

# Smokers' responses to advertisements for regular and light cigarettes and potential reduced-exposure tobacco products

**William L. Hamilton, Giulia diStefano Norton, Tammy K. Ouellette, William M. Rhodes, Ryan Kling, Gregory N. Connolly**

This study examines smokers' responses to advertisements for potentially reduced exposure tobacco products (PREP), light cigarettes, and regular cigarettes. A convenience sample of 600 adult smokers reviewed one actual advertisement for each type of product. Smokers ranked the products on health risk, amount of tar, and carcinogenicity, and identified the messages they perceived the advertisements to convey. Smokers perceived PREP products as having lower health risks (mean = 5.4 on a scale of 1–10) and carcinogens (6.6) than light cigarettes (5.8 and 6.9, respectively,  $p < .001$ ), and lights as having lower health risks and carcinogen levels than regular cigarettes (8.2 and 8.8, respectively,  $p < .001$ ). The average PREP rating for level of tar (5.3) was not significantly less than the light mean of 5.4, but both were significantly less than the regular mean of 8.4 ( $p < .001$ ). Although no advertisements explicitly said that the products were healthy or safe, advertisements for PREP products and light cigarettes were interpreted as conveying positive messages about health and safety. Most smokers believed that claims made in cigarette advertisements must be approved by a government agency. The results indicate that advertisements can and do leave consumers with perceptions of the health and safety of tobacco products that are contrary to the scientific evidence. Explicit and implicit advertising messages may be strengthened by the perceived government endorsement. This supports the Institute of Medicine's recommendation to regulate the promotion, advertising, and labeling of PREP tobacco products and light cigarettes. Effective regulation may need to focus on consumer perceptions resulting from advertisements rather than the explicit content of advertising text.

## Introduction

For more than 50 years, clear scientific evidence has shown that exposure to tobacco products poses significant health risks to both the individuals who consume them and to those who come into contact with second-hand or environmental tobacco smoke. However, despite the generally accepted knowledge that tobacco consumption results in significant adverse health outcomes, large numbers of adults and adolescents continue to use tobacco products. Moreover, due to the addictive nature of the nicotine contained in these products, many smokers find it

difficult to quit and as a result continue to expose themselves to the health risks that result from tobacco consumption.

A monograph recently released by the National Institutes of Health shows that the tobacco industry and consumers have responded to the growing awareness of health risks in ways that do not actually reduce those risks (National Cancer Institute, 2001). Tobacco manufacturers introduced cigarettes with filters and other design features that substantially reduced the level of tar delivered by the product in the machine tests used by government agencies. Some cigarettes (e.g., Vantage, True) were explicitly presented as a health-motivated alternative to quitting (NCI, 2001). The expectation of a lower level of risk took hold, as noted in a Brown & Williamson marketing study (1977): "Almost all smokers agree that the primary reason for the increasing acceptance of low 'tar' brands is the health reassurance they seem to offer." Philip Morris also recognized this trend:

---

William L. Hamilton, Ph.D., Giulia diStefano Norton, M.P.H., Tammy K. Ouellette, M.S., William M. Rhodes, Ph.D., Ryan Kling, M.A., Abt Associates Inc., Cambridge, MA; Gregory N. Connolly, D.M.D., M.P.H., Massachusetts Tobacco Control Program, Massachusetts Department of Public Health.

Correspondence: Giulia Norton, M.P.H., Abt Associates Inc., 55 Wheeler St., Cambridge, MA 02138, USA. Tel.: +1 617-520-3542; Fax: +1 617-349-2497; E-mail: [giulia\\_norton@abtassoc.com](mailto:giulia_norton@abtassoc.com)

"Research shows that Lights=Mild=Less Harmful... Government's pressures will intensify... This may further increase smokers' health concern and it is very likely that the mild/lights segment will continue its rapid growth" (Tcheng, 1987). Many consumers currently choose "light" and "ultra light" cigarettes as a means of reducing their risk (Gilpin, 2002, Weinstein, 2001).

But while these cigarettes deliver lower levels of tar and nicotine in machine tests, consumers adjust their smoking patterns in ways that maintain the level of tar and nicotine to which they are actually exposed. This phenomenon was known to the tobacco industry by 1974, when it was reported at the BAT (formerly British American Tobacco) research conference (Glantz, 1996, p.87). In 1980, the vice president of research and development at Brown & Williamson expressed concern about studying this behavior, asking "Is this in our best interests?" (Glantz, 1996, p.88). It would not serve the industry well for smokers to understand that their actual smoking behavior undermines their intent in choosing low-tar products. Indeed, the NIH report concludes that "The absence of meaningful differences in smoke exposure when different brands of cigarettes are smoked... and the resultant absence of meaningful differences in risk... make the marketing of the cigarettes as lower-delivery and lower risk products deceptive for the smoker" (Burns and Benowitz, 2001, p. 1).

More recently, tobacco manufacturers have begun to market two new types of tobacco products that claim further reductions in exposure to toxicants: (1) Cigarettes with a modified tobacco content that contain reportedly lower levels of toxic substances and carcinogens; and (2) cigarette-like products that deliver nicotine with less combustion than conventional products. The Institute of Medicine (IOM), in its recent study of tobacco harm reduction, *Clearing the Smoke*, (2001) included these two new classes of tobacco products in its definition of "potential reduced-exposure products," or PREPs. However, even though manufacturers claim reduced levels of toxicant delivery, the IOM concluded that no currently available scientific evidence supports a conclusion that PREP tobacco products result in reduced health risks to smokers or the general population (IOM, 2001).

PREP tobacco products are not to be confused with smoking cessation products, although both deliver nicotine to the user. PREP tobacco products are intended for continuous use by people who desire the effects of nicotine without the dangers of regular cigarettes. They are designed to look, feel, and taste much like regular cigarettes. In contrast, nicotine replacement therapies are intended to alleviate symptoms of withdrawal while the user's body responds to not smoking. They are designed to look and feel different from cigarettes; they deliver nicotine

transdermally via a patch, or via mucous membranes of the mouth through gum or nasal spray. While using nicotine replacement therapy, the smoker changes the behaviors associated with smoking (opening a pack, lighting the product, inhaling) as well as overcoming the nicotine addiction (Muramoto, 2003). The products also differ in that PREP tobacco products include tobacco and are not regulated by the U.S. Food and Drug Administration (FDA), who regulate nicotine delivery products without tobacco.

Public health, medical, and tobacco control professionals are concerned that advertising and marketing materials for these new modified tobacco and cigarette-like products may lead current and potential future smokers to mistakenly conclude that PREP tobacco products are safer or healthier than other cigarettes, or to view smoking these products as an alternative to smoking cessation. These concerns are grounded in past experience with cigarettes that have been marketed as low-yield, low-tar, light and ultra light. Marketing for these types of cigarettes has included both explicit and implicit messages regarding the potential for reducing the health risks associated with smoking (IOM, 2001). A recent review of advertising for low-yield cigarettes concluded that advertising for filtered and low-yield cigarettes was "intended to reassure smokers [who were worried about the health risks of smoking] and was meant to prevent smokers from quitting based on those same concerns" and that this advertising has contributed to "consumer ignorance and confusion" regarding low-yield cigarettes' relative healthfulness (Pollay and Dewhirst, 2001, p. 233). As a result, "many smokers choose Light and Ultra-Light brands because they believe that such cigarettes are less likely to cause health problems" (Weinstein, 2001, p. 198).

The study reported here responded to the IOM recommendation that further research address "marketing messages such as harm reduction claims and advertising" (IOM, 2001, p. 8). During May 2002, 600 adult smokers were intercepted at Boston-area shopping malls and asked to participate in a special study about their smoking behavior and perceptions of tobacco-related health risks. Study participants completed a brief interviewer-administered survey in which they examined three cigarette advertisements: one for a regular cigarette, one for a light cigarette, and one for a PREP tobacco product. Respondents were then asked questions regarding their perceptions of the cigarette brands they viewed and the messages conveyed by the specific advertisements.

## Method

### Sample selection

Study participants were selected as a convenience sample ( $N=600$ ) of 18–65 year old current Massachusetts

resident smokers, who were defined as those who had smoked at least 100 cigarettes in their lifetime and had smoked at least one cigarette during the prior 30 days. These individuals were selected from the larger population of individuals who visited three Boston-area shopping malls during May 2002.

Study participants were asked a series of screening questions to determine whether they met the study's requirements for smoking status, age, gender, residency, ability to complete the interview in English without assistance, and absence of a physical impairment that prevented them from seeing the advertisements. A total of 3,705 individuals were screened to obtain 600 interviews, equally distributed across six age/gender groups.

### *Description of study participants*

Smokers who participated in this study possessed demographic characteristics and smoking behaviors (Table 1) generally similar to the overall population of smokers in Massachusetts, as measured by the 1999 and 2000 Massachusetts Adult Tobacco Survey (MATS), a statewide representative survey carried out by the Center for Survey Research at the University of Massachusetts ( $N \geq 2,600$  smokers).

The majority of study participants had completed some education beyond high school (56.9%), as had MATS respondents (51.3%). Nearly three-quarters of

participants were non-Hispanic Whites (72.5%) compared with 86.8% of MATS respondents. Just under half the participants (45.8%) and MATS respondents (42.6%) had attempted to quit during the prior year.

### *Key measures*

The survey questions aimed to gain insight into smokers' perceptions of light and PREP tobacco products and their interpretations of light and PREP advertising messages in comparison to regular cigarettes. ("regular" cigarettes are sometimes referred to as "full flavor;" the "light" category includes ultra-light products.) To gauge perceptions, study participants were asked to assess the *health risk*, *amount of tar*, and *level of things that might cause cancer* using a scale from 1 to 10. To help ensure consistent responses, participants were shown a visual depiction of a ladder with the lowest rung labeled, for example, "very low risk of lung or heart disease" and the highest rung labeled, "very high risk of lung or heart disease." Results from these questions were analyzed in terms of the mean differences across the tobacco products.

Study participants also were asked whether they believed that the advertisements they saw contained any of a set of specified messages. Of principal interest are questions about whether the ad contained the message that the product is *safer or healthier* than other cigarettes, and whether it will *help someone quit smoking*. (Additional questions, intended to diffuse the focus on health issues, asked about messages that the product *tastes better* than others and asked whether it would be a *good one to smoke with friends*. Those results are not shown here.) Percentages were compared across PREP tobacco products, light cigarettes, and regular cigarettes.

The survey instrument used in this study, including the measures described above, was pre-tested prior to fielding the study. Direct observation and follow-up interviews with pre-test respondents were used to assess item clarity and respondent understanding. The questions used for the perception and advertisement messages were found to be effective during the pretest and were not substantially changed for the final study.

### *Advertisements used in study*

The study used two print advertisements for regular cigarettes (Marlboro Regular and Basic), two print advertisements for light cigarettes (Carlton Ultra Light and Basic Light) and three print advertisements for PREP tobacco products (Omni, Eclipse and Advance). All of these advertisements had appeared in national or regional magazines within the previous two years.

**Table 1.** Characteristics of the study sample.

	Percent of study sample <sup>a</sup>
<b>Age</b>	
18–30 years	32.8%
31–50 years	34.0%
51 years and older	33.2%
<b>Gender</b>	
Female	49.8%
Male	50.2%
<b>Education</b>	
High school graduate or less	43.2%
Some education beyond high school, but not college graduate	35.2%
College graduate or other higher educational degree	21.7%
<b>Race and ethnicity</b>	
White, non-Hispanic	72.5%
Non-White	27.5%
<b>Average number of cigarettes smoked per day (within last 30 days)</b>	
10 or less	31.4%
11–20	49.9%
More than 20	18.7%
<b>Usual type of cigarette smoked</b>	
Regular	62.5%
Light/Ultra Light	36.3%
<b>Attempted to quit during past year</b>	
Yes	45.8%
No	54.2%

<sup>a</sup>Number of cases for study sample is 599, as one case with incomplete data was dropped from analysis.

The regular and light advertisements selected for the study were chosen based on a combination of factors to ensure that a mixture of advertisement types and messages were represented in the study. (Table 2 presents the warnings and messages.) Because the research design called for all selected advertisements to be shown to respondents in all age, gender, and ethnic groups, advertisements that appeared strongly targeted to particular groups were not used. For the light cigarettes, we selected one advertisement with no explicit emphasis on the low-tar nature of the product, and one that explicitly emphasized this feature.

For the purposes of this study, it was assumed the PREP tobacco products might be understood by consumers as cigarettes, albeit cigarettes of a new class. However, it is important to note that the PREP tobacco products themselves have differing characteristics.

The Omni PREP tobacco product (produced by Vector Tobacco) came to market in 2001 and is advertised as containing tobacco that has undergone a proprietary treatment that reduces toxicant levels, in particular polycyclic aromatic hydrocarbons (PAH),

which have been shown to cause cancer. Similarly, the Advance PREP product (marketed by Brown & Williamson Tobacco Company beginning in 2000) also advertises having modified tobacco that results in a reduced yield of selected toxicants, in particular tobacco-specific nitrosamines. The Eclipse PREP product (marked by R.J. Reynolds beginning in 1996) is considered a "cigarette-like" product that is designed to have less combustion than other cigarettes. The product resembles a cigarette in size and shape, but uses a carbon tip to ignite a mixture of tobacco and glycerin before passing through a charcoal filter. To date, the health claims made by these products have not been substantiated with scientific evidence (Pauly, Streek and Cummings, 1995; Fagerstrom et al., 2000; Slade, Connolly and Lymperis, 2002).

Study participants were asked to examine one magazine advertisement for a regular cigarette, one advertisement for a light cigarette, and one for a PREP tobacco product. The combination of advertisements and the sequence of questions about them were varied in order to avoid any effects that might

**Table 2.** Messages included in advertisements.

Brand	Lead slogan	Health risk warnings or messages
<b>Marlboro Regular</b>	"Come to where the flavor is. Come to Marlboro Country."	- Surgeon General's warning
<b>Basic Regular</b>	"The best things in life are Basic"	- Surgeon General's warning
<b>Carlton Ultra Light</b>	"Isn't it time you started thinking about Number One? Think Carlton. With 1 mg Tar, It's the ultra ultra light."	- Surgeon General's warning
<b>Basic Light</b>	"The best things in life are Basic"	- Surgeon General's warning
<b>Advance</b>	"A step in the right direction. All of the taste ... Less of the toxins."	- Surgeon General's warning - Specific warning, "There is no such thing as a safe cigarette, nor is there enough available medical information to know if ADVANCE with less toxins will lower health risks." - Specific message, "ADVANCE contains less toxins than the leading light brands, thanks to a revolutionary new filter design and a patented new method for curing tobacco. Made with premium tobaccos, ADVANCE offers all of the rich, satisfying taste you would expect from a great light cigarette."
<b>Eclipse</b>	"The best choice for smokers who worry about their health is to quit. Here's the next best choice."	- Surgeon General's warning - Specific warning, "All cigarettes present some health risk, including Eclipse." - Specific message, "Eclipse, A Better Way to Smoke." - Specific message, "I had the support of my wife, if I'm going to smoke, she'd prefer I smoke Eclipse. Cecil W., Dallas, Texas"
<b>Omni</b>	"There's only one brand that significantly reduces carcinogens. Made you look!"	- Surgeon General's warning - Specific warning, "Smoking is addictive and dangerous to your health. Reductions in carcinogens (PAHs, nitrosamines, catechols) have NOT been proven to result in a safer cigarette. This product produces tar, carbon monoxide, other harmful by-products, and increased levels of nitric oxide." - Specific message, "The only cigarette to significantly reduce carcinogens that are among the major causes of cancer. The only one to still deliver premium taste. The only one to finally give smokers a reason to switch. Only Omni."



result from viewing a specific combination of advertisements or being asked first about a particular ad. Study subjects within each of the 6 gender-by-age strata were randomly assigned to 72 groups, defined by the 12 possible combinations of advertisements and the 6 possible orders of presentation.

The advertisements seen by study participants were professionally prepared color reprints of the actual magazine or newspaper advertisements.

#### *Data collection approach*

To minimize the potential for interviewer error, given the complex approach used to rotate the combination of advertisements seen by a respondent and the order in which the advertisements were to be presented, 600 separate survey packages were prepared in advance. Each package included the specific combination of advertisements to be shown, a questionnaire that reflected the order in which the advertisements were to be presented and specific question wording that referred to the advertisements in the package.

#### *Analytic approach*

After viewing an advertisement for a regular cigarette, a light cigarette, and a PREP tobacco product, respondents were asked to assess the health risk, amount of tar, and the level of things that might cause cancer associated with each specific product using a health risk ladder scaled from 1 to 10. For each of these three measures, we tested the difference in mean responses for the three product types: PREPs, regular, and light cigarettes.

Next, survey participants were asked four questions about particular messages that they believed the ads conveyed. The four possible messages concerned the product's taste, safety and health, peer acceptance, and ability to help someone quit smoking. We tested the difference in means across product types for safety and health and for ability to help someone quit smoking.

The comparison between mean responses (i.e., test for significance on the difference between response means) was accomplished using a multivariate model. For the variables with response scales of 1–10, we used a Tobit model with random effects (as programmed in the LIMDEP statistical software program). The Tobit model was selected for its ability to account for the effects of censoring at the ends of the health risk ladder (i.e., at 1 and 10) and the tendency for data to be concentrated at the scale's upper limit. With the particular model specified, the software allows one to account for censoring at only one end of the scale. Because the distribution of responses showed clustering at the upper end of the scale but not the lower, the specification took into account clustering at the upper

end. The random effect term was used to account for clustering that was introduced by the fact that each respondent answered three questions.

The model incorporated the following set of control variables: age (18–30, 31–50, and 51–65 years); gender; race (non-Hispanic White or other); number of cigarettes typically smoked per day (1–10, 11–20, or >20); type of cigarette smoked (regular, light, ultra light, or other); quit attempts in the last 12 months (1+ or none).

The model was specified as follows, ignoring the terms dealing with censoring:

$$H_{ij} = \alpha_i + \sum_{k=1}^7 S_{ik} \beta_k + X_i \delta + e_{ij}$$

where:

- $i$  is the  $i^{\text{th}}$  respondent,  $i=1..599$  (one case was omitted due to missing data).
- $j$  is the  $j^{\text{th}}$  stimulus,  $j=1..7$ .
- $H_{ij}$  is the response given by the  $i^{\text{th}}$  respondent to the  $j^{\text{th}}$  stimulus.
- $S_i$  is a dummy variable coded one when the  $i^{\text{th}}$  respondent is responding to the  $j^{\text{th}}$  stimulus, that is, when  $j=k$ ; otherwise coded zero.
- $X_i$  is a row vector of control variables
- $\alpha_i$  is a random effect, assumed to be distributed as normal with mean 0 and standard deviation  $\sigma_\alpha^2$ .
- $\beta_k$  is the estimated mean for stimuli  $k$  setting the control variables to zero.
- $\delta$  are parameters for the control variables
- $e$  is a random error term, with variance  $\sigma_e^2$ .

The analysis approach regarding the perceived messages in the ads (health and safety and ability to help someone quit smoking) was essentially the same. However, because the dependent variables were dichotomous rather than using the 1–10 scale, we used a Probit rather than a Tobit model. A random effect accounted for clustering.

## **Results**

### *Perception of health risk*

Smokers rated PREP tobacco products lower on the health risk ladder than either regular or light cigarettes, as shown in Table 3. The mean rating for PREPs as a group was 5.4 on the 10-point scale, lower than the mean of 5.8 for light cigarettes and well below the mean of 8.2 for regular cigarettes. Controlling for demographic characteristics and smoking behaviors, PREP ratings were statistically different from the ratings for light cigarettes, and both the PREP and light ratings were significantly different from those for regular cigarettes ( $p<.001$ ). Light

**Table 3.** Smokers' perceptions of product properties and advertising messages.

	Regular	Light	PREP	Light vs. Reg.	PREP vs. Reg.	Prep vs. Light
	Mean (standard error)	Mean (standard error)	Mean (standard error)	<i>p</i> value <sup>a</sup>	<i>p</i> value <sup>a</sup>	<i>p</i> value <sup>a</sup>
Respondents were shown the three advertisements and asked to use the "ladder" scaled from 1–10:						
"Please tell me where you would put each of the three cigarettes on the health risk ladder."	8.2 (.083)	5.8 (.105)	5.4 (.110)	<.001	<.001	<.001
"Please consider these three ads and rate them with respect to the amount of tar you think each product contains."	8.4 (.078)	5.4 (.111)	5.3 (.114)	<.001	<.001	.38
"Please consider these three ads and rate them with respect to the level of things that might cause cancer."	8.8 (.072)	6.9 (.114)	6.6 (.124)	<.001	<.001	<.001
"Look at the ad for [Product 1] while I read off some possible messages. For each possible message, tell me whether you think this is what the ad is trying to say."						
"This cigarette is safer or healthier than others."	0.1 (.012)	0.4 (.020)	0.6 (.020)	<.001	<.001	<.001
"This cigarette will help someone quit smoking."	0.1 (.009)	0.3 (.018)	0.4 (.02)	<.001	<.001	<.001

<sup>a</sup>*p* values based on multivariate Tobit or Probit model, as described in the *Analytic approach* section.

cigarette ratings were significantly different from ratings for regular cigarettes. (For complete regression results see Hamilton, 2001.)

The distribution of responses for regular cigarettes is quite different from that for either light cigarettes or PREPs, showing a strong perception that regular cigarettes pose greater health risk than the other products. The distributions for PREPs and lights are more similar, with some smokers rating each type of product as having very high health risk while others see little risk. Nonetheless, the difference in the bulk of the ratings clearly indicates a lower perceived health risk for PREPs than for light cigarettes.

#### *Perception of amount of tar*

Based on the advertisements viewed, smokers who participated in this study perceived PREP tobacco products and light cigarettes as having lower levels of tar than regular cigarettes. Survey respondents rated PREPs (mean=5.3) and lights (mean=5.4) lower than regular cigarettes (mean=8.4) on the 10-point ladder for tar (Table 3). The differences in ratings were statistically significant when controlling for demographic characteristics and smoking behaviors ( $p < .001$ ).

Smokers' ratings of PREP products and light cigarettes were not significantly different, reflecting the overlapping range of measured tar levels for these products (Table 4). Measured tar levels were specified in the fine print of the advertisements, and the study subjects apparently paid some attention to the fine print.

The ratings of individual products diverged from the fine print in some instances. For example, smokers rated Omni, with 15 mg of tar, significantly lower on the tar scale than the regular cigarettes, with measured levels of 15 and 16 mg. Similarly, smokers rated Omni lower than Basic, and Eclipse lower than Carlton, although these differences were not statistically significant.

#### *Perception of level of things that might cause cancer*

Smokers viewed PREP tobacco products as having lower levels of cancer-causing agents than regular or light cigarettes. When asked about the level of "things that might cause cancer," survey respondents rated PREP tobacco products at a mean of 6.6 on the 10-point ladder, significantly lower than light (mean=6.9) or regular cigarettes (mean=8.8) when controlling for demographic characteristics and smoking behaviors ( $p < .001$ ). Although the mean ratings for PREP products and light cigarettes were not

**Table 4.** Amount of tar contained in cigarette brands included in study.

Type	Brand	Mg Tar
<b>Regular</b>	Marlboro	15 mg
	Basic	16 mg
<b>Light</b>	Carlton Ultra Light	1 mg
	Basic Light	11 mg
<b>PREP</b>	Advance	10 mg
	Eclipse	3 mg
	Omni	15 mg

widely separated, the difference is statistically significant in multivariate analysis ( $p < .001$ ), as shown in Table 3.

#### *Health risk perceptions by different demographic groups*

Perceptions of PREP tobacco products as having lower health risks than regular and light cigarettes are strikingly consistent across all of the study's sample subgroups. We measured the proportion of people who perceived PREPs as having lower health risks than light cigarettes in each subgroup. The differences across groups defined by demographic characteristics or by smoking behavior are all less than nine percentage points.

When sample subgroups were examined for their ability to predict whether an individual perceived PREP tobacco products as having fewer health risks than regular cigarettes, the following relationships were identified.

- Respondents' gender was a significant predictor of this relationship. That is, male respondents were more likely ( $p < .05$ ) to rate PREP tobacco products lower on the health risk ladder than regular cigarettes, controlling for other demographic characteristics and smoking behaviors.
- Individuals who were non-Hispanic Whites were more likely ( $p < .05$ ) to view PREPs as having lower health risks than regular cigarettes.
- Educational attainment was a significant predictor of the probability of perceiving less health risk in PREPs than regular cigarettes ( $p < .05$ ). Respondents with lower levels of education were more likely to perceive a health advantage.
- There was some evidence that age also influences the probability of perceiving a lower health risk with PREPs, with older participants more likely to see an advantage. However, this relationship was not statistically significant at conventional levels ( $p = .06$ ).

These results suggest that individuals with these characteristics may be more receptive, or susceptible, to indirect and direct health messages contained in PREP tobacco product advertising.

Perceptions of light cigarettes as having lower health risks than regular cigarettes also were prevalent across all of study's sample subgroups. At least 65% of participants in all subgroups gave the light cigarette whose ad they saw a lower rating on the health risk ladder than the regular cigarette.

Some subgroups were especially likely to perceive a reduced risk with light cigarettes. The multivariate analysis revealed the following relationships.

- Study participants' age was a significant predictor of perceiving lower health risk with light cigarettes.

Participants over age 30 were more likely to rate light cigarettes lower on the health risk ladder ( $p < .01$ ).

- Less educated participants were more likely to see a health advantage in light cigarettes. Those with no education beyond high school were significantly more likely than college graduates to rate lights lower on the health risk ladder ( $p < .05$ ).
- Participants who usually smoke light or ultra light cigarettes were significantly more likely to believe that the light cigarette whose ad they saw entailed less health risk than the regular cigarette ( $p < .05$ ). This is consistent with research indicating that many people choose to smoke lower-tar products precisely because they believe that the health risk is lower (Gilpin, 2002; Weinstein, 2001).

Participants' gender, racial and ethnic background, smoking volume, or quit attempts during the past year were not significantly related to their perceptions of the relative health risk of light and regular cigarettes, controlling for other factors.

An examination of PREP ratings relative to those for light cigarettes found no statistically significant relationships between demographic or smoking variables and the likelihood of perceiving that the PREP offered lower health risk. That is, while over two-fifths of all study participants perceived the PREP to have lower health risk than the light cigarette whose ad they saw, this perception was not concentrated in people with any particular set of characteristics.

#### *Ad messages: Safety and health*

Asked whether "you think this is what the ad is trying to say," most subjects (62.3%) believed that the PREP ads they saw conveyed the message that "this cigarette is safer or healthier than others." In contrast, 43.7% saw this message in the advertisements for light cigarettes and just 10.0% saw it in the ads for regular cigarettes. All three differences (PREP vs. light, PREP vs. regular, and light vs. regular) are statistically significant in multivariate analysis ( $p < .001$ ).

The similarity in results across the three PREP advertisements was striking, particularly given the differences in the content of the advertisements. The Advance ad emphasized less toxins, the Eclipse ad argued that the product was "the next best choice" to quitting "for smokers who worry about their health," and the Omni ad emphasized reduced carcinogens. All three ads contained some explicit statement to the effect that smoking is not safe. Nonetheless, more than 62% of the smokers who saw each ad believed that the ad contained a positive message about health or safety.

Study participants perceived a health message in the absence of any explicit verbal statements about health in ads for light cigarettes as well. Differences in

imagery and color were apparently sufficient for smokers to perceive significantly different health messages.

#### *Ad messages: Help someone quit*

Two-fifths of the study participants (40.5%) interpreted the PREP advertisement as suggesting that the product "will help someone quit smoking." This was significantly higher than the proportion that perceived such a message in advertisements for light (25.7%,  $p < .001$ ) or regular (5.7%,  $p < .001$ ) cigarettes. The difference between light and regular cigarette advertisements also was statistically significant ( $p < .001$ ).

#### *Patterns for individual advertisements*

The analyses described above were replicated for individual advertisements by comparing ratings of each of the three PREP advertisements to ratings for the grouped light ratings and the grouped regular ratings. Similarly, ratings for each of the two light cigarette advertisements were compared to the grouped regular ratings. The results, not shown here, are consistent with the results reported above. Each of the statistically significant relationships between groups of advertisements was also significant when ratings for individual PREP or light advertisements were compared to the other groups.

#### *Government endorsement*

Study participants were asked, "If an advertisement claims that a cigarette has less dangerous substances, do you think that a government agency has to approve the claim?" Two thirds of the participants (67.1%) responded in the affirmative. The proportion was not significantly related to the messages that the smokers believed they saw in the advertisements. Thus, 72.4% of smokers who believed that PREP tobacco product ads contained a "safer or healthier" message also believed that a government agency must approve claims made in cigarette advertisements, as did 71.0% of those who thought the PREP advertisement conveyed a message that the product would help someone quit smoking. Likewise, among smokers who perceived these messages in advertisements for light cigarettes, 69.1% and 66.9%, respectively, believed that cigarette advertising claims must be approved by the government.

### **Discussion**

The study's findings confirm public health, medical, and tobacco control professionals' concerns that advertising for PREP tobacco products and light cigarettes may lead smokers to conclude that these

products pose fewer tobacco-related health risks than regular cigarettes, despite the absence of scientific evidence that these products carry reduced risk. In side-by-side comparisons of advertisements, smokers indicated that they thought PREP products were less unhealthy than either regular or light cigarettes, and that lights were less unhealthy than regulars.

The PREP results show how smokers' perceptions of a tobacco products' safety can be shaped solely by advertising (only 7.7% of study participants said they had previously seen an advertisement for the PREP product whose ad they viewed). Strikingly, study subjects perceived the same general pattern of lower risk and a health and safety advertising message across all three of the PREP products, although the advertisements differed substantially in their approach. Only the Omni ad specifically used the words "carcinogens" or "cancer." The Advance ad emphasized "less toxins," but without further information on the nature of the toxicity, and the Eclipse ad is not specific about the product's properties. Across these varying advertising strategies, however, participants drew the conclusion that the PREP tobacco products posed lower health risk than the regular or light cigarettes whose advertisements they saw.

It is also noteworthy that study participants' tar ratings for Omni were significantly lower than their ratings for the regular cigarettes, even though the tar levels reported in the advertisements are essentially the same. Clearly the participants were not simply responding to the numbers in the fine print, but were reporting their overall impression of the advertisements, including their impression of the light and regular product categories and of particular brands. This is consistent with research (e.g., Cohen, 1996) that suggests that consumers' perceptions may not sharply distinguish between the product's health risk and their perception of specific product properties. That is, the product that successfully conveys a message of lower overall risk gets the "benefit of the doubt" on specific properties such as the level of tar.

Neither the Surgeon General's warnings, which appeared on all of the advertisements, nor the additional health warnings in a similar format on each of the PREP tobacco product advertisements, appeared to affect study participants' perception of a health message. This is consistent with research findings that people do not recall health warnings on tobacco products (Brubaker, 1990), recall them less clearly than other elements of tobacco advertisements (Fischer, 1993), or recall them but find them ineffective (Ahmad, 2001).

Moreover, smokers perceived a positive health message in the light cigarette advertisements in the absence of any explicit verbal statements about health. The Carlton ad came closest to an explicit message, emphasizing the 1 mg tar content of the cigarette and featuring the tag line, "Isn't it time you started



thinking about number 1?" But the Basic Lights ad, which more than a third of the study participants perceived to contain the "safer or healthier" message, had no text obviously related to health. In fact, the only prominent text was the tag line "The best things in life are Basic," which was identical to the text in the Basic Regular ad. Differences in imagery and color were apparently sufficient for smokers to perceive significantly different health messages. Participants' prior exposure to products and advertisements also may have played a role, even though participants were asked to speak only to the specific ad they were viewing.

The study found that smokers of light or ultra light cigarettes are significantly more likely than other smokers to believe that lights pose lower health risks than regular cigarettes, which is consistent with research showing that light cigarette smokers tend to believe that a reduction in tar has made these cigarettes less dangerous to the smoker (Cummings, 2004). Indeed, research indicates that many people choose to smoke lower-tar products precisely because they believe that the health risk is lower (Gilpin, 2002; Weinstein, 2001).

Product advertising that conveys a "safer and healthier" message may constitute an alternative—and hence a barrier—to quitting for those smokers who are concerned about health. Two-fifths of study participants perceived a message that the PREP products would be helpful in quitting, and a quarter saw this message in light advertisements. This may reflect a conscious advertising strategy. Internal tobacco industry documents demonstrate that the industry identified smokers concerned with health as potential users of what are now known as PREPs. An R.J. Reynolds strategic plan states that, "Historically, mid-life switchers change brands seeking lower tar alternatives... there is an opportunity to address concerns among this large group with new technologies" (Iauro, 1985). Smokers who wanted to quit, rather than switch, also were identified as a potential market. Early product positioning for potential products targeted "hardcore smokers desperate to quit the smoking habit because of Health/Social pressures" (Wurmser, 1984).

Consumer misconceptions that arise from advertising may be strengthened by the perception that the government endorses the advertising claims. Two-thirds of study participants believed that "if an advertisement claims that a cigarette has less dangerous substances,... a government agency has to approve the claim." The implication of this widespread perception is that the current limited regulatory approach (requiring warning labels) actually contributes to consumer willingness to accept other explicit or implicit messages in advertisement. Since the study demonstrates that this can include health messages that are contrary to the scientific evidence,

the warning label may have the perverse effect of increasing the public health risk. To minimize this risk would require either making consumers better understand the government's limited role, or regulating tobacco advertising in a way that is more consistent with consumer expectations.

The study findings support two key recommendations of the Institute of Medicine: "Consumers [must be] fully and accurately *informed* of all the known, likely, and potential consequences of using these products" (IOM, 2001, p. 7), and "Promotion, advertising, and labeling of these products [should be] firmly *regulated* to prevent false or misleading claims, explicit or implicit" (IOM, 2001, p. 7) (emphasis in source).

Yet the study indicates that informing consumers and regulating advertising are not small challenges. Scientific information is not easily conveyed, and information in the fine print is readily overcome by visual cues and subtly crafted text. It may be necessary to adopt regulatory strategies that focus on the outcome rather than the content of advertising, such as requiring tobacco manufacturers and advertisers of PREP tobacco products and light cigarettes to demonstrate that consumer perceptions of the advertised product are consistent with the available scientific evidence. Advertising that demonstrably reduced rather than increased the gap between consumer understanding and the scientific evidence could truly reduce the public health risk associated with tobacco products.

### Limitations

Despite attempts to balance study participation by age and gender using strict sample selection guidelines, an important limitation in interpreting the study's results is that the study is based on a convenience sample rather than a probability sample. A random sample of the Massachusetts or U.S. smoking population might yield somewhat different results. Nonetheless, the relatively large sample size, together with the consistency of responses across subgroups defined by demographic and smoking-related characteristics suggest that the general patterns of response observed in the study are likely to be found in broader studies as well.

Smokers' responses in the context of the study might differ from their responses in "real life" situations. Participants probably paid more careful attention to the advertisements in the study than if they were casually perusing a magazine, perhaps focusing more closely on the text and the fine print, because they expected to be questioned about the ads. Since the fine print contained health warnings, and the text avoided making health claims, the results here may understate the extent to which advertisements leave consumers with favorable impressions of the health risks of light cigarettes and PREP tobacco products.

## Conclusion

This study assessed current smokers' interpretations of messages in advertising for regular cigarettes, light cigarettes, and PREP tobacco products. The smokers' perceptions of PREP tobacco products are particularly illuminating, as the great majority of smokers were completely unfamiliar with these products and learned of them only through the advertisement they were shown.

We demonstrate that smokers perceive advertisements for PREP products and light cigarettes as conveying positive messages about health and safety. This misperception exists despite the lack of specific messages regarding safety and is consistent within product type, despite varying wording and images used in the advertisements. Many smokers also perceived PREP products and light cigarettes as tools to "help someone quit smoking." Most smokers believed that claims made in cigarette advertisements must be approved by a government agency.

By showing that advertising can and does lead to perceptions that are contrary to the scientific evidence, these results support the IOM recommendation to regulate the promotion, advertising, and labeling of PREP tobacco products and light cigarettes.

## Acknowledgments

This research was conducted under contract to the Massachusetts Department of Public Health as part of the Independent Evaluation of the Massachusetts Tobacco Control Program. Additional support was provided by the National Cancer Institute to Dr. Connolly, grant number R01 CA87477-03. We would like to thank Geoffrey Wayne for sharing his knowledge of tobacco documents.

## References

- Ahmad, Z., Jaafar, R., Musa, R., & Naing, N. N. (2001). Adolescents' attitudes towards health warning message on cigarette packs. *Malaysian Journal of Medical Science*, 8, 20–24.
- Brown & Williamson. (1984). Low tar satisfaction. Hawkins, McCain, and Blumenthal Inc., July 25, 1977. (Bates No. 775036039–775036067).
- Brubaker, R. G., & Mitby, S. K. (1990). Health-risk warning labels on smokeless tobacco products: are they effective? *Addictive Behavior*, 15, 115–118.
- Burns, D. M., & Benowitz, W. L. (2001). Public Health Implications of Changes in Cigarette Design and Marketing. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine. Smoking and Tobacco Control Monograph No. 13*. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute.
- Cohen, J. B. (1996). Smokers' knowledge and understanding of advertised tar numbers: Health policy implications. *American Journal of Public Health*, 86, 18–24.
- Cummings, K. M., Hyland, A., Bansal, M. A., & Giovino, G. A. (2004). What do Marlboro Light smokers know about low tar cigarettes? *Nicotine and Tobacco Research*, 6(Suppl. 3), S323–S332.
- Fagerström, K. O., Hughes, J. R., Rasmussen, T., & Callas, P. W. (2000). Randomised trial investigating effect of a novel nicotine delivery device (Eclipse) and a nicotine oral inhaler on smoking behaviour, nicotine and carbon monoxide exposure, and motivation to quit. *Tobacco Control*, 9, 327–333.
- Fischer, P. M., Krugman, D. M., Fletcher, J. E., Fox, R. J., & Rojas, T. H. (1993). An evaluation of health warnings in cigarette advertisements using standard market research methods: what does it mean to warn? *Tobacco Control*, 2, 279–285.
- Gilpin, E. A., Emery, S., White, M. M., & Pierce, J. P. (2002). Does tobacco industry marketing of 'light' tobacco cigarettes give smokers a rationale for postponing quitting? *Nicotine & Tobacco Research*, 4, 147–155.
- Glantz, S. A., Slade, J., Bero, L. A., Hanauer, P., & Barnes, D. E. (1996). *The cigarette papers*. Berkeley, CA: University of California Press.
- Hamilton, W. L., Ouellette, T. K., & Rhodes, W. M. (2001). *Consumer responses to advertisements for potential reduced-exposure products*. Boston, MA: Massachusetts Department of Public Health. 2001.
- Iauco, D. N. (1985). New brands strategic plan. R.J. Reynolds, March 29, 1985. (Bates No. 502754532–502754536).
- Institute of Medicine. (2001). *Clearing the smoke: Assessing the science base for tobacco harm reduction*. Washington D.C.: National Academy Press.
- Muramoto, M. L., Ranger-Moore, J., & Leischow, S. J. (2003). Efficacy of oral transmucosal nicotine lozenge for suppression of withdrawal symptoms in smoking abstinence. *Nicotine & Tobacco Research*, 5, 223–230.
- National Cancer Institute. (2001). *Risks associated with smoking cigarettes with low machine-measured yields of tar and nicotine. Smoking and tobacco control monograph no. 13*. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute.
- Pauly, J. L., Streek, R. J., & Cummings, K. M. (1995). U.S. patents shed light on Eclipse and future cigarettes. *Tobacco Control*, 4, 261–265.
- Pollay, R. W., & Dewhirst, T. (2001). Marketing cigarettes with low machine-measured yields. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine. Smoking and Tobacco Control Monograph No. 13*. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute.
- Slade, J., Connolly, G. N., & Lymperis, D. (2002). Eclipse: does it live up to its health claims? *Tobacco Control*, 11, 64ii–70ii.
- Tcheng, J. (1987). Merit advertising brief. A memorandum to Cecil Yow. Philip Morris, July 27, 1987. (Bates No. 2084587895).
- Weinstein, N. D. (2001). Public Understanding of Risk and Reasons for Smoking Low-Yield Products. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine. Smoking and Tobacco Control Monograph No. 13*. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute.
- Wurmser, J. M. (1984). A structured creativity group. A presentation given by J.M. Wurmser. British American Tobacco, June 26, 1984. (Bates No. 400459873–400459886).