. This earned a formal rebuke from the Veterans Administration chief administrative officer. Like father, like son.

But the battle goes on. Although direct television and radio advertising ceased in 1972, the tobacco

industry now spends \$420 million annually in the United States on magazine and newspaper advertising. A current trend uses underwriting of athletic and public events to replace direct television advertising. Events such as the Marlboro Grand Prix bring to mind an Irish proverb: "Truth may be good, but juxtaposition is better."

A review of a recent Philip Morris Companies, Inc. quarterly report shows just some of the strategies employed by tobacco companies. Exports of cigarettes to the Third World have now been joined by exploitation of the new freedoms in the Soviet Union. The Philip Morris report states: "Marlboro, the best selling cigarette in the world, is also the most popular international brand in the Soviet Union. The soviet authorities approached a number of tobacco companies around the world to help satisfy consumer demand. The country is estimated to represent the third largest cigarette market in the world, and its huge needs make Philip Morris uniquely qualified to take the lead in answering its call."<sup>25</sup> On another subject, the company touts its war effort in the Gulf: "Appeals from soldiers and one man's attempts to charge cigarettes for his entire infantry mortar section to his credit card prompted Philip Morris U.S.A. to send 10,000 cartons of Marlboros to the troops. Unfortunately, Pentagon rules forbid using military facilities to distribute or transport free cigarettes, so the armed forces will not allow further shipments. Individual persons, of course, can still send cigarettes by mail. Philip Morris has a long history of supporting the United States military."<sup>25</sup>

Progress has been made since the days of tobacco companies openly using physician's endorsements. Figures 5 through 8 are representative of advertisements that appeared in the *New York State Medical Journal* from 1938 to 1952.<sup>26</sup>

Physicians, individually and in groups, are speaking out more frequently and effectively against cigarettes. Dr. Alan Blum founded a group in 1977 called DOC, Doctors Ought to Care. This group effectively uses counter-advertising directed toward children and adolescents. The Iowa Medical Society successfully sponsored legislation this year directed against adolescent tobacco use. The new law requires tobacco vending machines to have lock-out devices to prevent access by persons under age 18 years, prohibits distribution of free samples within 500 feet of a school or facility primarily used by children, and prohibits purchase or use of tobacco by those under age 18 years.

Although stopping young people from smoking before they begin is critical, data are increasingly accumulating that support efforts directed at stopping smoking for long-term smokers. The 1990 report of the Surgeon General entitled *The Health Benefits of Smoking*

**PLEASE  
ASK  
US.....**

**YOU MAY** have questions... on the physiological effects of smoking... which we can answer. Please feel free to ask us.

Our research files contain exhaustive data from authoritative sources—from which we will be glad to quote whatever may bear upon your question.

If you have not already read the studies on the relative effects of cigarette smoke, may we suggest that you use the request blank below? And also that you try Philip Morris Cigarettes yourself.

If you WOULD LIKE COPIES of reports listed let us check those sections of the paper for you, and mail to PHILIP MORRIS & CO., 119 FURTH AVENUE, New York, N.Y. 10022, and we will be glad to send you a State Four, Medical, Cigarette.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

FIG. 5. New York State Journal of Medicine Advertisement, 1938.

**INTERESTED IN  
CIGARETTE ADVERTISING?**

Words, claims, clever advertising do sell plenty of products. But obviously they do not change the product itself.

That Philip Morris are less irritating to the nose and throat is not a claim. It is the result of a difference in manufacture, proved\* advantage over and over again.

But why not make your own tests? Why not try Philip Morris on your patients who smoke, and confirm the effects for yourself.

**PHILIP MORRIS**

Philip Morris & Co., Ltd., Inc.  
119 FURTH AVENUE, N. Y.

\*Laryngoscope, Feb. 1937, Vol. XLV, No. 2, 149-154  
Laryngoscope, Jan. 1937, Vol. XLV, No. 1, 19-20

TO PHYSICIANS WHO SMOKE A PIPE: We suggest an unusually fine new blend—Country Doctor Pipe Mixture. Made by the same process as used in the manufacture of Philip Morris Cigarettes.

FIG. 6. New York State Journal of Medicine Advertisement, 1942.

*Cessation* contains 611 pages addressing just those issues. People *are* stopping. Thirty-eight million United States residents have stopped smoking; that represents nearly half of all living adults who ever smoked.<sup>27</sup>

What can we conclude? First, smoking cessation at any age is beneficial. Second, physician advice is critical and more effective than suggestions from any other source. Finally, I propose that the surgeon with his or her unique type of contact with the patient has an exceptional opportunity to influence the future smoking habits of that patient. Let me adapt one of the tobacco industry's own favorite slogans: "We've come a long, baby." Let's keep going!

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**Not only...**

**LABORATORY TESTS ... which**

- showed extent of the rubber combanctive strength
- 2.7 from the number of
- Philip Morris Cigarettes

**But also...**

**CLINICAL TESTS ... which**

- when smokers
- Philip Morris
- every case

**...conclusively prove**

**PHILIP MORRIS CIGARETTES**  
to be definitely and measurably  
**LESS IRRITATING**

Philip Morris & Company, Ltd., Inc., 100 Park Avenue, New York

TO THE PHYSICIAN WHO SMOKE A PIPE: We suggest an unusually low tar brand of pipe tobacco. Made by the same process as used in the manufacture of Philip Morris Cigarettes.

FIG. 7. New York State Journal of Medicine Advertisement, 1945.

12. A report of the Surgeon General. Smoking and Health. Rockville, MD; U.S. Department of Health and Human Services, 1964.

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**Doctor, be your own judge... try this simple test**

When many claim... of cigarette... you, the... to make... the simple test.

Take a Philip Morris and any other cigarette

1. Light up this one first. Take a puff - get a good mouthful of smoke - and draw it for the smoke to come directly through your nose.
2. Now do exactly the same thing with the other cigarette.

Notice that Philip Morris is noticeably less irritating, absolutely milder.

**PHILIP MORRIS**  
Philip Morris & Co. Ltd., Inc., 100 Park Avenue, New York, U.S.A.

FIG. 8. New York State Journal of Medicine Advertisement, 1952.

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27. A report of the Surgeon General. The health benefits of smoking cessation. Rockville, MD; U.S. Department of Health and Human Services, 1990.