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THE ACCURACY OF THE FTC TAR AND NICOTINE CIGARETTE RATING SYSTEM

HEARING

BEFORE THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

NOVEMBER 13, 2007

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ONE HUNDRED TENTH CONGRESS

FIRST SESSION

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THE ACCURACY OF THE FTC TAR AND NICOTINE CIGARETTE RATING SYSTEM

TUESDAY, NOVEMBER 13, 2007

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Committee met, pursuant to notice, at 2:35 p.m. in room SR–253, Russell Senate Office Building, Hon. Frank R. Lautenberg, presiding.

OPENING STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM NEW JERSEY

Senator LAUTENBERG. Now, we shall call the meeting to order. OK.

Today's hearing is part of our oversight of the Federal Trade Commission's activities. We're going to look closely at the FTC's role in the regulation of cigarette marketing. We're going to focus on the tests that the FTC has permitted tobacco companies to use for decades to measure the tar and nicotine levels of its cigarettes. Smokers have long relied on these tar and nicotine ratings to determine which cigarettes to smoke. For example, cigarettes with a low tar FTC rating are marketed as "light" cigarettes, and, as we're going to learn from today's hearing, smokers believe that when they switch to a light cigarette they're turning to a safer alternative than a regular cigarette. But the National Cancer Institute and other studies show that switching to a light cigarette may not only be as bad as a regular cigarette, but often its worse for your health. I want to repeat that, that a light cigarette can often be more deadly than a regular cigarette. And addicted smokers are the victims of this deception.

Now, I, too, was a smoker. But, fortunately, my 10-year-old daughter convinced me to stop. One day when I lit a cigarette at home, she said, and I'll quote her, "Daddy, they told me at school that, if you smoke, that you get a black box in your throat, and I love you, and I don't want you to get a black box in your throat." And it took me a couple of days, and that was the end of smoking. And I know it's not easy to give it up. As I smoked in those years, I kept thinking about giving it up, and never quite made it.

The reality is that most smokers are addicted to a drug, a drug called nicotine. And that's what we're going to learn in this hearing, it's the effect of nicotine on the brain that renders the FTC rating method inaccurate. The FTC employs the use of what some have called the "smoking robot machine." And thanks to the Cen-

ters for Disease Control, we have a short video which I'd like to show you now.

Now, can the people sitting in the audience see this? It demonstrates the FTC Method and the smoking robot.

Now, when you look at these nonaddicted machines, you don't get an accurate picture as to what really is happening. The machine's smoking, and the machine's life cycle is not affected. But the smokers' are. The reality is that smokers don't smoke cigarettes like a machine; rather, our brains manipulate puffing patterns to make sure that a smoker takes in enough nicotine from every cigarette to soothe the addiction. And that's why many who switch from Marlboros to Marlboro Lights wind up getting more tar, because they're taking longer and deeper puffs to bring in the same amount of nicotine that they got from a standard Marlboro cigarette. And even the FTC has the knowledge that, in its testing method, that it doesn't work.

In fact, in May 2000, the FTC put out a consumer alert about their tar and nicotine ratings which said—I quote here—"Don't count on the numbers," and "cigarette tar and nicotine ratings can't predict the amount of tar and nicotine that you get." So, the FTC was saying, essentially, "Don't pay attention to our own system." The FTC should not allow, therefore, this rating system to continue if it cannot stand behind it. And big tobacco should not be able to hide behind the FTC Method to justify the claim that light and low-tar cigarettes are healthier.

In 2005, in this committee, I tried to fix this problem, and I brought an amendment to prohibit the tobacco companies from continuing to use the FTC Method to justify health claims about their cigarettes. My amendment lost on a party-line vote. And I'm hopeful that, in the wake of this hearing, that we can build momentum to finally tackle this problem seriously.

The issue of tobacco control is a critical issue for our country. Tobacco-related illnesses rob more than 400,000 Americans of their lives each and every year. And tobacco creates $89 billion in annual healthcare costs.

Now, just last week, the Centers for Disease Control reported that recent declines in smoking have stopped. Now, this is a disturbing development for America's public health. And, as many know, I have a long history of trying to write sensible laws to help control the damage caused by tobacco use.

Now, I wrote the law banning smoking on airplanes in 1987. That law changed our Nation's culture about secondhand smoke and helped usher in the smoke-free revolution that we're now seeing across the country. And I'm proud that my home state of New Jersey recently passed a statewide law banning smoking in restaurants, bars, and workplaces.

I also wrote the law, in 1994, that requires that all buildings that house federally funded programs for children maintain a smoke-free environment. And now, we have another urgent tobacco problem to fix.

So, I look forward to hearing the testimony from our witnesses today.

And I'm pleased to be sitting here with a colleague and an ally in this, the Vice Chairman of the Commerce Committee, Senator Stevens.

STATEMENT OF HON. TED STEVENS, U.S. SENATOR FROM ALASKA

Senator STEVENS. Thank you very much.

I was trying to remember who was the author of that bill on Federal buildings, you or me, but it's all right.

I do thank you for holding the hearing, and I think there is a lot that remains to be done in this area. The FTC has used the same rating system to measure tar, nicotine, and carbon monoxide yields for 40 years yet cigarette design has not remained the same during this period. Concerns have been expressed to us that consumers are being misled by the cigarette rating system that's currently in use as it relates to light and low-tar cigarettes. The test machine was not intended to imitate human smokers, yet that is how consumers are interpreting the test results. I look forward to hearing the witnesses today.

And, unfortunately, I have another meeting at 3:30, but I'm pleased you have held this hearing, Mr. Chairman.

Senator LAUTENBERG. Thanks very much.

Now, I want to welcome our witnesses, but I also want to point out that both Altria, formerly known as Philip Morris, and R.J. Reynolds were asked if they would testify today, and they both refused. The Committee's going to explore, nevertheless, what steps will be taken to gather information from these companies after this hearing.

And, with that, I welcome our first panel. We have Mr. William Kovacic, a Commissioner of the Federal Trade Commission; Dr. Cathy Backinger, the Acting Chief of the Tobacco Control Research Branch of the National Cancer Institute; and Dr. David Ashley, the Chief of the Division of Laboratory Sciences at the Centers for Disease Control and Prevention. And I thank you for joining us.

Mr. Kovacic, you may begin, please. And we ask you to hold your testimony to 5 minutes, if you will.

STATEMENT OF HON. WILLIAM E. KOVACIC, COMMISSIONER, FEDERAL TRADE COMMISSION

Mr. KOVACIC. Thank you, Vice Chairman Stevens and Senator Lautenberg, for the opportunity to testify about the Federal Trade Commission's work concerning tar and nicotine ratings for cigarettes.

The written statement that I submitted presents the views of the Commission itself, and my spoken remarks today present my own views, and not necessarily those of my colleagues.

The question of how to give consumers useful information about the health risks of smoking has commanded the FTC's attention for nearly a half century. It was the FTC's cigarette rule in 1964, which required cigarette companies to place health warnings on packages and advertisements, that helped spur the adoption of the Federal Cigarette Labeling and Advertising Act. In 1967, the FTC began a program to provide cigarette ratings for tar and nicotine. Testing was done under the Cambridge Filter Test Method which

is known in the United States as the FTC Method. The program sought to provide smokers seeking to switch to lower-tar cigarettes information based on a single-standard measurement.

For some time, the Commission has been concerned that the current test method may mislead individual consumers who rely on the ratings it produces to indicate the amount of tar and nicotine that they actually will get from their cigarettes. The current ratings tend to be relatively poor indicators of tar and nicotine exposure. Among other reasons, smokers of lower-rated cigarettes tend to take bigger, deeper, more frequent puffs, or otherwise alter their smoking behavior to obtain the dosage of nicotine they need.

Although the limits of the test methodology were recognized when the program began in 1967, they became a substantially greater concern since the 1990s, due to changes in modern cigarette design and a better understanding of the nature and effects of smoking behavior. These concerns led the Commission, in 1994, along with Congressman Waxman, to ask the National Cancer Institute to convene a conference to address cigarette testing issues.

The NCI convened the conference, and, in 1996, recommended that the cigarette testing system measure and publish information on the range of tar, nicotine, and carbon monoxide that most smokers would expect from the cigarettes they smoke.

In September 1997, the Commission requested public comments and proposed revisions to the test method that would add a second tier of testing to better approximate the range of tar and nicotine yields and make it more apparent to consumers that the amounts of tar and nicotine they get from any specific cigarette depends on how they smoke.

Around the same time, some public health officials warned that recently released studies raised serious questions about the basic assumption then underlying cigarette testing; namely, that cigarettes with lower machine-measured tar and nicotine ratings are less harmful than ones with higher ratings. An NCI report in 1997 suggested that the reduced tar levels of modern cigarettes might have less benefits than previously believed. Other studies reported that changes in smoking behavior and cigarette design appear to have resulted in an increase in a specific type of cancer that occurs deeper in the lung.

Citing these studies, public health agencies asked the FTC to postpone its proposed changes to the test method until a broader review of unresolved scientific issues surrounding the system could be addressed.

In November 2001, the NCI reported the results of a review of the epidemiological and other scientific evidence on the public health effects of low-tar cigarettes. The panel of scientific experts assembled for that inquiry concluded that the existing scientific evidence did not demonstrate a public health benefit to smokers who switched to low-tar or light cigarettes.

The 2001 NCI report also concluded that measurements of tar and nicotine, as measured by the FTC Method, did not offer meaningful information to consumers, and that there was an urgent need to develop new testing approaches. The Commission understands that this report represented, at least in part, the first step in an HHS response to a 1998 FTC request for assistance. When

it announced the release of this report, the NCI noted the FTC's previous request and indicated that it would work with other science-based agencies at HHS to determine how to change the testing method.

The FTC understands that representatives from agencies within HHS are continuing to explore these issues. In addition, the World Health Organization has assembled a panel of experts to address tobacco testing issues.

The FTC believes it is vital that there be an effective mechanism for implementing any recommended changes to the test method once these evaluations are completed. The Commission brings strong market-based expertise to its scrutiny of consumer protection matters, yet we lack the specialized scientific expertise needed to design and evaluate scientific test methods.

When we evaluate medical or other scientific issues, the Commission often relies on other government agencies and outside experts with more knowledge in relevant areas. In its 1999 July report to the Congress, pursuant to the Cigarette Labeling and Advertising Act, the Commission recommended that Congress consider giving authority over cigarette testing to one of the Federal Government's science-based public health agencies. The Commission renewed that recommendation in 2003 in testimony before Congress, and the Commission reiterates that recommendation again today.

I thank the Committee for the opportunity to address these issues, and I await your questions.

[The prepared statement of Mr. Kovacic follows:]

PREPARED STATEMENT OF HON. WILLIAM E. KOVACIC, COMMISSIONER, FEDERAL TRADE COMMISSION

Chairman Inouye, Vice Chairman Stevens, Senator Lautenberg, and Members of the Committee, I am William E. Kovacic, a Commissioner at the Federal Trade Commission ("FTC" or "Commission").[1] The Commission is pleased to have this opportunity to provide testimony at today's hearing. Today, I would like to discuss the FTC's responsibilities and activities in the area of tobacco advertising generally, and then turn more specifically to a discussion of cigarette testing and the promotion of cigarettes based on machine-measured tar and nicotine yields. The testimony discusses concerns the FTC has with the test method, and renews the Commission's previous recommendation that Congress consider giving authority over cigarette testing to one of the Federal Government's science-based public health agencies.

As the Nation's consumer protection agency, the FTC has a broad mandate, with diverse responsibilities such as the prosecution and prevention of fraud in the marketing of healthcare products, deceptive financial practices in the subprime mortgage and credit repair industries, identity theft, and technology risks to consumers such as spam and spyware. The FTC also has responsibility over the marketing and promotion of tobacco products, including cigarettes, smokeless tobacco, cigars, and new tobacco products. One of the most challenging issues concerning cigarette advertising and promotion is the topic of today's hearing: the advertising and promotion of cigarettes based on their tar and nicotine yields as measured by the test methodology commonly referred to in the United States as "the FTC Method," although, as discussed below, the FTC stopped testing according to this method in 1987.[2]

Cigarette testing under this test methodology began 40 years ago, in 1967, when the Commission approved use of the FTC Method for measuring the tar and nicotine

[1] The written statement presents the views of the Federal Trade Commission. My oral testimony and responses to questions reflect my views, and do not necessarily reflect the views of the Commission or any other Commissioner.

[2] *See infra* n. 15.

yields of cigarettes.[3] From the outset, cigarette testing under the FTC Method was intended to produce uniform, standardized data about the tar and nicotine yields of mainstream cigarette smoke, *not* to replicate actual human smoking. Because no known test could accurately replicate human smoking, the FTC believed that the most important objective was to ensure that cigarette companies presented tar and nicotine information to the public based on a standardized method. In 1967, most public health officials believed that reducing the amount of "tar" in a cigarette could reduce a smoker's risk of lung cancer; therefore, it was thought that giving consumers uniform and standardized information about the tar and nicotine yields of cigarettes would help smokers make informed decisions about the cigarettes they smoked.[4] In the intervening 40 years, cigarettes have changed markedly and scientific understanding of smoking behavior has improved. These changes have important implications for cigarette measurement.

The Commission's Responsibilities Over Tobacco Advertising and Promotion

The Commission's core responsibility over the advertising and promotion of cigarettes and other tobacco products arises from its law enforcement authority under Section 5 of the FTC Act, which prohibits "unfair or deceptive acts or practices in or affecting commerce."[5] The FTC's law enforcement activities involving cigarette advertising and promotion date back to the 1930s.[6] In 1962, the FTC's request for technical assistance from the U.S. Public Health Service was among the factors that led the then-Surgeon General to establish an advisory panel to undertake a comprehensive analysis of the data on smoking and health. The work of the advisory panel, in turn, led to the now-historic 1964 Report of the Surgeon General finding that cigarette smoking presented significant health risks. In that same year, the Commission issued a regulation requiring tobacco companies to include health warnings in cigarette advertisements and on packages.[7] The FTC's regulation was superseded in 1965, before it went into effect, by the Federal Cigarette Labeling and Advertising Act ("Cigarette Act"),[8] which required health warnings on cigarette packages.

The Commission also has used its Section 5 authority to prosecute a variety of unfair and deceptive cigarette advertising practices—including claims about tar and nicotine ratings for cigarettes. For example, in the early 1980s, the FTC filed a Federal district court lawsuit challenging claims made by Brown & Williamson Tobacco Corporation that its Barclay cigarettes had only 1 mg. of tar. The FTC had previously revoked the "1 mg. tar" rating after concluding that the FTC Method did not accurately measure Barclay's tar, nicotine, and carbon monoxide due to the cigarette's unique channel ventilation system. The court agreed with the FTC, and found that the "1 mg. tar" claim was deceptive.[9] Likewise, in 1995, the Commission approved a consent agreement with American Tobacco Company, settling charges over advertisements that allegedly misused the tar and nicotine ratings by representing that smokers would get less tar by smoking 10 packs of Carlton brand cigarettes (which were rated at 1 mg. tar per cigarette) than by smoking a single pack of certain other brands of cigarettes (which were rated at 10 mg. of tar).[10]

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[3] When the Commission approved the test methodology, it was called the Cambridge Filter Method. The Cambridge Filter Method is now commonly referred in the United States as "the FTC Method."

[4] When the test method was adopted, the public health community believed that "[t]he preponderance of scientific information strongly suggests that the lower the tar and nicotine content of cigarette smoke, the less harmful would be the effect." U.S. Dept. of Health and Human Services, *The Health Consequences of Smoking: The Changing Cigarette* 1 (1981) (quoting a 1966 Public Health Service statement).

[5] 15 U.S.C. § 45(a).

[6] *See, e.g., Julep Tobacco Co.,* 27 F.T.C. 1637 (1938) (stipulation prohibiting claims that Julep cigarettes helped counteract irritations due to heavy smoking and never made the throat dry or parched).

[7] *See* Trade Regulation Rule for the Prevention of Unfair or Deceptive Advertising and Labeling of Cigarettes in Relation to the Health Hazards of Smoking, 29 *Fed. Reg.* 8324, 8354 (1964).

[8] 15 U.S.C. § 1331 *et seq.* Although the Commission administers the Cigarette Act, the Department of Justice enforces it.

[9] *FTC* v. *Brown & Williamson Tobacco Corp.,* 580 F. Supp. 981 (D.D.C. 1983), aff'd. in part, remanded in part, 778 F.2d 35 (D.C. Cir. 1985).

[10] *The American Tobacco Co.,* 119 F.T.C. 3 (1995). In another example of a Commission action involving unfair and deceptive cigarette advertising practices, in 1997, the Commission issued a complaint against the R.J. Reynolds Tobacco Co. alleging that the company's Joe Camel advertising campaign caused or was likely to cause many young people to begin or continue to smoke, thereby exposing them to significant health risks. *R.J. Reynolds Tobacco Co.,* 127 F.T.C. 49 (1999). The Commission's complaint was issued on May 28, 1997. On January 26, 1999, the Commission dismissed the complaint without prejudice because the relief sought had been

In addition to law enforcement actions, the Commission administers the Cigarette Act and administers and enforces the Comprehensive Smokeless Tobacco Health Education Act ("Smokeless Tobacco Act").[11] The Cigarette Act instructs the FTC to take certain steps to implement the mandated Surgeon General's health warnings. The Smokeless Tobacco Act directs the FTC to promulgate regulations governing the health warnings on packaging and advertising for smokeless tobacco products. The Commission's regulations specify the format, placement, and rotation of the warnings, and require companies to submit plans setting forth their rotation schedules to the FTC for approval.[12] In addition, the FTC enforces the ban in the Smokeless Tobacco Act on broadcasting smokeless tobacco advertisements on radio and television.

The Commission also publishes periodic reports on the advertising and promotion activities in the cigarette and smokeless tobacco industries.[13] Those reports provide information on sales and on various categories of advertising and marketing expenditures. The Commission issued its first report for cigarettes in 1967, and on the smokeless tobacco industry in 1987. The Commission also published periodic reports showing the tar, nicotine, and carbon monoxide yields of various cigarette brands from 1967 through 2000.[14] In light of concerns over the test method used to measure these yields, which are discussed later in this statement, these reports have not been published since 2000 (reporting on 1998 data). But the FTC continues to collect this information, and it is available to researchers on the FTC's website.

Finally, testing for the tar, nicotine, and carbon monoxide yields of cigarettes is conducted by the cigarette industry under the test methodology approved by the FTC in 1967.[15] Cigarette companies have promoted their cigarettes based on ratings generated by this test methodology, and have adopted descriptors, such as "light" and "low," to characterize cigarettes that have tar ratings of 15 mg. or less.[16]

The "FTC Test Method" and Its Limitations

Cigarette ratings for tar, nicotine, and carbon monoxide are determined by machine testing conducted in accordance with the Cambridge Filter test method, commonly known in the U.S. as "the FTC Method."[17] The FTC Method determines the relative yield of individual cigarettes by "smoking" them in a standardized fashion, according to a pre-determined protocol, on a machine. The machine is calibrated to take one puff of 2-second duration and 35 ml volume every minute. Cigarettes are smoked to a specified length, and the ratings are then calculated. In 1967, when it began, the intent of the tar and nicotine testing program was to provide smokers seeking to switch to lower tar cigarettes information based on a single, standardized measurement with which to choose among then-existing brands.

Over the past 40 years that the current system has been in place, there have been dramatic decreases in the machine-measured tar and nicotine yields of cigarettes. In 1968, for example, only 2 percent of all cigarettes had machine-measured yields

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achieved through, *inter alia,* the master settlement between the major tobacco companies and the Attorneys General for 46 states.

[11] 15 U.S.C. § 4401 *et seq.*

[12] 16 C.F.R. Part 307.

[13] In addition, the Commission issued a report on the advertising and promotion activities in the cigar industry in 1999. *Federal Trade Commission Report to Congress, Report on Cigar Sales, Advertising, and Promotion* (1999).

[14] Until 1981, the Reports only provided information about the tar and nicotine yields. In 1981, the test methodology was changed to include testing for carbon monoxide yields, and the Commission subsequently began reporting those yields in addition to tar and nicotine.

[15] In 1967, the Commission opened its own testing laboratory to analyze the tar and nicotine yields of cigarettes. In 1981, the Commission laboratory began to analyze the carbon monoxide yields as well. The Commission operated this laboratory until April 1987, when it decided to close it because, *inter alia*, significant expenditures were needed to update and continue the laboratory, and the same information was available from the industry. *See* Prepared Statement of the Federal Trade Commission on Cigarette Tar and Nicotine Testing Before the Subcommittee on Transportation, Tourism, and Hazardous Materials, U.S. House of Representatives (May 7, 1987). Since the FTC laboratory closed, the Tobacco Industry Testing Laboratory conducts the testing and provides the data to the individual cigarette companies; the Commission obtains the data from the cigarette companies pursuant to compulsory process.

[16] These terms are not defined by the FTC or any other government agency. The industry, however, has generally adopted them. The term "low" tar generally refers to cigarettes currently rated as 15 mg. tar or less and "ultra low" to those rated 6 mg. or less. The industry uses the term "full flavor" to describe cigarettes with tar ratings above 15 mg. The terms "light" and "ultra-light" are used interchangeably with "low" tar and "ultra low" tar, respectively.

[17] Europe and many other countries have adopted a similar machine-based test method established by the International Organization for Standardization. In those countries, the test method is referred to as the "ISO Method."

of 15 mg. or less. Today, over 83.5 percent of all cigarettes sold have machine-measured yields of 15 mg. or less.

Despite these dramatic decreases in machine-measured yields, the Commission has been concerned for some time that the current test method may be misleading to individual consumers who rely on the ratings it produces as indicators of the amount of tar and nicotine they actually will get from their cigarettes. In fact, the current ratings tend to be relatively poor predictors of tar and nicotine exposure. This appears to be primarily due to compensation—or the tendency of smokers of lower rated cigarettes to take bigger, deeper, or more frequent puffs, or otherwise alter their smoking behavior in order to obtain the dosage of nicotine they need. Such variations in the way people smoke can have significant effects on the amount of tar, nicotine, and carbon monoxide they get from any particular cigarette. Smokers may incorrectly believe, for example, that they will get three times as much tar from a 15 mg. tar cigarette as from a 5 mg. tar cigarette. In fact, if compensation is sufficiently great, it is possible for smokers to get as much tar and nicotine from relatively low rated cigarettes as from higher rated cigarettes. Although the limitations in the test methodology were recognized when the testing program began in 1967, they became a substantially greater concern by the 1990s as a result of changes in modern cigarette design and a better understanding of the nature and effects of compensatory smoking behavior.

In light of these concerns, in 1994, the Commission, along with Congressman Henry Waxman, asked the National Cancer Institute ("NCI") to convene a consensus conference to address cigarette testing issues. That conference took place in December 1994, and the NCI issued its Report of the conference in October 1996.[18] The NCI Report recommended, among other things, that the cigarette testing system measure and publish information on the range of tar, nicotine, and carbon monoxide that most smokers should expect from the cigarettes they smoke. Accordingly, in September 1997, the Commission requested public comments on proposed revisions to the test method that would add a second tier of testing—using more rigorous smoking conditions—to better approximate a range of tar and nicotine yields and make it more apparent to consumers that the amount of tar and nicotine they get from any specific cigarette depends on how they smoke it.

Around this same time, some public health officials expressed concerns that recently released studies raised serious questions about the basic assumption then underlying cigarette testing: that cigarettes with lower machine-measured tar and nicotine ratings are less harmful than ones with higher ratings. For example, in 1997, the NCI issued a Report noting that the apparent mortality risk among current smokers had risen in the last forty to fifty years, even though machine-measured tar and nicotine yields had fallen dramatically during the same period.[19] In attempting to understand this phenomenon, the authors of the NCI Report suggested that the increased mortality risk might be due to increases in current smokers' lifetime exposure to cigarette smoke, or that the reduced tar levels of modern cigarettes might have less benefits than previously believed. In addition to the NCI Report, a number of other studies reported that changes in smoking behavior and cigarette design appeared to have resulted in an increase in a specific type of cancer that occurs deeper in the lung than the type of lung cancer that was previously associated with smoking.[20]

Citing these studies, public health agencies asked the Commission to postpone its proposed modifications to the test method until a broader review of unresolved scientific issues surrounding the system could be addressed. The Commission responded to these comments, in 1998, by formally requesting that the Department of Health and Human Services ("HHS") conduct a review of the FTC's cigarette test method.[21] In particular, the Commission asked HHS to provide recommendations as to whether the testing system should be continued, and if it should be continued,

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[18] *Smoking and Tobacco Control Monograph 7: The FTC Cigarette Test Method for Determining Tar, Nicotine, and Carbon Monoxide Yields of U.S. Cigarettes: Report of the NCI Expert Committee,* National Institutes of Health, National Cancer Institute (1996).

[19] *Smoking and Tobacco Control Monograph 8: Changes in Cigarette-Related Disease Risk and Their Implications for Prevention and Control,* National Institutes of Health, National Cancer Institute (1997).

[20] *See* Thun, M.J., *et al.,* "Cigarette Smoking and Changes in the Histopathology of Lung Cancer," 89 *J. of the Nat'l Cancer Inst.* 1580 (1997); Ernster, V.I., "The Epidemiology of Lung Cancer in Women," 4 *Annals of Epidemiology* 102 (1994); Levi, F.S., *et al.,* "Lung Carcinoma Trends by Histologic Type in Vaud and Neuchatel, Switzerland, 1974–1994," 79 *Cancer* 906 (1997).

[21] Letter from Donald S. Clark, Secretary, Federal Trade Commission to the Honorable Donna E. Shalala, Secretary, Department of Health and Human Services (Nov. 19, 1998).

what specific changes should be made in order to correct the limitations previously identified by the NCI, an agency within HHS, and other public health officials.

In November 2001, the NCI published a Report presenting the results of a review of the epidemiological and other scientific evidence on the public health effects of low-tar cigarettes.[22] As noted in Dr. Backinger's testimony prepared for today's hearing, this NCI Report concluded that "there is no convincing evidence that changes in cigarette design . . . have resulted in an important decrease in the disease burden caused by cigarette use."[23] The NCI Report also concluded that "[v]ariations in the tar and nicotine delivery that result from the known compensatory alterations in smoking behaviors make the current U.S. cigarette tar and nicotine yields as measured by the FTC Method not useful to the smoker either for understanding how much tar and nicotine he or she is likely to inhale from smoking a given cigarette or for comparing the tar and nicotine intake that is likely to result from smoking different brands of cigarettes."[24]

The Commission understands that this Report represented, at least in part, the first step in the HHS response to the FTC's 1998 request for assistance. When it announced the release of this Report, the NCI noted the FTC's previous request, and indicated that it would work with its sister science-based agencies at HHS to determine what changes needed to be made to the testing method.[25]

The FTC understands that representatives from agencies within HHS are continuing to explore these issues. In addition, the Commission understands that an expert panel has been assembled by the World Health Organization to address tobacco testing issues and to make recommendations concerning such testing.

The Commission believes that it is vital that there be an effective mechanism for implementing any recommended changes to the test method once the evaluations are completed. Although the Commission brings a strong, market-based expertise to its scrutiny of consumer protection matters, it does not have the specialized scientific expertise needed to design and evaluate scientific test methodologies. Indeed, when evaluating medical or other scientific issues, the Commission often relies on other government agencies and outside experts with more knowledge in the relevant areas. Therefore, in its July 1999 "Report to Congress for 1997, Pursuant to the Cigarette Labeling and Advertising Act," the Commission recommended that Congress consider giving authority over cigarette testing to one of the Federal Government's science-based public health agencies. The Commission renewed that recommendation in 2003 in testimony before Congress,[26] and the Commission reiterates that recommendation again today.

In conclusion, the FTC thanks the Committee for the opportunity to present testimony on this important topic.

Senator LAUTENBERG. Thank you very much.

Ms. Backinger?

Dr. BACKINGER. Yes.

Senator LAUTENBERG. We invite you to give your testimony, please.

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[22] *Smoking and Tobacco Control Monograph 13: Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine,* National Institutes of Health, National Cancer Institute (2001).

[23] Statement of Cathy Backinger, M.D., "Research Findings Concerning So-Called Low-Tar or 'Light' Cigarettes," Testimony Before the Committee on Science, Commerce, and Transportation, U.S. Senate (Nov. 13, 2007). *See also Smoking and Tobacco Control Monograph 13: Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine,* National Institutes of Health, National Cancer Institute, at 146.

[24] *Smoking and Tobacco Control Monograph 13: Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine,* National Institutes of Health, National Cancer Institute, at 34.

[25] National Cancer Institute, "Low-Tar Cigarette: Evidence Does Not Indicate a Benefit to Public Health," *News from the NCI* (Nov. 27, 2001).

[26] Prepared Statement of the Federal Trade Commission Before the Committee on Energy and Commerce, Subcommittee on Commerce, Trade, and Consumer Protection, U.S. House of Representatives (June 3, 2003); Prepared Statement of the Federal Trade Commission Before the Committee on Government Reform, U.S. House of Representatives (June 3, 2003).

STATEMENT OF CATHY L. BACKINGER, PH.D., ACTING CHIEF, TOBACCO CONTROL RESEARCH BRANCH, NATIONAL CANCER INSTITUTE, NATIONAL INSTITUTES OF HEALTH, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Dr. BACKINGER. Senator Stevens and Senator Lautenberg, thank you for the opportunity today to testify on the National Cancer Institute's research findings regarding the disease risk of so-called low-tar or "light" cigarettes.

I am Dr. Cathy Backinger, Acting Chief of the National Cancer Institute's Tobacco Control Research Branch.

As is described more fully in my written testimony, there is a substantial long-standing body of evidence demonstrating that "light" or low-tar cigarettes do not reduce smokers' exposure to hazardous compounds or their risk of disease. Moreover, descriptions such as "light," low tar, "ultra light," and others, are aimed at conveying to consumers what NCI Monograph 13 termed "the illusion of risk reduction."

Additionally, the Federal Trade Commission test method does not offer smokers meaningful information on the amount of tar and nicotine they will receive from a cigarette or on the relative amounts of tar and nicotine exposure they are likely to receive from smoking different brands of cigarettes.

Cigarette manufacturers have made changes to cigarettes over the last 50 years in response to concerns that the growing body of evidence that smoking causes disease would motivate smokers to quit. In the 1950s, manufacturers began the widespread promotion of filtered cigarettes. And in early 1970s, manufacturers introduced and heavily marketed new low-tar cigarette brands. Many of the advertisements made implicit health claims so as to reassure smokers who were concerned about their health risks.

Over time, the market share for low-tar brands increased dramatically. In 1967, these products had only 2 percent of the market share. In 2005, these products held 83.5 percent of the market share.

By the early 1980s, however, scientific studies had begun to show that when smokers switched to low-tar cigarettes, they changed the way they smoked by smoking greater numbers of cigarettes, increasing their depth of inhalation, taking more frequent and/or larger puffs, as well as holding smoke in their lungs longer. Additionally, cigarette design features allowed smokers to vary the amount of smoke they inhaled. Reflecting this knowledge, the 1981 Surgeon General's Report concluded that "the benefits [of smoking low-tar cigarettes] are minimal in comparison with giving up cigarettes entirely." In short, more than 25 years ago, the Surgeon General warned that smoking low-tar cigarettes is not a substitute for quitting.

NCI's Monograph 7, published in 1996, considered the relationship between the FTC test method and actual human smoking behavior, as well as consumer perceptions of tar and nicotine ratings. Among the major conclusions of the monograph were:

One, smokers who switched to lower-tar and nicotine cigarettes frequently changed their smoking behavior, which may negate potential health benefits;

Two, brand names and brand classifications, such as "light" and "ultra light," represent health claims and should be regulated and accompanied in fair balance with an appropriate disclaimer; and

Three, the available data suggest that smokers misunderstand the FTC test data.

NCI's Monograph 13, published in 2001, reviewed and synthesized a vast amount of data, ranging from laboratory to population studies. Its most important finding is that "there is no convincing evidence that changes in cigarette design . . . have resulted in an important decrease in the disease burden caused by cigarette use." The monograph also found that "advertisements of filtered and low-tar cigarettes were intended to reassure smokers [who were worried about the health risks of smoking] and were meant to prevent smokers from quitting based on those concerns;" additionally, that "internal tobacco company documents demonstrate that cigarette manufacturers recognize the inherent deception of advertising that offer cigarettes as light or ultra light or as having the lowest tar and nicotine yields."

In summary, while cigarettes have changed over the last 50 years, the disease risks have not. Cigarette manufacturers have long understood that consumers would respond to the widespread dissemination of the grave health risks of smoking by quitting. Manufacturers work to reassure health conscious smokers by marketing filtered and low-tar cigarettes and heavily advertising these products as ways to reduce the risk of smoking. Smokers erroneously saw these products as viable alternatives to quitting, and, as a result, many more smokers continue to smoke who might otherwise have quit.

Thank you for the opportunity to appear before the Committee. I'm happy to answer any questions.

Thank you.

[The prepared statement of Dr. Backinger follows:]

PREPARED STATEMENT OF CATHY L. BACKINGER, PH.D., ACTING CHIEF, TOBACCO CONTROL RESEARCH BRANCH, NATIONAL CANCER INSTITUTE, NATIONAL INSTITUTES OF HEALTH, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Mr. Chairman, and members of the Subcommittee, thank you for the opportunity to testify today on the research findings of the National Cancer Institute (NCI), part of the National Institutes of Health (NIH), an agency of the Department of Health and Human Services (HHS), regarding the disease risk of so called low-tar or "light" cigarettes, and the challenges of conveying accurate information to smokers about the levels of tar, nicotine, and other hazardous chemicals in cigarette smoke. I am Dr. Cathy Backinger, Acting Chief of the National Cancer Institute's Tobacco Control Research Branch. The Branch's mission is to lead and collaborate on tobacco control and prevention research, and to disseminate evidence-based findings to prevent, treat, and control tobacco use. We envision a world free of tobacco use and tobacco-related cancers.

I would like to begin by stating the NCI's goals regarding cigarette smoking, the cause of an estimated 438,000 U.S. deaths annually and about one-third of all deaths from cancer. NCI supports, conducts, and disseminates research to prevent youth from ever starting to use tobacco products, to assist youth and adults who smoke in quitting, and to protect nonsmokers from exposure to secondhand smoke, a serious cause of disease and death in its own right.

As I will describe, there is a substantial, longstanding body of evidence demonstrating that "light" and low-tar cigarettes do not reduce smokers' exposure to hazardous compounds or their risk for disease. Moreover, descriptors such as "light," low-tar, "ultra light," and others, are aimed at conveying to consumers what NCI

Monograph 13 termed "the illusion of risk reduction."[1] Not surprisingly, research has demonstrated that these terms are interpreted by many smokers to mean reduced risk. Finally, measurements of tar and nicotine yields using the Federal Trade Commission (FTC) test method do not offer smokers meaningful information on the amount of tar and nicotine they will receive from a cigarette, or on the relative amounts of tar and nicotine exposure they are likely to receive from smoking different brands of cigarettes.[2]

Cigarette manufacturers have made changes to cigarettes over the last 50 years, largely in response to concerns that the growing body of evidence that smoking causes disease would motivate smokers to quit. In the 1950s, the major manufacturers began widespread promotion of filtered cigarettes; advertisements for these cigarettes depicted filters as a technology to remove the harmful elements of smoke.[3] By 1960, filtered cigarettes had become the dominant product on the market. In the early 1970s, manufacturers introduced new low-tar cigarette brands; by 1997, half of all cigarette advertising dollars were dedicated to low-tar products. Many of the advertisements made health claims, most implicitly, so as to reassure smokers who were concerned about their health risks. Over time, the market share for these brands increased dramatically. In 1967, low-tar cigarettes[4] constituted 2.0 percent of the market. By 2005, these products held 83.5 percent of market share.[5]

By the early 1980s, however, scientific studies had begun to show that when smokers switched to low-tar cigarettes, they changed the way they smoked, by smoking greater numbers of cigarettes, increasing their depth of inhalation, taking more frequent and/or larger puffs, as well as holding smoke in their lungs longer. Additionally, cigarette design features allowed smokers to vary the amount of smoke they inhaled, such as by covering ventilation holes on the filter with their fingers or lips. Based on this emerging evidence, the 1981 Surgeon General's report, *The Changing Cigarette,* concluded that, "the benefits [of smoking low-tar cigarettes] are minimal in comparison with giving up cigarettes entirely," and, "the tar and nicotine yields obtained by present testing methods do not correspond to the dosages that the individual smokers receive: in some cases they may seriously underestimate these dosages."[6] In short, more than 25 years ago, the Surgeon General warned that smoking low-tar cigarettes was no substitute for quitting, and raised serious questions about the FTC test method.

Our understanding of why smokers compensate when smoking "light" cigarettes was enhanced significantly by the 1988 Surgeon General's report, *The Health Consequences of Smoking: Nicotine Addiction.* The major conclusions of this volume were that: (1) cigarettes and other forms of tobacco are addicting; (2) nicotine is the drug in tobacco that causes addiction; and (3) the pharmacologic and behavioral processes that determine tobacco addiction are similar to those that determine addiction to drugs such as heroin and cocaine. In retrospect, public health authorities did not fully understand that when smokers switched to a cigarette with lower machine measured tar and nicotine content they would change the way they smoked in order to preserve their daily intake of nicotine. This was understood much earlier however, by some cigarette manufacturers, as demonstrated by their internal documents.

Tar and nicotine yields have historically been measured by a standardized machine testing regimen—the FTC test method—also known internationally as the ISO (for International Organization for Standardisation) machine-smoking method. This method, adopted in 1967, determines the yield of a cigarette by smoking it on a machine, in a standardized fashion, according to a predetermined protocol. The smoking machine is calibrated to take one puff of 2-second duration and 35 ml volume every minute; cigarettes are smoked to a butt length of 23 mm or to the length of the overwrap plus 3 mm, whichever is longer. These parameters were determined by a U.S. Department of Agriculture tobacco chemist so as to constitute an average of his observations of human smoking behavior. The FTC test method provided a uniform analytical procedure that could be replicated in different laboratories simultaneously and in the same laboratory over time.

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[1] National Cancer Institute, Smoking and Tobacco Control Monograph 13, *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine,* October 2001, page 5.

[2] Monograph 13, page 10.

[3] U.S. Department of Health and Human Services, *Reducing the Health Consequences of Smoking: 25 Years of Progress. A Report of the Surgeon General,* 1989, page 664.

[4] Low-tar cigarettes contain less than or equal to 15 mg of tar per cigarette.

[5] *Federal Trade Commission Cigarette Report for 2004 and 2005,* issued 2007 (*http://www.ftc.gov/reports/tobacco/2007cigarette2004-2005.pdf*).

[6] U.S. Department of Health and Human Services, *The Health Consequences of Smoking: The Changing Cigarette. A Report of the Surgeon General,* 1981, page vi.

The FTC long recognized that the machine testing did not replicate human smoking because, "No two human smokers smoke in the same way," and "No individual smoker always smokes in the same fashion."[7] Instead, the test was seen as a way for consumers to make valid comparisons between different brands of cigarettes. "Thus, if the consumer smoked each different cigarette [brand] the same way, he would inhale 'tar' and nicotine in amounts proportional to the relative values of the FTC figures."[8] However, the standardized machine measurements assumed that smokers would not engage in "compensatory behaviors" to control their intake of nicotine.

In 1996, NCI's Smoking and Tobacco Control Monograph Number 7, *The FTC Cigarette Test Method for Determining Tar, Nicotine, and Carbon Monoxide Yields of U.S. Cigarettes: Report of the NCI Expert Committee,* compiled evidence available at the time on the FTC test method, its relation to actual human smoking behavior, and consumer perceptions of tar and nicotine ratings. Among the major conclusions of the monograph were: (1) Actual human smoking behavior is characterized by wide variations in smoking patterns, which result in wide variations in tar and nicotine exposure. Smokers who switch to lower tar and nicotine cigarettes frequently change their smoking behavior, which may negate potential health benefits; (2) Brand names and brand classifications such as "light" and "ultra light" represent health claims and should be regulated and accompanied, in fair balance, with an appropriate disclaimer; and (3) The available data suggest that smokers misunderstand the FTC test data. This underscores the need for ongoing and extensive public education efforts.

Lastly, in 2001, NCI's Smoking and Tobacco Control Monograph Number 13, *Risks Associated with Smoking Cigarettes with Low Tar Machine-Measured Yields of Tar and Nicotine,* reviewed and synthesized what was by that time a vast amount of data from epidemiology, chemistry, toxicology, laboratory studies of smoking behavior, studies of risk perception and advertising, studies of product design, as well as previously confidential tobacco industry documents. The Monograph's most important finding is that "there is no convincing evidence that changes in cigarette design . . . have resulted in an important decrease in the disease burden caused by cigarette use."[9] That is, smokers who switch to low-tar cigarettes do not reduce their risk of disease; the only proven way to reduce the disease risks of smoking is to quit. The report also found that cigarette marketing and advertising for "filtered and low tar cigarettes were intended to reassure smokers (who were worried about the health risks of smoking) and were meant to prevent smokers from quitting based on those concerns," and that, "internal tobacco company documents demonstrate that the cigarette manufacturers recognized the inherent deception of advertising that offered cigarettes as "light" or "ultra light," or as having the lowest tar and nicotine yields."[10] The major conclusions of Monograph 13 are the following:

1. Epidemiological and other scientific evidence, including patterns of mortality from smoking-caused diseases, does not indicate a benefit to public health from changes in cigarette design and manufacturing over the last fifty years.

2. Widespread adoption of lower yield cigarettes in the United States has not prevented the sustained increase in lung cancer among older smokers.

3. Many smokers switch to lower yield cigarettes out of concern for their health, believing these cigarettes to be less risky or to be a step toward quitting. Advertising and marketing of lower yield cigarettes may promote initiation and impede cessation, more important determinants of smoking-related diseases.

4. Measurements of tar and nicotine yields using the FTC Method do not offer smokers meaningful information on the amount of tar and nicotine they will receive from a cigarette. The measurements also do not offer meaningful information on the relative amounts of tar and nicotine exposure likely to be received from smoking different brands of cigarettes.

The conclusion of Monograph 13 with regard to low tar cigarettes was reiterated by the 2004 Surgeon General's report, *The Health Consequences of Smoking,* the most comprehensive review of the evidence on smoking and health since the 1964 Surgeon General's report. This report stated as one of its four major conclusions

[7] National Cancer Institute, Smoking and Tobacco Control Monograph 7, *The FTC Cigarette Test Method for Determining Tar, Nicotine, and Carbon Monoxide Yields of U.S. Cigarettes: Report of the NCI Expert Committee,* August 1996, page 2.

[8] Monograph 7, page 4, quoting 1978 *Federal Register*, p. 11856.

[9] Monograph 13, page 146.

[10] Monograph 13, page 233.

that, "Smoking cigarettes with lower machine-measured yields of tar and nicotine provides no clear benefit to health."[11]

In summary, while cigarettes have changed over the last 50 years, the disease risks have not. Cigarette manufacturers have long understood that consumers would respond to the widespread dissemination of the grave health risks of smoking by quitting. Manufacturers worked to reassure "health conscious" smokers by marketing filtered and low-tar cigarettes, and heavily advertising these products as ways to reduce the risk of smoking. Smokers erroneously saw these products as viable alternatives to quitting, and as a result, many more smokers continued to smoke who might otherwise have quit. The marketing and advertising of low-tar cigarettes and manufacturers' use of the FTC test method data continues today.

A new generation of products is now being marketed by the tobacco industry with advertisements suggesting that they deliver lower amounts of toxic or addictive agents. For example, one such advertisement says, "all of the taste . . . less of the toxins." These products—sometimes referred to as potential reduced-exposure tobacco products, or "PREPs"—are highly engineered products which utilize new technologies to try to reduce certain harmful constituents, such as carcinogens (cancer causing agents) from tobacco smoke. To date, however, the scientific evidence is insufficient to evaluate whether these new products actually reduce the users' exposure or risk for tobacco-related diseases. The 2001 Institute of Medicine report *Clearing the Smoke* concluded that currently-available data does not allow for drawing meaningful differences in toxicity or harm between tobacco products and that a structure for regulatory oversight would be essential to any scientific assessment of claims for reduced harm.

There is a need for independent, objective, scientific research to provide guidance to the public about the health effects of different tobacco products. In order to address this research gap, NCI has introduced several new initiatives, including:

- A Program Announcement titled, "Testing Tobacco Products Promoted to Reduce Harm," which aims to stimulate multidisciplinary research on the characteristics of different tobacco products, methods for measuring users' exposure to toxic constituents, and the impact of manufacturers' claims on smokers' perceptions of risk. Currently funded grants under this Program Announcement include projects studying:
  - The impact of low ignition propensity ("fire-safe") cigarettes (Roswell Park Cancer Institute).
  - Mutagenicity of tobacco smoke in human cell co-cultures (New York University).
  - Clinical models for evaluating PREPs for tobacco users (Virginia Commonwealth University).
  - Laboratory based evaluation of potential reduced exposure products (Georgetown University).
  - Smoking topography and harm exposure in a new PREP (University of Pennsylvania).
- A 5-year Research and Development contract with the Lombardi Cancer Center at Georgetown University to support the advancement of laboratory methods for tobacco product testing, taking into account human behavior. Once developed, these methods could be utilized to assess the potential for new products to reduce exposure in the laboratory and in human clinical trials and to assist in evaluating the potential impact of product design changes on individuals and the population as a whole.
- Support of the University of Minnesota Transdisciplinary Tobacco Use Research Center (TTURC), which is conducting research on ways to reduce smokers' exposure to tobacco smoke and its constituents.
- Support of the Roswell Park Cancer Institute TTURC, which is studying how changes in cigarette design alter smokers' actual exposures and their perceptions of the health risks of smoking. Their ongoing multi-country survey also collects information on smokers' perceptions of "light" and "ultra light" cigarettes.
- NCI is utilizing two of its ongoing national surveys—the Health Information National Trends Survey and the Tobacco Use Supplement to the Current Popu-

[11] U.S. Department of Health and Human Services, *The Health Consequences of Smoking: A Report of the Surgeon General,* 2004, page 25.

lation Survey—to collect data on tobacco use and health risk perceptions related to new PREPs and other tobacco products.

- Collaboration with research partners, including other NIH Institutes and Centers, HHS's Centers for Disease Control and Prevention (CDC), and the World Health Organization (WHO), to identify research priorities and develop expertise related to tobacco products. NCI scientists are currently active members of the WHO Study Group on Tobacco Product Regulation and the Tobacco Laboratory Network, which aim to develop guidance on tobacco product testing.

Research also suggests that there is substantial risk that smokers over-interpret reduced risk claims made for modified tobacco products. Exposure reduction messages associated with these products appeal to smokers who are contemplating quitting.[12] Therefore, marketing of these products with messages that imply reduced exposure or harm may undermine youth prevention and adult cessation, which could result in an overall increase in harm to the population.

There is an ongoing need to ensure that consumers receive accurate information about the health risks of smoking. The use of misleading descriptors like "light" and "mild" and similar terms have been banned in 43 countries, including Canada, Brazil, and the 27 countries of the European Union.

Tobacco smoke is extremely complex, containing thousands (over 4,800) of constituents including at least 69 known carcinogens. Because of the complexity of tobacco smoke and variations in smoking patterns, it is unlikely that any single machine test will be able to provide meaningful estimates of actual human exposure to harmful constituents. Instead, it is likely that a battery of tests will be needed to make meaningful comparisons across products. Currently, standardized machine measurements of tobacco smoke emissions continue to be useful in laboratory settings to understand the properties of different cigarettes. However, these measurements do not provide meaningful information about the actual exposure or risk for the individual smoker. A WHO expert advisory group has stated that numerical ratings for tar, nicotine, and carbon monoxide from the FTC/ISO test method are misleading and recommended that they should not be displayed in advertising or on the cigarette packaging.[13]

Since the 1964 publication of the landmark *Surgeon General's Report on Smoking and Health* provided conclusive evidence of the health risks of smoking to the nation, education to better inform the public on smoking and health issues has been a crucial component of tobacco control and prevention efforts. For decades, the public has been misled by advertising implying, directly or indirectly, that low-tar cigarettes are less hazardous than other cigarettes. It is vital that the public understand that the only proven way to reduce the enormous burden of disease and death due to tobacco use is to prevent youth from beginning to smoke, and to help smokers, both youth and adults, to quit.

Thank you for this opportunity to present this information to you. I would be happy to answer any questions you may have.

Senator LAUTENBERG. Thank you very much.

Dr. Ashley?

STATEMENT OF DAVID L. ASHLEY, PH.D., CHIEF, EMERGENCY RESPONSE AND AIR TOXICANTS BRANCH; CHIEF, TOBACCO LABORATORY, NATIONAL CENTER FOR ENVIRONMENTAL HEALTH, CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC), DEPARTMENT OF HEALTH AND HUMAN SERVICES; AND CHAIR, TOBACCO LABORATORY NETWORK, WORLD HEALTH ORGANIZATION

Dr. ASHLEY. Mr. Stevens, Mr. Lautenberg, I'm Dr. David Ashley, Chief of the Emergency Response and Air Toxicants Branch, and Chief of the Tobacco Laboratory in the National Center for Environmental Health of the Centers for Disease Control and Prevention. I am also Chair of the World Health Organization's Tobacco

[12] Shiffman, S., Pillitteri, J.L., Burton, S.L., and Di Marino, M.E. Smoker and ex-smoker reactions to cigarettes claiming reduced risk. *Tobacco Control* 2004; 13:78–84.

[13] World Health Organization, "SACTob Recommendation on Health Claims Derived form ISO/FTC Method to Measure Cigarette Yield" (January 1, 2003). *Tobacco Control. WHO Tobacco Control Papers.* Paper ISO200. *http://repositories.cdlib.org/tc/whotcp/ISO200.*

Laboratory Network. I am pleased to be here today to discuss research findings from the CDC Tobacco Laboratory and provide a better understanding of the Federal Trade Commission Method and how results from the FTC Method should be interpreted.

Our laboratory evaluates how design and contents of tobacco products influence emissions of toxic and addictive substances, how people use these products, and how these factors impact people's exposure to the substances that cause disease.

We work closely with CDC's Office on Smoking and Health. We use multiple machine-smoking regimens, including the FTC smoking regimen, in our research.

For the past 12 years, CDC has developed and applied measurements to better understand the amount of addictive and toxic substances in cigarettes, and factors that affect the delivery of those substances to smokers and persons exposed to secondhand smoke. Our smoking machines enable us to assess the influence of various smoking conditions on the delivery of addictive and toxic substances to smokers. In tobacco and tobacco smoke, we currently measure nicotine, tar, tobacco-specific nitrosamines, bio-organics, aldehydes, polycyclic aromatic hydrocarbons, heavy metals, and other chemicals. Our lab has performed studies that assess the smoke intake of individual smokers. In addition, for the past 20 years we have measured components of cigarette smoke in the urine and blood of smokers and people exposed to secondhand smoke.

The FTC Method originated in observations made in 1936 on how people smoked. The smoking parameters proposed, which were 35 milliliter puffs of 2 seconds' duration, with a puff each 60 seconds, were based on how the cigarettes which were sold at that time were smoked. Since then, cigarette designs have changed through modification of the tobacco-blend composition, ventilated filters, porous paper, reconstituted tobacco, and expanded tobacco.

In carrying out a measurement using the FTC regimen, the tips of up to 20 cigarettes at a time are placed into holders that are attached to the smoking machine, which contains syringes or other devices for drawing air through the cigarettes. Holders included glass filter, commonly known as a Cambridge Filter pad, for collecting particulate matter, and special bags for collecting the gas phase.

Cigarette manufacturers have added ventilation holes to the modern cigarette in the paper surrounding the filter. These holes are far enough from the tip of the cigarette that they're exposed to room air when the cigarette is placed in the smoking machine to be tested using the FTC Method. As a result, room air is pulled into the cigarette and dilutes the smoke that is collected on the filter pad and in the collection bag, lowering the measured levels of nicotine, tar, and carbon monoxide.

Other factors can also influence the delivery, including the length of the filter, the design of the filter, the porosity of the paper; but, of these, filter ventilation is the major factor.

The way that people smoke cigarettes varies between people, and there are also variations in the way an individual smokes at different times. One of the more important factors in determining how people smoke is their need for nicotine. Unlike the machine, smok-

ers are able to adjust the way they smoke by taking larger puffs, more frequent puffs, or blocking ventilation holes so that they can increase their nicotine intake when smoking cigarettes with lower machine-measured tar and nicotine. When individual smokers smoke cigarettes of different designs, they can compensate, resulting in exposure to levels of smoke that vary much less than would be expected based on the results from the machine smoking using the FTC Method.

Studies of biomarkers in smokers have also shown that exposure to the toxic and addictive components to tobacco smoke are fairly consistent whether a smoker smokes a light, medium, or full-flavored cigarette.

Machine smoking regimens that are more intense than the FTC Method are currently in use. Health Canada requires tobacco companies to report levels of chemicals in tobacco smoke using a modified method with 55-milliliter puffs taken every 30 seconds and all ventilation holes blocked. The State of Massachusetts has required reports of tobacco emissions using a regimen of 45-milliliter puffs taken every 30 seconds with half of the ventilation holes blocked. These more intense smoking regimens are aimed at better approximating how the average smoker actually smokes the cigarette.

In summary, our laboratory has developed a broad set of capabilities to measure addictive and toxic substances in the tobacco product, in cigarette smoke, and in people. We've investigated different machine-smoking regimes, including the FTC Method, and how cigarette design factors can influence the delivery of toxic and addictive substances. We've found that using multiple smoking regimens improves our understanding of the variation in actual delivery of nicotine, tar, and carbon monoxide to the smoker, compared to using the FTC Method alone.

Thank you for this opportunity to present this information to you. I would be happy to answer any questions you may have.

[The prepared statement of Dr. Ashley follows:]

PREPARED STATEMENT OF DAVID L. ASHLEY, PH.D., CHIEF, EMERGENCY RESPONSE AND AIR TOXICANTS BRANCH; CHIEF, TOBACCO LABORATORY, NATIONAL CENTER FOR ENVIRONMENTAL HEALTH, CENTERS FOR DISEASE CONTROL AND PREVENTION; AND CHAIR, TOBACCO LABORATORY NETWORK, WORLD HEALTH ORGANIZATION

Mr. Chairman and Members of the Committee, I am Dr. David Ashley, Chief of the Emergency Response and Air Toxicants Branch and Chief of the Tobacco Laboratory in the National Center for Environmental Health of the Centers for Disease Control and Prevention (CDC), an agency of the Department of Health and Human Services. I am also the Chair of the World Health Organization's Tobacco Laboratory Network. I am pleased to be here today to discuss research findings from the CDC Tobacco Laboratory that provide a better understanding of the Federal Trade Commission (FTC) method and how results from the FTC Method should be interpreted.

Our laboratory has five research priorities: (1) to characterize the chemical constituents and chemical additives of tobacco products; (2) to characterize the chemical and physical properties of tobacco products that influence delivery of nicotine and other harmful substances; (3) to identify the causative agents of disease in tobacco and tobacco smoke; (4) to assess the exposure of the U.S. population (including children, women of childbearing age, and other susceptible groups) to the harmful chemical constituents of tobacco smoke; and (5) to collaborate in health studies examining the relationship of secondhand smoke exposure to health outcomes, such as cancer. We work closely with CDC's Office on Smoking and Health.

Smoking causes diseases of the lungs and coronary arteries of the heart, the latter being the leading cause of death in the United States. Cigarette smokers are 2 to

4 times more likely to develop coronary heart disease than nonsmokers. While attempting to decrease the risk of cancer associated with smoking by reducing exposures to suspected or known carcinogens is worthwhile, it is equally important to recognize that the amount of small particles, called particulate matter, is inhaled from cigarettes by smokers at many times the levels found to be associated with significant risk for diseases of the lung and heart among persons breathing air containing these particles from other sources such as industrial pollution or fires.

Our laboratory has developed a broad set of capabilities to measure addictive and toxic substances in the tobacco product, in cigarette smoke, and in people who smoke and are exposed to the smoke of others. We use multiple machine smoking regimens (*i.e.,* specified puff volumes, puff rates, total smoking time), including the FTC smoking regimen, in our research.

For the past 20 years, our lab at CDC has conducted research on assessing exposure to cigarette smoke. We developed new methods to measure cotinine, a metabolite of nicotine, in serum and saliva as a marker of tobacco smoke exposure. We have applied this measurement to national surveys to track over time the exposure of the U.S. population to tobacco smoke, both for smokers and persons exposed to secondhand smoke. We have documented substantial decreases in exposure to secondhand smoke in the U.S. population and identified differences in exposure between age, sex, and race/ethnic groups.

CDC has also developed and applied measurements to better understand the amount of addictive and toxic substances in cigarettes and factors that affect the delivery of these substances to smokers and persons exposed to secondhand smoke. Our smoking machines enable us to assess the influence of various smoking conditions on the delivery of addictive and toxic substances to smokers. In tobacco and tobacco smoke, we currently measure nicotine, "tar" (*i.e.,* nicotine-free dry total particulate matter), tobacco-specific nitrosamines, volatile organics, aldehydes, polycyclic aromatic hydrocarbons, and heavy metals. Our lab has performed studies that assess the smoke intake of individual smokers. In addition, we have measured components of cigarette smoke in the urine and blood of smokers and people exposed to secondhand smoke.

The FTC Method originated in observations made by J.A. Bradford and Colleagues[1] in 1936 on how people smoked and was described again by C.L. Ogg in 1964.[2] The smoking parameters they proposed (*i.e.,* 35 milliliter puffs of 2 seconds duration with a puff each 60 seconds to a butt length of 23 millimeters or to the length of the overwrap plus 3 millimeters, whichever is longer) were based on how the cigarettes which were sold at that time were smoked. Since then, cigarette designs have changed, through, for example, changes in the tobacco blend composition, ventilated filters, porous paper, reconstituted tobacco, and expanded tobacco.[3]

In carrying out a measurement using the FTC regimen, the tips of up to 20 cigarettes at a time are placed into holders that are attached to the smoking machine, which contains syringes or other devices for drawing air through the cigarettes. The holders include a glass filter commonly known as a Cambridge filter pad for collecting particulate matter. Special bags collect the gas phase which is drawn through the Cambridge filter pads. To measure nicotine and "tar", the particulate matter collected on the pad is extracted and analyzed by a separate analytical instrument known as a gas chromatograph. The carbon monoxide generated during smoking is measured by an infrared spectrometer that samples from the collection bags.

Cigarette manufacturers have added ventilation holes to the modern cigarette, punched in the paper surrounding the filter. These holes are far enough from the tip of the cigarette that they are exposed to room air when the cigarette is placed in the smoking machine to be tested using the FTC Method. As a result, room air is pulled into the cigarette and dilutes the smoke that is collected on the filter pad and in the collection bag. This dilution using ventilation holes results in lower measured levels of nicotine, "tar", and carbon monoxide.[3] Other factors can also influence the delivery of nicotine, "tar", and carbon monoxide including the length of the filter, the design of the filter, and the porosity of the paper; but, of these, filter ventilation is the major factor.

The way that people smoke cigarettes varies between people and there are also variations in the way an individual smokes at different times. Factors that influence smoking patterns include nicotine level of the cigarette, the smoker's level of stress, mood and the time since they smoked their last cigarette. One of the more important factors in determining how people smoke is their need for nicotine. Persons smoking cigarettes with a range of nicotine levels adjust the way they smoke to obtain a relatively steady amount of nicotine per cigarette.[4] Unlike the machine, smokers are able to adjust the way they smoke by taking larger puffs, more fre-

quent puffs, or blocking ventilation holes so that they can increase their nicotine uptake, when smoking cigarettes with lower machine-measured "tar" and nicotine.[5]

When a larger puff is taken, puffs are taken more frequently, or ventilation holes are blocked, cigarettes deliver much higher levels of the toxic and addictive components of tobacco smoke than is characterized using the FTC Method. When individual smokers smoke cigarettes of different designs, compensation techniques result in exposure of smokers to levels of smoke that vary much less than would be expected based upon results from machine smoking using the FTC Method.[4]

Studies of biomarkers in smokers (chemical measurements in blood and urine) have also shown that exposure to the toxic and addictive components of tobacco smoke are fairly consistent, whether a smoker uses a light, medium, or full-flavored cigarette.[4 6] These findings are largely explained by compensation techniques used by the smokers.

Machine smoking regimens that are more intense than the FTC Method are currently in use. Health Canada requires tobacco companies to report levels of chemicals in tobacco smoke using a modified method with 55 milliliter puffs taken every 30 seconds and all ventilation holes blocked. The State of Massachusetts has required reports of tobacco emissions using a regimen of 45 milliliter puffs taken every 30 seconds with half of the ventilation holes blocked. These more intense smoking regimens are aimed at better approximating how the average smoker actually smokes the cigarette.

In summary, our laboratory has developed a broad set of capabilities to measure addictive and toxic substances in the tobacco product, in cigarette smoke and in people. We have investigated different machine smoking regimens, including the FTC Method and how cigarette design factors can influence the delivery of toxic and addictive substances. We have found that using multiple smoking regimens improves our understanding of the variation in actual delivery of nicotine, "tar", and carbon monoxide to the smoker compared to using the FTC Method alone.

Thank you for this opportunity to present this information to you. I would be happy to answer any questions you may have.

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Senator LAUTENBERG. Thank you very much.

The—thank you all—each for your testimony. And not only did I marvel at the detail with which you reported your findings, but the fact that you were all able to come very close to the time mark that we had set out for you, that deserves congratulations. I wish we could say the same for this side of the table.

Commissioner Kovacic, I think it was fairly clear what you said—but just—let me verify it—that the FTC cigarette testing method is inaccurate at predicting the amount of tar and nicotine that a smoker will receive from a cigarette.

Mr. KOVACIC. That's correct, Senator.

Senator LAUTENBERG. Given that the FTC is not a scientific agency, should your agency continue to oversee these health ratings?

Mr. KOVACIC. We think it would be much better, Senator, that that task be dedicated to one of our public institutions that has the deeper scientific expertise.

Senator LAUTENBERG. Do you think that the ratings based on the FTC cigarette testing method are designed to deceive smokers into believing that their health is less harmed when they use tar or light cigarette designations?

Mr. KOVACIC. The rating system, as it was designed, was not designed to deceive. The assumption was that it would assist smokers, who wanted to choose lower-tar cigarettes, in particular, to select cigarettes that would give them a lower dosage of tar when they smoked. What is impressive from the testimony of my colleagues and others, and the work that their institutions have done, is that those early assumptions did not take into account what's called the "compensation effect." And I think the key question for all of us whether there is any significant subset of users who do derive useful information from these standards and change their behavior in beneficial ways, or whether, as I believe I interpret Dr. Backinger's findings, in particular, that those instances of benefit are negligible.

Senator LAUTENBERG. Would the FTC object if Congress prohibited tobacco companies from continuing to make claims based on the FTC Method?

Mr. KOVACIC. I would strongly prefer that there be a process that asks whether, first, there is an alternative measure or measurement that would be an improvement. But, I think, at a minimum, the guidance that Congress might give is first, to pursue alternatives that would be more informative. But, if, indeed, there is a general conclusion, assembling the science that has been done in this area, that the FTC Method, as it's called, provides no benefits to consumers, and, indeed, has net harms, then that's a basis for prohibition.

Senator LAUTENBERG. I go back to a time, Senator Stevens, when we were taught to smoke by the military, our emergency rations had a sleeve of four cigarettes, essentially saying that tobacco is good for you, it calms the nerves, et cetera. It—didn't say that we were creating addicts. And, at the time, I served in the European theater—and I know that you served in the Pacific CBI, right?—that all of the temporary camps that were used to receive soldiers in the European theater, and the same ones used to send them back home, were named after cigarettes. There was Lucky Strike and other camps there—Old Gold, et cetera. So, we learned the easy way. And though I'm sure it wasn't the design of the U.S. Government to create this addiction, the fact is that that was the result.

Dr. Backinger, does the National Cancer Institute believe that the FTC Method deceives smokers? You talk about the number of people who started originally smoking light cigarettes, and how much that market share has grown. Do you think that the program's designed to deceive people into becoming smokers?

Dr. BACKINGER. As outlined in the—in Monograph 13, the research has shown that the FTC numbers and the test method do not provide meaningful information to consumers. The monograph also found, through research analyzing tobacco industry documents, that the tobacco manufacturers knew this.

Senator LAUTENBERG. Is it appropriate to say that the continuation of the FTC Method as a basis for light and low-tar claims could lead more Americans to getting lung cancer?

Dr. BACKINGER. I—the data do show, from research, that smokers who were health conscious and may have quit—otherwise have quit—decided to smoke what was called "light" or "low-tar" cigarettes, and, therefore, thinking they were going to have—be at reduced risk for lung cancer, as well as other diseases; however, that was not the case.

Senator LAUTENBERG. In 2001, NCI found that problems with the FTC cigarette testing method was an urgent health issue. Has any government agency that you're aware of acted upon those findings?

Dr. BACKINGER. Since 2001, when the monograph was issued, NCI and other institutes at NIH have funded research to look into different test methods and look at laboratory methods to look at how smokers smoke under actual conditions. So, the answer is yes.

Senator LAUTENBERG. Dr. Ashley, just—this is slightly repetitive, but I ask the question, nevertheless, to clarify it for the record. Are light or low-tar cigarettes as addictive as regular cigarettes, in your judgment?

Dr. ASHLEY. Using the FTC Method for measuring and reporting nicotine, tar, carbon monoxide numbers—using that method did not reflect the way people actually smoke. Our research has shown that by using multiple methods, you get more information, you can get more data that tells you much more what the actual exposure of people is when they actually use cigarettes. And so, it's important to be able to do that research and find out exactly what the levels are that people are actually exposed to, and not the way the machine makes that measurement.

Senator LAUTENBERG. Have tobacco companies manipulated cigarette design to affect the FTC results? Have they moved things around within the cigarette itself to try and affect a less ominous result than we really believe is there?

Dr. ASHLEY. I can't really speak to the motivations of the tobacco industry, but I—we do know that the design of the cigarette does greatly influence the measurements and the results that come from when you use the FTC Method.

Senator LAUTENBERG. Senator Stevens?

Senator STEVENS. Thank you, Mr. Chairman.

Mr. Kovacic, do you have authority to change those machines?

Mr. KOVACIC. I think we don't specify the test methodology itself, Senator. I think what we would have authority to do is to withdraw any indication that, in some sense, our agency stands behind the methodology, and we would certainly have the authority to convene proceedings, to work with our colleagues, to draw attention to the limitations of the existing methodology and suggest others.

Senator STEVENS. But, Doctor, they're paid for with taxpayers' money, right?

Mr. KOVACIC. I believe they're not, Senator. The—and this is something I could clarify for you afterwards, but the——

Senator STEVENS. Who possesses them?

Mr. KOVACIC. The testing is done by a trade association that does the tests. We subpoena, on a regular basis, the data, and post it on our website.

Senator STEVENS. Are you prohibited from testing?

Mr. KOVACIC. We are not, Senator. We abandoned our own testing. We used to have variants of these elegant machines on the top floor of our building, until the mid-1980s, where the cost of maintaining them became relatively high, and we came to realize the limitations of our own expertise to do this work.

Senator STEVENS. Dr. Backinger, does NCI have any testing machines?

Dr. BACKINGER. No, we do not.

Senator STEVENS. Dr. Ashley, do you have any testing machines?

Dr. ASHLEY. Yes, sir, we do.

Senator STEVENS. Where did you get them?

Dr. ASHLEY. We purchased them as part of our program, looking at the impact of design of cigarettes on emissions, how people smoke——

Senator STEVENS. That's not the question. Where did you get them?

Dr. ASHLEY. We purchased them from manufacturers who make the machines.

Senator STEVENS. They make them for the same testing organization that's not Federal?

Dr. ASHLEY. They make them for whatever consumer would purchase them. They are purchased largely by the tobacco industry. We got our tobacco smoking machines from the same companies that make them for the industry.

Senator STEVENS. They are the same ones that Mr. Kovacic is talking about, right?

Dr. ASHLEY. Yes, sir.

Senator STEVENS. Have any of you ever asked Congress for money to produce your own machines?

Dr. ASHLEY. If I can try to clarify something, the machine itself——

Senator STEVENS. I've really got a shortage of time, Doctor, just would you please answer my question. Have any of your agencies ever asked the Congress to give you money to replicate those machines, to build better machines?

Dr. ASHLEY. No, sir.

Senator STEVENS. How long have these machines been in existence? Dr. Kovacic, when were they made?

Mr. KOVACIC. I believe, in the 1960s, the original design.

Senator STEVENS. That even predates my presence in the Congress. That's pretty old. You know, I just don't understand that.

Tell me this, have you done any studies on increasing taxes on cigarettes and how it affects consumers? Any of you?

Dr. BACKINGER. The NCI has supported research, through extramural funding, to look at the increase of price on—price of cigarettes on consumption and prevalence. And we actually—one of our monographs addresses that. I don't have that information with me specifically today. But research does show that as you increase the price of cigarettes, it affects both youth smoking and adult smoking.

Senator STEVENS. Did that cover the question of bootlegging cigarettes as a result of increased taxes?

Dr. BACKINGER. I am not—I don't know that off the top of my head. I would need to check back with that and get back to you for the—on the record.

Senator STEVENS. Do any of your agencies have jurisdiction over pursuing those who bootleg cigarettes, who sell them, notwithstanding Federal laws?

Mr. KOVACIC. We generally wouldn't, Senator, no. We could prosecute people who misrepresent the source of the cigarettes, who advertise cigarettes as coming from one source, but receive them from another. But the actual policing of bootlegging, counterfeiting, that's beyond our authority.

Senator STEVENS. It's up to the state, is that right?

Mr. KOVACIC. Or, I would assume, Senator, Customs and Border Protection, those that deal with cross-border movements.

Senator STEVENS. Did you start to say something, Dr. Ashley?

Dr. ASHLEY. There is a Federal agency that deals with that. It's not CDC.

Senator STEVENS. Well, I've just one last question. As part of our Congressional involvement, we did require that the cigarette manufacturers do a certain amount of advertising. I've seen some recently, as a matter of fact, on television and over the radio, and, I think, even in the printed media, directed toward young people and trying to prevent them from smoking. Have any of you studied the results of those advertisements that we've required?

Dr. BACKINGER. The National Cancer Institute did fund one study in that arena, which was published in the December 2006 *American Journal of Public Health*. And I could provide that article for you and for the record.

[The information referred to is contained in the Appendix.]

Dr. BACKINGER. Just off the top of my head, the research found that youth that saw those ads on TV were not—did not help prevent smoking initiation.

Senator STEVENS. Since that basic settlement that we were all part of, has there been an increase or a decrease in cigarette smoking by younger people?

Dr. BACKINGER. The—for the latest years that are available—and I would have to look at that again—but youth smoking has increased slightly in the last 2 years for which we have data. Slightly.

Senator STEVENS. Last irrelevant question, but my colleague has mentioned the fact we were all given so many free cigarettes. My friends and I were never seduced by those cigarettes. We didn't smoke cigarettes, we smoked pipes. Have you ever made any studies of pipes and its connection to cancer, Doctor?

Dr. ASHLEY. We have not studied pipes.

Senator STEVENS. Dr. Backinger?

Dr. BACKINGER. I am not aware of any NCI-funded research on pipes, specifically, but I could check.

Senator STEVENS. Yes. Well, I'd be interested.

I quit a long time ago, anyway, but I just wondered whether there is any connection between pipe smoking as well as the cigarette smoking. What about cigars, have you done studies of cigars?

Dr. BACKINGER. We—NCI did look at cigars, and, during the 1990s—when there was an increase in prevalence of smoking of cigars—and we do have an NCI monograph on that subject.

Just—the other comment, however, is, all tobacco, regardless of its form, is hazardous and causes a variety of cancers, as well as other diseases.

Senator STEVENS. Did your monographs compare the basic results of smoking different types of substances, like pipe or tobacco or cigarettes?

Dr. BACKINGER. The cigar monograph was focused solely on the various types of cigars that were available at the time.

Senator STEVENS. Well, I thank you very much.

Thank you for your testimony. I'm a little disturbed about the—this is the first time I've heard about those machines being—not—that our government testing was not done by other than machines that the industry developed.

Thank you.

Senator LAUTENBERG. I have a couple of questions I'd like to ask you.

Dr. Ashley, last Thursday the CDC found the number of smokers has remained the same over the last 2 years. We know that the tobacco companies spent $13 billion in 2005 on advertising and marketing, almost double that which they spent in 1998. Do you believe that the increases in tobacco advertising is the reason that we're seeing no decline in the population that is smoking?

Dr. ASHLEY. I believe the CDC report says—concluded that fact that it is bottoming out and no longer decreasing is because of the decrease in money spent on tobacco control.

Senator LAUTENBERG. We're looking at testing machines, and seeing how reliable they might be. I think the most reliable testing machines are humans. And is there sufficient confirmation of the relationship of cancer, heart problems, and other conditions, that we can attribute directly to smoking? Dr. Backinger?

Dr. BACKINGER. Yes.

Senator LAUTENBERG. Have we seen any tests related to the difference in the incidence of cancer, et cetera, from the light, or however else they're described, cigarettes and the regular cigarettes? Is there more frequent occurrence, can you say, of using either the regular cigarette or the light cigarettes, in terms of the people who use these?

Dr. BACKINGER. The studies that were conducted are epidemiological studies, population-based. So, it's—we don't have data on individuals, *per se.* But, overall, people that smoke "light" or low-tar cigarettes did not have a decrease in any of the disease risks and cancers from smoking as people that smoked regular cigarettes, conventional cigarettes.

Senator LAUTENBERG. Thank you all for your excellent testimony, and given in very clear, unequivocating fashion. I appreciate that. Thank you.

And we'll call the next panel, please, to the table.

Senator STEVENS. I would appreciate a copy of those two monographs, Doctor.

Dr. BACKINGER. Yes, I will follow up with that. Thank you.

Senator LAUTENBERG. I'm not really a button-pusher, as you can see.

I thank the members of this panel: Dr. John Samet, the Chairman of the Department of Epidemiology at Johns Hopkins University; Jack Henningfield, Adjunct Professor at Johns Hopkins University School of Medicine; Mr. Marvin Goldberg, a Professor of Marketing at Penn State University; and Mr. Stephen Sheller, the Founder and a Managing Partner from the law firm of Sheller, P.C. And I thank all of you for joining us and sharing your views and expertise.

And, Dr. Samet, may I ask you, please, to start.

STATEMENT OF JONATHAN M. SAMET, M.D., M.S., PROFESSOR AND CHAIRMAN, DEPARTMENT OF EPIDEMIOLOGY, JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH

Dr. SAMET. Thank you, Senator Lautenberg, Senator Stevens. I appreciate the opportunity to address the Committee today on the matter of the accuracy of the FTC tar and nicotine rating system. This is an important public health issue, not only for the United States, but for the approximately 1.3 billion smokers in other countries.

Let me begin with the bottom line; that is, that there is a consensus among the scientific and public health communities that a lower machine yield of tar and nicotine, as measured by the FTC protocol, has no health implications. I base this statement on the findings of a number of recent reviews by expert groups, including not only Monograph 13 of the National Cancer Institute, but a review by the Institute of Medicine published in 2001, the 2004 report of the Surgeon General, and a review of the same topic, carried out in 2002, published in 2004, by the World Health Organization's International Agency for Research on Cancer. In my written testimony, I've summarized the key statements from these reports.

As a major finding, the 2004 report of the Surgeon General states, "Smoking cigarettes with lower machine-measured yields of tar and nicotine provides no clear benefit to health." What is the basis for this bottom line? Part of the basis lies in the epidemiological studies already referred to in the last panel, those studies that have looked at risks to smokers as they have been using these products and smoking them. This is a somewhat difficult area for epidemiologists, but we now have many studies on the question.

To quickly summarize evidence that is included in these different reports, the epidemiological studies that have been carried out largely show no indication of lower risks associated with using lower-yield products. Perhaps one exception are studies that compared, early on, users of filter to the nonfilter cigarettes of the past.

We have additional data from—comparison of how risks have changed over time; first, in the two large studies of 1 million Americans each, carried out by the American Cancer Society, and also in a 50-year study of the British doctors. We've seen a decline in the sales-weighted average of tar from above 30 milligrams per cigarette to less than 15. These studies show no indication of a parallel change in risk. In fact, comparing the findings of CPS I, the first study of the American Cancer Society, 1959 to 1972, with the findings of the second study, which began in 1980, risks for all of

the major diseases went up. The same finding was noted in the study of British doctors, carried out over 50 years, with no decline in risks for lung cancer and other diseases over time.

Another relevant body of data involves measuring the level of tobacco-smoke components, so-called biomarkers, in body fluids of those who smoke. Again, if the FTC Method was giving us accurate information about the amounts of carcinogens and other toxins entering people, we would expect to find that levels of such markers in smokers paralleled those in the products—paralleled the yields of those in the products that they smoked. In fact, using such markers, we find no correlation, or limited correlation, between what is on the package and what is in the person.

Recently, for example, we measured cotinine, a nicotine by-product, in saliva samples from smokers in four countries around the world. We found no difference in the uptake of nicotine in these smokers, as indicated by the cotinine level, comparing smokers of regular and light cigarettes. There are many other studies with similar findings.

So, in summary, we now have epidemiological studies that have addressed the challenging question of whether changes in the product over time have altered risks. Both epidemiological studies and evidence from studies using biomarkers show no changes in risk for the major smoking-related diseases—caused diseases—that parallel the changes in nicotine or tar yield. All of the recent authoritative reports developed by multidisciplinary teams of experts have concluded that there is no indication of benefit to the health of smokers from smoking lower-yield products.

The FTC tar and nicotine ratings provide no meaningful information about risks to smokers. The numbers provided are potentially misleading the smokers, as are product labels that attempt to convey messages based on yield.

Thank you, and I'd be pleased to answer questions.

[The prepared statement of Dr. Samet follows:]

PREPARED STATEMENT OF JONATHAN M. SAMET, M.D., M.S., PROFESSOR AND CHAIRMAN, DEPARTMENT OF EPIDEMIOLOGY, JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH

Introduction and Background

Mr. Chairman, and Committee members, thank for you the opportunity to address the Committee on Commerce, Science, and Transportation on the matter of the accuracy of the FTC tar and nicotine rating system. This is an important public health issue, not only for the United States, but for the approximately 1.3 billion smokers in other countries. In my testimony I will speak to whether the FTC ratings and tobacco industry cigarette brand labels that have an implicit basis in them, *e.g.,* "light" and "ultra light", have any implications for the serious risks to health caused by cigarette smoking.

In speaking to this topic, I draw on several decades of relevant research experience as well as my participation in developing a number of the major reports that have considered the FTC ratings and the implications of tar and nicotine yields for risks to health. My professional background and training is in internal medicine and the subspecialty of pulmonary diseases and in epidemiology, the scientific method used to study the health of populations. I have carried out research that examined if risks for lung diseases, including lung cancer, are associated with type of cigarette smoked and tar yield. My studies have also assessed whether levels of biomarkers of tobacco smoke exposure, particularly cotinine (the major nicotine metabolite) vary with the yield and type of cigarette smoked.

Additionally, I was a contributor to Monograph 13 of the National Cancer Institute, published in 2001, which addressed the implications of lower-yield products,

as measured by machine, for human health. I was Senior Scientific Editor for the 2004 Report of the Surgeon General on active smoking and Chair of the Working Group of the International Agency for Research on Cancer (IARC) of the World Health Organization that developed Monograph 83, *Tobacco Smoke and Involuntary Smoking,* published in 2004. These reports also considered the information about risks provided by cigarette yield. In the Department of Justice lawsuit against the tobacco industry (*United States* v. *Philip Morris*), I also testified on this topic.

There Is Consensus That a Lower Machine Yield Has No Health Benefit

The attached table provides the summary findings of the key recent reports on the topic including those prepared by the National Cancer Institute,[1] the Institute of Medicine,[2] the Surgeon General,[3] and the International Agency for Research on Cancer[4] (Table 1). Each of these reports was developed by a multidisciplinary group of experts who evaluated the relevant evidence. There is clear consensus in their findings: machine-measured yields of tar and nicotine are not informative with regard to risks to health of smoking cigarettes; lower yields do not imply lesser health risks. As a major finding, the 2004 report of the Surgeon General states (p. 25): "Smoking cigarettes with lower machine-measured yields of tar and nicotine provides no clear benefit to health."

Epidemiological Studies Provide No Evidence That Lower Yields Have Health Benefits

Much of the scientific evidence leading to this consensus comes from epidemiological studies. FTC reports and other information document a substantial decline since the 1950s in machine-measured tar and nicotine yields of cigarettes smoked in the United States (Figure 1). Epidemiologists have carried out research to determine whether this decline has had any consequences for risks to the health of smokers. A substantial benefit might be anticipated, of health risks tracked with machine-measured yields.

The relevant evidence on the risk of lower tar products has been growing, but this is a difficult topic for researchers. Investigating the consequences of modifications in cigarettes is difficult because cigarettes have been changing continually over time, so that comparisons cannot be made between groups that have smoked the same cigarettes throughout their entire lives. People who started smoking in the 1950s then moved on to the cigarettes of the 1960s and 1970s, for example, if they continued to smoke. In spite of these methodological complications, epidemiological studies would be able to detect changes in risk of a magnitude that matched the changes in yields (Figure 1).

The available epidemiological evidence comes from three sources: (1) comparisons of changes in mortality rates for lung cancer and other diseases over time in relation to changes in products used by smokers; (2) case-control studies comparing disease risks in smokers of different types of products; and (3) cohort studies that have tracked smokers over substantial periods of time, as with the study of British physicians in progress from 1951 through 2001, or that have been conducted serially, as with the two very large epidemiological studies carried out by the American Cancer Society and known as Cancer Prevention Studies I and II, or CPS I and CPS II. The relevant evidence is not extensive and not fully consistent across the three sources. There is also evidence from studies that have involved measurements of levels of cigarette smoke components in biological samples from smokers of different types of cigarettes.

Several case-control and cohort studies have shown small reductions in risk, on the order of 20 percent for lung cancer, comparing smokers of filter cigarettes with smokers of non-filter cigarettes. These were largely early epidemiological studies, carried out in the 1960s and 1970s; the comparison at the time was largely between smokers of non-filtered and filtered cigarettes. Several reports have commented on these early findings (Table 1). The relevance of these findings to current cigarettes is uncertain. In general, epidemiological studies show that tar yield of the cigarettes smoked is only a weak predictor of lung cancer risk after taking account of other aspects of the smoking history.

Some have interpreted the rapid decline in lung cancer mortality in younger males in the United Kingdom during the last decades of the 20th century as indicating a benefit of the changing cigarette. Sir Richard Peto at Oxford has proposed that the decline in lung cancer rates in the United Kingdom was too great to be explained by dropping smoking rates alone and has argued that changes in cigarettes over time also contributed to the decline. However, data from major cohort studies that cover the same time period—the British physicians' study, and CPS I and II indicate rising relative risks of lung cancer over time in smokers generally.

If the changes in cigarette yields had any benefit we would expect these relative risks to be dropping. Instead, they have risen.

Some of the most compelling evidence is from the American Cancer Society's Cancer Prevention Studies. The data from these studies show that regardless of how cigarettes changed, for smokers in CPS I (1959–1972) *versus* those in CPS II (1980–1986), relative risks of lung cancer (and other diseases) went up (Table 2). Over the time interval separating these two studies, there was a substantial drop in the tar and nicotine yields of the cigarettes that were smoked in the United States (Figure 1). In fact, in more detailed analyses of the data that have been published, the mortality rates from lung cancer tend to be higher within categories defined by the numbers of cigarettes smoked and the number of years of smoking, comparing the second study with the first.[5,6] This pattern of higher risks in CPS II suggests an increase in the risk of smoking over time, comparing similar groups of smokers in CPS I and CPS II.

Also relevant are analyses of the data from the British Doctors' Study which compared risks in the first and second halves of the study after 40 years of follow-up.[7] The comparison shows that the relative risk values went up comparing the first 20 years (1951–1971) to the second 20 years (1972–1991). The paper on the 50-year follow-up described progressively increasing risks for mortality among smokers over the five decades of follow-up.[8] Even looking back at the older studies that found small reductions in relative risks at one particular point in time, comparing filter to non-filter cigarette use, these studies did not track how risks changed over time as more and more smokers were smoking cigarettes with lower FTC tar and nicotine yields and the sales-weighted tar and nicotine yields declined progressively (Figure 1).

While the epidemiological studies have emphasized smoking and lung cancer, findings have been generally similar for the other major diseases caused by cigarette smoking. With respect to heart disease and chronic obstructive pulmonary disease (COPD), the evidence has also consistently shown that smokers who use lower tar products obtain no benefit at all in terms of reducing their risk of acquiring these two diseases. The findings from the comparison of CPS I and CPS II are similar to those for lung cancer (see Table 2). Risks for all the major diseases caused by smoking increased in CPS II.

It is important to consider a possible additional risk to health posed by the use of low yield products: the 2004 Surgeon General's Report noted the rise in adenocarcinoma, among the major types of lung cancer. One remarkable change in the epidemiological characteristics of lung cancer over the last 40 years approximately has been a shift in the predominant type of lung cancer. At the beginning of the epidemic of tobacco-caused lung cancer, the leading histologic type was squamous cell carcinoma, which characteristically involves the larger and more central airways of the lung. Since the late 1960s, there has been a shift so that adenocarcinoma is now the most common in both men and women. Interestingly, adenocarcinomas tend to occur more peripherally in the lung, arising from the smaller airways. One hypothesis is that changes in the cigarette have lead to deeper inhalation with a pattern of deposition of carcinogens in the lung that differed from that typically occurring with the older, higher-yield products.[9,10] Some have also suggested that the mix of carcinogens in tobacco smoke may have changed, perhaps with greater concentrations of tobacco-specific nitrosamines, which cause adenocarcinoma in exposed animals.

Biomarker Studies Show No Association of Machine-Measured Yield With Levels of Smoke Components in the Bodies of Smokers

Researchers have studied the relationship between the FTC measurements, that is, tar and nicotine yields as reported from the FTC Method, and the levels of tar components and nicotine actually entering into the bodies of smokers. Biomarker is a general term for compounds that can be measured in a biological material. With regard to cigarette smoking, we measure these biomarkers as quantitative indicators of how much a person has smoked, and of the amount of biological materials reaching the lungs, and then getting into the bloodstream.

Using these methods, researchers have explored the relationship between the FTC-yield measurements and the levels of biomarkers in smokers. If the FTC measurements are providing meaningful information, the levels of biomarkers should track with the measured yields. A number of studies have used biomarkers of dose for specific tobacco smoke components, including carboxy-hemoglobin (hemoglobin bound to carbon monoxide rather than to oxygen) and cotinine (a metabolite specific to the breakdown of nicotine).

In general, research using these biomarkers has indicated little, if any, correlation between the FTC-yield of tar or nicotine, and the levels of the biomarkers measured

in smokers. These studies have been conducted both in the population context and in laboratory settings. For example, in a study that my group conducted in New Mexico,[11] we collected saliva for the analysis of cotinine levels, and breath samples for measurement of carbon monoxide levels in a population survey sample of Hispanic persons. After taking account of the numbers of cigarettes smoked, the levels of biomarkers were not associated with the yields of tar and nicotine of the current brand of cigarette. Another study [12] evaluated smoking patterns and biomarkers in the laboratory setting, contrasting smokers of medium-yield and low-yield cigarettes. The smokers had greater puff volumes and puff frequencies than are specified in the FTC protocol and had substantially greater intakes of tar and nicotine than those implied by the brand yield listings. More recently, we measured the cotinine level in saliva samples from smokers in four countries (Brazil, China, Mexico, and Poland).[13] Cotinine concentration per cigarette smoked did not differ between smokers of light and regular cigarettes (Figure 2). Figure 2 shows the data for each country with two curves for country, one showing the cotinine level for smokers of regular cigarettes and the other for smokers of light cigarettes. The curves are essentially identical in each of the countries.

These and other results suggest that there is little difference in the levels of biomarkers comparing smokers of higher yield tar/nicotine cigarettes and lower yield tar/nicotine cigarettes, as measured by the FTC Method. This finding implies that doses of carcinogens or other toxic materials that smokers inhale have little relationship, if any, to the FTC tar yield. This finding further implies that the gradual reduction in tar yield over the past several decades has not resulted in a reduction in smokers' exposure to carcinogens and other toxic agents, and that the FTC test method is not informative with respect to lung cancer risk or to the risks of smoking-caused diseases generally.

There are several explanations for this lack of correlation. First, the smoking pattern of the machine is not representative of how people smoke; in other words, the machine does not smoke like a person, or even the average person. It uses a pattern of puffing that is based on very old information. Second, the ventilation holes in the filter, which are not covered when the end of the cigarette is inserted into the machine, are generally covered by smokers as they hold the cigarette and puff. Third, smokers tend to compensate for the reduced yield of nicotine by increasing the volume of puffs (that is, the volume of smoke they pull into their mouths), the number of puffs per cigarette, and the number of cigarettes smoked. This compensation is not replicated by the test machine. In this manner, smoking cigarettes produces similar levels of biomarkers, regardless of whether the cigarettes smoked are labeled as "Low Tar" or "Low Nicotine."

Summary and Overall Conclusions

Beginning in the 1950s, following the initial epidemiological studies showing very strong associations of smoking with risk for lung cancer and other diseases, the tobacco industry has continually altered cigarettes, adding filters and making other changes that have led to reduced yields of tar and nicotine as measured by a machine (Figure 1). Both epidemiological studies and evidence from studies using biomarkers show no parallel changes in risks for the major smoking-caused diseases. All recent authoritative reports, developed by multidisciplinary teams of experts, have concluded that there is no indication of benefit to the health of smokers from smoking lower yield products. The FTC tar and nicotine ratings provide no meaningful information about risks to smokers. The numbers provided are potentially misleading to smokers, as are product labels that attempt to convey messages based on yield.

Table 1.—Summary findings of the key reports on machineMmeasured cigarette yields and health

Report and Conclusion	Page Number	Year
DNCI Smoking and Tobacco Control Monograph 13 [1]		*2001*
"Epidemiological and other scientific evidence, including patterns of mortality from smoking-caused diseases, does not indicate a benefit to public health fro changes in cigarette design and manufacturing over the last fifty years."	p. 10	
"Widespread adoption of lower yield cigarettes by smokers in the United States has not prevented the sustained increase in lung cancer among older smokers."	p. 10	

Table 1.—Summary findings of the key reports on machineMmeasured cigarette yields and health—Continued

Report and Conclusion	Page Number	Year
"Measurements of tar and nicotine yields using the FTC Method do not offer smokers meaningful information on the amount of tar and nicotine they will receive from a cigarette. The measurements also do not offer meaningful information on the relative amounts of tar and nicotine exposure likely to be received from smoking different brands of cigarettes."	p. 10	
"Epidemiological studies have not consistently found lesser risk of diseases, other than lung cancer, among smokers of reduced yield cigarettes. Some studies have found lesser risks of lung cancer among smokers of reduced yield cigarettes. Some or all of this reduction in lung cancer risk may reflect differing characteristics of smokers of reduced-yield compared to higher-yield cigarettes."	p. 146	
"There is no convincing evidence that changes in cigarette design between 1950 and the mid 1980s have resulted in an important decrease in the disease burden caused by cigarette use either for smokers as a group or for the whole population."	p. 146	
Clearing the Smoke: Assessing the Science Base for Tobacco Harm Reduction, Institute of Medicine [2]		*2001*
"Most current assessments of morbidity and mortality suggest that low-yield products are associated with far less health benefit, if any, than would be predicted based on estimates of reduced toxic exposure using FTC yields."	p. 2	
"The weight of the evidence indicates that lower-tar and nicotine yield cigarettes have not reduced the risk of disease proportional to their FTC yields, in part because smokers compensate to obtain more nicotine and in part because the products themselves contain higher concentrations of selected carcinogens."	p. 67	
"There is no evidence of a threshold for tobacco smoking and cancer risk. This conclusion is consistent with the knowledge that there are many carcinogens in tobacco smoke, the aggregate would work to increase risk at any level. Modeling for low-dose indicates increased risk with less than one cigarette per day. Thus persons who initiate smoking with PREPS that contain tobacco would increase their risk for cancer, and there is unlikely to be a "safe" cigarette. Former smokers who resume smoking with such products would increase their risk further."	p. 431	
"The available data are suggestive, but not sufficient, to conclude that smokers of so-called low-tar cigarettes have lower cancer risk compared to those who smoke higher tar cigarettes, with the same caveats as for filter smoking studies."	p. 432	
IARC Monograph 83, Tobacco smoke and involuntary smoking [4]		*2004*
". . . after considering the limitations of the evidence, the Working Group concluded that changes in cigarettes since the 1950s have probably tended to reduce the risk for lung cancer associated with the smoking of particular numbers of cigarettes at particular ages."	p. 171	
"The yields of tar, nicotine and carbon monoxide from cigarettes, as measured by standard machine-smoking tests, have fallen over recent decades in cigarettes sold in most parts of the world, but have remained higher in some countries. The tar and nicotine yields as currently measured are misleading and have only little value in the assessment of human exposure to carcinogens."	p. 1179 (Summary)	
The Health Consequences of Smoking: A Report of the Surgeon General [3]		*2004*
"Smoking cigarettes with lower machine-measured yields of tar and nicotine provides no clear benefit to health."	p. 25	

[1] U.S. Department of Health and Human Services (USDHHS), National Cancer Institute. Risks associated with smoking cigarettes with low machine-measured yields of tar and nicotine. Bethesda, MD: National Institutes of Health, 2001.

[2] Stratton K., Shetty P., Wallace R., Bondurant S., eds. Clearing the smoke: assessing the science base for tobacco harm reduction. Washington,D.C.: National Academy Press, 2001.

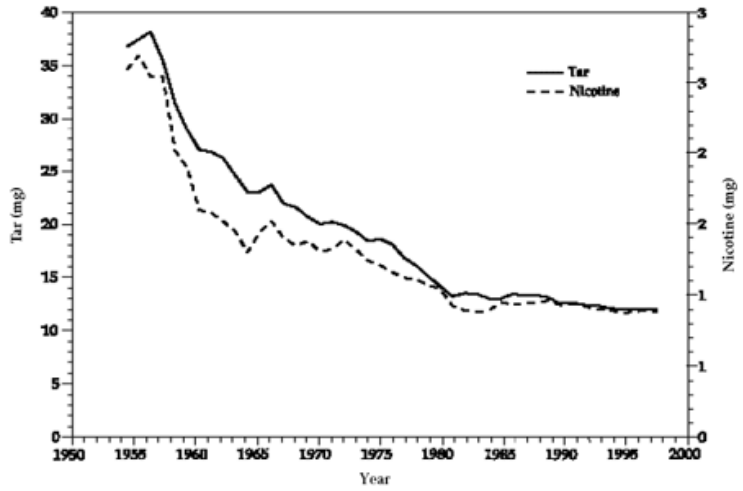
[3] U.S. Department of Health and Human Services (USDHHS). The health effects of active smoking: A report of the Surgeon General. 2004. Washington, D.C., U.S. Government Printing Office.

[4] International Agency for Research on Cancer (IARC). Tobacco smoke and involuntary smoking. IARC monograph 83. 2004. Lyon, France, International Agency for Research on Cancer.

Table 2.—Changes in cigarette-related mortality risks between Cancer Prevention Study 1 (1959 through 1965) and Cancer Prevention Study II (1982 through 1988) and percentage of deaths attributable to active cigarette smoking. Source: [14]

	CPS I		CPS II	
	Males			
	Relative Risk	Percent	Relative Risk	Percent
Overall Mortality	1.7	42.2	2.3	57.1
Lung Cancer	11.9	91.6	23.2	95.7
Coronary Heart Disease	1.7	41.5	1.9	46.2
Chronic Obstructive Pulmonary Disease	9.3	89.2	11.7	91.4
Stroke	1.3	21.9	1.9	46.8
Other Smoking Related Cancers	2.7	63.4	3.5	71.2
	Females			
Overall Mortality	1.2	18.7	1.9	47.9
Lung Cancer	2.7	63.4	12.8	92.2
Coronary Heart Disease	1.4	27.0	1.8	45.1
Chronic Obstructive Pulmonary Disease	6.7	85.0	12.8	92.2
Stroke	1.2	15.2	1.8	45.7
Other Smoking Related Cancers [a]	1.8	45.0	2.6	60.8

[a] Sites include larynx, oral cavity, esophagus, bladder, kidney, other urinary, and pancreas.



*Values before 1968 are estimated from available data.

Figure 1. Sales weighted average tar and nicotine deliveries, U.S., 1953-1993 Source: [15]

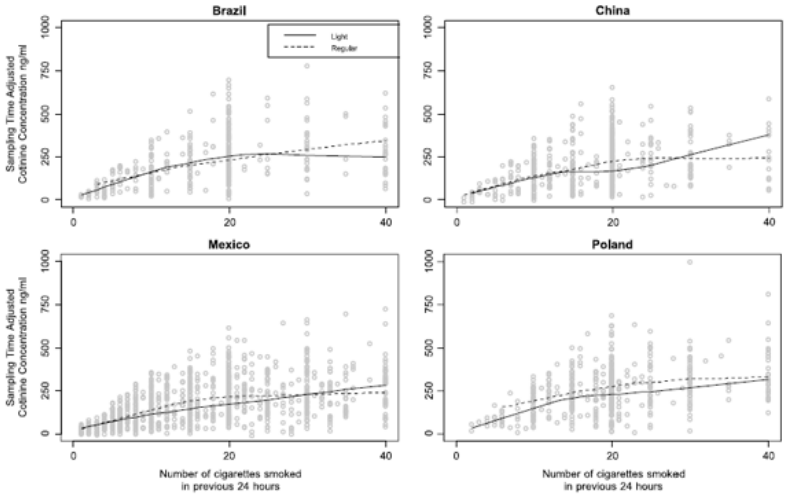


Figure 2. Scatter plots of time-adjusted cotinine concentration (ng/mL) and number of cigarettes smoked in the previous 24 hours by country with LOESS smoothers by type of cigarette. Source:[13]

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[1] U.S. Department of Health and Human Services (USDHHS), National Cancer Institute. Risks associated with smoking cigarettes with low machine-measured yields of tar and nicotine. Bethesda, MD: National Institutes of Health, 2001.

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[3] U.S. Department of Health and Human Services (USDHHS). The health effects of active smoking: A report of the Surgeon General. 2004. Washington, D.C., U.S. Government Printing Office.

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lationship with amount smoked and cigarette type. *Cancer Epidemiol Biomarkers* Prev 2006; 15(10):1799–1804.

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Senator LAUTENBERG. Thank you very much.

Dr. Henningfield, you're next, please.

STATEMENT OF JACK E. HENNINGFIELD, PH.D., VICE PRESIDENT, RESEARCH AND HEALTH POLICY, PINNEY ASSOCIATES; PROFESSOR OF BEHAVIORAL BIOLOGY, ADJUNCT, AND DIRECTOR, INNOVATORS AWARDS PROGRAM, DEPARTMENT OF PSYCHIATRY AND BEHAVIORAL SCIENCE, THE JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

Dr. HENNINGFIELD. Senator Lautenberg, thank you for the opportunity to testify.

For three decades, I have studied drug addiction and tobacco use at Johns Hopkins Medical School, the National Institute on Drug Abuse, and Pinney Associates, and I am a consultant to GlaxoSmithKline on smoking cessation medicines. I also serve the World Health Organization in its efforts to evaluate the international equivalent of FTC, which is called the ISO [International Standards Organization] Cigarette Testing Method. I provide additional detail in my written submission.

The FTC cigarette testing method does not provide accurate information about tar and nicotine exposure to cigarette smokers. It greatly underestimates inhaled amounts. Furthermore, the ratings support marketing that undermine our efforts to prevent young people from starting to smoke and from motivating smokers to quit. The problem has persisted, in part, because of the absence of public health-based regulatory oversight that would have been responsive to the warning signs over the past two decades or longer.

How did it happen? What is the path toward resolution? Let me start with the problem and how it was discovered.

I believe Americans trust product content ratings because our Nation leads the world in setting standards for truthful ingredient information for foods and drugs. This information typically communicates the maximum exposure from a product, not average exposure. When a content or delivery rating of food product or drug product is found to misrepresent the product, the established protocols can fix the problem. Every year, FDA acts on hundreds of products that are misrepresented, or, more technically, misbranded. It isn't surprising that Americans believe the FTC rating bears some relationship to health effects and exposure. Consumers, such as my own sister, do not believe that the government would allow such a scam to continue. I am a scientist in this area; I was similarly deceived in my research efforts.

This figure shows what many of us thought was a major success story in public health. In the 1960s—from the 1960s to 1980s, the FTC ratings of tar and nicotine plummeted, as rated by the FTC

Method. As intended, consumers flocked to cigarettes with lower ratings. Even scientists like me thought we could take advantage of what appeared to be a broad range of nicotine dosing systems for biological research. And then we had a hard time interpreting our results, because a lot of it didn't make sense if we were really manipulating nicotine dose to the proportion that we thought.

But the warning bells were sounded by human studies in the 1980s, by NIDA and other NIH research. In 1983, Dr. Neal Benowitz published one of the seminal studies. His studies showed that light cigarettes did not deliver less nicotine. In fact, as shown by the solid line in this figure, actual nicotine exposure was not related to FTC ratings. The dotted line shows what scientists had expected and what companies advertised and what consumers wanted: lower levels of exposure from cigarettes with the lower ratings. This problem was confirmed by FDA and acknowledged by FTC in the 1990s. In 2001, National Cancer Institute Monograph 13 came to the most devastating conclusion of all, that there is no health benefit to cigarettes with low FTC ratings.

How did it happen? FTC's intentions were good, and it is not unreasonable that they expected the rating system would help smokers reduce their tar and nicotine. FTC did not anticipate the extent to which tobacco industry would go to design cigarettes to undermine the tests and render the rating system meaningless. Also under-appreciated at the time was the power of the addictive process that motivated smokers—to more intensively smoke cigarettes, a process that we refer to as compensatory smoking.

The cigarette designs that you've already heard mentioned that circumvented the method were elaborate, but several are easily pointed out. This shows the ventilation holes which smokers cannot see on most cigarettes. They're not covered by the machines, but smokers can easily cover them with fingers and lips. There are many other design features that enable smokers to get addictive doses of nicotine, even if it means higher levels of tar, from virtually any cigarette on the market.

There is no simple fix that we could provide to FTC; in part, because cigarette designs continue to evolve. But, there is a path toward resolution, and that is to charge FDA to set standards for cigarette testing and labeling, and oversee the validity of the testing, as proposed in current legislation. FDA is the world authority in measuring dosing capacity and exposures produced by a broad range of products, including ever-changing drug delivery systems. For FDA, the scientific challenge is well understood. It has the capacity to not only fix the problem for currently marketed cigarettes, but also to prevent such a colossal and long-lasting deception to consumers from ever occurring again.

Thank you for the opportunity. I'll be pleased to do whatever I can to help.

[The prepared statement of Dr. Henningfield follows:]

PREPARED STATEMENT OF JACK E. HENNINGFIELD, PH.D., VICE PRESIDENT, RESEARCH AND HEALTH POLICY, PINNEY ASSOCIATES; PROFESSOR OF BEHAVIORAL BIOLOGY, ADJUNCT, AND DIRECTOR, INNOVATORS AWARDS PROGRAM, DEPARTMENT OF PSYCHIATRY AND BEHAVIORAL SCIENCE, THE JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

Mr. Chairman, Senator Lautenberg, and other members of the subcommittee, thank you for the opportunity to testify. For three decades, I have studied drug addiction and tobacco use at Johns Hopkins Medical School, the National Institute on Drug Abuse, and Pinney Associates. I serve on the World Health Organization Study Group on Tobacco Product Regulation and advise its Tobacco Laboratory Network and the Conference of Parties guiding implementation of the Framework Convention ("Treaty") on Tobacco Control on the measurement and communication of tobacco product contents and emissions. Through Pinney Associates I consult to GlaxoSmithKline on smoking cessation medications; I have a financial interest in a smoking cessation medicine that is under development; and, I have testified on these topics in litigation brought against the tobacco industry by the U.S. Department of Justice and other plaintiffs.

My work is also supported by the Robert Wood Johnson Foundation Innovators Awards Program at The Johns Hopkins University School of Medicine. I speak on my own behalf and am not representing any of these organizations in my testimony today.

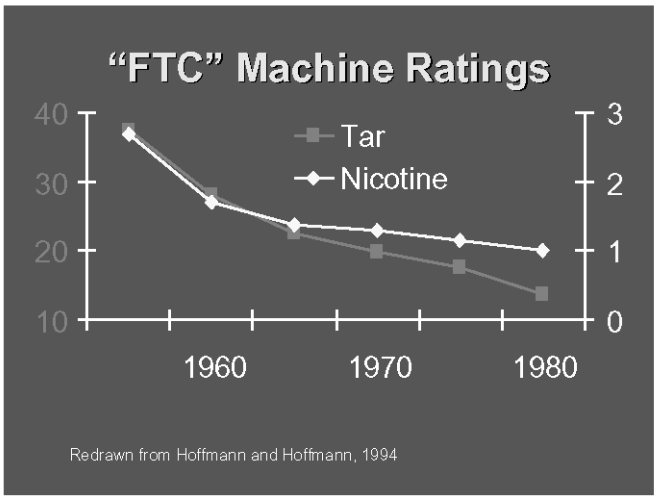
My testimony is focused on the problems with the FTC Method and the science base for its elucidation and resolution.

The FTC Cigarette Testing Method does not provide accurate information about tar and nicotine exposure to cigarette smokers and, in fact, greatly underestimates the inhaled amounts. Furthermore, the ratings support marketing that undermines our efforts to prevent young people from starting to smoke and to motivate smokers to quit.

This problem has persisted in part because of the absence of public health-based regulatory oversight that would have been responsive to warning signs over the past two decades. How did it happen? What is the path toward resolution? I will start with the problem and how it was discovered.

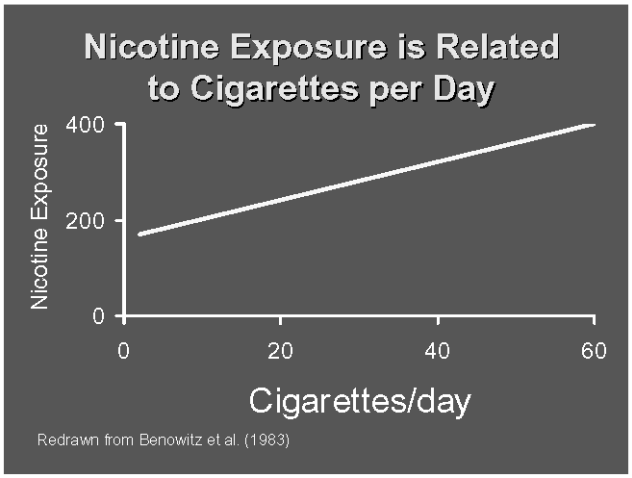
The Problem

I believe Americans trust product content ratings because our Nation leads the world in setting standards for truthful ingredient information for foods and drugs. This information typically communicates maximum exposure from a product. When content or delivery ratings are found to misrepresent the product, established protocols can fix the problem. Every year, FDA acts on hundreds of products that are misrepresented or more technically—"misbranded". It isn't surprising that Americans believe the FTC rating bears some relationship to health effects and exposure. Consumers, such as my own sister, do not believe the government would allow a scam like this to go on.

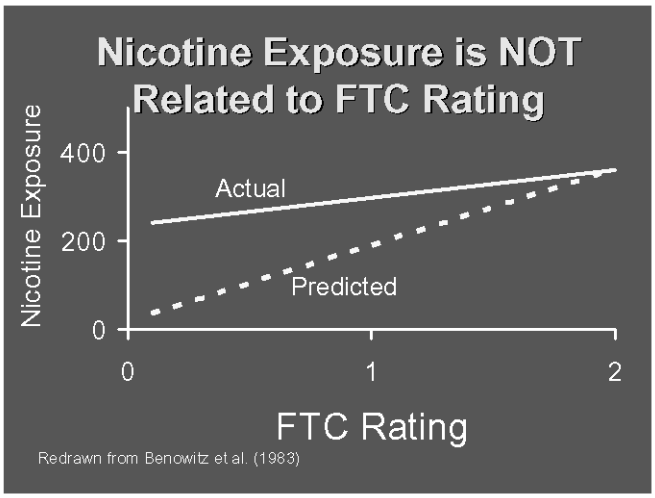


This figure shows what many of us thought was a major success story in public health: the 1960s to 1980s plummeting of tar and nicotine levels in cigarettes as rated by the FTC Method (figure modified from Hoffman and Hoffman, 1994). As intended, consumers flocked to cigarettes with lower ratings. Even scientists like me thought we could take advantage of what appeared to be the broad range of nicotine dosing systems for biological research. Of course, we knew the ratings did not precisely predict exposure but we expected that the ratings were meaningfully related to human exposure.

The warning bells sounded in the 1980s by NIH researchers. In 1983, Dr. Neal Benowitz and his colleagues (1983) published one of the seminal studies. His study showed that light cigarettes did not deliver less nicotine. This figure (estimated from plasma cotinine levels) shows that nicotine exposure is directly related to number of cigarettes smoked.



The second figure from the Benowitz study revealed the problem. The dotted line shows what scientists had expected based on FTC testing: namely that there would be lower levels of exposure from cigarettes with lower ratings. However, the solid line reveals that actual exposure was *not* related to FTC rating.



Unfortunately, consumers not only reasonably believe that their exposure to tar and nicotine will be less from cigarettes with lower FTC Method deliveries, they be-

lieve that health risks of cigarettes are lower in proportion to tar and nicotine reductions. For example, Kozlowski and Pillitteri (2001) reported the results of a national telephone survey which showed that for many cigarette smokers an important factor in smoking light cigarettes was the belief that they could reduce the risks of smoking without having to quit. They also cited previously secret tobacco industry documents which revealed that this was the intent of the industry in their design and marketing approach that enabled them to "reassure smokers, to keep them in the franchise as long as possible." Responses to survey questions about the number of light cigarettes that would need to be smoked to get the same amount of tar as from a regular cigarette indicated that about 90 percent of the respondents held "mistaken beliefs regarding the distinctions between machine based *yields* of tar and actual tar *intake*."

These consumer misperceptions were further explored by Cummings and colleagues (2004) in a telephone survey of cigarette smokers. They found that only 12 percent of smokers correctly understood that you could get as much tar from a single light cigarette as from a regular cigarette, and a third or more smokers believed that high tar cigarettes were twice as likely to cause disease as low tar cigarettes.

A further complication in the accuracy and potential misapplication of FTC Method testing is that as meaningless as the results are for widely marketed "conventional" cigarettes, FTC has never even developed testing protocols for modified cigarettes and novel cigarette substitutes that are under development and in early stages of marketing. For example, Shiffman and colleagues (2003) found that one cigarette substitute, marketed with tar and claims based on the tobacco companies own modification of the FTC Method has led to serious misperceptions among smokers such as one in four believing that Eclipse is a completely safe alternative to conventional cigarettes, with highest levels of interest in people who had been contemplating quitting smoking. Even more startling was that 15 percent of young adults who had quit smoking for at least 2 years were interested in using Eclipse. There are many other modified tobacco products in various stages of marketing and development, as described by Hatsukami and colleagues (2004, 2005), and these pose emerging problems of even greater complexity to testing and communications than conventional cigarettes.

These problems were confirmed by FDA and acknowledged by FTC in the 1990s. In 2001, National Cancer Institute Monograph 13 came to the most devastating conclusion of all: there is no health benefit to cigarettes marketed as "light" and "low tar".

How Did it Happen?

FTC's intentions were good and it was probably not unreasonable for the agency to expect that the rating system would help smokers reduce their tar and nicotine exposures as advocated by the Surgeon General, *and* would provide incentives for companies to develop lower-yielding cigarettes (Wilkenfeld *et al.,* 2000). FTC did not anticipate the extent to which the tobacco industry would go to design cigarettes to undermine the test and render the rating system meaningless with respect to actual intake and health effects. Also under-appreciated at the time was the power of the addictive process that motivated cigarette smokers to more intensively smoke cigarettes that delivered lower yields per puff ("compensatory smoking").

The cigarette designs that circumvented the method were elaborate, but several are easily pointed out. Vent holes dilute the smoke in FTC machines, but do not do so when covered by the fingers and lips of smokers. There are many other tricks employed in the deception and these include the use of various chemicals to alter burning properties and nicotine delivery as well as other physical design features that are discussed in National Cancer Institute Monographs 7 and 13. For example, the machine stops smoking 3 mm before reaching the overwrap connecting the filter to the tobacco column and so does not test all the tobacco. Not surprising, this overwrap became larger when FTC testing started. Accelerant chemicals are added so that the cigarette would burn faster and, therefore, the relatively slow-puffing machines would measure lower tar and nicotine. The mix of design features used to cheat the FTC test method varies across cigarettes and appear to be continuing to evolve. Until the testing is in place under authority of an agency with the experience to evaluate drug and toxin delivery and empowered to demand information about the designs and their consequences, scientists and consumers alike will remain in the dark with respect actual deliveries and associated health effects.

The recent and emerging problems with respect to emerging generations of modified cigarette products, such as those involving carbon heating systems, electronic ignition, and novel filtration, is occurring because there is presently no regulatory oversight mechanism in place with expertise to develop and validate new testing

methods. In the vacuum, the tobacco companies are adopting their own variations on the existing FTC Method.

Path Towards Resolution

There is no simple fix that we could provide to FTC, in part, because, cigarette designs continue to evolve. But there is a path toward resolution and that is to charge FDA to set standards for cigarette testing and labeling and oversee the validity of the testing, as proposed in current legislation intended to give FDA authority over tobacco products.

FDA is the world authority in measuring dosing capacity and exposures produced by a broad range of products, including ever-changing drug delivery systems. It would be capable of developing and validating accurate methods for testing and communicating the results for current cigarette products as well as for the emerging generations of modified cigarettes and cigarette substitutes. For FDA, this scientific challenge is well understood. It has the capacity to not only fix the problem with respect to currently marketed cigarettes but also to prevent such a colossal and long-lasting deception of consumers and impediment to public health from ever occurring again.

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Senator LAUTENBERG. Thank you very much.

Dr. Goldberg?

STATEMENT OF MARVIN E. GOLDBERG, PH.D., IRVING & IRENE BARD PROFESSOR OF MARKETING, SMEAL COLLEGE OF BUSINESS, PENN STATE UNIVERSITY

Dr. GOLDBERG. Thank you, Senator Lautenberg, I'm pleased to be here to testify.

My consideration is that of advertising and promotion. From the 1950s, when filter tips were introduced, until 2006, the tobacco industry has spent roughly $235 billion, in 2006 dollars, on advertising and promotion for cigarettes. That's over $10 million a day. In the last year, 2005, that we have data for, over $13.5 billion were spent. That's over $37 million every day for that year.

What do you get, or what does the tobacco industry get, for that? It gets imagery, over the decades, that is pounded into our, and especially youth's, heads, of vital, energetic, attractive people smoking what seems to be a pretty neutral product. The images of death and disease are far removed. It also buys, more latterly, tremendous positioning in the stores; in particular, convenience stores, where 60 percent of all cigarettes are sold. Not coincidentally—for 90 percent of the cigarette smokers that start before they're 18 years—not coincidentally, teenagers spend twice as much time in convenience stores, hanging out, as adults do. It buys positioning, it buys very significant advertising as the displays—colorful displays represent. The teenagers talk about what they see, and convince one another. The industry then says, "It's not us, it's the kids talking about it and convincing each other." That's what we call, today, "viral marketing." The virus is introduced—by the industry, however. It's the heavy, targeted advertising. And then the viral introducer says, "I'm not part of this. It's kids influencing kids." Well, viral marketing—viral marketers understand that process.

From 1967 to 1998, when we have the data from the FTC, if you look at the percentage of advertising that was allocated by the companies to light cigarettes—advertising for light cigarettes—and compare that to the sales for light cigarettes—what percentage did they represent?—we see that this was push marketing. It's not that the consumer sat out there and said, "I want this product," it was pushed upon them. For example, in 1979, less than 30 percent of sales revenues to the tobacco industry came from light cigarettes, but almost 50 percent of their advertising dollars went to advertising of light cigarettes; 50 *versus* less than 30. They pushed this on the market.

The main motivation that people have for smoking, as we've heard before, light cigarettes is the health issue. The tobacco industry recognizes that through their internal documents. When we

have done studies on this, people look to less tar, less nicotine, less risk. About four out of five smokers say they smoke light cigarettes because of health reasons.

We tried to develop a radio message, and when we developed it, we talked to focus groups to set up the actual script. We couldn't get people to believe that one light cigarette equaled one regular cigarette. We had to use a small white lie in our script. We said something like, "Smoking a light cigarette is sort of like jumping off the 15th story of a building instead of the 20th story of the building." That little white lie, they could kind of buy. Today, people believe you need to smoke two or three light cigarettes to get the equivalent of a regular cigarette.

The tobacco industry does something much better than tell you the cigarettes are healthier, they use a kind of syllogistic reasoning, "Tar is unhealthy, we know that. Light cigarettes have less tar. *Ergo,* light cigarettes are healthier." The tobacco industry knows, as lawyers know, when you get the person you're trying to persuade to draw the conclusion themselves, you've done a better job at persuading. They've persuaded themselves that it must be true.

Today, the R.J. Reynolds website reads, "An individual's level of risk for serious disease is significantly affected by the type of tobacco product used." In other words, you can smoke a light cigarette, and you'll still be OK. What does Philip Morris say? "There's no safe cigarette." If you think carefully about that, it means, logically, there can be a "safer" cigarette.

I'll stop here.

Thank you.

[The prepared statement of Dr. Goldberg follows:]

PREPARED STATEMENT OF MARVIN E. GOLDBERG, PH.D., IRVING & IRENE BARD PROFESSOR OF MARKETING, SMEAL COLLEGE OF BUSINESS, PENN STATE UNIVERSITY

The development of the market for light cigarettes was not driven by consumer demand or "pull," but rather "pushed" by the tobacco firms' heavy marketing and promotion outlays and enabled by the deceptive messages regarding light cigarettes' ostensible health benefits.

Smokers did not naturally gravitate to the experience of smoking low tar cigarettes. This was not a "pull" marketing phenomenon, where consumer demand drove sales, but rather a "push" phenomenon that was developed and shaped by the industry as a function of its deceptive claims for light cigarettes. Advertising and promotion for the light category drove the process with campaigns that continue to make the case through imagery and otherwise that smokers of light cigarettes are attractive, healthy and vigorous people engaging in attractive vigorous activities; (illness and disease are far removed from these scenes).

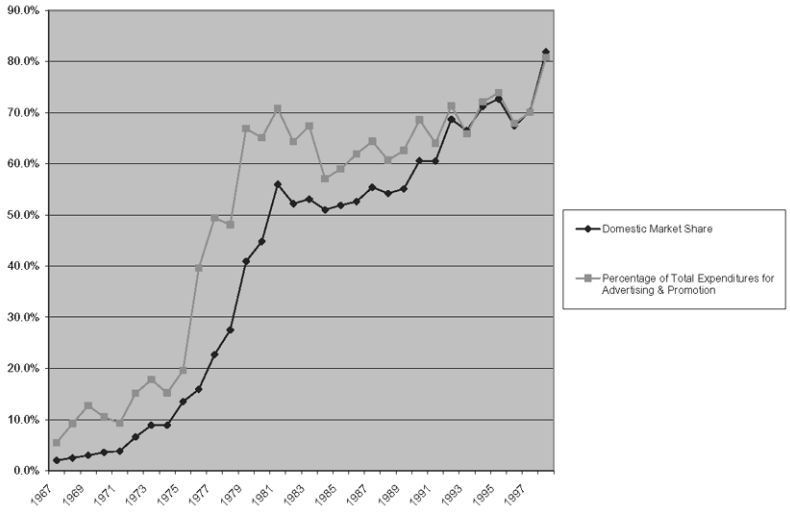
From the 1950s (when the focus was on filters that ostensibly reduced tar levels) until 2006, the industry spent an estimated $235 billion (in 2006 dollars) on advertising and promotion for cigarettes; (data drawn from Federal Trade Commission; FTC 2007; figures for years prior to 1970, 1971 through 1974, and 2006 are estimates). In 2005, the last year for which figures are available, the industry spent over $13.5 billion—about $37 million per day—on advertising and promoting cigarettes; (FTC 2007).

The figure below illustrates: (1) the trend with regard to the percentage of the tobacco industry's advertising and promotion dollars that were allocated annually to light cigarettes from 1967 to 1998 the years that the FTC reported this data in their annual report on cigarettes (FTC 2000) and (2) the annual percentage of total cigarette sales represented by light cigarettes. As may be noted, "Light" cigarettes (defined as less than 15 mg. tar) came to dominate both categories.

Also evident in the figure below—until the 1990s, the percentage of dollars allocated to advertising and promotion for the light cigarette category exceeded their

share of market. In effect, the industry was investing in and driving the growth of this category. Ultimately, by the 1990s, given a "ceiling effect" (there is only so high that both percentages could realistically go) the two sets of percentages became more closely aligned.

Share of Market for Light Cigarettes & Percentage of Marketing Expenditures devoted to Light Cigarettes*



*FTC 2000; The figure follows these trends only until 1998, because the 2000 FTC report --for data from 1998-- was the last report that documented the percentage of the industry's sales and promotion dollars allocated to light cigarettes.

As a parallel part of their advertising and promotion strategies, the tobacco industry has shaped "viral marketing" campaigns to ensure the success and popularity of light cigarettes.

The tobacco industry has long understood how advertising and interpersonal influence combine to influence the individual smoker or potential smoker. The process starts with the intense advertising and promotion on the part of the industry. In the second step in this process, the message conveyed in the advertising is relayed by individuals as part of the "bandwagon" effect. This process has recently been labeled "virus or viral" marketing.

> . . . [T]he future belongs to marketers who establish a foundation and process where interested people can market to *each other*. Ignite consumer networks and then get out of the way and let them talk;" (Godin 2001, p.15; emphasis in the original).

Advertising and promotion serve to initiate discussion by both "opinion leaders" and their "followers" who touch base with one another to assess the merits of what they have seen/heard. In this "multi-step flow" of information those around us can and do influence us, but *this influence comes as a consequence of the advertising and promotion to which we are exposed* (Assael 2004). While an industry like the tobacco industry can try and point to the interpersonal influence process (people influencing people) it cannot absolve itself of the ultimate responsibility for the popularity, sales and consumption of the products they promote. As shown in the figure above, the tobacco industry chose to "push market" light cigarettes by investing heavily in advertising and promotion to ensure the growth of this segment. With the dollars they spent, together with the promise of reduced health risks, they succeeded in gaining the smoking public's attention for lights—and their purchase dollars. The "bandwagon" proved to be unstoppable, with the light cigarette category steadily increasing its share of market to the point where it currently accounts for the vast proportion of sales.

In sum, it is important to recognize that this process, where a particular brand or a particular product category (such as lights) gains popularity as a function of

person-to-person influence does not stand by itself. It is not an independent and competing source of influence, but properly understood as an integral part of the tobacco industry's global marketing process—their efforts to saturate society with misleading messages about cigarettes. By "igniting consumer networks" among peers, and co-opting the dynamics of person-to-person influence for their own commercial purposes, the companies need not be concerned with whether any particular person saw or was exposed to any particular advertisement. The tobacco companies understand that their massive marketing campaigns are akin to a "virus" where ". . . the advertiser creates an environment in which the idea can replicate and spread. It's the virus that does the work, not the marketer" (Godin 2001; p. 26). In this way, the tobacco industry's advertising and promotion efforts are causally linked to smokers' and potential smokers' actions and choices.

Internal corporate documents make it clear that the tobacco companies have long known that the health issue has been the main motivation for smokers to switch to lower tar/light brands.

Consider the statements below from internal documents of Brown and Williamson, Philip Morris, R.J. Reynolds and Lorillard:

> Those who smoked their current brand for less than a year switched for health purposes—to reduce the tar and nicotine level instead of quitting (Brown & Williamson 1977).
>
> The largest group of all [brand switchers are] those who are convinced that smoking is dangerous to their health and who are torn between a conscience that urges them to quit and a hedonistic desire to continue to do something they enjoy.
>
> The very fact, then, that a smoker has decided to switch from a full-flavor cigarette to a low-delivery cigarette tells us something very important about him: he is concerned about his health, and he is willing to do something about it; (Philip Morris 1978).
>
> As low-yield brands become more popular among adults . . . modeling behavior may lead adolescents to smoke them as well. Furthermore, such brands may become considered "safer", thus leading teenagers to pay less attention to public health campaigns designed to discourage initiation; (R.J. Reynolds 1980).
>
> Most smokers . . . do not really understand what tar and nicotine are, or the difference between the two. "Tar and nicotine" is a term commonly used as a single word. . . . Those who smoke low tar and nicotine cigarettes generally do so because they believe such cigarettes are "better for you"—there is less tar and nicotine to do long-term damage; (Lorillard 1976).

Research has confirmed the conclusions drawn by tobacco industry executives as cited above: the factor leading smokers to low tar/lights is that they believe these cigarettes are "'better for you.'"

Research has documented the salience of health factors in guiding smokers who switch to light cigarettes. Below I discuss two relevant studies in which I was second author: Kozlowski *et al.,* (1998) and Kozlowski *et al.,* (1999). Kozlowski et al (1998) reported on the following question posed to those who smoked light cigarettes: "I'm going to ask you about reasons some people might give for smoking Light . . . cigarettes. For each one please tell me whether it is one of your reasons for smoking Light . . . cigarettes" Five options were then read to the respondent: one of the options, taste, was discussed above; the remaining four involved ways that smokers of lights might believe that their cigarette held a health-related benefit: "step to quitting," "less risk," "less tar," "less nicotine." When the last three of the listed risk factors ("less risk," "less tar," "less nicotine,") were analyzed together, only 24 percent of the respondents failed to select at least one of these three options; in other words 76 percent answered affirmatively to at least one of the health-related benefits (as reported on p. 13). If one adds to this those who only selected the "step to quitting," the percentage would no doubt climb beyond 80 percent; (while many, if not most smokers, are motivated to quit by health concerns, the "quitting" response was not part of this health-related benefits analysis).

The same logic applies to the second of the studies I worked on with Kozlowski. (Kozlowski *et al.,* 1999). Smokers of light cigarettes were asked to indicate which of four reasons they had for smoking lights; (they could select more than one of the reasons). While a separate analysis was not conducted, with 52 percent citing "reduce tar/nicotine" and 35 percent and 38 percent citing "step toward quitting" and "reduce risk" respectively, the percentage citing at least one of these factors would likely climb to 80 percent and beyond. ("Taste," the fourth reason is discussed fully below).

First hand evidence also documents how successful Philip Morris and the rest of the tobacco industry have been in persuading smokers of low tar/light cigarettes are healthier.

It should be noted that the actual purpose of the Kozlowski *et al.* (1999) study was to develop and assess the effectiveness of a "radio" message informing smokers about the true risk associated with smoking light cigarettes. In the formative steps leading to the development of the "radio" message, earlier drafts of the script were presented to focus groups consisting of smokers. These drafts tried to argue that there was "no difference" between light and regular cigarettes of light cigarettes. While the final version still took this approach, the smokers' reluctance to accept this argument led to the added statement that if there was any difference, it was a meaningless one; (smoking light cigarettes instead of regulars is "Kind of like jumping off a 15-story building instead of a 20-story building"). This is evidence of how successful tobacco marketers have been in convincing smokers that there *is* a health benefit associated with lights; stating that there was *no difference* in the risks associated with smoking lights *versus* regulars was so contrary to the views expressed in the focus groups, we had to "bend" the truth so as to ultimately be able to persuade smokers of light cigarettes.

The tobacco industry has pointed to ostensibly conflicting data, arguing that these data demonstrate that smokers don't believe low tar/light cigarettes are healthier and they choose lights for reasons other than health concerns.

The industry has pointed to ostensibly conflicting data, arguing that these data demonstrate that smokers choose lights for reasons other than health concerns; for example, a 1975 survey by the U.S. Department of Health, Education & Welfare found that 40.6 percent of current smokers believed that all cigarettes are probably about equally dangerous." In 1975, the share of market for light cigarettes (below 15 mg tar) was under 10 percent. As a result, the vast proportion of those defined as smokers in this survey would have been smokers of regular cigarettes. It is not at all surprising that smokers of regular cigarettes would attempt to justify their own smoking choice, thereby reducing the psychological discomfort/dissonance that would result from acknowledging that their choice (regulars) might be "wrong" and more harmful.

Further explaining this phenomenon was the fact that when first introduced, Light cigarettes were considered relatively tasteless. As acknowledged by the tobacco industry as recently as April 21, 2005 (transcript of Trial Record, *United States of America, Department of Justice, Plaintiff* v. *Philip Morris USA et al., Defendants*) when low-tar cigarettes were introduced, the tobacco companies recognized that their taste was aversive—it was hardly seen as selling point for the light cigarette category.

> It took a long time for low-tar cigarettes to ever really catch on in this country. . . . [The industry believed that] these products will taste different, and unless the public health community gives, gives people a reason to smoke them [*i.e.,* "it's better for your health"], I don't think they're going to be successful; (p. 19670).

As such, they did not represent much of an alternative for smokers of regular cigarettes, despite the fact that held out the (false) hope of a "safer" cigarette; (as discussed below, this problem was eventually "fixed" with the advent of lights that yielded considerably more tar). Without shifting to lights as a way of reducing their cognitive dissonance, smokers of regular cigarettes had to take a different path to reduce their dissonance; to do so they developed "protective" attitudes. If one can't change one's behavior and there are clearly negative aspects of that behavior, then changing one's attitudes toward the behavior in question is typically how one attempts to reduce the dissonance (Festinger 1957; Cohen and Kassarjian 1965). Given this psychological dynamic, it is not surprising that 40.6 percent responded that that "all cigarettes are about equally dangerous." Unwilling to shift to the tasteless lights, yet uncomfortable in the belief that lights were in some way "better/safer," it is somewhat surprising that the 40.6 percent figure was not still higher. Evidently, the "message" of light cigarettes' supposed health benefits was hard to ignore, for many of these regular smokers, notwithstanding the cognitive dissonance it generated.

More recently, a study by Schiffman *et al.,* (2001) sampled over 2,120 smokers in a national telephone survey. Of these, 816 were smokers of light cigarettes. Fully 80 percent of the respondents believed that one had to smoke 2, 3 or more light cigarettes in order to get the same levels of tar delivery as in a regular cigarette. Since tar is typically regarded as a health-risk, 4 of 5 consumers conclude that the less

of it, as in a light cigarette, the safer the cigarette. The evidence I present below strongly disputes that mistaken view.

As part of their extensive advertising and promotion campaign for more than a half-century, the tobacco industry have promoted a type of ***syllogistic reasoning*** that encourages smokers of light/low tar cigarettes to believe they are at less risk.

For over half a century, smokers have been led to believe that a cigarette that tastes "milder" and is "less irritating" must be better for them. As one example, 67 percent agree that "lights are smoother on the throat and chest." Since smokers cannot know from simply examining a cigarette whether it is healthier than others or not, they need to rely on what they believe is indirect evidence (proxies); smooth and mild serve as such proxies. The syllogism goes: if mildness means less throat irritation, and less throat irritation means—in some way—a healthier cigarette, then mild, light cigarettes must be better for health.

Similarly, if lights are said to have less tar/nicotine, and if it is understood that tar/nicotine have negative health consequences, the smoker is led syllogistically to the conclusion that Lights must be better for health; (less of the "bad stuff"). The senior tobacco executives have engaged in these syllogisms and they believed their customers did as well. Consider the following responses by senior tobacco industry executives:

> Q. In terms of tar delivery, is there a health benefit between a twelve milligram cigarette and an eight milligram cigarette?
> A. My position is that less is better than more. I believe that if a person smokes a cigarette and receives 8 milligrams of tar, that is better than smoking a cigarette and receiving 12 milligrams of tar.
>
> Written Direct testimony of Susan Ivey, CEO of R.J. Reynolds, *United States* v. *Philip Morris,* 2005 (82:12–20).

> My understanding is I think, *pretty common* that . . . low tar is better than high tar . . . there have been characteristics associated with tar that are believed to be linked to health issues, and lower tar is better than higher tar.
>
> Deposition of Ronald Bernstein, CEO of Liggett group, (in *United States* v. *Philip Morris,* 2002 (35:4–36:9; emphasis added).

> If something is—is identified as—as being potentially harmful, having less of it would seemingly be better.
>
> Deposition of Ronald Bernstein in *United States* v. *Philip Morris,* 2002 (25:19–26:5).

> Q. Don't you think that many people wanted low tar cigarettes because they were led to believe that low tar cigarettes were less dangerous to their health than high tar cigarettes?
> A. That may be a perception among some smokers . . . less is best in all kinds of products, product categories.
>
> Donald Johnston, former CEO of American Tobacco in *Broin* v. *Philip Morris,* 1994 (62:4–13).

Importantly, in this type of syllogistic reasoning, where the conclusion is self-generated, consumers effectively persuade themselves and this process generates more favorable, stronger, more actionable brand attitudes—attitudes that translate into actual purchase decisions. Consumers are more likely to remember the message and have greater confidence in the brand attitude they have developed. These brand attitudes are likely to be more resistant to counter-persuasion (Kardes 1999; Heimbach and Jacoby 1972; Moore *et al.,* 1986). In sum, this indirect, syllogistic approach, is *more* persuasive relative to directly putting forth the (false) conclusion that "low tar/nicotine cigarettes are healthier for you." As expressed in a report prepared for Brown and Williamson: ". . . the [advertising] copy should be ambiguous enough to allow the reader to fill-in his/her illogical-logic . . ." (Marketing and Research Counselors, Inc. 1975, pp. 12–13).

Internal tobacco company documents further indicate that while the Barclay brand may have done a better job in allowing for smoker "compensation" than its competitors, the others in the industry also developed cigarettes that allowed for compensation; (Kozlowski 2005).

As internal documents reveal, the tobacco industry recognized that it would be by allowing actual tar yields to increase that the cigarettes would come closer to tasting like regular cigarettes, and so gain in popularity. One way in which this was done was through "micro-vents" found on the filters of most cigarettes. Research has documented that most smokers are not aware of the micro-vents or of their effects. The micro-vents are inadvertently (or sometimes intentionally) covered/blocked by

the fingers/lips of smokers. This blocking has the effect of reducing the ventilation and increasing the levels of tar and nicotine the smoker receives. In a national survey, two-thirds (66 percent) of smokers of light cigarettes were either unaware of the vents or did not understand that vent blocking increased their exposure to tar.

A carefully documented example of this type of compensation was the development of the cigarette "Barclay" and the reaction to it (Kozlowski *et al.,* 2005). In the design of the cigarette, not just the manufacturer of Barclay, but competitors as well, considered the compensation principle. In the Philip Morris documents cited below, the company acknowledged the compensation/tar/flavor link and also indicated that they sought to replicate the process.

> Product smokes differently in smoker's mouth than in dental dam of smoking machine. Smoker's lips close channels (grooves) between tipping paper and filter lowering dilution and resulting in higher tar delivery; Meyer L.F. (1980; Philip Morris document).
>
> This filter design results in some unusual delivery characteristics when smoked by a human that do not occur during machine smoking. . . . The dilution decrease to the [human] smoker results in substantially higher tar delivery than would be the case of a conventionally diluted all CA [cellulose acetate] filter . . . *Subjective impressions by flavor development have corroborated the higher tar estimates . . . filter process development to either duplicate or simulate the Barclay effect is in progress.* Houck W.G. (1980; Philip Morris Document; emphasis added).

The tobacco industry sought to take advantage of the multiple ways in which smokers' compensation alters the real tar yields for smokers as compared to machine-generated tar yields.

Consider the following statements in internal corporate documents from R.J. Reynolds, Lorillard and Philip Morris:

> . . . [S]ome people change their smoking habits and attempt to compensate for lower 'tar' and nicotine deliveries, for example, by taking larger puffs, more puffs, or smoking more cigarettes; R.J. Reynolds 1978.
>
> . . .[S]mokers tend to deviate more from the standard (of the FTC machine test] . . . with highly ventilated, low [tar/nicotine] yield brands. These kind of cigarettes generally . . . make it easy to expend some extra puffing effort; Lorillard 1981.
>
> The smoker data collected in this study are in agreement with results found in other project studies. The panelists smoked the cigarettes according to physical properties; *i.e.,* the dilution and the lower RTD of Marlboro Lights caused the smokers to take larger puffs on that cigarette than on Marlboro 85's. The larger puffs, in turn, increased the delivery of Marlboro Lights proportionally. In effect, the Marlboro 85 smokers in this study did not achieve any reduction in smoke intake by smoking a cigarette (Marlboro Lights) normally considered low in delivery; (Philip Morris 1975).

Promoting light cigarettes as extensions of major brands and aligning them with the mother brand (e.g., Marlboros, Marlboro Lights), helped shaped smokers' perceptions of their taste.

At the same time as they developed light cigarettes that allowed for compensation, the tobacco companies learned how to boost the *perceived* strength of the taste, by using their advertising to shape the images associated with Lights. The companies viewed the taste dimension much as a "Rorschach ink blot test." Light cigarette smokers could be induced to see/taste in the cigarettes what the companies wanted them to see/taste.

> . . . [I]t is almost impossible to know if the taste smokers talk about is something which they, themselves attribute to a cigarette or just a "play-back" of some advertising messages;" (Marketing and Research Counselors, Inc, 1975, p. 2).

The industry further understood that they could "borrow" some of the brand equity established for their primary (regular) brands such as Marlboro Reds ad Camels for the benefit of the light cigarettes. They did so by creating brand extensions—Marlboro Lights, Camel Lights etc. and using the same advertising themes and imagery that had been so successful to shape the imagery associated with the light extensions. That this strategy could affect smokers perceptions of the light cigarettes *taste,* is recognized in their internal documents.

> . . . [O]ther free standing low tar brands such as Kent, Vantage, Carlton, etc. were perceived to be weaker and have less taste than the line extension low tars: like Marlboro Lights, Winston Lights, Camel Lights. Apparently these line extension low tars *share the taste heritage* of their parent full flavor brands; (Philip Morris 1990, pp. 13–14; emphasis added).

When R.J. Reynolds sought to develop a low yield cigarette in 1976, they recognized the image problem associated with low-yield cigarettes and set out to address it:

> What we want is to portray the feeling and image projected by Marlboro and Kool advertising on a Vantage/Merit type of cigarette. In other words, put "balls" (two of them) on a low "tar" and nicotine cigarette and position; Hind *et al.,* 1976, p. 63.

The tobacco industry has acknowledged that the taste of regular cigarettes hardly serves as a positive benchmark.

One needs to question whether the "standard" for taste set by regular cigarettes is such that the taste of regular cigarettes is a positive feature? Are regular cigarettes inherently "tasty?" Internal documents indicate that the tobacco companies believed that the initial taste for (typically underage) starter smokers was aversive and sought to take measures to compensate for this. As early as 1959, a Philip Morris document focused on "mildness" as a strategy for attracting young starters: "we also should win more young non-smokers with mildness;" (memo from W.H. Danker to R. N. DuPuis May 28, 1959). With nearly nine in ten smokers starting before age 18 and more than half of these smoking regularly by 18 (Lynch and Bonnie 1994; USDHHS 1994), it is clear that "young non-smokers" was referring to those under 18.

In 1974, R.J. Reynolds considered flavored cigarettes as a way of masking the tobacco taste. A meeting at the R.J. Reynolds offices resulted in a memo titled "New Products." Under the authorship of J. Donati of Taitham-Laird & Rudner, an R.J. Reynolds advertising agency, the memo served to define a "Cigarette Designed for Beginning Smokers."

> This cigarette would be low in irritation and possibly *contain an added flavor to make it easier for those who have never smoked to acquire the taste for it more quickly;* (J. Donati (1974; emphasis added)).

After considering flavors including "citrus, apple, grape, herbs and spices, cola, coffee, chocolate and hickory" the options for further work were narrowed to cola, coffee and chocolate. Today R.J. Reynolds markets flavors like "Mocha Taboo" and "Midnight Berry" through its "Kool" brand. This strategy would suggest that the company believes that the taste of tobacco is best when masked.

The tobacco industry has advanced the "taste" of low tar/lights cigarettes as the primary reason they are chosen by smokers. When questioned about the role of this false and illusory dimension of low tar/light smokers' responses are often misleading.

When smokers are asked why they smoke light cigarettes, significant numbers may respond that it is because of the "taste." This is understandable—they first experience the cigarette on their tongue and in their mouth—the most apparent locus of taste. But research tells us that "taste" is a good deal more than what we experience on our tongue. Twenty years ago, the Coca Cola company was concerned about losing market share among young cola drinkers to Pepsi Cola. Research suggested that younger consumers appeared to prefer the slightly sweeter taste of Pepsi. In response, Coca Cola developed a sweeter version of their product and proceeded to extensively test market it in blind taste tests across the country. Repeatedly and reliably *in blind taste tests,* consumers indicated that they preferred the sweeter version to the regular Coke. With that evidence in hand, Coke introduced "New Coke" with the new, sweeter formula. What happened next was shocking to Coke. Once the product they were drinking was *labeled* Coke, that knowledge impacted how they evaluated what they tasted—now they hated it. Within 3 months Coke had retreated and was pushing its original formula "Classic" Coke again (Fournier 1999; rev. 2001).

That taste is, at least in part, a function of how products are portrayed/labeled and advertised has been carefully researched in the context of "field" experiments with foods. In one such experiment, the same lunch meals were sold in a university faculty cafeteria but were labeled differently on different days. For example, on some days one such meal was identified as "Succulent Italian Seafood filet" but on other days merely as "Seafood Filet." Those who bought and ate the foods when they were described in an embellished way reported that: the foods were more appealing

to the eye; *they tasted significantly better;* and after eating the meal they food felt more "comfortably full and satisfied;" (Wansink *et al.,* 2004).

Interestingly, when desserts were labeled "healthy" (*e.g.,* "chocolate pudding vs. "healthy chocolate pudding; apple crisp vs. healthy apple crisp). they were rated as tastier. The researchers reasoned, that as long as the dessert actually tasted good, consumers' initially lower expectations regarding something labeled "healthy" would be disconfirmed; that is, they would have been surprised by the good taste. Pleasantly surprised, the unexpected contrast between their actual and expected experience would have led them to evaluate the taste of the dessert more positively than someone who had seen the dessert label without the adjective "healthy;" (Wansink *et al.,* 2004b).

Smokers of regular cigarettes who switched to what they perceived to be "healthier," light cigarettes, would have had a parallel disconfirming experience. These smokers would have expected light cigarettes to yield less taste (along with less tar). However, given the compensatory smoking behavior described above, light cigarettes yielded just as much tar/taste. As a result, the pleasantly surprised light cigarette smokers were quick to focus on the taste as the apparent motivation for smoking lights.

As with the food experiments cited above, if questioned, smokers are almost certainly not going to be aware of how the label "light" (and hence the inference "healthier") influence their perceptions of the cigarette's taste. They revert to the more proximal evidence—what they believe they experience—on their tongues—and their answer as to why they smoke the cigarette they do smoke may reflect that logic.

In two court cases where both Philip Morris and R.J. Reynolds sued Loews/Lorillard, it was evident that these tobacco companies do not believe that smokers are primarily guided by taste in selecting light cigarettes.

The plaintiff firms, Philip Morris and R.J. Reynolds argued that in a comparative taste test, smokers reported that the Lorillard low tar brand tasted better than the comparison brand *only if they were first told that Lorillard's brand had lower tar than either the R.J. Reynolds or the Philip Morris comparison brand.* When (other) smokers made the same comparative taste test without being reminded of the relative tar levels, their taste preferences were very different.

The basis of both suits was the approach taken in two parallel Lorillard surveys asking smokers to compare the taste of its low tar "Triumph" to R.J. Reynolds' Winston Lights and to Philip Morris' Merit. Subsequent Lorillard advertising claimed that the preponderance of the smokers tested appeared to prefer the taste of Triumph over Winston Lights and that it was the "National Taste Test Winner" over Merit. Both plaintiffs Philip Morris and R.J. Reynolds argued that these claims were deceptive inasmuch as the taste question posed in each survey had, as a preface, a reminder of the lower tar scores for Triumph relative to those for Winston Light and for Merit. Each of the plaintiff companies ran a test of their own, where the tar scores for the two brands were not revealed and the resulting taste preferences in their research were very different.

These comparisons suggest how much of what is ostensibly labeled as "taste" is influenced by other factors; in this case, the salience of how "light"/low tar a cigarette might be. In effect, the plaintiff firms acknowledge that where smokers are reminded of tar yields, *the relative tar levels and not taste* are the determining factors in the smokers' evaluations of the cigarettes; (*R.J. Reynolds Tobacco Company, Plaintiff,* v. *Loew's Theatres, Inc;* No. 80 Civ 4197 (RWS) United States District Court for the Southern District of New York; 511 F. Supp. 867; 1980 U.S. Dist. LEXIS 16738; 210 U.S.P.Q. (BNA) 291; October 24, 1980; *Philip Morris Incorporated, Plaintiff,* v. *Loew's Theatres, Inc.,* No. 80 Civ. 4082 (RWS) United States District Court for the Southern District of New York; 511 F. Supp. 855; 1980 U.S. Dist. LEXIS 12554 July 26, 1980).

Of course, for decades the tobacco companies have used low tar/lightness as a critical way of selling cigarettes and have made that dimension very salient for smokers. Following the logic presented above, it is reasonable to expect that when respondents are asked, they may say that "taste" is the reason they prefer light/low tar cigarettes. Note, however, that following the logic of the two court cases discussed above, the causal sequence is, in fact, reversed. In actuality, it is because their cigarettes are light (and advertising and promotion continue to make that dimension salient) that smokers say they prefer the taste. They would not say so for the same cigarette, if its "lightness" was not made salient.

The tobacco industry has misleadingly used lighter colors (whites and pastels) on the cigarette packages and in their advertising to persuade smokers that low tar/light cigarettes were purer and healthier.

Because consumers often cannot directly judge the merits of a product claim, they develop heuristics or "rules of thumb" which involve relying on "proxies" for the real evidence they are seeking. For example, consider how difficult it is to judge how "fresh" fish in a supermarket is. Supermarket executives have come to realize that for some consumers, fish sitting on a styrofoam tray represents a proxy conveying "not fresh," while fish sitting on ice represents a proxy conveying "fresh."

It is for the same reason that the tobacco industry has signaled the lighter, milder and ostensibly purer and safer features of light cigarettes, by using lighter colors in their advertising and on their packaging. Tobacco firms have been consistent and strategic in developing this tactic. Consider the following statements (as cited in the National Cancer Institute's Monograph 13, p. 217) by Philip Morris and the British American Tobacco Co. respectively:

> . . . [W]hen Marlboro Lights was first introduced in 1971 . . . the advertising was dramatically different . . . first using water color executions, then big pack sots, a lot of white space and a small cowboy visual. (Philip Morris 1990, p. 6).
>
> Light-lighter-lightest were achieved by insistance [sic] on lighter presentations-product story imagery—white packs—pale colours—mildness dominated copy. (British American Tobacco Company, circa 1985, p. 13).

A number of other examples of this strategy are cited in Chapter 7 of Monograph 13, including the Philip Morris, Parliament campaign where models were consistently dressed in all white and placed in all white environments (National Cancer Instititute; Monograph 13, p. 218). As Koten (1980; cited in Monograph 13 on p. 218) concludes:

> Red packs connote strong flavor, green packs connote coolness or menthol and white packs suggest that a cigarette [sic] is low-tar. White means sanitary and safe. And if you put a low-tar cigarette [sic] in a red package, people say it tastes stronger than the same cigarette [sic] packaged in white. (Koten, 1980, p. 22).

More broadly, to ask people to provide *reasons for their behavior*; i.e., *why* they do what they do is to ask them to play the role of social scientist in explaining their behavior; research has shown that is a very risky endeavor. People develop "theories" as to why they behave as they do and use both these theories and the most proximal evidence in support of these theories, to explain their behavior. Sometimes these theories and evidence are accurate, but very often they are not. One reason they are often incorrect is that people tend to use evidence that is proximal and are less alert/sensitive to more subtle, complex and distal causes of their behavior (Nisbett and Ross 1980). Thus when asked about the taste of the dessert, those in the cafeteria focus on their taste buds and are not likely to be sensitive to the influence of the "healthy" label placed on the dessert on the cafeteria line and on the resulting effect of their positive reaction. When asked about why they smoke light cigarettes, smokers focus on the proximate evidence—their taste buds; they are much less aware of how the label "light" subtly influences their attitudes and behaviors, as well as their compensatory smoking behavior (as described above).

Still today, the industry is not forthcoming about the risks of smoking light cigarettes.

It is only recently that R.J. Reynolds has come to curtly acknowledge that "Smoking causes serious disease" (R.J. Reynolds website; accessed Aug. 26, 2007). However, the website goes on to provide the (would be) smoker with considerable "wiggle room" to justify (continued) smoking:

> An individual's level of risk for serious disease is significantly affected by the type of tobacco product used as well as the manner and "frequency of use;" (R.J. Reynolds website; accessed August 26, 2007).

In effect, smokers are still encouraged to search for a safer "type of tobacco product"—most typically a "light" one. Alternatively, they are encouraged to alter their "manner of . . . use." The latter suggestion runs directly contrary (as discussed below) to the widely accepted "compensation" smoking behavior which smokers of light cigarettes use.

The Philip Morris website is more expansive in ostensibly accepting the public health position regarding the risks of smoking any cigarette:

> Philip Morris USA agrees with the overwhelming medical and scientific consensus that cigarette smoking causes lung cancer, heart disease, emphysema and other serious diseases in smokers. Smokers are far more likely to develop serious diseases, like lung cancer, than non-smokers. *There is no safe cigarette*. . . . Philip Morris USA agrees with the overwhelming medical and scientific consensus that cigarette smoking is addictive. It can be very difficult to quit smoking, but this should not deter smokers who want to quit from trying to do so; (emphasis added) Philip Morris website, accessed August 26, 2007).
>
> To reduce the health effects of smoking, the best thing to do is to quit; public health authorities do not endorse either smoking fewer cigarettes or switching to lower tar and nicotine brands as a satisfactory way of reducing risk. (Philip Morris USA website, accessed August 26, 2007).

While Philip Morris gives voice to the public health community's view that lower tar and nicotine (light) brands do not reduce the risk of smoking, the company is careful not to endorse that view. Further, as has been noted (Kozlowski 2005), to say there is "no safe cigarette" still allows the smoker to take false comfort in the mistaken belief that light cigarettes may be "safer."

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Senator LAUTENBERG. Thank you very much.

Dr. Goldberg, your testimony reflects what I think is the most obvious, and I asked in a couple of earlier questions, and I thank you.

Mr. Sheller?

STATEMENT OF STEPHEN A. SHELLER, ESQ., FOUNDER AND MANAGING PARTNER, SHELLER, P.C.

Mr. SHELLER. Yes. Thank you, Senator Lautenberg.

And I'm sort of sad and angry at the FTC; I'll be frank with you. You know, I've practiced law for more than 40 years, and I'm here to tell you about the effects of the FTC's failure to do its job. And I want to just bring to your attention two Federal judges who have reviewed this.

One Federal judge once phrased it this way, "The tobacco industry may be the king of concealment and disinformation."

And Judge Kessler, in—Gladys Kessler—in *U.S.* v. *Philip Morris,* declared the Philip Morris companies to be racketeers. Racketeers. That's a quote. She said, "Even as they engaged in a campaign to market and promote filtered and low-tar cigarettes as less harmful than conventional ones, defendants either lacked evidence to substantiate their claims or knew them to be false." She goes on to say, "There is an overwhelming consensus in the public health and scientific community, both here and abroad, that low-tar cigarettes offer no health benefit to smokers, have not reduced the risk of lung cancer and heart disease, and, for smokers using them, have not produced any decrease in the incidence of lung cancer. Moreover, because of the misleading nature of the advertising for low-tar cigarettes, smokers who might have quit have refrained from doing so, in the belief that such cigarettes reduce their health risk." She didn't just make that up, she heard the evidence for months; for months.

Now, what has happened in litigation? You know, I've been practicing law for some 40 years now. And, Senator Lautenberg, you recall, back in early 1998, your aide, Dan Katz, tried to do something about this. And I sent you the evidence I had personally collected from the depositions I had done that established, even within the company, they believed it to be a fraud; even within the companies.

Now, what has happened today? I'll tell you what's happened today. We have 40 lawsuits that have been filed involving the light-cigarette scam in class actions in 22 different states. There are certified—meaning they're grouped together—class actions pending in Massachusetts, Missouri, and New York. However, the industry has used the FTC's—and I'll call it "clear misconduct"—they are like—either it's intentional or they are like—what's that famous

children's nursery rhyme? I think it was called—I forget her name now—Rip Van Winkle. Rip Van Winkle. In fact, I would have hoped that the Director of the FTC would have been the one to testify, because I was going to call her Mrs. Rip Van Winkle. They have had the audacity to come before you today and told you they knew about this for years, but they don't want to do anything about it. The reason they don't want to do anything about it, I'll tell you, because the tobacco industry is using this vehicle of their laziness and incompetence, on the level of a Katrina or worse, government incompetence, to give them a defense. They go into court and say, "Well, the FTC has been regulating us for years." In fact, there was an even an FTC witness—his name escapes me for the moment, but I think it was Peter—Dr. Peterman—John Peterman—worked for the FTC from 1976 to 1993. He came in to court rooms—and I was involved, as you know, in the Illinois $10 billion verdict. Again, a judge found them guilty of all kinds of terrible things. That got reversed by the Supreme Court of Illinois, based on the FTC's supposed regulation of the industry.

Now, they come here today with the purpose of telling you, "We're going to do something someday, but we want to see what else is better." The time—the buck has stopped. You must issue a—legislation—because they won't do anything—you must immediately legislate a ban on tar and nicotine levels being monitored, period. They're—the tobacco industry, by the way, has machines which are called "human mimic smoking machines." They know what the real numbers could be. But I add something to you today. All tar is not equal. There are different tars coming out of those cigarettes; depends on the burn level. I know the chemistry quite well, I've learned it over the years. The other element of it is—that is very, very important—is, they have gone into court and used these guys as their defense. It's a disgrace. It shouldn't be accepted.

So, I ask you to move quickly and listen to what two judges—Federal judges—have already said. One called them the worst example—the king of disinformation. Another called them racketeers. What else do you need? And the FTC sits there? I think it's time that you really began to take action.

Thank you.

[The prepared statement of Mr. Sheller follows:]

PREPARED STATEMENT OF STEPHEN A. SHELLER, ESQ., FOUNDER AND MANAGING PARTNER, SHELLER, P.C.

Good afternoon. I have practiced law for more than 40 years. In that time, I have initiated many lawsuits involving medical malpractice, toxic torts, medical device and drug product and complex catastrophic personal injuries. For the past 13 years, I have also dedicated a substantial portion of my practice to litigation involving the cigarette companies. While, as one Federal judge once phrased it, "the tobacco industry may be the king of concealment and disinformation,"[1] the so-called light cigarette fraud is the most shameless example of outright fraud by this industry I have yet to encounter.

I have researched industry practices around light cigarettes and have worked with a number of attorneys around the country to file consumer fraud class actions against the cigarette manufacturers that seek compensation for customers who bought these cigarettes that were sold and marketed as "light," but were, in fact, not really lower in tar or nicotine and certainly were not any less hazardous than so-called "full flavor" brands. This is accomplished by designing the cigarette to cre-

[1] *Haines* v. *Liggett Group, Inc.,* 140 F.R.D. 681 (D.N.J. 1992). The judge was H. Lee Sarokin.

ate misleading readings on puff machines using a technique for measuring tar and nicotine known as the FTC Method.

The principal allegation in light cigarette lawsuits is that cigarette manufacturers have misled consumers by marketing light and low tar cigarettes as having less tar and nicotine than other brands, even though the actual exposure levels are no different. Those who smoked (and continue to smoke) light cigarettes, reasonably believing they were being exposed to less tar or nicotine, are seeking court-ordered damages for their losses. I believe that there have been about 40 lawsuits filed in 22 different states on the light cigarette issue. Certified class actions are pending in Massachusetts, Missouri, and New York at this time.

In fact, there is good reason to believe so called, "light, smooth, mild" cigarettes are potentially more dangerous to ones health than "full flavor" cigarettes.

An important key to uncovering the light cigarette fraud was Monograph 13 released by the National Cancer Institute in 2001.[2] That monograph concludes that "cigarette manufacturers recognized the inherent deception of advertising that offered cigarettes as light [and] . . . as having the lowest tar and nicotine yields . . ." but went ahead anyway with that advertising. Shortly after the release of the monograph, it was announced that the FTC asked for guidance from DHHS to determine whether the FTC testing method could be improved and a working group was to convene in 2002, but I am unaware of any outcomes from this request for guidance.[3] The FTC appears to have gone to sleep as Rip Van Winkle did in the famous children's story and clearly needs Congress to wake them up.

What has been happening in these lawsuits is that the cigarette companies have been using the lack of clarity around regulation of testing accuracy and the regulatory role of the FTC in two distinct and important ways:

1. The cigarette companies claim that the use of the terms "light" and "lowered tar and nicotine" are regulated by the FTC and, therefore, state consumer protection laws' exemption for federally regulated products defeats our state law claims of fraud. In the only light cigarette class action to go to trial, a verdict against Philip Morris for around $10 billion dollars was reversed by the Illinois Supreme Court in a 4–3 decision.

That Court relied largely on a 1971 Consent Order with American Tobacco Company over the marketing campaign for the Pall Mall Gold 100's and Lucky Filters that required American tobacco to print tar and nicotine comparisons with other brands for advertising that claimed these 2 brands of cigarettes were low, lower, or reduced in tar than other brands. This one consent order dealing with one company's ad campaign hardly constitutes FTC adoption of a trade regulation or even a regulatory approach to the use of the terms "light" and "lowered tar and nicotine" which are at the heart of the light cigarette fraud. Nonetheless, this argument is being raised repeatedly by cigarette industry defendants in ongoing litigation.

2. The cigarette companies have, until this summer, removed light cigarette class action lawsuits from state to Federal courts under the ruse that the companies are acting as agents under a Federal officer and are, therefore, entitled to a Federal court venue under the Federal Officer Removal Statute.[4] This argument, while absurd on its face, was successful in several cases and created expense, delay, and, most importantly, the assumption that the companies were simply following the regulatory requirements set down by the FTC around their products and should be immune to any claims of fraud. Ultimately, this argument was defeated by the U.S. Supreme Court on June 11 of this year in a unanimous decision[5] that echoed the conclusion of the Solicitor General that the FTC has not asserted control over the marketing of light cigarettes.

Court Remedies

The courts in many jurisdictions either refuse to certify a class, or reverse the certification of a class in the appellate courts, thereby sanctifying the tobacco industry's misconduct and allowing them to continue this misconduct as we sit here. A solution is to consider legislation requiring that these cases be handled and certified as class actions, to encourage attorneys to take on what would ordinarily be a lawsuit on

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[2] Nat'l Cancer Inst., *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine*, SMOKING AND TOBACCO CONTROL MONOGRAPH 13, NAT'L INST. OF HEALTH (Donald Shopland, David Burns, *et al.,* eds., 2001).

[3] *See* NCI's "Questions and Answers on Monograph 13" at Question 7, viewed at *http://www.cancer.gov/newscenter/monograph13-QA/print?page=&keyword=*.

[4] U.S.C. sec. 1442(a)(1).

[5] *Watson, et al.,* v. *Philip Morris Companies, Inc.,* 551 U.S.____The (2007).

behalf of one individual with a very small damage claim. The tobacco industry knows that if a lawsuit cannot go forward as a class this will be the death knell of consumer claims. In addition, any money not claimed by consumers that is paid as part of a class action award by the tobacco industry, should be contributed to a *cy pres* fund.

This enormous fraud on the American people must stop. Federal legislation is needed to protect consumers from the cigarette industry's practices with their "light" brands and defrauded consumers should have the right to be compensated for their loss. I think that U.S. District Judge Gladys Kessler got it right when she ruled last year that the cigarette companies were racketeers in *U.S.* v. *Philip Morris.* About the light cigarette fraud, she said:

> "Even as they engaged in a campaign to market and promote filtered and low tar cigarettes as less harmful than conventional ones, Defendants either lacked evidence to substantiate their claims or knew them to be false".[6]

She goes on to say:

> "There is an overwhelming consensus in the public health and scientific community, both here and abroad, that low tar cigarettes offer no health benefit to smokers, have not reduced the risk of lung cancer and heart disease for smokers using them, and have not produced any decrease in the incidence of lung cancer. Moreover, because of the misleading nature of the advertising for low tar cigarettes, smokers who might have quit have refrained from doing so in the belief that such cigarettes reduced their health risks".

Thank you for taking up this important issue.

Senator LAUTENBERG. Thank you very much. The—I admire the candor that shows up here. And I don't want to show any bias; that's not Senator-like.

[Laughter.]

Senator LAUTENBERG. But I also don't like the fact that somehow or other, over 400,000 people a year die of smoking-related disease. And so, when I think about the anguish and the grief that occurs and the impact on people's ability to function as they live, as a result of having had a career in smoking, I'll call it, and then the cost for their unhealthiness is distributed among the population and runs close to $89 billion a year for that. It's a terrible thing to witness.

Dr. Samet, I think you said that switching to light/low-tar cigarettes doesn't cause fewer—well, let me not put words in your mouth. Does switching to light and low-tar cigarettes actually cause fewer people to quit smoking?

Dr. SAMET. So, the concern is, the—does the availability of products that are perceived as carrying a lower risk lead to switching? And I think that has been demonstrated to be the case for some proportion of smokers. The concern is that people might move to a lower-yield product instead of doing what they should do, which is to quit. And there is some evidence to suggest that that can be the case.

Senator LAUTENBERG. I think I noted, in some information, that people who had actually quit smoking for some time had come back to smoking, based on the attraction that low-tar offered, at least in advertising. Do we have any information, any of you, of that happening?

Dr. HENNINGFIELD. People are constantly coming back to smoking, for a lot of reasons. The information that we do have is that, when there are surveys, such as national telephone-based surveys,

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[6] *United States* v. *Philip Morris USA, Inc.,* 449 F. Supp. 2d 1 (D.D.C. 2006) at 430.

asking people what would attract them to smoking or coming back to smoking, what is attractive to people are cigarettes that appear to be safer. And this has been very scary, from a public health perspective, because when someone has quit, they're on the road to health, and it's terrible, the idea that they might be lured back to smoking, thinking that the products are substantially safer or flat-out safe.

Senator LAUTENBERG. Remind us, how long have the tobacco companies been aware of the smoker compensation, the period of time when smokers take longer, deeper puffs to compensate for lower amounts of nicotine?

Dr. HENNINGFIELD. A number of us have looked at the documents. I testified in the Department of Justice trial. And, since at least the 1970s, if not decades before, the companies understood that these cigarettes delivered more than advertised.

Mr. SHELLER. It's——

Senator LAUTENBERG. Mr. Sheller, do you have——

Mr. SHELLER. Yes. Actually, it was before the consent decree in 1970 that they were so happy to—no decree—voluntary agreement to use this deceitful trick. They were well aware of it, and they just decided, "Oh, it would be great," as it's now another way that they've avoided responsibility.

But you have the documents, actually, which were given in 1986—as the discovery we did. We—you know, they knew all about it. It's in evidence. And time has—as I said, it's no longer the FTC's turn. They've fumbled the ball. You know, your committee has to have oversight of them. They had the audacity to come in here today and tell you, "We've—we may do something soon, when we get—we're not expert in it, we don't know what we're doing. We need help from this one and that one." That's been their story for years. Put an end to it, please.

Senator LAUTENBERG. In earlier testimony regarding smoking and its cost, we found out that the awareness of the tobacco companies about the lethality of the product they were selling and the addiction went back to the—I believe it was the middle 1930s when that information first was made available.

Mr. SHELLER. Yes.

Senator LAUTENBERG. And, Dr. Henningfield, when switching to light cigarettes, are those smokers conscious of the fact that they're breathing deeper, that they're working harder to fulfill the need they feel to get the nicotine in their systems?

Dr. HENNINGFIELD. Actually, to the contrary, a lot of people believe that they are actually inhaling something less toxic, because it is smoother and cooler. In other words, the cigarette, which may be as deadly or more deadly, actually feels smoother and cooler by using chemicals like menthol, by using ventilation to cool the smoke. It's like putting a lot of alcohol in a fruit beverage. And so people are deceived in many different ways; and then, with the marketing, of course.

Mr. SHELLER. Yes, I've called it strawberry syrup on strychnine. Poison.

Senator LAUTENBERG. It sounds mild, in your description.

Dr. GOLDBERG. We actually have data that two-thirds of smokers either don't know about the microvents or don't know that they contribute to the amount of tar that they get.

Senator LAUTENBERG. Why are cigarettes allowed to use the word "light" without having any light benefit? Isn't that simply deceiving consumers while the government looks the other way, Dr. Henningfield?

Dr. HENNINGFIELD. Well, I think it reflects the problem—I think that cigarette regulation by the Federal Trade Commission is not their area of competence. I do not believe that the problem was intentional. But this sort of regulation is bread and butter to agencies, like the Food and Drug Administration, which set standards for light products. And if you look at the food rule from the early 1990s, you see specific criteria for use of the term "light." You see them saying, "you can't use the term 'ultra light,' because it's not meaningful." Then there are specific standards. Most of the cigarette companies sell other products, or the major ones do, they sell Kraft cheese, for example, that is "light." That cheese has to meet certain standards that are objective.

Senator LAUTENBERG. The—my folks were able to dig out some packs of cigarettes I—I don't know whether you're—all of you are aware, but we were able to persuade the—Rules Committee to ban the sale of cigarettes throughout the Capitol. And it's just taking place. And, if anything, it seemed kind of backward. Here we are, preaching the gospel, and downstairs they're selling the tools for addiction. And so, we are—that—as of, I think, it's the first of the year, that they will no longer be available. There are sales now—and I'm not advertising—of cigarettes at lower prices to clear out the inventory.

But all of these facts—and I don't mean to pick up out any of them—but the reference is, "Surgeon General's Warning: Cigarette smoke contains carbon monoxide." Now, wouldn't you think that would scare the devil out of those people who are buying cigarettes? Carbon monoxide? Say you can get that from your car if you—well, if you want to end—we have different packages. This one is—they give it a number on this package—this is called Camel number 9. It is a beautiful package, but carrying almost a lethal message. Here, they're more specific, "Surgeon General's Warning: Smoking causes lung cancer, heart disease, emphysema, and may complicate pregnancies." This one really—Mr. Sheller, you managed to, I think, get some justifiable anger about what we see, but here's this ad. It says, "Camels, light and luscious." Now——

Mr. SHELLER. You should see what they mail my daughter at home. I have a daughter who's at Temple University, finishing up this year as—becoming a special-ed teacher. And, because she's over 21, somehow or other they found her. She doesn't smoke, but we get things in the mail—I've been saving them—that are mind-boggling from the cigarette companies.

Senator LAUTENBERG. Well, we're—we've learned a lot, but we haven't yet learned enough. And I'm hoping that we can use the knowledge that we've gained here today, with your help, to really do something about this.

Dr. GOLDBERG. Senator, if I could, in response—when you say things like, "There are awful things like carbon monoxide," et

cetera, we often think of this dispassionate person to whom the message is addressed. And, as you've said, this is—you know, there is a wonderful study that shows, when you show a Harvard/Yale football game, way back in the 1950s, to Harvard and Yale people, they each tell you that the other side was terrible, in terms of the penalties and infractions. They're committed to a particular perspective. Well, smokers are, too. They're very committed. They're addicted. And so, we're not talking about a reasonable person dispassionately considering the information.

Senator LAUTENBERG. How about—we all remember when a doctor was advertised as preferring one cigarette to another.

Mr. SHELLER. Oh, yes. With a white coat.

Senator LAUTENBERG. I thank you all for your testimony. We're going to adjourn this hearing.

And I note, Mr. Sheller, that your admonition that Congress should act swiftly——

Mr. SHELLER. Yes.

Senator LAUTENBERG.—to stop allowing companies to make light and low-tar claims based on the FTC Method, we'll look at that very closely.

Mr. SHELLER. Thank you——

Senator LAUTENBERG. With that——

Mr. SHELLER.—Senator Lautenberg.

Senator LAUTENBERG.—this hearing is adjourned. And, once again, thank you all.

[Whereupon, at 3:59 p.m., the hearing was adjourned.]

A P P E N D I X

PREPARED STATEMENT OF HON. PAMELA JONES HARBOUR, COMMISSIONER, FEDERAL TRADE COMMISSION

Today, the Commission approves testimony to be presented on November 13, 2007 before the Senate Committee on Commerce, Science, and Transportation concerning the Federal Trade Commission's Tar and Nicotine Rating System. I concur in the decision to present testimony providing an overview of the FTC's responsibilities and activities in the area of tobacco advertising and a discussion of cigarette testing and the promotion of cigarettes based on machine-measured tar and nicotine yields. I also concur in the Commission's recommendation that Congress consider giving authority over cigarette testing to one of the Federal Government's science-based public health agencies.

However, I would also recommend that steps be taken to prohibit the use of any claims based on the Cambridge Filter Method—also known as "FTC Method"—for testing tar and nicotine. *See* the attached May 10, 2007 letter to the Hon. Frank R. Lautenberg. The tobacco industry has known for decades that the FTC Method does not accurately measure the amount of tar and nicotine a person consumes from a cigarette. Prohibiting the use of claims based on the FTC Method would remove the FTC's apparent imprimatur from cigarette labels and ads.

FEDERAL TRADE COMMISSION
Washington, DC, May 10, 2007

Hon. FRANK R. LAUTENBERG,
U.S. Senate,
Washington, DC.

Dear Senator Lautenberg:

I send this letter to express my support for S. 625, the Family Smoking Prevention and Tobacco Control Act.[1] The bill creates a reasonable framework to oversee the manufacture, sale, advertising, and marketing of tobacco products. Notably, the bill includes several key consumer protection measures.

First, the bill allows the Food and Drug Administration to regulate tobacco products. This is a critical starting point. The FDA has lacked adequate authority in this area for decades, and tobacco manufacturers have exploited the void. The bill authorizes FDA scientists to track, analyze, and regulate the components of tobacco products. At last, the FDA will have more effective tools to protect the public's health.

Second, the bill properly assigns—to manufacturers themselves—the burden of substantiating "modified risk" claims, such as "light," "low tar." and "reduced exposure." Consumers' choices are influenced by these claims. If a manufacturer says that its tobacco product poses a reduced risk, the manufacturer should be required to substantiate the claim with competent evidence that can be evaluated by scientists. This bill will compel manufacturers of tobacco products to provide scientific data, which will enable scientists to scrutinize modified-risk claims and determine whether the claims can be made responsibly.

The bill gives the FDA authority to establish new testing procedures and disclosures about tar and nicotine. However, an additional provision is needed to ensure that consumers receive accurate information about tar and nicotine levels. Thus, the bill should prohibit the use of any claims based on the so-called "FTC Method." Such a provision would be similar to the prohibition in your bill, S. 3872. The tobacco industry has known for decades that the FTC Method does not accurately measure the amount of tar and nicotine a person consumes from a cigarette. Since 1999, the

[1] This letter reflects my own views. It does not purport to represent the views of the Commission or any other Commissioner.

FTC has publicly stated its concerns about the Method's accuracy. It distresses me that a small number of cigarette manufacturers still invoke the name of the FTC when claiming low tar and nicotine content. By prohibiting the use of claims based on the FTC Method, the bill would remove the FTC's apparent imprimatur from cigarette labels and ads.

Third, the bill appropriately preserves coordination between the FTC and the FDA in enforcing labeling and marketing requirements, particularly as they relate to children. This kind of enforcement is a core element of the FTC' s consumer protection mission. The bill wisely preserves the FTC's jurisdiction over unfair or deceptive cigarette advertising. I am especially pleased that advertising in violation of the proposed Act also will be deemed a violation of a rule promulgated under Section 18 of the FTC Act. Civil penalty authority is an important tool in the FTC's enforcement arsenal. By enabling the FTC to seek civil penalties immediately when a violation of the proposed Act is found, the Act will further enhance the agency's authority to stop misleading and youth-oriented advertising.

I thank you for your leadership in sponsoring the bipartisan Family Smoking Prevention and Tobacco Control Act. The regulation of the manufacture, sale, advertising, and marketing of tobacco products is a tall order, but it is crucial for the health of our country, particularly its young people. I hope that action on the bill will advance the dialogue and push Federal health agencies to step up to the plate on this issue.

Please contact me if I may provide any assistance to you as the bill moves forward.

Sincerely,

PAMELA JONES HARBOUR,
Commissioner.

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EFFECT OF TELEVISED, TOBACCO COMPANY-FUNDED SMOKING PREVENTION ADVERTISING ON YOUTH SMOKING-RELATED BELIEFS, INTENTIONS, AND BEHAVIOR

by Melanie Wakefield, Ph.D., Yvonne Terry-McElrath, M.S.A, Sherry Emery, Ph.D., Henry Saffer, Ph.D., Frank J. Chaloupka, Ph.D., Glen Szczypka, B.A., Brian Flay, Ph.D., Patrick M. O'Malley, Ph.D., Lloyd D. Johnston, Ph.D.

Objective. To relate exposure to televised youth smoking prevention advertising to youths' smoking beliefs, intentions, and behaviors.

Methods. We obtained commercial television ratings data from 75 U.S. media markets, and to determine the average youth exposure to tobacco company youth-targeted and parent-targeted smoking prevention advertising. We merged these data with nationally representative school-based survey data (n = 103,172) gathered from 1999 to 2002. Multivariate regression models controlled for individual, geographic, and tobacco policy factors, and other televised antitobacco advertising.

Results. There was little relation between exposure to tobacco company-sponsored, youth-targeted advertising and youth smoking outcomes. Among youths in grades 10 and 12, during the 4 months leading up to survey administration, each additional viewing of a tobacco company parent-targeted advertisement was, on average, associated with lower perceived harm of smoking (odds ratio [OR] = 0.93; confidence interval [CI] = 0.88, 0.98), stronger approval of smoking (OR = 1.11; CI = 1.03, 1.20), stronger intentions to smoke in the future (OR = 1.12; CI = .04, 1.21), and greater likelihood of having smoked in the past 30 days (OR = 1.12; CI = .04, 1.19).

Conclusions. Exposure to tobacco company youth-targeted smoking prevention advertising generally had no beneficial outcomes for youths. Exposure to tobacco company parent-targeted advertising may have harmful effects on youth, especially among youths in grades 10 and 12. (*Am J Public Health*. 2006; 96: 2154–2160.. doi:10.2105/AJPH.2005.083352)

The tobacco industry has actively attempted to remake its public image in response to evidence that it marketed products to youth and misled the public about smoking health risks.[1 2] This effort has included public education campaigns to communicate that youths should not smoke.[3] In December 1998, Philip Morris launched a national $100 million television campaign the company described as targeted to youths aged 10–14 years.[4] The primary message was that youths do not need to smoke to fit in socially with their peers, and the campaign delivers the slogan "Think. Don't Smoke." Although this campaign ended on U.S. television in January 2003, the ads continue to be broadcast in other countries.[5] In October 1999, and with a budget of around $13 million,[6] Lorillard Tobacco Company also launched a

U.S.-televised youth smoking prevention campaign with the slogan, "Tobacco is Whacko if You're a Teen."[4]

In mid-July 1999, Philip Morris launched a campaign that emphasized parental responsibility for talking to children about smoking; the slogan was "Talk. They'll Listen."[7] This parent-focused youth smoking prevention campaign has featured a variety of television ads and continues today. The overt message of these ads is that parents should talk to their children about not smoking.

Few studies have examined the potential affect of youth-focused tobacco company-sponsored advertising. Of those, most have only assessed immediate appraisals of the advertisements by youths,[8 9 10] or the relation between ads and attitudes thought to be predictive of smoking behavior change,[11] rather than smoking behavior itself. No studies have examined the effects of tobacco company parent-focused advertising on youth. Because advertising that may influence youth smoking has also been broadcast at various times and intensities by tobacco control programs,[12] it is a complicated matter to establish the relative influence of tobacco company-sponsored advertising.

The objective of this study was to assess the relation between exposure to tobacco company youth smoking prevention advertising and youth smoking-related beliefs, intentions, and behavior in a representative sample of American secondary school students. The study includes youth-targeted and parent-targeted advertising. The study sample included the primary target age group of the youth-targeted ads (grade 8, mean age 14 years), as well as older youths in grades 10 and 12 (mean ages 16 and 18 years, respectively). We used objective media monitoring data to measure potential exposure of youths to different sources of advertising, as opposed to self-reported measures of exposure that can be correlated with openness to change in smoking behavior.[13]

Methods

Advertising Data

Nielsen Media Research provided data on the occurrence of all smoking-related advertisements that appeared on network and cable television across the largest 75 U.S. television media market areas during 1999–2002. These 75 markets accounted for 78 percent of American viewing households.[14] A media market is defined by a group of nonoverlapping counties forming a major metropolitan area. Data are on the basis of individual ratings of television programs obtained by monitoring household audiences across media markets. Ratings provide an estimate of the percentage of households with televisions that watch a program or advertisement in a media market over a specified time interval.[15] The advertising exposure measure used in our study is based on Target Rating Points (TRPs) for the population aged 12–17 years. In these analyses, TRPs were aggregated each month; 100 TRPs are equal to an average of 1 potential advertisement exposure per month for all youth aged 12–17 years within a media market. TRPs represent potential average exposure; actual exposure for any given individual would vary on the basis of actual television viewing. In this study, all the tobacco company parent-targeted advertising was from Philip Morris. However, tobacco company youth-targeted advertising was broadcast by Philip Morris and Lorillard; Philip Morris made up 90.8 percent of the total TRPs in 1999, 93.0 percent in 2000, 85.2 percent in 2001, and 37.5 percent in 2002.

Monthly TRP data were merged with nationally representative data collected during 1999–2002 from the Monitoring the Future school survey.[16] Data were collected from February to June each year from samples of students in grades 8, 10, and 12, drawn to be representative of all students in the specified grade for the 48 contiguous states. All surveys were self-completed and group-administered in school settings.

Dependent Variables

Separate analyses were conducted for each of the following self-reported dependent variables: recall of antitobacco advertising at least weekly (1 = seeing antitobacco commercials on television or hearing them on the radio at least once a week in recent months); approval of smoking (1 = don't disapprove of people smoking ≥ 1 pack a day (grades 8 and 10), or don't disapprove of people (aged 18 years or older) smoking ≥ 1 pack a day (grade 12); perceived enjoyment of life by smokers (1 = no disagreement with the statement that smokers know how to enjoy life more than nonsmokers); preference for dating nonsmokers (1 = no preference for dating nonsmokers); perceived exaggeration of smoking harm (1 = no disagreement with the statement that the harmful effects of smoking have been exaggerated); perception that being a smoker reflects poor judgment (1 = do not agree that being a smoker reflects poor judgment); perception that smoking is a dirty habit (1 = do not agree

that smoking is a dirty habit); perceived harm of smoking (1 = believe people risk "great harm" to themselves by smoking ≥ 1 pack of cigarettes a day); intentions to be smoking in 5 years time (0 = definitely will not be smoking cigarettes in 5 years; 1 = other[17]); smoking in the past 30 days (1 = any cigarette smoking in the past 30 days); and consumption among current smokers, as measured by a 6-point scale: less than 1 cigarette/day (0.5), 1–5 cigarettes/day (3.0), about .5 pack/day (10), about 1 pack/day (20), about 1.5 pack/day (30), and 2 or more packs/day (40). The natural log of this scale was used in all models.[18]

The school survey randomly allocates students to several different forms of survey questionnaires to maximize the number of questions asked of students. Although all students are asked about smoking behavior (current smoking and consumption), only some forms contain questions on recall of advertising, and smoking-related attitudes and intentions. For this reason, different numbers of students respond to each outcome measure. The total number of students included in each model is specified in table footnotes.

Independent Variables

Advertising exposure for each student was calculated to reflect the cumulative effect of repeated potential exposure to tobacco industry advertising and gave greater weight to more recent exposure.[19-21] Thus, in analyses, individual student potential exposure to tobacco industry advertising was reflected by the sum of TRPs for the month in which the school survey was completed, plus the sum of depreciated TRPs from the 3 previous months. On the basis of the work of Pollay and colleagues,[21] a depreciation value of 0.3 was specified as noted in the equation.

$$(1)\ \mathrm{Adstock}_t = \mathrm{Ad}_t + \lambda \mathrm{Ad}_{(t-1)} + \lambda^2 \mathrm{Ad}_{(t-2)} + \lambda^3 \mathrm{Ad}_{(t-3)}$$

where Adstock is the total effective advertising, λ is set at the specified value of 0.3 as noted above, and Ad indicates ad sponsor TRPs for time periods t, $t-1$, $t-2$, and $t-3$. A range of values for λ were examined. Because results were highly similar, λ was set at 0.3, consistent with previously published data by Emery and colleagues[22] on the effect of state tobacco control ads. The depreciated sum was scaled by dividing by 100. The resulting TRP exposure value represents the depreciated average number of times that advertising from a particular sponsor was potentially seen by 100 percent of the youth aged 12–17 years in each media market over the 4 months leading up to each specific school's date of survey participation. Thus, students within the same media market were assigned different advertising exposures, depending on the month in which their school was surveyed. However, within media markets, students in each school were assigned the same advertising exposure values, because they completed the survey on the same date. Smoking-related outcomes were modeled using continuous versions of depreciated TRPs for youth-targeted and parent-targeted advertising.

Statistical Analyses and Covariates

Our analyses used survey commands in Stata (Stata Corp, College Station, Tex) for descriptive population estimates and multivariate regression models (SVYLOGISTIC for dichotomous outcomes; SVYREG for the models of cigarette consumption using the natural log of the consumption scale). The complex multistage sample design was accounted for by using sampling weights to adjust for differential selection probabilities, and by using Taylor linearization-based variance estimators to adjust for clustering by school and compute robust standard errors.

Initially, for each type of tobacco company advertising, we tested several functional forms, including quadratic and threshold models, to explore whether the relations between exposure and outcomes were nonlinear. The linear models fit the data best, and are reported here. Thus, odds ratios refer to change in the likelihood of each outcome measure, on the basis of each additional advertisement viewed, on average, in the 4 months leading up to the date of survey administration.

For tobacco company youth-targeted advertising, we first ran models for all students combined and controlled for: (1) competing advertising exposure from 2 types of campaigns: tobacco control (including state and national American Legacy Foundation campaigns) and tobacco company parent-targeted advertising; (2) individual sociodemographics: gender, race/ethnicity, average parental education, dual parent household, grade point average, 3 or more evenings out a week for fun/recreation, past-month truancy, year, region, and student-earned income; and (3) state tobacco policy variables: average real price per pack of cigarettes[22] and a smoke-free air index measuring the comprehensiveness of state smoke-free laws. The smoke-free air index values depended on the number, type, and level of protection for smoke-free locations, and whether the state had the authority to preempt local smoke-free regulations.[22] On the basis that the primary target group of the tobacco company youth-targeted advertising was youths aged 10–14 years and that middle- (grade 8,

mean age 14 years) and high-school (grades 10 and 12, mean ages 16 and 18 years, respectively) students are at very different developmental stages, we ran separate models for grade 8 *versus* grades 10 and 12. In the model for grades 10 and 12, a dummy variable for grade 12 was also included. This analysis process was repeated to examine the relation between tobacco company parent-targeted advertising and youth smoking outcomes (with the exception that competing advertising exposure for tobacco company youth-targeted advertising was included as a covariate).

We conducted sensitivity analyses to explore the robustness of findings for outcomes of greatest concern. Because advertising and policy variables were correlated, we excluded each tobacco policy variable and tobacco control campaign exposure, to explore if observed relations changed in a systematic way. In addition, we were able to include information on student-reported frequency of television watching as a covariate in models of smoking prevalence and consumption, because these questions occurred on the same survey form as television watching questions for all 3 grades. In this set of analyses, the school survey item measured self-reported average weekday television viewing as a continuous variable (a 7-point scale ranging from 0 to 5+ hours).

Results

After retaining cases that had no missing data for covariates and at least 1 of the specified dependent variables, 103,172 students remained in the analytic sample; 36 percent were students in grade 8 and 64 percent were students in grades 10 and 12. Table 1 shows that 20.8 percent of the sample population had smoked in the last 30 days and average daily consumption for these smokers was 5.43 cigarettes.

On average, students had been exposed to 4.77 depreciated potential viewings of tobacco company youth-targeted advertising and 1.13 potential viewings of tobacco company parent-targeted advertising in the 4-month period leading up to the survey. As expected from the diverse timing and intensity of these campaigns, there was variation between students, with a range of 0 to 14.51 viewings of tobacco company youth-targeted ads, and a range of 0 to 4.13 viewings of tobacco company parent-targeted ads. There was also variation in exposure to tobacco control campaigns (mean 6.88 viewings; for state antitobacco campaigns, mean = 1.66 [range = 0–19.14]; for the American Legacy Foundation, mean = 5.23 [range = 0–21.85]).

After we controlled for covariates, increased exposure to tobacco company youth-targeted advertising among all students was generally unrelated to recall of televised anti-tobacco advertising or to smoking beliefs or behavior (Table 2). However, on average, each additional ad viewed was associated with a 3 percent stronger intention to smoke in the future (OR = 1.03; CI = 1.01, 1.05). When analyzed separately for middle- and high-school students, higher exposure to tobacco company youth-targeted advertising was unrelated to any outcome for students in grades 10 and 12. For students in grade 8, higher exposure was associated with stronger intentions to smoke in the future (OR = 1.04; CI = 1.01, 1.08). Inclusion of self-reported frequency of television watching as a covariate did not change the finding that there was no relation between increased tobacco company youth-targeted advertising and smoking in the past 30 days, or consumption among smokers. (Data for students who smoked in the past 30 days: all students OR = 0.99; CI = 0.96, 1.01; grade 8 OR = 0.99; CI = 0.95, 1.04; grades 10 and 12 OR = 0.99; CI = 0.96, 1.01. Data for consumption among smokers: all students Parameter estimate = $-.008$, $P > .05$; grade 8 Parameter estimate = $-.014$, $P > .05$; grades 10 and 12 Parameter estimate = $-.004$, $P > .05$.)

After adjusting for covariates, Table 2 shows that among all students combined, each additional tobacco industry parent-targeted ad was associated with a lower likelihood of recalling antitobacco advertising (OR = 0.87; CI = 0.82, 0.92), lower perceived harm of smoking (OR = 0.95; CI = 0.92, 1.00), stronger intentions to smoke in future (OR = 1.12; CI = 1.05, 1.19), and a greater likelihood of smoking in the past 30 days (OR = 1.10; CI = 1.03, 1.17).

Separate models for middle- and high-school students indicated that, among students in grade 8, greater tobacco company parent-targeted advertising exposure was related to lower odds of recalling antitobacco advertising (OR = 0.86; CI = 0.78, 0.94), a greater likelihood of perceiving the harms associated with smoking have been exaggerated (OR = 1.07; CI = 1.01, 1.13), and stronger intentions to smoke in the future (OR = 1.10; CI = 1.00, 1.21). Among students in grades 10 and 12, higher advertising exposure was also associated with less likelihood of recalling antitobacco advertising (OR = 0.86; CI = 0.80, 0.94), stronger approval of smoking (OR = 1.11; CI = 1.03, 1.20), lower perceived harm of smoking (OR = 0.93; CI = 0.88, 0.98), stronger intentions to smoke in future (OR = 1.12; CI = 1.04, 1.21), and a greater likelihood of smoking in the past 30 days (OR = 1.12; CI = 1.04, 1.19). Each addi-

tional ad exposure during the 4 months leading up to survey administration, on average, was associated with a 12 percent increase in the likelihood that students in grades 10 and 12 had smoked in the past 30 days.

In sensitivity analyses among students in grades 10 and 12, where relations of most concern were found, exclusion of cigarette price or strength of smoke-free air index generally did not systematically influence the relation between increasing tobacco company parent-targeted advertising and stronger approval of smoking, lower perceived harm of smoking, stronger intentions to smoke in the future, or greater likelihood of smoking in the past 30 days (Table 3). When tobacco-control ad exposure was removed, relations persisted between increasing tobacco company parent-targeted ad exposure and stronger approval of smoking as well as smoking in the past 30 days, but were weakened for perceived harm of smoking and intention to smoke in the future.

Table 1.—Sample Characteristics of Students in 8th, 10th, and 12th Grade: 1999–2002

	Weighted No.	Percentage	Mean
Independent control variables (N = 103,172) [a]			
Middle school (grade 8)		36.0	
High school (grades 10 and 12)		64.0	
Male		47.3	
Race/ethnicity			
White		71.6	
African American		12.0	
Hispanic		10.9	
Other		5.5	
Lives with both parents		75.0	
Regularly out ≥ 3 nights/wk		44.5	
Skipped or cut school in the past month		19.4	
Earned income, $			1–15/wk (median)
Parental education (range: 1–6) [b]			3.99
Average school grade (range: 1–9) [c]			6.22
Real price/pack of cigarettes, $ (range: $1.32–$2.86)			1.92
Smoke-free air index (range: −22.50–51.00)			13.15
Region			
Northeast		21.5	
Midwest		28.0	
West		18.8	
South		31.7	
Independent variables (N = 103172) [a]			
Average tobacco industry parent-targeted exposure [d] (range: 0.00– 4.13)			1.13
Average tobacco industry youth-targeted exposure [d] (range: 0.09–14.51)			4.77
Average tobacco control exposure [d] (range: 0.00–23.90)			6.88
Dependent variables [e]			
Recall antitobacco ads on TV or radio at least weekly (1 = yes)	28,768	62.4	
Approve of others/adults smoking ≥ 1 pack per day (1 = yes) [f]	65,388	22.7	
Do not prefer to date nonsmokers (1 = yes)	37,645	22.6	
Feel that smokers know how to enjoy life more than nonsmokers (1 = yes)	37,685	16.2	
Feel the harmful effects of cigarettes have been exaggerated (1 = yes)	37,240	34.2	
Do not feel that being a smoker reflects poor judgment (1 = yes)	37,343	39.6	
Do not feel that smoking is a dirty habit (1 = yes)	37,320	27.5	
Perceive great harm in smoking ≥ 1 packs/day (1 = yes)	95,952	69.6	
Intend to smoke in 5 years (1 = yes)	34,047	39.1	
Smoked in the past 30 days (1 = yes)	101,720	20.8	
Consumption frequency among current smokers (.5, 3, 10, 20, 30,40) [g]	19,581		5.43

[a] Number of students was obtained by retaining only cases with valid data for all independent control variables, and valid data on at least 1 of the specified dependent variables.

[b] Parental education was a scaled value ranging from 1 to 6, and was a combined average of mother's and father's highest level of education, where 1 = grade school or less, 2 = some high school, 3 = high school completion, 4 = some college, 5 = college completion, and 6 = graduate school.

[c] Average school grade was a 9-item scale where 1 = D and 9 = A.A mean of 6 indicates a B.

[d] Exposure to specific ads during the 4 months before the school survey. Advertising exposure data reported at the student level and not at the media market level, because students within the same media market will have different average exposures on the basis of their school survey date.

[e] Possible Ns for dependent variables varied, because not all items were asked of all students.

[f] Students in grades 8 and 10 were asked about disapproval of others' smoking; students in grade 12 were asked about disapproval of adults' smoking.

[g] Consumption was measured by a 6-point scale: less than 1 cigarette/day (0.5), 1–5 cigarettes/day (3.0), about 0.5 pack/day (10), about 1 pack/day (20), about 1.5 pack/day (30), and 2 or more packs/day (40). The natural log of this scale was used in all models.

When self-reported frequency of television watching was included as a covariate, the relation between tobacco company parent-targeted ad exposure and current smoking was unchanged for students in grade 8 (OR = 1.11; CI = 0.99, 1.25, not significant) but was strengthened among students in grades 10 and 12 (OR = 1.14; CI = 1.05, 1.25, $P < .01$). Control for television watching did not change the previously nonsignificant results for cigarette consumption (grade 8: Parameter estimate = $-.068$, $P > 0.5$; grades 10 and 12: Parameter estimate= $-.016$, $P > .05$).

In models of students in all three grade levels, higher cigarette price was associated with lower consumption among current smokers (Parameter estimate = $-.002$, SE = 0.001, $P < .05$), and stronger smoke-free laws were associated with a lower likelihood of smoking in the past 30 days (OR = 0.99; CI = 0.99, 1.00, $P = .01$ [data not shown]). In addition, consistent with previous studies,[11 22] we observed expected relations between increasing exposure to tobacco control campaign advertising and higher recall of antitobacco advertising (OR = 1.04; CI = 1.03, 1.04, $P < .001$), more protective beliefs about smoking (*e.g.,* increased perceived harm of smoking) (OR = 1.01; CI = 1.00, 1.02, $P < .01$), weakened intentions to smoke in future (OR = 0.98; CI = 0.97, 0.99, $P < .001$), and a lower likelihood of smoking in the past 30 days (OR = 0.99; CI = 0.98, 1.00, $P < .01$).

Discussion

Overall, we found no systematic associations between increased exposure to tobacco company youth-targeted smoking prevention advertising and smoking outcomes among American youths. We found that increased exposure to tobacco company parent-targeted smoking prevention advertising was associated with lower recall of antitobacco advertising and stronger intentions to smoke in the future for all students. Among students in grade 8, tobacco company parent-targeted advertising was related to stronger beliefs that the harms associated with smoking have been exaggerated, and among students in grades 10 and 12, was associated with lower perceived harm of smoking, stronger approval of smoking, and a higher likelihood of having smoked in the past 30 days. Importantly, the results for smoking prevalence among students in grades 10 and 12 were not systematically influenced by correlations between price and strength of smoke-free air laws, or tobacco control advertising exposure, although some models were less robust when tobacco control ad exposure was removed as a covariate.

Table 2.—Odds Ratios for Each Unit Increase in Number of Ads Viewed, With 95% Confidence Intervals (CIs), for Smoking-Related Beliefs and Behavior and Tobacco Industry Smoking Prevention Advertising Exposure: 1999–2002

	Exposure, all students [a]		Exposure, 8th Grade Students [b]		Exposure, 10th and 12th Grade Students [c]	
	Youth-Targeted [d]	Parent-Targeted [e]	Youth-Targeted [d]	Parent-Targeted [e]	Youth-Targeted [d]	Parent-Targeted [e]
Recall antitobacco ads on TV or radio at least weekly	1.00 (0.98, 1.02)	0.87*** (0.82, 0.92)	0.99 (0.96, 1.02)	0.86** (0.78, 0.94)	1.01 (0.98, 1.03)	0.86** (0.80, 0.94)
Approve of others/adults smoking ≥ 1 pack/day [f]	0.98 (0.95, 1.00)	1.06 (0.99, 1.13)	0.98 (0.95, 1.01)	1.03 (0.96, 1.12)	0.98 (0.96, 1.01)	1.11** (1.03, 1.20)
Do not prefer to date nonsmokers	1.00 (0.97, 1.02)	1.04 (0.97, 1.11)	1.00 (0.96, 1.04)	1.05 (0.94, 1.18)	0.99 (0.97, 1.02)	1.03 (0.96, 1.11)
Feel that smokers know how to enjoy life more than nonsmokers	1.00 (0.98, 1.03)	1.00 (0.94, 1.07)	1.02 (0.98, 1.06)	1.07 (0.96, 1.19)	0.99 (0.97, 1.02)	0.94 (0.87, 1.01)
Feel the harmful effects of cigarettes have been exaggerated	1.00 (0.98, 1.02)	1.03 (0.99, 1.08)	1.01 (0.98, 1.03)	1.07* (1.01, 1.13)	0.99 (0.96, 1.01)	0.99 (0.93, 1.06)
Do not feel that being a smoker reflects poor judgment	0.99 (0.97, 1.01)	0.99 (0.94, 1.04)	0.98 (0.95, 1.01)	1.02 (0.95, 1.09)	0.99 (0.97, 1.02)	0.96 (0.90, 1.03)
Do not feel that smoking is a dirty habit	1.00 (0.98, 1.02)	1.00 (0.94, 1.07)	1.00 (0.96, 1.03)	1.01 (0.92, 1.10)	1.01 (0.98, 1.03)	0.99 (0.91, 1.07)
Perceive great harm in smoking ≥ 1 packs/day	0.99 (0.98, 1.01)	0.95* (0.92, 1.00)	0.99 (0.97, 1.01)	0.98 (0.93, 1.04)	1.00 (0.98, 1.02)	0.93** (0.88, 0.98)
Intend to smoke in 5 years	1.03** (1.01, 1.05)	1.12** (1.05, 1.19)	1.04* (1.01, 1.08)	1.10* (1.00, 1.21)	1,.01 (0.99, 1.04)	1.12** (1.04, 1.21)
Smoked in past 30 days	0.99 (0.97, 1.01)	1.10** (1.03, 1.17)	0.99 (0.95, 1.04)	1.11 (0.99, 1.25)	0.99 (0.97, 1.01)	1.12** (1.04, 1.19)
Consumption frequency among current smokers,[g] parameter estimate (SE)	−.014; (.008)	.019 (.025)	−.014 (.015)	.069 (.044)	−.012 (.009)	.018 (.028)

Note. All models controlled for tobacco control advertising exposure, either tobacco company parent-targeted or youth-targeted advertising exposure, year, gender, race/ethnicity, earned income, average parental education, whether both parents live in the home, grade point average, evenings out, truancy, region, state cigarette price, and state smoke-free air index values. aAll students model Ns (weighted): smoked in last 30 days 101,720; perceived harm 95,952; disapproval 65 388; recall 28,768; consumption 21,138; remaining perception models range from 34,047 to 37,685.

[a] Grade 8 model Ns (weighted): smoked in last 30 days 36,382; perceived harm 36,236; disapproval 23,305; recall 12,136; consumption 4,621; remaining perception models range from 12,287 to 16,688.

[c] Grades 10 and 12 model Ns (weighted): smoked in last 30 days 65,338; perceived harm 59,716; disapproval 42,083; recall 16,632; consumption 16,517; remaining perception models range from 20,827 to 21,760. A dummy variable identifying students in grade 12 was included in these models.

[b] Tobacco company youth-targeted ads sponsored primarily by Philip Morris, and by Lorillard Tobacco Company.

[e] Tobacco company parent-targeted ads sponsored by Philip Morris.

[f] Students in grades8 and 10 asked about disapproval of others'smoking; 12th grade students asked about disapproval of adults'smoking.

[g] Consumption measured by a 6-point scale: less than 1 cigarette/day (0.5), 1–5 cigarettes/day (3.0), about 0.5 pack/day (10), about 1 pack/day (20), about 1.5 pack/day (30), and 2 or more packs/day (40). The natural log of this scale was used in all models.

*$P < .05$; **$P < .01$; ***$P < .001$.

Table 3.—Odds Ratios and 95% Confidence Intervals for Tobacco Company Parent-Targeted Advertising Exposure and Selected Smoking Outcomes Among Students in Grades 10 and 12: 1999–2002 [a]

Model [a]	Weighted No.	Excluding state cigarette price	Excluding state smoke-free air index value	Excluding tobacco control ad exposure
Approve of others/adults smoking ≥ 1 pack/day [b]	42,083	1.10* (1.02, 1.18)	1.11** (1.03, 1.21)	1.10** (1.04, 1.17)
Perceive great harm in smoking ≥ 1 packs/day	59,716	0.95 (0.90, 1.01)	0.93** (0.88, 0.98)	0.97 (0.93, 1.01)
Intend to smoke in 5 years	21,760	1.12** (1.04, 1.20)	1.13** (1.05, 1.22)	1.04 (0.98, 1.10)
Smoked in past 30 days	65,338	1.10** (1.03, 1.18)	1.12** (1.05, 1.20)	1.07** (1.02, 1.12)

[a] Tobacco company parent-targeted ads sponsored by Philip Morris. All models controlled for year, gender, race/ethnicity, earned income, average parental education, whether both parents live in the home, average school grade, evenings out, truancy, region, and dummy variable for students in grade 12. Unless specified above, models also controlled for tobacco control advertising exposure, either tobacco company parent-directed or youth-targeted advertising exposure, state cigarette price, and state smoke-free air index values.

[b] Students in grade 10 were asked about disapproval of others' smoking; students in grade 12 were asked about disapproval of adults' smoking.

*$P < .05$; **$P < .01$.

Our study did have limitations. Our use of cross-sectional survey data reduced our ability to make direct causal inferences about whether potential exposure to tobacco company parent-targeted advertising resulted in changes to youth smoking behavior, or whether an unmeasured factor may better explain the relations we observed. However, our ability to adjust for competing advertising exposures, our use of regional and year dummy variables, our sensitivity analyses, and the fact that we observed results for tobacco policy [23 24] and other advertising covariates [11 22] that were largely consistent with those found in previous studies, lead us to believe that it is unlikely that we are misrepresenting the relation between exposure to tobacco company youth-targeted or parent-targeted advertising and youth smoking outcomes. An alternate hypothesis is that tobacco companies may have purposefully purchased parent-targeted advertising in media markets that have higher youth smoking rates. This seems unlikely, however, given that the vast majority of their television time was bought through national network and cable channels and was not supplemented by the purchase of local media market television time. In addition, although the study had a large sample size, which makes differences between groups more likely to achieve statistical significance, the overall consistency in the pattern and robustness of findings leads one to conclude that the detected relations are real.

As previously mentioned, another study limitation is that because TRPs measure average exposure for the overall population in a media market, individual youths may have more or less actual exposure, depending upon their own viewing habits. However, when we adjusted for self-reported television watching, the relations between tobacco company youth-targeted and parent-targeted advertising and smoking in the past 30 days did not change for students in grade 8 and strengthened for students in grades 10 and 12. Previous studies of antitobacco and antidrug advertising have found a strong correlation between advertising recall and TRP measures.[22 25]

Studies that use controlled exposure have indicated that tobacco company youth-targeted advertisements are less likely than those from state tobacco control programs tomake youths stop and think about smoking [10] and are of less interest to youths.[26] In 1 national study, Philip Morris "Think. Don't Smoke" advertisements were associated with increased intention to smoke and more favorable feelings toward the tobacco industry.[6] Massachusetts youths aged 14–17 who recalled seeing Philip Morris' "Think. Don't Smoke" ads perceived them to be less effective than ads that featured the serious consequences of smoking.[8] Our finding of no relation between tobacco company youth-targeted advertising and youth smoking substantiates these previous results. Although tobacco company youth-targeted advertising was withdrawn from U.S. television in early 2003, ads continue to be broadcast in other countries, contributing "clutter" to other public health-sponsored advertising efforts [12] that have been shown to be effective.[11 22 27]

Our finding of potentially harmful relations between tobacco company parent-targeted smoking prevention advertising and youth smoking is a source of concern. Our observation of adverse relations associated with parent-targeted advertising is not simply an artifact of our methodological approach: we have previously reported beneficial relations between exposure to state-sponsored antitobacco advertising and youth smoking beliefs and behavior using the same methods.[22]

Why might such advertising have harmful relations, especially for older teens? Although parents are the overt target group of tobacco company parent-targeted advertising, youths are exposed to them, on average, at levels almost equivalent to those of state-sponsored antitobacco campaigns. The overt message of the parent-

targeted campaign is that parents should talk to their children about smoking, but no reason beyond simply being a teenager is offered as to why youths should not smoke.

Theories in developmental psychology suggest that authority messages specific to teenagers invite rejection by those who have migrated to a dominant peer group orientation as they make the transition to adulthood, typically between ages 15 to 17 years.[28 29] As adolescents age toward adulthood, they are more inclined to perceive themselves as independent and self-reliant and less likely to report that they rely on their parents for guidance or assistance.[28] Evaluations of the U.S. National Anti-Drug Media Campaign, which used messages encouraging parents to talk to their children about illicit drugs, have also reported unfavorable effects on adolescents.[30 31] Facilitating productive interaction between parents and adolescents about substance use may require more intensive intervention approaches than simple encouragement through the mass media, which may do more harm than good.

During depositions and testimony in U.S.-based tobacco trials, tobacco company witnesses put forward their youth smoking prevention efforts as evidence that they are concerned about youth smoking and that the campaigns are part of efforts to reduce youth smoking.[32] However, during questioning at such a trial, Carolyn Levy, Director of Philip Morris youth smoking prevention programs, admitted that the aim of their programs was to delay smoking until age 18[32] This contrasts with the aims of public health-funded programs, which are to encourage people to never take up smoking.

In summary, our analysis suggests that tobacco company youth- and parent-targeted smoking prevention advertising campaigns confer no benefit to youths, and especially for older teens, parent-targeted advertising may have harmful relations. In the United States, youths have the benefit of the national American Legacy Foundation antitobacco campaign, as well as state antitobacco campaigns. The Legacy Foundation's budget cuts will force it to advertise less in the future, [33] and state antitobacco campaign advertising has begun to decline as a result of reduced state tobacco control funding.[12 34] Many other countries of the world have limited or no public health-sponsored televised antitobacco advertising. Given a media environment that has fewer demonstrably beneficial advertising messages, it is conceivable that tobacco company smoking prevention ads could have even greater adverse effects on youth smoking behavior than suggested by this study.

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Contributors

M. Wakefield conceived and led the study and the writing of the article. Y. Terry-McElrath conducted the analysis and assisted with writing. S. Emery, H. Saffer, F. Chaloupka, B. Flay, P.M. O'Malley, and L.D. Johnston contributed to conception of the study and the analysis and assisted with writing. G. Szczypka undertook data management for the study and assisted with writing.

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Human Participant Protection

This study was approved by the University of Illinois, Chicago, institutional review board. Use of data from the Monitoring the Future school surveys received ethical approval by the University of Michigan Behavioral Sciences institutional review board.

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RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. DANIEL K. INOUYE TO HON. WILLIAM E. KOVACIC

Question. Are the ratings based on the FTC cigarette testing method *deceiving* smokers?

Answer. The Commission has been concerned for some time that the current test method may be misleading to individual consumers who rely on the ratings it produces as indicators of the amount of tar and nicotine they actually will get from their cigarettes.

As noted in the Commission's November 13, 2007 Prepared Statement to the Committee, the ratings produced by the current test method tend to be relatively poor predictors of tar and nicotine exposure, primarily due to smoker compensation. If sufficiently great, compensatory smoking behavior can result in smokers getting as much tar and nicotine from relatively low-rated cigarettes as from higher-rated cigarettes.

When the Commission approved the test method in 1967, the intent was to produce uniform, standardized data about the tar and nicotine yields of mainstream cigarette smoke, *not* to replicate actual human smoking. Because no known test could accurately replicate human smoking, the FTC believed that the most important objective was to ensure that cigarette companies presented tar and nicotine information to the public based on a standardized method. At the time, most public health officials believed that reducing the amount of "tar" in a cigarette could reduce a smoker's risk of lung cancer; therefore, it was thought that giving consumers uniform and standardized information about the tar and nicotine yields of cigarettes would help smokers make informed decisions about the cigarettes they smoked.

In the intervening 40 years, the limitations of the test method became a substantially greater concern as a result of changes in modern cigarette design and a better understanding of the nature and effects of compensatory smoking. These concerns have prompted the Commission to take a number of actions over the past decade.

First, in 1994, the Commission, along with Congressman Henry Waxman, asked the National Cancer Institute ("NCI") to convene a consensus conference to address cigarette testing issues. NCI held that conference in December 1994, and issued its Report in October 1996.

The NCI Report recommended, among other things, that the cigarette testing system measure and publish information on the range of tar, nicotine, and carbon monoxide that most smokers should expect from the cigarettes they smoke. Accordingly, in September 1997, the Commission requested public comments on proposed revisions to the test method that would add a second tier of testing—using more rigorous smoking conditions—to generate a range of tar and nicotine yields for each cigarette and make it more apparent to consumers that the amount of tar and nicotine they get from any specific cigarette depends on how they smoke it.

Ultimately, public health agencies asked the Commission to postpone its proposed modifications to the test method until a broader review of unresolved scientific issues surrounding the system could be conducted. The agency responded to these comments in 1998 by asking the Department of Health and Human Services ("HHS") to review the test method. In particular, the Commission asked HHS to recommend whether the testing system should be continued, and if so, what specific changes should be made to correct the limitations previously identified by the NCI and others. The Commission understands that HHS continues to explore these issues.

The Commission's concerns about the current system led it to recommend in 1999 that Congress consider giving authority over cigarette testing to one of the Federal Government's science-based, public health agencies.[1] The agency specifically noted that it does not have the specialized scientific expertise needed to design scientific test procedures. The Commission reiterated that request in 2003[2] and again at the November 13, 2007 hearings.

Finally, the cigarette industry's use of descriptors that are based on ratings produced by the test method—such as "light" and "low tar"—is one of the issues currently before the United States Court of Appeals for the District of Columbia Circuit. The trial judge in the U.S. Department of Justice's RICO case against the major cigarette manufacturers found that the manufacturers had made false and fraudulent statements about "light" and "low" tar cigarettes in marketing their products when they knew those cigarettes did not provide a clear health benefit compared to full-flavor cigarettes (the industry's term for cigarettes with tar ratings above 15 mg.). The judge barred the companies from using the terms "light" and "low" in marketing their products in the future. The companies have appealed that decision and remedy. We are monitoring that case, and believe that the court's resolution of this issue will provide guidance and clarity on a complex issue that has raised troublesome questions for some time.

SUPPLEMENTAL INFORMATION SUBMITTED BY CATHY L. BACKINGER, PH.D.

The Impact of Cigarette Tax Increases on Cigarette Smuggling

NCI Research Published in Monograph 14: Changing Adolescent Smoking Prevalence concluded that:

> "[R]elatively little is known about the impact of large price increases on the growth of a black market in tobacco products and its subsequent impact on demand, particularly among youths. To the extent that organized and casual smuggling of tobacco products would result from large tax and price increases, the effects of the increases on tobacco use might be smaller than otherwise expected. The limited research in this area, however, suggests that the presence of a black market in tobacco products may be just as, or more, related to other factors—including the presence of informal distribution networks, nonexistent or weak policies concerning black market sales, and their lack of enforcement—as it is to prices (Joossens and Raw, 1995)."[1]

The 2000 Surgeon General's Report, *Reducing Tobacco Use,* concluded:

- "Smuggling has a significant, but small, impact on cigarette demand, implying that a state cigarette tax increase will lead to some smuggling."
- "On average, 6 percent of state cigarette tax revenues were lost due to smuggling activities in 1995."
- "States can raise cigarette taxes and generate increased revenues, even as cigarette sales decline and interstate smuggling increases."[2]

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[1] Federal Trade Commission Report to Congress for 1997, Pursuant to the Cigarette Labeling and Advertising Act, 5–6 (1999) (available at *http://www.ftc.gov/os/1999/07/1997 cigarettereport.pdf*).

[2] Prepared Statement of the Federal Trade Commission Before the Committee on Energy and Commerce, Subcommittee on Commerce, Trade, and Consumer Protection, U.S. House of Representatives (June 3, 2003); Prepared Statement of the Federal Trade Commission Before the Committee on Government Reform, U.S. House of Representatives (June 3, 2003).

[1] National Cancer Institute. Changing Adolescent Smoking Prevalence. Smoking and Tobacco Control Monograph No. 14. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Pub. No. 02–5086, November 2001.

[2] U.S. Department of Health and Human Services. *Reducing Tobacco Use: A Report of the Surgeon General.* Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for

Continued

A California Department of Health survey found that soon after California's 50-cent cigarette tax increase went into effect in 1999, no more than 5 percent of all smokers purchased cigarettes in nearby states, from Indian reservations or military bases, or via the Internet, or otherwise avoided the state's cigarette tax.[3]

The Effect of Televised, Tobacco Company-Funded Smoking Prevention Advertising on Youth Smoking

The National Cancer Institute funded a study published in the American Journal of Public Health in 2006 titled *The Effect of Televised, Tobacco Company-Funded Smoking Prevention Advertising on Youth Smoking-Related Beliefs, Intentions, and Behavior.* Below is a summary of this study:

Recently, some tobacco companies have sought to portray themselves as interested in helping to prevent youth smoking, or in helping adults to quit. The sincerity and effectiveness of these efforts has been challenged by many in the medical and public health community who believe that, in reality, these activities are aimed at improving the dismal public profile of tobacco companies and at shifting attention away from their efforts to promote tobacco use.

In a recently published study, Wakefield *et al.* confirmed that the tobacco industry's youth-targeted smoking prevention advertising does not have beneficial outcomes for youth. In fact, it appears that exposure to tobacco company advertising targeted to parents may have harmful effects on youth, especially among those in grades 10 and 12.

Among students in grade 8, tobacco company advertising targeted to parents was related to:

- stronger beliefs that the harms associated with smoking have been exaggerated,
- lower recall of anti-tobacco advertising (state and national American Legacy Foundation campaigns, such as *truth*®), and
- stronger intentions to smoke in the future.

Among youths in grades 10 and 12, during the 4 months leading up to the survey administration, each additional viewing of a tobacco company advertisement targeted to parents was, on average, associated with:

- lower perceived harm of smoking,
- stronger approval of smoking,
- greater likelihood of having smoked in the past 30 days,
- lower recall of anti-tobacco advertising (state and national American Legacy Foundation campaigns, such as truth®), and
- stronger intentions to smoke in the future.

Cigarette Taxes and Cigarette Use

NCI-funded research has found that raising tobacco prices and implementing limits on tobacco marketing are effective in reducing and preventing tobacco use.[1]

- Youth are more susceptible to price increases than adults:
  - Youth: 10 percent increase in price = 5 percent reduction in prevalence.
  - Adults: 10 percent increase in price = 1–2 percent reduction in prevalence.[2]

CDC research has found that lower-income Americans and young adults are more susceptible to price increases than other Americans:

Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2000. 82–50179.

[3] Cancer Prevention & Control Program, University of California—San Diego—The California Tobacco Control Program: A Decade of Progress, Results from the California Tobacco Survey, 1990–1999 By the Tobacco Control Section, California Department of Health Services, December 26, 2001. *http://ssdc.ucsd.edu/ssdc/pdf/1999_Final_Report.pdf.*

[1] Chaloupka *et al.,* (2002). Tax, price and cigarette smoking: evidence from the tobacco documents and implications for tobacco company marketing strategies. *Tobacco Control,* 11 Suppl 1: 162–72.

[2] National Cancer Institute. Changing Adolescent Smoking Prevalence. Smoking and Tobacco Control Monograph No. 14. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Pub. No. 02–5086, November 2001.

- Lower-income Americans (family incomes at or below the national median) are more likely to quit smoking as a result of cigarette price increases than higher-income Americans.
- Persons aged 18 through 24 years are more responsive to price increases than older smokers.
- Hispanic smokers and non-Hispanic black smokers are more likely than white smokers to reduce or quit smoking in response to price increases.[3]

The 2000 Surgeon General's Report, Reducing Tobacco Use, concluded:

- "The price of tobacco has an important influence on the demand for tobacco products, particularly among young people."
- "Substantial increases in the excise taxes on cigarettes would have a considerable impact on the prevalence of smoking and, in the long term, reduce the adverse health effects caused by tobacco."[4]

Why might such advertising have harmful effects, especially for older teens?

- Although parents are the stated audience for tobacco company advertising targeted to parents, youths are exposed to them, on average, at levels almost equivalent to those of state-sponsored anti-tobacco campaigns.
- The message of the parent-targeted campaign is that parents should talk to their children about smoking, but no reason beyond simply being a teenager is offered as to why youth should not smoke.
- Theories in developmental psychology suggest that authority messages specific to teenagers invite rejection by those who have migrated to a dominant peer group orientation as they make the transition to adulthood, typically between ages 15 to 17 years.

Public health experts note that, if indeed tobacco companies wanted to make a positive contribution toward reducing youth tobacco use, the obvious first step would be to decrease or eliminate the billions of dollars the companies spend so effectively each year to advertise and promote tobacco use.

Source: The Effect of Televised, Tobacco Company—Funded Smoking Prevention Advertising on Youth Smoking

Wakefield, M., Terry-McElrath, Y., Emery, S., Saffer, H., Chaloupka, F.J., Szczypka, G., Flay, B., O'Malley, P.M., Johnston, L.D. (2006). "Effect of Televised, Tobacco Company—Funded Smoking Prevention Advertising on Youth Smoking-Related Beliefs, Intentions, and Behavior" *American Journal of Public Health,* Vol 96, No. 12, 2154–2160. *http://www.ajph.org/cgi/content/ful1/96/12/2154.*

Disease Risks of Pipe, Cigar and Cigarette Use

As previously stated (in Dr. Backinger's testimony), all forms of tobacco products are harmful, including cigars and pipes.[1] Because pipe use among Americans is much lower than the use of other tobacco products, there is limited research specifically on pipe smoking. Below is a summary of NCI funded research, along with information from additional studies, on how the health risks of smoking pipes or cigars, compares to that of smoking cigarettes.

- Cigar and pipe smoking are strongly related to cancers of the mouth, oropharynx, hypopharynx, larynx and esophagus.[2 3 4]
- Cigar and pipe smoking are causally associated with lung cancer and there is evidence they are also causally associated with, pancreatic, stomach and urinary bladder cancer.[2]
- The risk of death from lung cancer is higher in pipe and cigar smokers than in non-smokers, but lower in pipe and cigar smokers than in cigarette smokers. This is because both pipe and cigar smokers typically smoke less tobacco and have a lower degree of inhalation.[4 5]
- The risk of lung cancer increases with the number of pipes or cigars smoked per day, and with the degree of smoke inhalation.[5]

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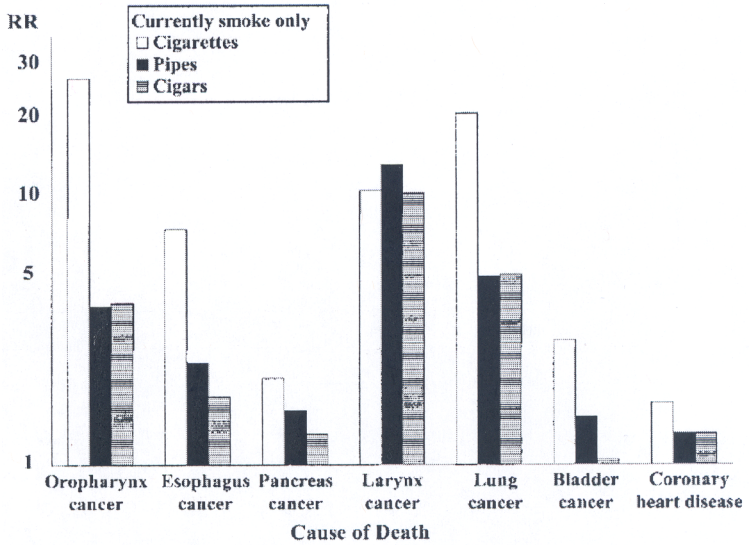
[3] Centers for Disease Control and Prevention. Response to increases in cigarette prices by race/ethnicity, income, and age groups—United States, 1976–1993. *Morbidity and Mortality Weekly Report* 47(29):605–609, 1998.

[4] U.S. Department of Health and Human Services. *Reducing Tobacco Use: A Report of the Surgeon General.* Atlanta, Georgia: 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, 2000. 82–50179.

- Graph 1 below describes the difference in risks of dying from particular diseases for exclusive cigarette, pipe, and cigar smokers compared to nonsmokers. Among other things, the graph shows that:



  - Current pipe smokers are ~5 times more likely to develop lung cancer than non-smokers while cigarette smokers are ~20 times more likely to develop the disease.
  - Current pipe smokers are ~14 times more likely to develop larynx cancer than non-smokers while cigarette smokers are ~10 times more likely to develop the disease.[6]

Sources: Disease Risks of Pipe, Cigar and Cigarette Use

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. FRANK R. LAUTENBERG TO MARVIN E. GOLDBERG, PH.D.

Question 1. The tobacco companies have claimed that *smokers* believe that the word "light" refers to *taste.* Is that true? Or is this just another device to seduce smokers into discarding care about their health in pursuit of their addiction?

Answer.

The tobacco industry has advanced the "taste" of low tar/lights cigarettes as the primary reason they are chosen by smokers. When questioned about the role of this false and illusory dimension of low tar/light smokers' responses are often misleading.

When smokers are asked why they smoke light cigarettes, significant numbers may respond that it is because of the "taste." This is understandable—they first experience the cigarette on their tongue and in their mouth—the most apparent locus of taste. But research tells us that "taste" is a good deal more than what we experience on our tongue. Twenty years ago, the Coca Cola company was concerned about losing market share among young cola drinkers to Pepsi Cola. Research suggested that younger consumers appeared to prefer the slightly sweeter taste of Pepsi. In response, Coca Cola developed a sweeter version of their product and proceeded to extensively test market it in blind taste tests across the country. Repeatedly and reliably *in blind taste tests,* consumers indicated that they preferred the sweeter version to the regular Coke. With that evidence in hand, Coke introduced "New Coke" with the new, sweeter formula. What happened next was shocking to Coke. Once the product they were drinking was *labeled* Coke, that knowledge impacted how they evaluated what they tasted—now they hated it. Within 3 months Coke had retreated and was pushing its original formula "Classic" Coke again (Fournier 1999; rev. 2001).

That taste is, at least in part, a function of how products are portrayed/labeled and advertised has been carefully researched in the context of "field" experiments with foods. In one such experiment, the same lunch meals were sold in a university faculty cafeteria but were labeled differently on different days. For example, on some days one such meal was identified as "Succulent Italian Seafood filet" but on other days merely as "Seafood Filet." Those who bought and ate the foods when they were described in an embellished way reported that: the foods were more appealing to the eye; *they tasted significantly better;* and after eating the meal they felt more "comfortably full and satisfied." (Wansink *et al.,* 2004).

Interestingly, when desserts were labeled "healthy" (*e.g.,* chocolate pudding vs. healthy chocolate pudding; apple crisp vs. healthy apple crisp). they were rated as tastier. The researchers reasoned, that as long as the dessert actually tasted good, consumers' initially lower expectations regarding something labeled "healthy" would be disconfirmed; that is, they would have been surprised by the good taste. Pleasantly surprised, the unexpected contrast between their actual and expected experience would have led them to evaluate the taste of the dessert more positively than someone who had seen the dessert label without the adjective "healthy;" (Wansink *et al.,* 2004b).

Smokers of regular cigarettes who switched to what they perceived to be "healthier," light cigarettes, would have had a parallel disconfirming experience. These smokers would have expected light cigarettes to yield less taste (along with less tar). However, given the compensatory smoking behavior described in my prepared testimony, light cigarettes yielded just as much tar/taste. As a result, the pleasantly surprised light cigarette smokers were quick to focus on the taste as the apparent motivation for smoking lights.

As with the food experiments cited above, if questioned, smokers are almost certainly not going to be aware of how the label "light" (and hence the inference "healthier") influence their perceptions of the cigarette's taste. They revert to the more proximal evidence—what they believe they experience—on their tongues—and their answer as to why they smoke the cigarette they do smoke may reflect that logic.

In two court cases where both Philip Morris and R.J. Reynolds sued Loews/Lorillard, it was evident that these tobacco companies do not believe that smokers are primarily guided by taste in selecting light cigarettes.

The plaintiff firms, Philip Morris and R.J. Reynolds argued that in a comparative taste test, smokers reported that the Lorillard low tar brand tasted better than the comparison brand only if they were first told that Lorillard's brand had lower tar than either the R.J. Reynolds or the Philip Morris comparison brand. When (other) smokers made the same comparative taste test without being reminded of the relative tar levels, their taste preferences were very different.

The basis of both suits was the approach taken in two parallel Lorillard surveys asking smokers to compare the taste of its low tar "Triumph" to R.J. Reynolds' Winston Lights and to Philip Morris' Merit. Subsequent Lorillard advertising claimed that the preponderance of the smokers tested appeared to prefer the taste of Triumph over Winston Lights and that it was the "National Taste Test Winner" over Merit. Both plaintiffs Philip Morris and R.J. Reynolds argued that these claims were deceptive inasmuch as the taste question posed in each survey had, as a preface, a reminder of the lower tar scores for Triumph relative to those for Winston Light and for Merit. Each of the plaintiff companies ran a test of their own, where the tar scores for the two brands were not revealed and the resulting taste preferences in their research were very different.

These comparisons suggest how much of what is ostensibly labeled as "taste" is influenced by other factors; in this case, the salience of how "light"/low tar a cigarette might be. In effect, the plaintiff firms acknowledge that where smokers are reminded of tar yields, the relative tar levels and not taste are the determining factors in the smokers' evaluations of the cigarettes; (*R.J. Reynolds Tobacco Company, Plaintiff* v. *Loew's Theatres, Inc;* No. 80 Civ 4197 (RWS) United States District Court for the Southern District of New York; 511 F. Supp.867; 1980 U.S. Dist. LEXIS 16738; 210 U.S.P.Q. (BNA) 291; October 24, 1980; *Philip Morris Incorporated, Plaintiff* v. *Loew's Theatres, Inc.;* No. 80 Civ. 4082 (RWS) United States District Court for the Southern District of New York; 511 F. Supp.855; 1980 U.S. Dist. LEXIS 12554 July 26, 1980).

Of course, for decades the tobacco companies have used low tar/lightness as a critical way of selling cigarettes and have made that dimension very salient for smokers. Following the logic presented above, it is reasonable to expect that when respondents are asked, they may say that "taste" is the reason they prefer light/low tar cigarettes. Note, however, that following the logic of the two court cases discussed above, the causal sequence is, in fact, reversed. In actuality, it is because their cigarettes are light (and advertising and promotion continue to make that dimension salient) that smokers say they prefer the taste. They would not say so for the same cigarette, if its "lightness" was not made salient.

Promoting light cigarettes as extensions of major brands and aligning them with the mother brand (e.g., Marlboros, Marlboro Lights), helped shaped smokers' perceptions of their taste.

At the same time as they developed light cigarettes that allowed for compensation, the tobacco companies learned how to boost the *perceived* strength of the taste, by using their advertising to shape the images associated with Lights. The companies viewed the taste dimension much as a "Rorschach ink blot test." Light cigarette smokers could be induced to see/taste in the cigarettes what the companies wanted them to see/taste.

> . . . [I]t is almost impossible to know if the taste smokers talk about is something which they, themselves attribute to a cigarette or just a "play-back" of some advertising messages;" (Marketing and Research Counselors, Inc, 1975, p. 2).

The industry further understood that they could "borrow" some of the brand equity established for their primary (regular) brands such as Marlboro Reds and Camels for the benefit of the light cigarettes. They did so by creating brand extensions—Marlboro Lights, Camel Lights etc. and using the same advertising themes and imagery that had been so successful to shape the imagery associated with the light extensions. That this strategy could affect smokers perceptions of the light cigarettes *taste,* is recognized in their internal documents.

> . . . [O]ther free standing low tar brands such as Kent, Vantage, Carlton, etc. were perceived to be weaker and have less taste than the line extension low tars: like Marlboro Lights, Winston Lights, Camel Lights. Apparently these line extension low tars *share the taste heritage* of their parent full flavor brands; (Philip Morris 1990, pp. 13-14; emphasis added).

When R.J. Reynolds sought to develop a low yield cigarette in 1976, they recognized the image problem associated with low-yield cigarettes and set out to address it:

> What we want is to portray the feeling and image projected by Marlboro and Kool advertising on a Vantage/Merit type of cigarette. In other words, put "balls" (two of them) on a low "tar" and nicotine cigarette and position. (Hind *et al.,* 1976, p. 63).

Question 2. If there were no cigarettes labeled as "light," would the tobacco companies just come up with another word to send the same deceptive *message* to smokers?

Answer. Forty-three countries, including Canada, Brazil, and the 27 countries of the European Union have banned the misleading terms such as "light" and "mild" (Backinger 2007). It would be useful to canvas the experiences these countries have had with the tobacco industry's efforts to do an "end-run" around this prohibition. Casual observation on a trip to Canada suggests that the companies are substituting other words that will likely be used by smokers to distinguish between lights and regulars. If the same is true in other countries that have banned the use of "light" and "mild" it suggests that the advantages gained from this step are likely to be limited.

One conclusion that ought to be drawn from the reasoning presented above is that the particular descriptors on the package are not necessarily the critical factor. Rather, the real issue is the question of the ultimate effect of any intended legislation. I have attached a paper by Kropp and Halpem-Fisher (2004) which I would like to go into the record. It indicates that, like adults, adolescents today believe that light cigarettes represent a reduced threat to smokers health relative to regular cigarettes. The goal of any legislation should be to turn this around. To this end, the tobacco companies should be required to develop a "corrective advertising" campaign advising smokers of the lack of any differences for their health between light and regular cigarettes. This campaign should continue as long as surveys of smokers show that the vast majority understand there is no difference in the risk to health from light versus regular cigarettes. While calling for corrective advertising may be more difficult legislatively, it is likely to be the most effective way to achieve the desired objective.

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ADOLESCENTS' BELIEFS ABOUT THE RISKS INVOLVED IN SMOKING "LIGHT" CIGARETTES

By Rhonda Y. Kropp, B.S.N., M.P.H. and Bonnie L. Halpern-Felsher, Ph.D.

ABSTRACT. *Background.* Light cigarettes have been marketed by the tobacco industry as being a healthier smoking choice, a safe alternative to cessation, and a first step toward quitting smoking altogether. Research, however, has failed to show a reduction in smoking-related health risks, an increase in rates of smoking cessation, a decrease in the amount of carbon monoxide or tar released, or a reduction in the rates of cardiovascular disease or lung cancer associated with light cigarette use, compared with regular cigarette use. Nevertheless, more than one-half of adolescent smokers in the United States smoke light cigarettes. This study is the first to investigate adolescents' perception of the risks associated with smoking light cigarettes, as well as adolescents' attitudes and knowledge about the delivery of tar and nicotine, health risks, social effects, addiction potential, and ease of cessation with light cigarettes, compared with regular cigarettes.

Design. Participants were 267 adolescents (mean age: 14.0 years) who completed a self-administered questionnaire during class time. After reading scenarios in which they imagined that they smoked regular or light cigarettes, participants estimated the chances that they would personally experience 7 smoking-related health risks and 3 addiction risks. Participants also responded to 14 items concerning their attitudes and knowledge about light cigarettes *versus* regular cigarettes.

Results. Participants thought that they would be significantly less likely to get lung cancer, have a heart attack, die from a smoking-related disease, get a bad cough, have trouble breathing, and get wrinkles when smoking light cigarettes, compared with regular cigarettes, for the rest of their lives. Furthermore, when participants were asked how long it would take to become addicted to the 2 cigarette types, they thought it would take significantly longer to become addicted to light *versus* regular cigarettes. Adolescents also thought that their chances of being able to quit smoking were higher with light *versus* regular cigarettes. Similarly, when participants were asked how easy it would be to quit smoking the 2 cigarette types,

they thought it would be significantly easier for them to quit smoking light cigarettes than regular cigarettes. Adolescents agreed or strongly agreed that regular cigarettes deliver more tar than light cigarettes and that light cigarettes deliver less nicotine than regular cigarettes.

Conclusions. Overall, the results of this study show that adolescents hold misperceptions in both their personal risk estimates and their general attitudes about the health risks, addictive properties, and ease of cessation associated with light cigarettes. With a variety of light and ultra light cigarettes on the market, adolescents are led to think that there is a progression of safety levels to choose from when deciding which cigarettes to smoke. This illusion of control over health outcomes contributes to an underestimation of risks associated with smoking light cigarettes and supports these misperceptions. These results are of concern, given evidence suggesting that, if adolescents think they are less vulnerable to smoking-related health risks (*i.e.,* lung cancer), then they are more likely to initiate smoking. Furthermore, there is evidence that adolescents are not fully aware of the addictive nature of cigarettes and therefore think that they can experiment with smoking during adolescence without becoming addicted or experiencing any health consequences. The data presented here support concerns regarding smoking addiction; adolescents might be even more inclined to smoke light cigarettes to delay addiction. Without correct information about light cigarettes, adolescents are unable to make informed decisions about their smoking behaviors. The findings presented here strongly suggest that healthcare practitioners need to talk to their adolescent clients not only about the overall risks of smoking but also about the specific risks associated with smoking light cigarettes and other tobacco varieties, including the potential for addiction and long-term health consequences. Information shared with adolescents about light cigarettes, both individually by healthcare practitioners and at the population level via counter-advertising campaigns, may be successful in changing current misperceptions, and ultimately light cigarette smoking patterns, among youth.

Light cigarettes were introduced in the 1950s in response to growing public concern about the health effects of smoking. Light cigarettes have been marketed by the tobacco industry as being a healthier smoking choice, a safe alternative to cessation, and a first step toward quitting smoking altogether. Research, however, has failed to show a reduction in smoking-related health risks,[1 2] an increase in rates of smoking cessation,[3 4] a decrease in the amounts of carbon monoxide,[2 5 6] or tar[2] released, or a reduction in the rates of cardiovascular disease or lung cancer[1 7] associated with light cigarette use, compared with regular cigarette use. Nevertheless, a recent national survey of smokers found that 58.5 percent of adult smokers and 52.8 percent of adolescent smokers reported using light cigarettes.[8]

Despite clear data showing that light cigarettes are not a safe alternative to smoking, adults in the United States harbor misperceptions about the health risks associated with smoking light and ultra light cigarettes,[2 9–13] with a large proportion of adult smokers thinking that such cigarettes deliver less tar and nicotine, produce milder sensations, reduce the health risks associated with smoking, and assist with smoking cessation.[10 11] No research has explored attitudes, beliefs, and perceptions of risk regarding light cigarettes among adolescents. If adolescents, like adults, think that light cigarettes are less risky to their health and are easier to quit than regular cigarettes, then they too may be more willing to try and to continue smoking these perceived "safer" cigarettes. This assertion is supported by theories indicating that perceptions of risk are related to engagement in both health-compromising and health-promoting behaviors.[14–22]

The present study addresses this gap in the literature by exploring adolescents' perceptions of the risks associated with smoking light cigarettes. In addition, we assessed adolescents' attitudes and knowledge about the delivery of tar and nicotine, health risks, social effects, addiction potential, and ease of cessation when smoking light cigarettes, compared with regular cigarettes. We hypothesized that adolescents would perceive light cigarettes to be less harmful to their health, to be less addictive, and to deliver less tar and nicotine than regular cigarettes. If these assertions are supported, than efforts to prevent adolescents' tobacco use must include specific communication about the harmful nature of light cigarettes, in addition to all cigarette and tobacco varieties.

Methods

Participants

Participants were 267 adolescents (mean age: 14.0 years; SD: 1.49 years) participating in a larger longitudinal study on the relationship between risk perceptions and tobacco use. The participants were ethnically diverse, with 56.8 percent of the participants describing themselves as white/non-Hispanic, 18.5 percent as Asian, 18.5 percent as Hispanic or Latino, 2.3 percent as Pacific Islander, 1.2 percent as

African American, 1.5 percent as American Indian/Alaskan Native, and 1.2 percent as other. Participants' mothers' education, on average, was high, with 17.9 percent of the mothers having a professional degree, 6.1 percent having some education after college, 25.1 percent having a 4-year college degree, 20.5 percent having at least some college education, and 19.4 percent having a high school degree or less; 9.9 percent of the participants reported that they did not know their mothers' education.

Participant Recruitment

Participants in the larger study were recruited from 2 northern California public high schools (schools A and B), during their 9th grade year, to take part in a longitudinal study of tobacco beliefs and smoking behaviors. Participants in school A were recruited in autumn 2001, and those in school B were recruited in autumn 2002. Interested participants signed the adolescent assent form, and parents signed the parental consent form. Of the 790 students who received consent packets (302 from school A and 488 from school B), 418 (53 percent) returned completed consent forms (79.5 percent and 36.5 percent consent rate for schools A and B). Of the 790 students who received consent packages, a total of 395 adolescents completed the baseline survey, for an overall response rate of 50 percent (75.5 percent response rate for school A and 34.2 percent response rate for school B).

Perceptions of light cigarettes were assessed in spring 2003, which corresponded to the second (school B, 9th grade) and fourth (school A, 10th grade) rounds of data collection; therefore, only those rounds of data are reported in this article. Overall, 200 participants from school A completed the fourth-round survey and 152 participants from school B completed the second-round survey, for a total of 352 participants (89.4 percent retention rate). Only participants who indicated that they had heard of light cigarettes were included in the analyses for the current report (n = 267), accounting for 75.8 percent of the total sample. There were no significant differences between the 2 schools with respect to gender or age at the time of recruitment; however, significant differences were found with respect to ethnicity ($X2$ = 57.3, df = 3, P < .001) and mother's education (X^2 = 19.7, df = 8, P < .05), with 1 school (school B) having fewer white/non-Hispanic students and lower levels of mothers' education. However, we did not find any significant differences in the results for these 2 schools or any differences based on age; therefore, data for the 2 schools were combined.

Procedures

Participants completed a self-administered questionnaire during class time. The researchers explained the instructions for completing the survey and remained available to answer questions that arose during administration. Refreshments were provided for all participants. Participants in school A also received a movie gift certificate, whereas the administrators and teachers in school B received school supply money to compensate for their efforts in the study. The study received approval from the University's institutional review board.

Measures

Demographic Features

Participants provided information about their age, grade, gender, ethnicity, and mother's level of education.

Smoking Behaviors

Participants were asked about the number of times they had "smoked a few puffs of a cigarette" in their entire lives, with responses being made on a 5-point scale (*i.e.,* none, 1 time, 2–5 times, 6–10 times, or > 10 times).¢

Chance Estimates of Personally Experiencing Smoking-Related Risks

Participants read 2 scenarios about smoking cigarettes in general (proxy for regular cigarettes) and then 2 scenarios about smoking light cigarettes. The scenarios were identical except for the specification of light cigarettes. The first scenario asked participants to imagine that they had just begun smoking cigarettes (*i.e.,* "Imagine that you just began smoking. You smoke ~2 or 3 [light] cigarettes each day. Sometimes you smoke alone, and sometimes you smoke with friends."). After reading this scenario, participants estimated the chances that they would personally experience 5 smoking-related risks (Tables 1 and 2).

Table 1.—Comparison of Adolescents' Estimates of Personal Risk and Benefit With Regular Versus Light Cigarettes: Mean-Level Analyses

	Risk estimates, mean (SD)		*t* Value
	Regular cigarettes	Light cigarettes	
Short-term cigarette use			
Risks			
Smell like an ashtray	79.81 (27.29)	79.04 (26.66)	0.822
Get a bad cough from smoking	71.93 (28.17)	69.97 (28.24)	1.56
Have trouble catching your breath	71.56 (28.59)	71.20 (27.85)	0.325
Have many really bad colds	58.09 (30.42)	60.07 (30.62)	1.52
Have bad breath	78.43 (29.61)	75.64 (29.74)	2.16*
Addiction			
Become addicted to cigarettes	69.07 (30.30)	66.98 (30.13)	1.32
Still be smoking in 5 y	57.32 (32.42)	59.76 (31.18)	1.45
Be able to quit smoking	45.82 (32.98)	50.19 (32.20)	2.53†
How long will it take to become addicted‡	2.98 (1.18)	3.17 (1.15)	3.73§
How easy will it be for you to quit smoking‖	3.64 (1.08)	3.41 (1.06)	4.59§
Long-term cigarette use			
Risks			
Get lung cancer	73.04 (25.22)	70.89 (27.03)	1.79¶
Die from lung cancer	68.80 (26.92)	68.35 (26.87)	0.356
Get a bad cough from smoking	75.52 (25.31)	74.06 (25.60)	1.45
Have trouble catching your breath	76.36 (24.16)	74.69 (26.62)	1.50
Have a heart attack	67.66 (25.51)	65.15 (26.35)	2.12*
Get wrinkles on your face	79.74 (24.13)	78.44 (25.50)	1.159
Die from a smoking-related disease	73.13 (25.36)	70.53 (26.89)	2.30*

*$P < .05$; † $P < .01$; § $P < .001$; ¶ $P < .10$.
‡Response scale for this question: will not happen (1); ≥ 1 month (2); 1 to 6 months (3); 7 to 11 months (4); 1 to 2 years (5); 3 to 4 years (6); ≥ 5 years (7).
‖Response scale for this question: very easy (1); somewhat easy (2); a little easy (3); not very easy (4); not at all easy (5).

Table 2.—Comparison of Adolescents' Estimates of Personal Risk and Benefit With Regular Versus Light Cigarettes: Individual-Level Analyses

	Percent of participants indicating		
	More likely for regular cigarettes	No difference	More likely for light cigarettes
Short-term cigarette use			
Risks			
Smell like an ashtray	23.9	55.7	20.5
Get a bad cough from smoking	33.2	41.7	25.1
Have trouble catching your breath	27.7	44.6	27.7
Have many really bad colds	26.0	41.6	32.4
Have bad breath	31.9	48.7	19.4
Addiction			
Become addicted to cigarettes	34.4	37.4	28.2
Still be smoking in 5 y	31.8	34.1	34.1
Be able to quit smoking	23.7	38.5	37.8
How long will it take to become addicted	8.4	66.2	25.5
How easy will it be for you to quit smoking	31.1	60.6	8.3
Long-term cigarette use			
Risks			
Get lung cancer	29.8	46.6	23.7
Die from lung cancer	29.2	43.1	27.7
Get a bad cough from smoking	33.0	45.6	21.5
Have trouble catching your breath	29.9	46.4	23.8
Have a heart attack	36.6	40.1	23.3
Get wrinkles on your face	31.2	48.5	20.4
Die from a smoking-related disease	40.6	38.3	21.1

Next, participants were asked to imagine that they continued to smoke cigarettes for the rest of their lives (ie, "Now imagine that you continued to smoke ~2 or 3 [light] cigarettes each day for the rest of your life."). After reading this scenario, participants estimated the chances that they would personally experience 7 smoking-related health risks (Tables 1 and 2).

Participants' chance estimates were provided as any percentage between 0 percent and 100 percent. The quantitative response scale (0–100 percent) was chosen over scales that use lexical probability terms (such as "likely" and "probably") to estimate

risk because of the great variability in meaning ascribed to these terms by adolescents.[23–25]

Estimates of Addiction

After reading the scenario concerning short-term cigarette use (as described above), participants estimated the chances (0–100 percent scale) that they would personally experience 3 addiction risks (Tables 1 and 2). Participants were also asked about the ease of cessation (ie, "If you smoke ~2 or 3 [light] cigarettes each day, how easy will it be for you to quit smoking?"), with responses being made on a 5-point scale ranging from "very easy" to "not at all easy." Finally, participants reported on the length of time until addiction (ie, "If you smoke ~2 or 3 [light] cigarettes each day, how long do you think it will take until you become addicted to [light] cigarettes?"), with responses being made on a 7-point scale ranging from "will not happen" to "5 or more years."

Attitudes and Knowledge About Light Cigarettes

Participants responded to 14 items concerning their attitudes and knowledge about light cigarettes *versus* regular cigarettes in 4 categories, ie, delivery (amount of tar and nicotine; 2 items), health risks (5 items), perceived social outcomes (5 items), and addiction/cessation (2 items) (Table 3). Participants responded to each item on a 4-point scale, ranging from "strongly agree" to "strongly disagree." Participants also had the opportunity to indicate that they did not know how to answer each question.

Table 3.—Comparison of Adolescents' Attitudes and Knowledge Regarding Regular and Light Cigarettes

Statement on regular versus light cigarettes	Mean (SD)*	Percent of participants indicating				
		Strongly agree	Agree	Disagree	Strongly disagree	Don't know
Delivery						
Regular cigarettes deliver more tar	2.04 (0.77)	18.8	45.5	13.9	4.1	17.7
Light cigarettes deliver less nicotine	2.54 (0.87)	6.9	33.1	23.8	11.9	24.2
Health risks						
Regular cigarettes are more likely to cause a heart attack	2.60 (0.83)	6.9	28.4	33.3	10.7	20.7
Regular cigarettes are more likely to cause lung cancer	2.57 (0.87)	8.4	28.7	29.9	11.5	21.5
Regular cigarettes are more likely to cause a bad cough	2.66 (0.86)	5.7	29.7	28.9	14.1	21.7
Light cigarettes are more likely to cause trouble catching your breath	2.90 (0.78)	4.6	13.4	43.5	14.9	23.7
Regular cigarettes are less likely to cause wrinkles on the face	3.12 (0.83)	4.5	8.0	36.0	25.8	25.8
Perceived social benefits						
Smoking light cigarettes looks cooler	3.42 (0.74)	2.7	5.4	32.2	47.7	12.0
Smoking light cigarettes makes you thinner	3.04 (0.83)	4.2	8.8	33.5	20.0	33.5
Smoking regular cigarettes is more likely to make you smelllike an ashtray	2.86 (0.89)	6.8	20.5	36.4	22.3	14.0
Smoking a regular cigarette makes you feel more relaxed	2.84 (0.88)	5.7	14.1	30.9	14.9	34.4
Smoking light cigarettes looks more grown-up	3.21 (0.81)	4.2	8.3	37.9	34.8	14.8
Cessation						
It is easier to quit smoking light cigarettes	2.71 (0.86)	6.4	25.3	33.2	15.1	20.0
Regular cigarettes are more addictive	2.69 (0.90)	6.9	28.7	28.0	17.2	19.2

*Response scale for this question: strongly agree (1), agree (2), disagree (3), strongly disagree (4). Participants could also indicate if they did not know.

Results

Preliminary Analyses

Before conducting the main study analyses, we conducted analyses to determine whether perceptions of light versus regular cigarettes varied according to smoking experiences. We had only 84 participants who had ever tried a cigarette, even a puff, and 61 adolescents who reported having ever smoked a light cigarette. Furthermore, the number of times participants had tried a cigarette varied greatly,

with 18 adolescents having tried a cigarette 1 time, 24 adolescents having tried a cigarette 2 to 5 times, 11 adolescents having tried a cigarette 6 to 10 times, and 31 adolescents having smoked > 10 times. Therefore, the sample sizes with variations in smoking experiences were too small to allow a meaningful analysis according to smoking group. However, because perceptions of risk vary with the number of times an adolescent has smoked,[21] we did examine the correlation between the number of times the adolescent had smoked and differences in perceptions of light versus regular cigarettes. None of these correlations was significant; therefore, data were combined across smoking experiences.

Perceptions of Smoking-Related Risks With Light Versus Regular Cigarettes

Paired *t* tests were used to examine our hypothesis that adolescents perceive less risk if they smoke light cigarettes, compared with regular cigarettes. Given the literature showing that adults perceive light cigarettes as less harmful and addictive than regular cigarettes and our directional hypothesis that adolescents would demonstrate similar if not greater bias, we used 1-tailed, directional *t* tests.

As indicated in Table 1, adolescents did not perceive a significant difference in the chances of experiencing 4 of the risks (*i.e.,* bad cough, trouble catching breath, bad colds, and smell like an ashtray) with short-term use of regular *versus* light cigarettes. Adolescents did think the risk of having bad breath was higher with regular *versus* light cigarettes ($P = .032$). Importantly, participants did think that they would be significantly less likely to get lung cancer ($P = .075$), have a heart attack ($P = .036$), and die from a smoking-related disease ($P = .022$) when smoking light cigarettes *versus* regular cigarettes for the rest of their lives. No differences were found in chance estimates of dying from lung cancer, getting a bad cough, having trouble breathing, or getting wrinkles with the 2 cigarette types.

Perceived risk of becoming addicted and still smoking in 5 years did not differ significantly between regular and light cigarettes in the short-term tobacco use scenario. However, when participants were asked about their perceived ability to quit smoking the 2 cigarette types, they thought that their chance of being able to quit smoking was greater with light *versus* regular cigarettes ($P = .012$). Adolescents also thought it would take significantly longer to become addicted to light *versus* regular cigarettes ($P < .0001$) (Table 1). Similarly, when participants were asked how easy it would be to quit smoking the 2 cigarette types, they thought that it would be significantly easier for them to quit smoking light cigarettes than regular cigarettes ($P < .0001$) (Table 1).

Because many of the results were not significant, we conducted a power analysis to confirm that we had adequate power to detect differences in perceptions of light *versus* regular cigarettes. With an α of .05 for a 1-tailed *t* test, we found that, with a sample size of 267, we had adequate power of .74 to detect small effects.[26] Therefore, we do not think that the lack of significance was attributable to sample size.

It was also important to determine the actual percentage of participants who incorrectly thought that regular cigarettes are more harmful and addictive than light cigarettes. Therefore, each individual was assigned a score for each outcome, corresponding to whether they thought the outcome was more likely to occur with regular cigarettes (+1) or with light cigarettes (-1) or was equally likely to occur with regular or light cigarettes (0). As shown in Table 2, while > 40 percent of participants on average gave equal estimates of risk outcomes (bad cough, trouble catching breath, bad colds, and bad breath) for regular and light cigarettes, between 26 percent and 33 percent thought that these outcomes were more likely to occur when beginning to smoke regular cigarettes, compared with light cigarettes, and between 19 percent and 32 percent viewed these outcomes as more likely with light cigarettes.

A large proportion of the participants (between 29 percent and 41 percent) thought that they were more likely to experience a number of negative health outcomes (lung cancer, heart attack, death from a smoking-related disease, bad cough, trouble breathing, and getting wrinkles) if they smoked regular cigarettes, compared with light cigarettes, for the rest of their lives. Importantly, 40.6 percent thought that they were more likely to die of a smoking-related disease with regular cigarettes than with light cigarettes, whereas only 21.1 percent thought that the risk was higher for light cigarettes and 38.3 percent did not perceive a difference in risk between the 2 cigarette types. A large percentage of the participants thought that addiction was less likely with light cigarettes. For example, 34.4 percent thought that they were more likely to become addicted to regular cigarettes than to light cigarettes, and 37.8 percent thought that it would be easier for them to quit smoking light cigarettes than regular cigarettes (Table 2).

Attitudes and Knowledge About Light Cigarettes

Participants were asked how strongly they agreed or disagreed with a series of 14 statements comparing regular and light cigarettes in terms of the amounts of tar and nicotine delivered, health effects, social benefits, and addictive properties. Table 3 shows the average scale responses for each item, as well as the proportions of participants who strongly agreed, agreed, disagreed, and strongly disagreed with each statement. In terms of delivery, 64.3 percent of the adolescents agreed or strongly agreed that regular cigarettes deliver more tar than light cigarettes and 40.0 percent thought that light cigarettes deliver less nicotine than regular cigarettes. Adolescents had similar misperceptions about the health risks associated with light cigarettes, with a large proportion of participants agreeing or strongly agreeing that smoking regular cigarettes is more likely to cause lung cancer (37.1 percent), a heart attack (35.3 percent), and a bad cough (35.4 percent), compared with smoking light cigarettes; however, between 41 percent and 44 percent of the adolescents either disagreed or strongly disagreed with these statements. The majority of adolescents disagreed or strongly disagreed that they would look cooler (79.9 percent), become thinner (53.5 percent), or look more grown-up (72.7 percent) with light cigarettes, although almost 13 percent agreed or strongly agreed with these statements. A significant proportion of adolescents demonstrated misperceptions about the addictive properties and ease of cessation with light cigarettes, with 35.6 percent and 31.7 percent agreeing or strongly agreeing that regular cigarettes are more addictive than light cigarettes and that light cigarettes are easier to quit than regular cigarettes, respectively. Between 45 percent and 48 percent of the adolescents disagreed or strongly disagreed with those statements. It should be noted that, on average, 22 percent of the participants stated that they did not know the answers to each of these knowledge questions.

Discussion

Light cigarettes, although marketed as a healthy alternative to regular cigarettes and as an aid to quitting smoking, in fact do not reduce the health risks associated with smoking[1 2] and do not increase rates of smoking cessation.[3 4] Despite these facts, more than one-half of adolescent smokers in the United States smoke light cigarettes. The current study is the first to examine whether adolescents are aware of the true risks of smoking light cigarettes or whether their beliefs have been influenced by tobacco industry claims that light cigarettes are less harmful. Overall, the results of this study show that adolescents hold misperceptions in both their personal risk estimates and their general attitudes about the health risks, addictive properties, and ease of cessation associated with light cigarettes. These findings are similar to those outlined in studies with adult samples [2 9–13] and expand on those results by assessing perceived risk for a number of short- and long-term smoking outcomes in an adolescent population.

On average, adolescents in this study thought that long-term use of light cigarettes was less likely to cause lung cancer, heart attacks, and death from a smoking-related disease than was use of regular cigarettes. Adolescents also thought it would take longer to become addicted to light cigarettes and it would be easier to quit smoking light cigarettes, compared with regular cigarettes. Given that 64.3 percent and 40.0 percent of adolescents incorrectly thought that regular cigarettes deliver more tar and nicotine, respectively, than light cigarettes, these misperceptions about the health and cessation properties of light cigarettes are not surprising. With a variety of light and ultra light cigarettes on the market to choose from, adolescents are led to think that there is a progression of safety levels from which to choose when deciding which cigarettes to smoke. This illusion of control over the health outcomes contributes to an underestimation of risks associated with smoking light cigarettes and supports these misperceptions.[27]

Although some of the adolescents in this study were aware of the health risks and addictive properties associated with light cigarettes, the data clearly showed that 22 percent of the adolescents were uncertain regarding the differences between regular and light cigarettes and between 25 percent and 35 percent of the adolescents thought that health risks were more likely with regular cigarette use than with light cigarette use. These results are of concern, given evidence suggesting that, if adolescents think they are less vulnerable to smoking-related health risks (*i.e.,* lung cancer), then they are more likely to initiate smoking.[14–22] Furthermore, there is evidence that adolescents are not fully aware of the addictive nature of cigarettes and thus think that they can experiment with smoking during adolescence without becoming addicted or suffering any health consequences.[22 27] The data presented here support concerns regarding smoking addiction; adolescents might be even more inclined to smoke light cigarettes to delay addiction.

Adolescents' misperceptions about the health and cessation properties of light cigarettes mirror marketing by the tobacco industry. In fact, it has been shown that adolescent' smoking intentions[28] and behavior[29] are heavily influenced by the multimedia smoking campaigns launched by the tobacco industry. This is supported in part by our results showing significant differences in risk perceptions for light *versus* regular cigarettes in smoking outcomes most countered by pro-tobacco campaigns marketing light cigarettes (*e.g.,* healthier or a first step to cessation), whereas adolescents perceived less difference in outcomes not focused on by tobacco media (*e.g.,* cough and wrinkles), although the effects of media exposure were not specifically evaluated in this study.

Healthcare practitioners' efforts to dispel adolescents' inaccurate beliefs about light cigarettes may be informed by the success of light cigarette counter-advertising, which has been shown to be effective in changing knowledge[30–33] and intentions to quit smoking[31 33] among adults. Interestingly, a limited number of studies suggest that messages that focus on dispelling myths about the sensation of light cigarettes ("feel milder," "feel smoother," or "less harsh") may be more effective than those providing factual information about tar and nicotine delivery, blocked vents, or health outcomes related to smoking light cigarettes among adults.[32 33]

A number of study limitations need to be discussed. First, questions concerning personal risk estimates did not ask specifically about regular cigarettes but instead asked about cigarettes in general. These general cigarette questions were juxtaposed with questions specifically about light cigarettes and were therefore treated as a proxy for questions about regular cigarettes. However, if some adolescents interpreted "cigarettes" as other than regular cigarettes, then they would likely have been considering light cigarettes when answering these questions, which would result in an underestimation rather than overestimation of perceived risk differences. Second, the order of the questioning about regular and light cigarettes was not counterbalanced. The results were consistent with the adult literature on light cigarettes and with hypotheses that adolescents perceive light cigarettes as less harmful and addictive. Therefore, we do not think that participants' responses were influenced by the order of the questions, although we cannot be certain. Third, because of the small numbers of smokers and light cigarette smokers in this sample, we were unable to explore differences in attitudes and risk perceptions between smokers and nonsmokers or between light cigarette smokers and nonsmokers. Such analyses have yielded interesting results in studies of adults,[11] and similar exploration among adolescents is needed. Last, the cross-sectional nature of this analysis did not allow investigation of potential links between risk perceptions, attitudes, and smoking initiation, cessation, or cigarette brand choices.

Conclusions

This study has demonstrated that adolescents harbor misperceptions about the health risks, addictive properties, and ease of cessation associated with light cigarettes. Such misperceptions have the potential to influence adolescents' intentions to initiate and quit smoking, thereby increasing the number of adolescent smokers in the United States. Without correct information about light cigarettes, adolescents are unable to make informed decisions about their smoking behaviors. The findings presented here strongly suggest that healthcare practitioners need to talk to their adolescent clients not only about the overall risks of smoking but also about the specific risks associated with smoking light cigarettes and other tobacco varieties, including the potential for addiction and long-term health consequences. Information shared with adolescents about light cigarettes, both individually by healthcare practitioners and at the population level via counter-advertising campaigns, may be successful in changing current misperceptions, and ultimately light cigarette smoking patterns, among youths.

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PREPARED STATEMENT OF R.J. REYNOLDS TOBACCO CO.

R.J. Reynolds Tobacco Co. is pleased to provide comments for the Committee's hearing on the accuracy of the Federal Trade Commission's (FTC) "tar" and nicotine rating system for cigarettes.

R.J. Reynolds, the FTC and the public health community agree that the FTC test does not and cannot predict the actual amount of "tar" and nicotine an individual smoker receives. It is widely accepted that machine test yields based upon a single smoking regime, like that prescribed by the FTC Method, do not equate to what an average consumer obtains from smoking.

According to the 1967 press release announcing adoption of the FTC Method, the testing determines "the amount of tar and nicotine generated when a cigarette is smoked by a machine in accordance with the prescribed method." The same FTC press release stated that the method was not intended to "duplicate conditions of actual humans smoking," or gauge "the amount of smoke, or tar and nicotine, which the 'average' smoker will draw from any particular cigarette. . . ."

While the fundamental limitations of the FTC Method have not changed since adopted some forty years ago, the relevance of machine yields to actual or average consumer yields has been extensively and publicly examined. Expert panels have been convened by the National Cancer Institute and the World Health Organization. A range of studies identifying the deficiencies of existing methods as well as potential alternative testing regimes have been published. A paper reviewing the recent advances and better understanding of these issues, authored in part by a R.J. Reynolds Tobacco Co. scientist, is attached * and made part of this testimony. (Attachment: Dixon, M. and Borgerding, M.F. (2006) Recent advances in the application and understanding of alternative smoking regimes. *Rec. Adv. Tob. Sci.* 32, 3–83.)

While no machine-test can mimic all human behaviors, the key to progress in this area should be development of a standard, smoking machine-based test method for cigarettes that more closely models the variability of smoke yields under conditions of consumer use. Clearly, this should begin with the body of scientific work that has already been completed. As active participants in this debate and process, we would welcome the opportunity to participate in the Committee's efforts to establish a robust and realistic testing standard that can be widely applied.

R.J. Reynolds Tobacco Co. has a keen interest in advancing the testing methodology for cigarettes. We have been an active participant in the world-wide debate over the emerging issues. We welcome an open, scientifically-based discussion on these issues as part of a broader discussion of the methods of potential harm reduction of tobacco products. We believe decreasing the health risks and harm directly associated with the use of tobacco products is in the best interests of our society.

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* This paper is retained in the Committee's files.