

Women, Tobacco, and Cancer: ***An Agenda for the 21st Century***

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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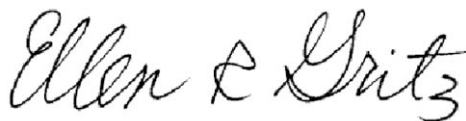
From the Leadership

We are very pleased to submit the Report of the Women, Tobacco, and Cancer Working Group. Currently, in the United States, 170,000 women die each year from smoking, and lung cancer has surpassed breast cancer as the leading cause of cancer death in women since 1986. The burden of tobacco use is especially high for certain populations of women, including women with low levels of education and in certain ethnic groups, such as American Indians. Ominously, rates of tobacco use are rising among women in economically developing countries, where women's tobacco use has traditionally been very low. Despite this, tobacco use has not generally been considered a "women's issue."

The 2001 Surgeon General's report, *Women and Smoking*, presented a comprehensive overview of the health effects of smoking on women and girls, and provided a framework and direction on what is needed to reduce smoking. The Working Group builds on the Surgeon General's report by articulating a set of strategies in five areas: discovery, development, delivery, partnerships, and evaluation and surveillance.

This Report represents the collaborative efforts of the dedicated scientists, clinicians, and advocates who participated in the Working Group. We believe that it is possible to reduce and ultimately eliminate tobacco use and tobacco-caused disease in the United States and abroad. With sustained, focused efforts that include partnerships and collaborations among researchers, practitioners, community advocates, and policy makers, we can implement these recommendations and help make this goal a reality.

Respectfully,



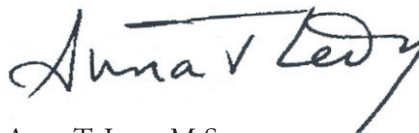
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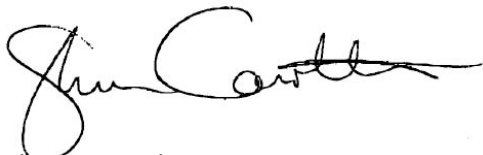
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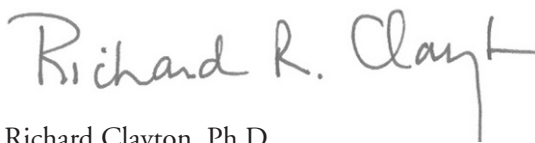
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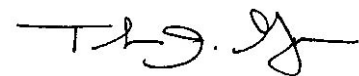
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Executive Summary

For far too long, tobacco use has been viewed as a men's issue, but the use of tobacco among women around the world is now common. As a result, women have experienced a dramatic upsurge in cancers, cardiovascular and lung disease, and other life-threatening conditions caused by tobacco use. Currently, it is estimated that approximately 1 in 5 U.S. women smoke and 170,000 U.S. women die each year from smoking.

The 2001 report of the Surgeon General, *Women and Smoking*, identified several strategies to reduce smoking among women. In addition, in 2001, the National Cancer Institute (NCI) highlighted research on tobacco and tobacco-related cancers in its annual budget document. The Department of Health and Human Services' (DHHS) *Healthy People 2010* continues to make smoking cessation and prevention a priority.

The Women, Tobacco, and Cancer Working Group was formed to respond to the priorities identified in these and other plans and reports. The group focused on identifying ways to stimulate scientific research and suggesting approaches to translate knowledge into interventions to prevent tobacco-related cancers in women in the United States and other countries. The Working Group, a public/private partnership led by NCI, met in Houston, Texas, in February 2003. This Report summarizes the recommendations of the breakout groups at the February 2003 Women, Tobacco, and Cancer Working Group meeting (see the *Summary of Recommendations*, pages 3-4).

Implementing the strategies described in the report will advance our progress toward the following goals:

Discovery

Increase our understanding of sex and gender differences* across the broad range of research on women, tobacco, and cancer.

A better understanding of the biological, psychological, and behavioral mechanisms and processes associated with women's and men's responses to nicotine exposure is critical to develop

better prevention and cessation interventions for addiction and to prevent and treat tobacco-related cancers. Research on genetic factors and hormonal variations throughout the life cycle should be emphasized in elucidating women's susceptibility to tobacco-related diseases and addiction, as well as responses to pharmaceutical and behavioral interventions. We need to understand how the interaction of gender, culture, race and ethnicity, and socioeconomic status affects women's and girls' use of tobacco products, perceptions of risk, and responses to relevant health messages. To conduct research that can be translated into effective applications, we must validate and standardize sex- and gender-appropriate definitions and measures of addiction, exposure, injury, and recovery.

Development

Develop new and more effective interventions to prevent and treat tobacco use and environmental tobacco smoke (ETS) exposure among women and girls, especially in populations at greatest risk.

We must translate basic and applied research into effective, evidenced-based prevention and treatment programs by using knowledge from animal studies, pilot projects, and small-scale clinical and community-based trials. By using or modifying existing mechanisms, we can rapidly evaluate promising interventions, programs, and policies—such as the World Health Organization Framework Convention on Tobacco Control—on tobacco use by women and girls, both nationally and globally. We need to evaluate and monitor the impact of tobacco control policies on tobacco use by women and girls, both nationally and globally. State-of-the-art, audience-tailored communication strategies should be used to develop and disseminate evidence-based messages that target women and girls.

* "Sex and gender differences" are defined as follows in the 2001 Institute of Medicine (IOM) report *Exploring the Biological Contributions to Human Health—Does Sex Matter?:* "The committee defines sex as the classification of living things, generally as male or female according to their reproductive organs and functions assigned by the chromosomal complement, and gender as a person's self-representation as male or female, or how that person is responded to by social institutions on the basis of the individual's gender presentation. Gender is shaped by environment and experience." (16)

Delivery

Ensure the widespread delivery of effective interventions to prevent and treat tobacco use and ETS exposure among women and girls.

The reach and impact of evidence-based tobacco control programs, policies, and counter-advertising campaigns must be expanded by increasing the appeal, access, affordability, and use of effective interventions, particularly among women and girls in populations at greatest risk. We need to identify and use targeted strategies to involve individuals, communities, policy makers, and organizations, especially women's organizations and those that have not previously been involved in tobacco control.

Partnerships

Harness and expand partnerships, networks, and innovative research platforms to design and launch broad-based strategies to eliminate the harms of tobacco use and ETS exposure.

Successfully implementing the discovery, development, and delivery recommendations will require capitalizing on existing collaborations and developing new partnerships. To maximize the development and dissemination of effective interventions, partners must be involved from the beginning, and knowledge gained from practice should be used to inform future research. We need to encourage researchers to investigate common pathways of tobacco-related disease mechanisms by fostering networks of clinical and translational researchers. Community-based participatory research needs to be conducted through partnerships between research institutions and community-based organizations, especially those that serve populations at greatest risk. Because of the magnitude and persistence of the tobacco use problem in American Indian/Alaska Native populations, it is particularly important to develop partnerships between research institutions and tribal colleges, tribal health departments, and/or American Indian health care and community settings. Similarly,

partnerships with organizations that serve women with low levels of education and women of low socioeconomic status are also a key priority.

Evaluation and Surveillance

Improve national and global evaluation and surveillance of the harms of tobacco use and ETS exposure and of women's and girls' knowledge, attitudes, and behaviors related to tobacco use and harms.

It is essential to monitor and evaluate progress toward reducing tobacco use and the impact of tobacco-related cancers on women. This will require further development of standardized measures and surveillance systems to ensure that data are comparable within and across nations. Information obtained will help strategically target funding to ensure that gains are maintained while expanding support for tobacco control among the general public, including policy makers. Identification and dissemination of best practices will inform researchers and practitioners about which prevention and cessation interventions are the most effective and help determine how to tailor core interventions to specific populations.

The Working Group believes that reducing and ultimately eliminating the harmful effects of tobacco use on women requires integrating advances in our understanding of basic biologic, behavioral, and social factors to develop new prevention and treatment interventions and ensure the delivery of new evidence-based interventions to all women who need them. As interventions are delivered, their impact on individual and public health must be evaluated and monitored to inform future research and development. Successful implementation of all of the recommendations of the Women, Tobacco, and Cancer Working Group will require many collaborations and partnerships between Federal and non-Federal organizations. Such efforts have the potential to rapidly decrease tobacco use and ETS exposure and, ultimately, morbidity and mortality.

Summary of Recommendations

DISCOVERY	DEVELOPMENT	DELIVERY
<p>OVERALL GOAL: Increase our understanding of sex and gender differences* across the broad range of research on women, tobacco, and cancer.</p>	<p>OVERALL GOAL: Develop new and more effective interventions to prevent and treat tobacco use and ETS exposure among women and girls, especially in populations at greatest risk.</p>	<p>OVERALL GOAL: Ensure the widespread delivery of effective interventions to prevent and treat tobacco use and ETS exposure among women and girls.</p>
<p>A better understanding of sex and gender differences is critical to eliminating tobacco use and tobacco-related cancer morbidity and mortality in women and men.</p> <p>Multidisciplinary research is needed on:</p> <ul style="list-style-type: none"> ■ Sex differences in the mechanisms and processes associated with: <ul style="list-style-type: none"> ◆ All phases of tobacco addiction—from experimentation to regular use and addiction to cessation—including the natural history of the progression between phases and the effects of environmental tobacco smoke (ETS) exposure. This includes genetic, molecular, cellular, neurobiological, biobehavioral, and hormonal factors that play a critical role in tobacco addiction and in the etiology of cancers and other diseases caused by tobacco. ◆ The etiology of cancers caused by tobacco, especially those related to gene-hormone-environment interactions involved in carcinogenic and other disease pathways. ◆ Methods of prevention and treatment of tobacco addiction. ■ Gender-specific factors in tobacco use and the components of effective prevention and treatment interventions for women and girls, especially in populations at greatest risk, to: <ul style="list-style-type: none"> ◆ Identify behavioral, psychosocial, sociocultural, and environmental influences on tobacco use, exposure to ETS and disease risk, and prevention and treatment interventions. ◆ Assess women’s and girls’ knowledge of the harms of tobacco use and ETS exposure and the benefits of quitting. <p>Multidisciplinary research is needed to:</p> <ul style="list-style-type: none"> ■ Validate and standardize sex- and gender-appropriate definitions and measures of addiction, ETS exposure, tissue injury, and recovery. 	<p>Translating basic and applied research into effective, evidence-based prevention and treatment programs and broad public health tobacco control policies will require:</p> <ul style="list-style-type: none"> ■ Using evidence from animal studies, pilot projects, and small-scale clinical and community-based studies to develop, refine, and evaluate promising sex- and gender-appropriate interventions for prevention, cessation, and treatment. ■ Using or modifying existing infrastructures to rapidly evaluate the efficacy of promising treatments and the effectiveness and cost-effectiveness of proven small-scale interventions, programs, and policies. ■ Developing and disseminating evidence-based cessation, prevention, and advocacy messages targeted to women using state-of-the-art, audience-tailored communication strategies. ■ Conducting research to explore and strengthen the positive health impacts of public and private tobacco control policies on women and girls, especially in populations at greatest risk, and improving the adoption of evidence-based policies and strategies by policy and decision makers. ■ Monitoring the harmful effects of tobacco marketing targeted to diverse populations of women and girls domestically and globally. 	<p>Expanding the reach and impact of evidence-based tobacco control programs and policies will require:</p> <ul style="list-style-type: none"> ■ Increasing the appeal, access, affordability, and use of effective interventions, particularly among women and girls in populations at greatest risk. ■ Identifying and using targeted messages and strategies to involve and activate individuals and organizations in effective, sustained advocacy for evidence-based tobacco control programs and policies. ■ Making data from surveillance and policy research, as well as social, economic, and cultural studies, available to the health care community, policy makers, and the general public in a timely and effective fashion. ■ Supporting research and demonstration projects to better understand how to convert women’s broad-based support for tobacco control policies and programs into more active involvement in their communities.

* See footnote on page 1.

Summary of Recommendations (continued)

PARTNERSHIPS	EVALUATION AND SURVEILLANCE
<p>OVERALL GOAL: Harness and expand partnerships, networks, and innovative research platforms to design and launch broad-based strategies to eliminate the harms of tobacco use and ETS exposure among women and girls.</p>	<p>OVERALL GOAL: Improve national and global evaluation and surveillance of the harms of tobacco use and ETS exposure, and of women’s and girls’ knowledge, attitudes, and behaviors related to tobacco use and harms.</p>
<p>Successfully implementing the discovery, development, and delivery recommendations will require capitalizing on existing collaborations and developing new partnerships. To maximize the development and dissemination of effective interventions, partners must be involved from the beginning, and knowledge gained from practice should be used to inform future research.</p> <p>Partnerships are especially needed between:</p> <ul style="list-style-type: none"> ■ Established networks of clinical and translational researchers that can provide the resources and infrastructure needed to foster cross-disciplinary interactions and rapidly evaluate treatments and interventions. ■ Research institutions and community-based organizations that serve populations at greatest risk to conduct community-based participatory research. These partners must be committed to joint decision making in designing research, sharing ownership of the products of research, and disseminating and implementing research results. ■ Research institutions and tribal colleges, tribal health departments, and/or American Indian health care and community settings to develop effective, culturally appropriate individual, family, and community-level tobacco prevention and cessation initiatives. ■ Public and private funding agencies to fully and efficiently support the implementation of successful interventions. 	<p>It is essential to monitor and evaluate progress toward reducing tobacco use, ETS exposure, and the impact of tobacco-related cancers on women and to make midcourse adjustments as needed. This will require further development of standardized measures and surveillance systems to ensure that data are comparable within and across countries.</p> <p>Local, national, and global evaluation and surveillance will be critical for:</p> <ul style="list-style-type: none"> ■ Monitoring and measuring national and global trends and patterns in tobacco use and exposure to ETS using standardized measures. ■ Ensuring that research and programmatic funding are strategically targeted and, where appropriate, tailored to specific populations. ■ Assessing whether progress has been made and whether it is due to specific interventions and policies. ■ Identifying effective interventions through success stories and rigorous case studies to inform researchers, encourage broader dissemination, and increase public support.

Introduction

For far too long, tobacco use has been viewed as a men's issue, but the use of tobacco among women around the world is now common. As a result, women have experienced a dramatic upsurge in cancers, cardiovascular and lung disease, and other life-threatening conditions caused by tobacco use. For example, between 1950 and 1997, lung cancer mortality for white women in the United States increased by over 600 percent (1). Women who smoke also experience higher rates of cancers of the mouth, pharynx, esophagus, larynx, bladder, pancreas, kidney, and cervix—and possibly other sites. In addition, these women have an increased risk of developing and dying from cardiovascular disease and chronic obstructive pulmonary diseases, including chronic bronchitis and emphysema with airflow obstruction. Currently, it is estimated that 1 in 5 U.S. women smoke and 170,000 U.S. women die each year from smoking (1).

Smoking prevalence decreased among U.S. women from 34 percent in 1965 to 20 percent in 2002, but most of this decline happened between 1974 and 1990; prevalence declined more slowly in the 1990s (1, 2). Smoking rates remain alarmingly high among certain U.S. populations. In 2002, approximately 22 percent of white women in the United States were current smokers, but the rate among American Indian/Alaska Native women was 41 percent (2). Moreover, smoking prevalence is almost three times higher among women who did not finish high school than among those with a college degree (3). Smoking rates are significantly lower among women in economically developing countries (about 9 percent) than in economically developed countries, where the average rate is 22 percent (4).

As might be expected in economically developing countries where smoking rates among women are relatively low, lung cancer death rates are also low (1). With increased female autonomy, increased marketing of tobacco products to women, and changes in women's roles, smoking uptake and ensuing disease are expected to increase in economically developing countries (5). In addition, women's use of traditional forms of tobacco is already widespread in many economically developing countries (6). Reflecting this, a recent article notes that "curtailing the increase in tobacco use among women in developing countries represents one of the greatest opportunities for disease prevention in the world today" (7).

Impetus for This Report

The 2001 report of the Surgeon General, *Women and Smoking*, identifies five strategies to reduce smoking among women:

- Increase awareness of the impact of smoking on women's health and counter the tobacco industry's targeting of women.
- Support women's antitobacco advocacy efforts and publicize that most women are nonsmokers.
- Continue to build the science base on gender-specific outcomes and on how to reduce disparities among women.
- Act now: we know more than enough.
- Stop the epidemic of smoking and smoking-related diseases among women globally.

In addition, in 2001, NCI began to highlight research on tobacco and tobacco-related cancers as an Extraordinary Opportunity for Research in its annual budget document, *Plans and Priorities for Cancer Research*. The Department of Health and Human Services' *Healthy People 2010* continues to make smoking cessation and prevention a priority. Relevant goals include reducing smoking prevalence and decreasing death rates from both lung cancer and cancer overall.

Working Group on Women, Tobacco, and Cancer

The Women, Tobacco, and Cancer Working Group was formed to respond to the priorities identified in these and other plans and reports. In particular, the group focused on identifying ways to stimulate scientific research and suggesting approaches to translate knowledge into action to prevent tobacco-related cancers in women in the United States and abroad. The Working Group, a public/private partnership led by NCI, is a multidisciplinary group of experts from Federal and non-Federal research and advocacy organizations.

The Working Group meeting held in Houston, Texas, in February 2003 and this Report are the culmination of the dedicated efforts of the Breakout Group Co-Chairs and the Working Group's Steering Committee. A more detailed description of the Working Group process, a meeting agenda, and the Steering Committee and Working Group rosters can be found in the appendices following the Report.

Organization of This Report

This Report summarizes the recommendations of the breakout groups at the February 2003 Women, Tobacco, and Cancer Working Group meeting. These summary recommendations are organized under five cross-cutting goals in the following areas:

- Discovery
- Development
- Delivery
- Partnerships
- Evaluation and Surveillance

These goals reflect the themes of the breakout group discussions, as well as the framework adopted by NCI in 2001 to meet its Challenge Goal of eliminating the suffering and death due to cancer by 2015.

The recommendations discussed in this Report are drawn from the deliberations of the seven breakout groups at the Working Group meeting:

- Biology and Cancer
- Addiction

- Epidemiology and National Surveillance
- Interventions for Prevention and Treatment
- Awareness, Risk Perception, and Communications
- Community and Policy Interventions
- Global Issues

Complete breakout group summaries are included in the appendices at the end of the Report.

We believe that to reduce and ultimately eliminate the harmful effects of tobacco on women, we must integrate advances in our understanding of basic biologic, behavioral, policy, and social factors. This will lead to the development of new prevention and treatment interventions and help ensure that the interventions delivered to women are evidence based. As interventions are delivered, their impact on individual and public health must be monitored and evaluated to inform future research and development. Strong Federal, state, local, and private partnerships will also be needed to implement the recommendations.

Recommendations

Discovery

Overall Goal: Increase our understanding of sex and gender differences across the broad range of research on women, tobacco, and cancer.

A better understanding of sex and gender differences* is critical to eliminating tobacco use and tobacco-caused cancer morbidity and mortality in women and men.

Research suggests that women differ from men in their biological responses to nicotine, progression to nicotine dependence, and patterns of intake and that women have higher rates of relapse and greater risk of health problems caused by smoking (8-15). However, the effects of oral contraceptives, menopause, hormone replacement therapy,

Discovery refers to the process that generates new knowledge about fundamental disease processes at the genetic, molecular, cellular, organ, individual, and population levels.

and other sex-related factors on smoking rates, craving, and relapse are not well understood. The menstrual cycle, puberty, pregnancy, and menopause

should be primary foci of research on nicotine dependence and tobacco use to determine, for example, whether nicotine has a disruptive effect on hormone levels and whether sex hormones can affect craving and rates of relapse. Ovarian hormones may modulate response to medications, which may account for women's lower success rates in quitting in response to certain pharmacotherapies.

Some case-control studies suggest that women are more susceptible to tobacco-induced carcinogenesis than men, after taking into account baseline exposure, body weight, body height, and body mass index (17). However, cohort studies have not supported this observation (18). Estrogen or menopausal status has an impact on lung cancer risk in women, and some evidence indicates a positive interaction between menopausal estrogen therapy, smoking, and the development of adenocarcinoma of the lung (19). A better

understanding of the role of estrogens in premalignant and malignant disease progression may lead to the development of antiestrogen therapies for lung cancer prevention and treatment.

Depression, which is more common in women than in men, is associated with higher dependency on smoking (20). Women are more likely than men to smoke in response to stress and negative affect (1, 21, 22). However, the underlying mechanisms of the relationships among tobacco use, negative affect, and stress are not fully understood. Research aimed at testing interventions to help women with depression quit smoking must take into account the multiple demands and unique stressors in the daily lives of women.

Differences in smoking prevalence and patterns of use among women belonging to different subgroups (as defined by socioeconomic status, race, culture, and ethnicity) may affect initiation and cessation. It is important that cultural and, potentially, biological differences inform prevention and cessation programs targeting particular groups (23). Concurrently, understanding what cultural and social factors protect women from tobacco is also valuable, particularly in cultural groups where traditional roles for women are changing in ways that may facilitate tobacco use.

Discovery Recommendations

1.a Multidisciplinary research is needed on sex differences in the mechanisms and processes associated with all phases of tobacco addiction—from experimentation to regular use and addiction to cessation—including the natural history of the progression between phases and the effects of environmental tobacco smoke (ETS) exposure. This includes genetic, molecular, cellular, neurobiological, biobehavioral, and hormonal factors that play a critical role in tobacco addiction and in the etiology of cancers and other diseases caused by tobacco.

Multidisciplinary research integrates technologies and knowledge from a variety of interrelated fields.

* See footnote on page 1.

Research is needed to address:

- *Environmental, behavioral, genetic, molecular, cellular, neurobiological, and hormonal sources of variation in nicotine use and addiction.* Sex differences must also be studied at different stages of life, taking into consideration biological, behavioral, and environmental factors.
- *The interactions of the different sources of variation in animals and humans during all phases of nicotine addiction, including initiation, maintenance, withdrawal, and relapse.* In particular, the genetic influences on different stages of tobacco use require further investigation because these influences may vary. In addition, a better understanding of how genes and the environment interact to increase susceptibility to tobacco use is needed.
- *The natural history of tobacco use, including initiation, maintenance, cessation, and relapse (24).* Some recent data indicate that the patterns of initiation and maintenance may be changing (25), and these apparent changes may affect tobacco use prevalence and the incidence and prevalence of tobacco-related morbidity and mortality in the future. It is not known whether the observed patterns are similar or different for different subpopulations. Variation in the natural history of tobacco use across populations within a nation and across nations should be more fully explored.

1.b Multidisciplinary research is needed on sex differences in the mechanisms and processes associated with the etiology of cancers caused by tobacco, especially those related to gene-hormone-environment interactions involved in carcinogenic and other disease pathways.

Research is needed to address:

- *Cross-disciplinary research on mechanisms of tobacco-related disease.* Estrogen status, for example, is recognized as a factor that affects lung cancer risk in women. Estrogen or one of its metabolites may be a weak carcinogen, but studies have not addressed this in depth, particularly in relationship to tobacco use. An understanding of the role of estrogens in the pathogenesis of lung cancer should facilitate the selection and evaluation of antiestrogen therapies for the treatment of this disease. Further insight into sex-specific pathways for lung carcinogenesis may be gained through the use of proteomic and genomic

approaches in the analysis of early lesions and established tumors obtained from both women and men.

- *Common pathways between inflammation and tobacco-caused disease.* To date, relatively little research has focused on the interplay between inflammation and the development of lung cancer. Further understanding is needed of the effects of oxidative stress on lung biology and the mechanisms controlling the expression and release of pro-inflammatory mediators in the lung.

In **transdisciplinary research**, teams from a variety of relevant fields collaborate to address a common problem using shared concepts and approaches.

Transdisciplinary investigations are also needed to understand common pathways of cancer, heart disease, and lung disease caused by tobacco.

- *The variety of cellular processes regulated by nicotine and other tobacco smoke constituents to identify new therapeutic targets for intervention in tobacco-related diseases.* Further understanding of the mechanisms by which nicotine alters cell growth is also important to further guide pharmacologic therapy.

1.c Multidisciplinary research is needed on sex differences in the mechanisms and processes associated with methods of prevention and treatment of tobacco addiction.

Research is needed to address:

- *Whether sex and gender differences exist in prevention and treatment efficacy.* Studies have produced conflicting results as to whether women have the same, less, or more difficulty quitting smoking than men (26-32). Methodological limitations may account for the uncertainty.
- *Whether physiological, psychological, and/or behavioral factors mediate or moderate differences between men and women in responses to treatment and tobacco use cessation.* These differences may be due to a number of factors, including depression, nicotine dependence, withdrawal, demographics, social support, coping styles, expectancies, and weight concerns. To date, research has not adequately addressed these issues.
- *The influence of factors unique to women—such as the menstrual cycle, pregnancy, and menopause—on tobacco use*

behavior and treatment efficacy. While some factors, such as pregnancy, have been associated with increased quit rates, others have not been well explored. Targeting these events will make it possible to capitalize on potential windows of opportunity.

- *Effective strategies for tailoring interventions to women.* Identifying whether sex and gender differences exist and the factors through which they affect tobacco use will lead to the targeting and tailoring of prevention and intervention efforts.

2.a Multidisciplinary research is needed on gender-specific factors in tobacco use and the components of effective prevention and treatment interventions for women and girls, especially in populations at greatest risk, to identify behavioral, psychosocial, sociocultural, and environmental influences on tobacco use, exposure to ETS and disease risk, and prevention and treatment interventions.

Populations at greatest risk for tobacco use and tobacco-related disease include women with low income and/or low levels of education, members of certain racial and ethnic groups, pregnant women, and women with mental health or other substance abuse disorders.

Research is needed to address:

- *Tobacco use among different populations.* Tobacco use varies among population subgroups, and increasingly, the devastating health effects of tobacco are concentrated in certain populations. Race, ethnicity, socioeconomic status, age, sexual orientation, disability, and culture may all play a role in initiation, maintenance, and cessation of tobacco use. Yet, adequate data on tobacco use are lacking for many population subgroups. To more precisely identify disparities, it is necessary to assess the interrelationships of specific population characteristics as they influence tobacco use, exposure to ETS, and disease risk. Understanding how these differences affect tobacco use behaviors will allow us to identify social and contextual factors that could aid in prevention and treatment for all women and help reduce health disparities.

- *The role of gender issues and the interaction of gender, culture, and ethnicity in the continuum from experimentation to addiction.* Experimentation with and initial exposure to tobacco occur early, and the time from experimentation to addiction is very brief (33, 34). Factors that contribute to experimentation and regular tobacco use are not well understood.
- *Social contextual factors, such as partner and household tobacco use, social networks, social ties, and discrimination.* Interest in cessation and vulnerability to relapse may be influenced by these factors. Family, social, and cultural factors may be especially important for minority and underserved women who have limited access to care and may depend on existing social networks for support.

2.b Multidisciplinary research is needed on gender-specific factors in tobacco use and the components of effective prevention and treatment interventions, especially in populations at greatest risk, to assess women's and girls' knowledge of the harms of tobacco use and ETS exposure and the benefits of quitting.

Research is needed to address:

- *Women's current levels of knowledge of the risks of tobacco use and their assessment of their personal risk.* More research is needed to determine accuracies and inaccuracies in women's knowledge about tobacco use, prevention, and cessation and the interplay of affective, experiential, and cognitive approaches to assessing risk and deciding what course of action to take. This research should identify mechanisms to which women will respond and focus on different ethnic, socioeconomic, and health status groups across the lifespan.
- *Women's perceptions of the addictiveness of tobacco and their understanding of the process by which people become addicted.* Further research is needed to explore how beliefs about the addictiveness of tobacco are formed and how prevention messages can counteract inaccurate impressions of individual control.
- *Culturally relevant messages and entry points that respond to women's perceived needs.* It is important to understand the meaning of tobacco use to women in its historic social context, especially in economically developing countries, where tobacco use is frequently linked to emancipation and "Western" culture. Investigation of the knowledge, attitudes, and practices of women who use smokeless

and traditional forms of tobacco is also important, particularly in some economically developing countries where these products are commonly used by women. The role of men as positive or negative influences on women's health also needs further investigation.

3. Multidisciplinary research is needed to validate and standardize sex- and gender-appropriate definitions and measures of addiction, ETS exposure, tissue injury, and recovery.

Research is needed to further develop:

- *The definition of nicotine addiction/dependence.* Reasons for tobacco use vary among individuals and, probably, across population subgroups, time, and situations. A more precise definition of nicotine addiction will make it possible to better define sex-relevant experimental parameters.
- *Appropriate instruments for assessing nicotine dependence.* Addiction/dependence appears to be multidimensional and may include physical, behavioral, and physiological components (35-38). To date, none of the instruments

commonly used to measure nicotine dependence assesses all aspects, and the intercorrelation of these instruments is surprisingly low (38). Therefore, better measures need to be developed to identify differences in nicotine dependence between men and women and between adults and adolescents.

- *Validated, biologically relevant measures of tobacco smoke exposure, injury, and recovery.* Validating these measures includes linking measures of exposure to those of injury in biological models, linking measures of injury to outcomes, examining modifying factors of injury from exposure, and investigating new tobacco products. Intermediate markers between injury and disease must be identified. Although several good models are available, identifying the effects of tobacco exposure in these models is time consuming, pointing to the need for accelerated models as well as for mixture and single-agent models (39). The biomarkers identified can be used to provide a more specific and efficient tool for assessing biological exposure and effect and, thus, identifying persons at risk.

Development

Overall Goal: Develop new and more effective interventions to prevent and treat tobacco use and ETS exposure among women and girls, especially in populations at greatest risk.

To eliminate the harms caused by tobacco use and ETS exposure among women and girls, especially those in populations at greatest risk, basic and applied research must be translated into effective, evidence-based prevention and treatment programs and broad public health tobacco control policies.

Knowledge gained from research is critical to developing effective interventions for both smoking and disease prevention for women and girls, as well as for cessation and disease treatment. This is especially important because evidence indicates that women respond differently to treatments than men. For example, research has found that

Development refers to the process of creating and evaluating tools and interventions using knowledge gained through research, to reduce the cancer burden through the prevention, early detection, diagnosis, and treatment of cancer and its consequences.

women are more responsive than men to telephone quit-line use and support (40). Research has also shown that women are more concerned about their weight than men. Unfortunately, smoking cessation often leads to weight

gain, and some evidence suggests that women are less likely than men to seek treatment or attempt to quit smoking on their own because of this issue (41, 42). Other factors that are unique to women and girls that may influence smoking behaviors and treatment efficacy include phase of menstrual cycle, pregnancy, menopausal status, and use of hormone therapies. Knowledge of sex and gender differences and the sequelae of these unique factors will provide a better understanding of how treatments should be designed for women and girls.

Research findings must be shared between the basic and applied research communities and integrated into the

development and refinement of interventions. Understanding the effects of such variables as sex and gender, culture, ethnicity, educational level, and socioeconomic status is critical in designing effective interventions. Community intervention research and community-based research have provided valuable insights for the design of state- and community-level interventions that have helped reduce tobacco use (43-45). Examples include the NCI Community Intervention Trial for Smoking Cessation (COMMIT) and the American Stop Smoking Intervention Study (ASSIST) (46).

Increasing communication between researchers and practitioners will help ensure that research designs are informed by practitioners' constraints and that researchers are investigating issues that reflect population needs. Increased multidisciplinary collaboration will also aid in the development of the most cost-effective and efficient practices possible. Best practices in the United States should be shared with other countries, but they must be adapted to the cultural, social, and economic needs of local communities. For example, mass media campaigns should be modified in communities and countries where community leaders have more influence than print media among illiterate women. Given the need to strengthen leadership in economically developing countries, greater effort must also be made to exchange knowledge and success stories between the economically developed and developing worlds. We have much to learn from each other.

Development Recommendations

- 1. Translating basic and applied research into effective, evidence-based prevention and treatment programs and broad public health tobacco control policies will require using evidence from animal studies, pilot projects, and small-scale clinical and community-based studies to develop, refine, and evaluate promising sex- and gender-appropriate interventions for prevention, cessation, and treatment.**

Evidence from the following should be used:

- *Animal studies, pilot projects, and small-scale clinical and community-based studies.* Animal studies may be useful in understanding the role of behavioral, hormonal, genetic, neurobiological, and environmental factors in nicotine addiction. These models will help in the development of potential behavioral and pharmacologic interventions

for the prevention and cessation of nicotine addiction. For example, pharmacological interventions from the field of depression and other psychiatric comorbidities could be tested in animal models and perhaps provide data to begin pilot clinical and community-based studies. In addition, menstrual cycle effects on craving and withdrawal symptomatology and cognitive behavioral therapy regarding weight gain concerns can be studied in pilot or small-scale settings.

2. Translating basic and applied research into effective, evidence-based prevention and treatment programs and broad public health tobacco control policies will require using or modifying existing infrastructures to rapidly evaluate the efficacy of promising treatments and the effectiveness and cost-effectiveness of proven small-scale interventions, programs, and policies.

Promising interventions that need to be evaluated include:

- *Nicotine replacement therapy (NRT)*. Existing infrastructures, such as the National Institute on Drug Abuse Clinical Trials Network, may be used for investigations on how to maximize the effectiveness of NRT for women because women may have different sensitivity to nicotine than men during withdrawal. Hormonal effects may alter nicotine sensitivity, but few studies have examined hormonal influences on the responsiveness to NRT. Additional studies are needed to determine whether the menstrual cycle should be taken into consideration to maximize the effectiveness of NRT.
- *Bupropion, the only non-NRT drug treatment that is currently approved for smoking cessation*. This treatment may be especially useful for women because it may reduce withdrawal symptoms and weight gain, a major concern for women. Similar research will be needed for other pharmacologic agents under development for cessation.

Translational research is the bidirectional exchange between basic and clinical science to move research findings to applied settings involving patients and populations.

- *Combinations of medications and behavioral treatments, which may be more effective than single treatments*. Women who smoke and have a history of depression are less likely to quit. Existing research infrastructures should be used to examine the application of treatments for other disorders, such as depression, to nicotine dependence.
- 3. Translating basic and applied research into effective, evidence-based prevention and treatment programs and broad public health tobacco control policies will require developing and disseminating evidence-based cessation, prevention, and advocacy messages targeted to women using state-of-the-art, audience-tailored communication strategies.**

Strategies should include:

- *Advancing the social marketing agenda using qualitative and quantitative research methods and focusing on the psychological, sociocultural, and economic segmentation of women*. Simply recognizing the personal health risks of tobacco use does not often lead to cessation (47). Awareness of risk needs to be combined with decreased benefits from tobacco use, increased barriers to tobacco use, and social and environmental support for not using tobacco. The key is to identify sets of attitudes and values of women that can be targeted for prevention, cessation, and advocacy messages for environmental change. Further research is needed to explore how tobacco products fit into women's views of affordable routine pleasure, as well as their perceptions of addiction.
- *Using lifestyle risk factors, sociodemographics, and health perceptions to create target audiences for health messages*. Understanding the diversity of tobacco users' representations of explanations for their own tobacco use may also play a role in developing effective antitobacco messages. Comprehensive models of tobacco addiction that take into account the various influences in women's lives are clearly needed.
- *Methods to decode and debunk tobacco industry messages and counter their persuasive power*. Redefining women's emancipation should be based on women's own perceptions. The tobacco industry must be prevented from "owning" gender images of modernity. The ultimate goal is to use media and communication

strategies to increase the demand for prevention and cessation among women.

- *Developing antitobacco campaigns that are based on at least the same level of systematic and extensive research as tobacco company campaigns.* Although some focus group research has helped elucidate the benefits of and barriers to smoking cessation for particular groups of women (48), few large-scale studies have examined the “hot buttons” that motivate women to take action against tobacco. The research to inform antitobacco campaigns should provide a clear picture of the attitudes, values, and needs of target groups, including those at risk for tobacco use, current tobacco users, and women’s health advocates.
- *A comprehensive feedback system to help researchers hone new research quickly and effectively.* Although message concepts are routinely tested among target audiences, large-scale trials of media messages and intervention results are not as commonly catalogued and monitored. The system should include surveillance and monitoring to determine the effectiveness of the messages among various segments of the population.

4. Translating basic and applied research into effective, evidence-based prevention and treatment programs and broad public health tobacco control policies will require conducting research to explore and strengthen the positive health impacts of public and private tobacco control policies on women and girls, especially in populations at greatest risk, and improving the adoption of evidence-based policies and strategies by policy and decision makers.

Policy-related research will help to:

- *Reinforce the positive effects of tobacco control policies on the health of women and girls, especially those at greatest risk.* This will fill major knowledge gaps regarding gender differences in attitudes, behavior, and the impact of tobacco policies. Research can also clarify the policy development process, including models by which policies alter social norms and behaviors, and optimal strategies for collaboration with policy makers.
- *Educate policy makers in economically developing countries about the utility of tobacco control measures.* Two major areas of concern should be the implementation of the World Health Organization (WHO) Framework

Convention on Tobacco Control (Framework Convention) and multicountry studies of national and local policies designed for international comparisons. For example, research might address the impact on women’s health of a total ban on tobacco advertising or the impact of comprehensive ETS restrictions.

- *Increase levels of awareness among women.* Awareness varies widely by social, economic, and cultural context, even within a country. Subgroups of women to target for raising awareness should be identified in policy-related research.
- *Build feasibility studies and evaluation and monitoring of policies resulting from enforcement of the Framework Convention into a gender-specific tobacco strategy.* Multicountry studies that measure the impact of specific measures on women’s tobacco use will provide important comparative data. Accurate evaluations are also needed of new legislation, such as bans on tobacco use in workplaces and public places.
- *Improve legal and governance structures for tobacco control.* Monitoring and evaluating existing and new laws is necessary to ensure compliance and identify reasons for lack of enforcement.
- *Help advocates work with governments to implement the Framework Convention.* Nongovernmental organizations (NGOs) can also use information to persuade governments to take action and increase public awareness of the importance of gender-sensitive tobacco strategies. Tobacco control programs could target advocacy toward policies that work best to reduce tobacco use among women and girls.

5. Translating basic and applied research into effective, evidence-based prevention and treatment programs and broad public health tobacco control policies will require monitoring the harmful effects of tobacco marketing targeted to diverse populations of women and girls domestically and globally.

Monitoring needs to include:

- *Tobacco advertising and promotion targeted to diverse populations of women in the United States and internationally.* This information will enhance counter-marketing programs to educate women and girls and policy and program planning to counter tobacco industry messages that promote tobacco use. In addition,

information on tobacco company advertising and promotion activities could be used to show women that options are available for becoming emancipated and independent other than using tobacco.

- *The perception developed by marketers that tobacco use is an affordable pleasure for women.* Many women smokers report that tobacco use is a positive and meaningful

part of their lives (49). Further research is needed to explore this positive association, including how women experience tobacco use as an affordable pleasure. This research can assist in understanding the benefits women associate with tobacco use, provide ways to counter these benefits, and identify complementary benefits associated with quitting tobacco use.

Delivery

Overall Goal: Ensure the widespread delivery of effective interventions to prevent and treat tobacco use and ETS exposure among women and girls.

The reach and impact of evidence-based tobacco control programs and policies must be expanded to reduce the harms of tobacco use and ETS exposure.

Relatively few women receive formal smoking cessation assistance because of lack of interest, time, and resources and low availability. Minorities and those of lower socioeconomic status are disproportionately affected. Women with little education are far more likely to smoke than those with more education, emphasizing this population's enormous need for services (50). The Surgeon General's report on tobacco use among U.S. racial and ethnic minority groups concluded that members of minority groups were less likely than other groups to participate in smoking cessation programs and receive cessation advice from health care providers due to barriers such as lack of transportation, money, and access to health care (51).

Delivery refers to the process of disseminating, facilitating, and promoting evidence-based prevention, early detection, diagnosis, and treatment practices and policies to reduce the burden of cancer in all segments of the population.

Research is the key to developing best practices to prevent and reduce women's tobacco use (52, 53), and these best practices must be promptly disseminated to public health practitioners and consumers. In addition, mechanisms must be in place so that practitioners and consumers can provide

researchers with feedback to ensure that research is useful and applicable in the real world. Researchers and public health professionals have a responsibility to translate basic research into effective smoking cessation and prevention messages that can be disseminated by the media and by women's organizations for broad public impact.

Much research demonstrates that women do not fully understand or appreciate the impact of tobacco use on their health (54, 55). Effective ways to communicate accurate health messages may vary depending on a woman's age, race

and ethnicity, tobacco use status, socioeconomic status, and other factors. Meta-analyses of gender-specific interventions demonstrate that these factors are significantly related to how women approach cessation (56-58).

Long-term, sustained, and coordinated strategies must be devised for incorporating tobacco control into the women's health agenda and engaging women's and girls' organizations in tobacco control issues. Initiatives are needed that will convert women's support for tobacco control efforts into active involvement in and advocacy for comprehensive tobacco control programs and policies.

As a result of these efforts, key information will be disseminated more rapidly and completely to the general public and decision makers. Partnerships will open communication channels from consumers back to researchers to help inform and shape future research agendas and to refine and improve current best-practice interventions. Partnerships will also increase accountability through media attention, link local and international networks, help decrease tobacco use through better treatments, and promote strong national and local legislation.

Delivery Recommendations

- Expanding the reach and impact of evidence-based tobacco control programs and policies will require increasing the appeal, access, affordability, and use of effective interventions, particularly among women and girls in populations at greatest risk.**

Increasing the use of effective interventions will require:

- *The development of tobacco control policies and counter-advertising campaigns.* Such policies and campaigns can substantially increase quitting motivation and demand for and use of evidence-based treatments. Effective tobacco control policies include increased excise taxes on cigarettes, smoke-free indoor air laws, and public and private insurance coverage for tobacco dependence treatment.
- *Finding ways, other than through actual experience, of encouraging women to view the dangers of tobacco use as personally relevant.* Some tobacco users may not be aware of the connection between tobacco use and their health. Even when women are aware of the health risks of tobacco use, they often have a perception of personal safety or "self-exemption" from the consequences of tobacco use.

- *Increasing demand for interventions, which must be attractive, affordable, and accessible to all women.* Campaigns aimed at women tobacco users should highlight the unique risks to women of tobacco use, risks to infants and children from exposure to ETS, and benefits of quitting related to reproductive and general health. Campaigns should also address common misconceptions about the effects of quitting on women's long-term health.

- *Increasing access to care.* It is critical to broaden the help offered to women through the health care system. Every woman should receive evidence-based tobacco use assessment, and women who smoke should receive cessation counseling during visits with health care providers. Cost barriers must be reduced, and new treatments that use technologies such as telephone quit lines or the Internet may expand access for many. However, interventions that rely on access to Web-based resources—or even the telephone—may not reach some populations at greatest risk.

2. Expanding the reach and impact of evidence-based tobacco control programs and policies will require identifying and using targeted messages and strategies to involve and activate individuals and organizations in effective, sustained advocacy for evidence-based tobacco control programs and policies.

Targeted messages and strategies should address:

- *Ways to more effectively communicate the devastating impact of smoking on women's health.* The most effective ways may vary depending on a woman's age, tobacco use status, socioeconomic status, and other factors. Studies should segment priority audiences and provide insights into appropriate channels and tactics to reach them. To ensure progress, translation and outreach efforts must be appropriately tracked and evaluated so that best practices can be identified and replicated.

- *Ways to increase outreach to young women (59).* Research is needed to increase our knowledge of young women's receptiveness to tobacco industry messages and effective countermarketing messages and to identify appropriate channels and tactics to reach young women. We also need a better understanding of the role tobacco plays in girls' and young women's self-perception and desired self-image to help women define these attributes in alternative ways.

- *Ways to engage women in tobacco cessation and advocacy.* Long-term, sustained, and coordinated strategies are needed to engage women's and girls' organizations in tobacco issues and to incorporate the issue of tobacco into the women's health agenda. Women's and girls' organizations are appropriate partners in determining how best to communicate to women the importance of the problem of tobacco use and their potential role in addressing it.

3. Expanding the reach and impact of evidence-based tobacco control programs and policies will require making data from surveillance and policy research, as well as social, economic, and cultural studies, available to the health care community, policy makers, and the general public in a timely and effective fashion.

Strategies should include:

- *Development of a mechanism to identify individual and/or policy-relevant tobacco control research findings and use state-of-the-art communication strategies to maximize dissemination to relevant audiences.* Materials may come from peer-reviewed journal articles, conference abstracts, polling and marketing research reports, and other sources.

- *Outreach to health professional organizations to assist them in providing training at national, state, and local meetings.* Primary care providers, including nurses, nurse practitioners, social workers, family practitioners, obstetrician/gynecologists, internists, dentists, and others can benefit from training in best practices for prevention and cessation.

- *Close cooperation between researchers and tobacco control activists.* General principles of good project planning apply, such as ensuring that policy makers and women's leaders are involved from the beginning in identifying research priorities and planning programs.

- *Briefings to educate and inform the media so that they understand the context in which new findings are released.* The briefings would not only explain the new research findings, but would also describe the expected impact or use of the findings.

- *Use of the Internet, one of the most cost-effective techniques for rapidly disseminating information.* Local groups can use new information technologies to receive training in how to better use research results. This is especially

important in regions where training opportunities are limited, such as in the economically developing world.

4. Expanding the reach and impact of evidence-based tobacco control programs and policies will require supporting research and demonstration projects to better understand how to convert women’s broad-based support for tobacco control policies and programs into more active involvement in their communities.

Strategies should include:

- *Educating women’s organizations about the toll tobacco use takes on women and engaging organizations in tobacco control activities.* Systemic change requires involvement of a wide cross-section of society. Women’s organizations have an enormous impact on how society views and acts upon what are considered “women’s issues” (60).
- *Funding pilot or demonstration projects to determine how to effectively engage women leaders and create effective grassroots programs.* Research on competing issues and the overall agenda of various women’s organizations will provide insights into how to approach these groups to consider adding tobacco control to their agendas.
- *Developing appropriate messages and materials for reaching out to organizations that have not previously been involved in tobacco control.* By positioning tobacco cessation as a primary factor in overall women’s health and economic well-being and showing that coordinated efforts can lead to declines in women’s tobacco use, women’s engagement with tobacco issues may be increased.

Partnerships

Overall Goal: Harness and expand partnerships, networks, and innovative research platforms to design and launch broad-based strategies to eliminate the harms of tobacco use and ETS exposure among women and girls.

Successfully implementing the discovery, development, and delivery recommendations will require capitalizing on existing collaborations and developing new partnerships. To maximize the development and dissemination of effective interventions, partners must be involved from the beginning, and knowledge gained from practice should be used to inform future research.

New and expanded partnerships are needed to make progress in tobacco use prevention, control, and treatment. Partners should identify existing funding mechanisms and increase awareness among various organizations that tobacco control is part of their charge. Using models of well-organized activist communities, such as those for breast cancer and HIV/AIDS, might yield strategies to provide additional funding for tobacco control research and implementation of proven strategies.

Partnerships should also be formed with national agencies in economically developing countries, such as the Center for Disease Control in China and the National Cancer Institute of Brazil, as these agencies both use and sponsor research. A stimulus for global cooperation concerning gender and tobacco will also come from the Framework Convention, because

Partnerships are working relationships between government agencies, nongovernmental organizations, private foundations, corporations, academic institutions, and community groups to accelerate progress.

the countries that ratify the treaty will be required to report on their progress. The linkages between these countries, U.S. partners, the international women's movement, and research centers will be critical to monitoring and evaluating programs. However, more effort must be made to include

women's NGOs, health care professionals, national ministries for women's affairs, national centers of excellence that teach gender studies, and women's studies centers—particularly in economically developing countries. Furthermore, many international development and funding agencies, such as the WHO, United Nations regional economic and social commissions, and the World Bank, can cooperate to advance tobacco control and prevention among women.

Existing infrastructures, such as the National Institute on Drug Abuse Clinical Trials Network, may be used to quickly evaluate the efficacy of promising treatments and the effectiveness and cost-effectiveness of proven small-scale interventions. Partnerships among Institutes and Centers of the National Institutes of Health (NIH) can also make possible cross-disciplinary research in a broad range of tobacco-related disease mechanisms, including gene-hormone-environment interactions, sex differences

Innovative research platforms are the support structures (e.g., Cancer Centers, Centers of Excellence, Special Populations Networks for Cancer Awareness and Training, Transdisciplinary Tobacco Use Research Centers) and collaborations with other government agencies, academic institutions, and industry that make it possible to pursue rapidly evolving discoveries.

in carcinogenic and disease pathways, and inflammation. Moreover, partnerships between U.S. Department of Health and Human Services agencies that conduct research (such as NIH and the Centers for Disease Control and Prevention [CDC]) and Federal and state agencies that deliver health care, as well as community and advocacy organizations, will be needed to bring the knowledge gained through research to the development and dissemination of effective, evidence-based interventions.

Partnership Recommendations

- Partnerships are especially needed between established networks of clinical and translational researchers that can provide the resources and infrastructure needed to foster cross-disciplinary interactions and rapidly evaluate treatments and interventions.**

These partnerships should:

- *Encourage transdisciplinary investigations of common pathways of tobacco-caused cancer, heart disease, and*

lung disease. Smoking causes 140,000 premature deaths from cardiovascular disease each year (61). Although progress is being made in understanding its pathogenesis, the precise mechanisms by which tobacco causes cardiovascular disease have not yet been fully elucidated. Epidemiologic data support the notion that common mechanisms may exist for cigarette smoke-induced carcinogenesis and cardiovascular disease. Recent studies have defined common biological pathways that may be important to the pathogenesis of tobacco-caused diseases (62). Further characterization of these common pathways, combined with the use of mouse models with disruptions in genes that confer disease susceptibility, may allow for the development of targeted intervention and treatment strategies for multiple tobacco-caused diseases.

- *Support further research into cross-disciplinary interactions in tobacco-caused disease mechanisms.* Estrogen may play a role in both premalignant disease and malignant disease progression. An understanding of the role of estrogens in the pathogenesis of lung cancer should facilitate the selection and evaluation of potential antiestrogen therapies for the treatment of this disease. An exploration of mechanisms should also include the early preinvasive stage and chemoprevention so that pharmaceutical agents can be developed to treat these early stages of tobacco exposure.

2. Partnerships are especially needed between research institutions and community-based organizations that serve populations at greatest risk to conduct community-based participatory research. These partners must be committed to joint decision making in designing research, sharing ownership of the products of research, and disseminating and implementing research results.

These partnerships should:

- *Support research institutions that partner with community-based organizations, especially those that serve populations at greatest risk.* These organizations may include community health centers, other community-based organizations, and educational institutions that serve minority populations. True partnerships will include training of community-based collaborators in research methodologies and training of academic researchers in ways to culturally tailor interventions. Such partnerships will also include a commitment to shared

ownership of the products of research and joint decision making regarding protocol development, program implementation, data analysis, and dissemination of findings. True partnerships are bidirectional: Community-based collaborators are trained in research methodology, and academic researchers are trained in culturally and community-tailored interventions. These partnerships also require a commitment to joint decision making and shared ownership of the problem.

- *Involve NCI and other NIH Institutes and Centers.* These collaborations should study such issues as tobacco use in people with diabetes, cancer, hypertension, or other comorbid conditions and the interaction between alcohol and tobacco prevention and control policies.
 - *Ensure that those who are the subjects of research have a voice in determining future research funding allocations.* Involving people who smoke, community-based organizations, and communities of color in funding allocation decisions will help maximize the impact of research and help counter discrimination based on race and ethnicity, gender, and social class.
- 3. Partnerships are especially needed between research institutions and tribal colleges, tribal health departments, and/or American Indian health care and community settings to develop effective, culturally appropriate individual, family, and community-level tobacco prevention and cessation initiatives.**

These partnerships should:

- *Incorporate culturally competent approaches and language.* Because of the magnitude and persistence of the tobacco use problem in American Indian/Alaska Native populations, tribal colleges, tribal health departments, and other institutions that serve these communities should be especially targeted for research partnerships.
- 4. Partnerships are especially needed between public and private funding agencies to fully and efficiently support the implementation of successful interventions.**

These partnerships should:

- *Consider replicating the applied research model used for NCI's American Stop Smoking Intervention Study (ASSIST) project.* Lessons learned from the ASSIST project could be applied to the development of public/private partnerships to decrease women's tobacco use. For

example, clinics in the U.S. Department of Agriculture's Women, Infants, and Children (WIC) program might be an appropriate setting for a public-private partnership to design and implement women's quit-smoking programs and reduce children's ETS exposure. Successful projects could then be considered for nationwide dissemination.

- *Conduct research and demonstration projects to understand how to convert broad community support, especially women's and girls' support, for tobacco control policies into active community involvement in their development and enforcement.* Researchers, practitioners, and community advocates must work together to identify ways to

effectively mobilize communities to reduce the burden of tobacco-caused cancers. This will require a collaborative effort to understand why some communities are poised for change and others are not. Participatory research methodologies can help us understand how to increase women's and girls' involvement. The community should be involved from the earliest stages, and research designs should reflect diversity in age, language, and sociocultural and economic status.

Evaluation and Surveillance

Overall Goal: Improve national and global evaluation and surveillance of the harms of tobacco use and ETS exposure and of women’s and girls’ knowledge, attitudes, and behaviors related to tobacco use and harms.

It is essential to monitor and evaluate progress toward reducing tobacco use, ETS exposure, and the impact of tobacco-related cancers on women and to make midcourse adjustments as needed. This will require further development of standardized measures and surveillance systems to ensure that data are comparable within and across countries.

Surveillance data are needed to monitor tobacco use and ETS exposure among women and to trace the epidemic as it develops globally. A comprehensive surveillance system would include information about the tobacco user or potential tobacco user, tobacco products, tobacco industry activities, and the economic, cultural, political, and historical activities and interventions that support or discourage tobacco use (63, 64).

In addition, current surveillance systems focus largely on the smoker and do not systematically collect other important information, such as the natural history of smoking or factors influencing tobacco use in diverse populations globally (64). Surveillance data are important because they provide the basis for designing program and policy interventions and health communication messages. For example, information on product constituents, product marketing, and tobacco use prevalence is crucial for monitoring tobacco-related disease incidence and prevalence. In many cases, however, the methods for such a comprehensive surveillance system still need to be developed.

To determine “best practices” for tobacco control interventions, we must understand the levels and types of interventions being implemented and their effects.

To better measure the extent of state and local tobacco control activities, tobacco use surveillance must be enhanced at the state and local levels, and creative, user-friendly measures must be developed to report the impact of tobacco control

interventions on tobacco use and exposure to ETS. Tobacco control programs must also monitor existing and new laws to ensure compliance and identify reasons for lack of enforcement, where applicable. This information can be used to improve legal and governance structures for tobacco control.

Standardized monitoring of state and local tobacco control activities will provide the information needed for optimal program development, implementation, and evaluation. These measures can then be linked with measures of tobacco use to document pre- and postintervention behavior changes (65). These measures must be easy to use to ensure that they will be applied.

Global surveillance is needed of tobacco use and exposure to ETS among adults and children, by sex, using standardized measures so that cross-country comparisons are available. Because of the range of support, both cultural and financial, and the differences in infrastructure for surveillance activities in different countries (66), this is critically important for cross-national programs. Ensuring that surveillance and monitoring are comparable across countries is a complex and difficult task (67). Particularly in economically developing countries, surveillance systems for monitoring tobacco use and its health consequences are very limited at present.

Evaluation and Surveillance Recommendations

Local, national, and global evaluation and surveillance will be critical for:

- Monitoring and measuring national and global trends and patterns in tobacco use and exposure to ETS using standardized measures.
- Ensuring that research and programmatic funding are strategically targeted and, where appropriate, tailored to specific populations.
- Assessing whether progress has been made and whether it is due to specific interventions and policies.
- Identifying effective interventions through success stories and rigorous case studies to inform researchers, encourage broader dissemination, and increase public support.

Global evaluation and surveillance should address:

- *Trends in tobacco use, changing patterns of use, and factors that affect use.* Basic information concerning the variety of tobacco products used by women, such as chewing

tobacco and hookah, is generally absent, as are data on changing patterns of use in relation to marketing. Little information is available on tobacco use among female nurses, physicians, and other health professionals. Research that maps national trends is vital to developing gender-sensitive counter-advertising campaigns. Although using common definitions is often complex, the effort to do so will improve comparability on a global basis and the ability to perform meta-analyses.

- *Those who do not use tobacco, by gender and age, to obtain data on initiation, quitting, and acceptable prevention methods.* An important supplement to conventional epidemiological surveillance is monitoring cultural and social factors that protect women against tobacco use. These data are needed to maintain as an integral part of public policies the current relatively low prevalence rates among women and girls in many economically developing nations.
- *The impact of tobacco production and processing on women tobacco workers.* In many tobacco-producing countries, women and girls who work on tobacco farms are exposed to serious environmental hazards. Epidemiological and surveillance data, as well as social, economic, and cultural research, are needed to develop appropriate health policies and programs for these workers. Priority should be given to their knowledge, attitudes, and practices related to risk behavior.
- *The creation of baselines for monitoring the progress and impact of the Framework Convention and establishing global indicators for gender and tobacco.* The number of high-quality research projects on gender and tobacco in economically developing countries could increase as more data become available on measurable outcomes. Better data can also help persuade children's rights organizations, women's organizations, and others to undertake tobacco control and prevention efforts.
- *The scope of the tobacco epidemic.* The prevalence of tobacco use in different subgroups of women must be assessed to identify high-risk groups of women who can be targeted by health education and intervention programs. Collecting information on prevalence levels can also assist tobacco control advocates in their activities in support of tobacco control policies. By collecting data on prevalence before and after a tobacco control policy is implemented, for example, advocates can demonstrate the impact (or lack of impact) of the policy.
- *The patterns, extent, and trends in tobacco use among women, health and economic consequences of tobacco use for women, and underlying sociocultural factors.* This information can help support the development of tobacco control policies and programs.
- *Tobacco use within specific populations of women.* This information is needed to increase the effectiveness of policies and programs for reducing overall tobacco use and subsequent health consequences among women. In particular, data need to be collected on women and girls of different ages and socioeconomic status levels.
- *Morbidity and mortality.* Although economically developed countries typically have complete and reliable vital registration data on causes of death, their data on morbidity are much less complete. In economically developing countries, data on mortality and morbidity are very limited. If reliable data on the health hazards of tobacco use for a given population are not available, they need to be collected.
- *Ways to maximize the efficiency and completeness of existing surveys while minimizing their costs.* A number of surveys conducted periodically at the national and state levels include questions on individual tobacco use behavior. Although these surveys serve distinct and useful purposes, gaps remain in what is being monitored. The efficiency and appropriateness of survey designs and sampling strategies must also be improved, and information must be generated more quickly to inform and shape the policy agenda.
- *Global surveillance of tobacco use and exposure to ETS among adults and children, by sex, using standardized measures so that cross-country comparisons are available.* Because of the range of support, both cultural and financial, and the differences in infrastructure for surveillance activities in different countries, collecting standardized surveillance data is critically important for cross-national programs. Ensuring that surveillance and monitoring are comparable across countries is a complex and difficult task. Particularly in economically developing countries, surveillance systems for monitoring tobacco use and its health consequences are very limited.

Conclusion

Forty years after the first Surgeon General's Report conclusively linked smoking to lung cancer in men, tobacco use *remains* the nation's leading cause of preventable, premature death in both women and men. Currently, approximately 170,000 American women die from smoking each year, and in the late 1980s, lung cancer surpassed breast cancer as the leading cause of cancer death in women. Despite this, tobacco use is not generally considered a "women's issue."

The nation has made enormous progress in reducing tobacco use, especially among affluent, educated women; indeed, the *Healthy People 2010* goal of reducing smoking prevalence to 12 percent has already been reached by this group of women. In stark contrast, economically disadvantaged, poorly educated women and members of some racial and ethnic groups, among others, smoke at very high levels. Smoking rates are especially high and persistent among American Indian/Alaska Native women and girls.

The 2001 Surgeon General's Report, *Women and Smoking*, which focused on the devastating toll of tobacco use for women, highlighted the importance of continuing to build the science base on gender-specific research. The Women, Tobacco, and Cancer Working Group has identified numerous priority research issues across the spectrum

of tobacco control and prevention disciplines. However, generating new knowledge is not sufficient. Greater emphasis must be placed on translating knowledge into effective program and policy interventions that can be applied to all populations, especially populations of women at greatest risk for tobacco use and tobacco-caused disease.

Tobacco use and tobacco-caused cancers are already common among women in most economically developed countries. However, smoking rates among women in economically developing countries are still generally low. There is broad agreement that preventing the epidemic of tobacco use and tobacco-caused cancers from spreading to women and girls in economically developing nations is a critical public health priority. Accomplishing this will require generating new knowledge and using what we already know to put into place effective prevention programs and policies.

Successful implementation of all of the recommendations of the Women, Tobacco, and Cancer Working Group will require sustained and focused efforts, including collaborations and partnerships among many public and private-sector organizations. Reducing, and ultimately eliminating, tobacco use and tobacco-caused disease among women is possible, and it is a goal worth striving for.

References

1. U.S. Department of Health and Human Services. *Women and Smoking: A Report of the Surgeon General*. Rockville: MD: U.S. Department of Health and Human Services, Public Health Service, Office of the Surgeon General; 2001.
2. Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 2002. *Morbidity and Mortality Weekly Report*. 2004;53:427-31.
3. Centers for Disease Control and Prevention. Prevalence of cigarette use among 14 racial/ethnic populations—United States, 1999-2001. *Morbidity and Mortality Weekly Report*. 2004;53:49-52.
4. Jha P. *Curbing the Epidemic: Governments and the Economics of Tobacco Control*. Washington, DC: The World Bank; 1999.
5. World Health Organization. Fact Sheet on Gender, Health and Tobacco. World Health Organization Web site. Available at: <http://www.who.int/gender/documents/en/Tobacco.references.pdf>.
6. Chollat-Traquet C. *Women and Tobacco*. Geneva: World Health Organization; 1992.
7. Patel JD, Bach PB, Kris MG. Lung cancer in U.S. women, a contemporary epidemic. *Journal of the American Medical Association*. 2004;291:1763-8.
8. Lynch WJ, Roth ME, Carroll ME. Biological basis of sex differences in drug abuse: Preclinical and clinical studies. *Psychopharmacology*. 2002;164:121-37.
9. Perkins KA, Grobde JE, Stiller RL, Fonte C, Goettler JE. Nasal spray nicotine replacement suppresses cigarette smoking desire and behavior. *Clinical Pharmacology and Therapeutics*. 1992;52:627-34.
10. Perkins KA, Donny E, Caggiula AR. Sex differences in nicotine effects and self-administration: Review of human and animal evidence. *Nicotine & Tobacco Research*. 1999;1:301-15.
11. Perkins KA. Smoking cessation in women. Special considerations. *CNS Drugs*. 2001;15:391-411.
12. Swan GE, Ward MM, Carmelli D, Jack LM. Differential rates of relapse in subgroups of male and female smokers. *Journal of Clinical Epidemiology*. 1993;46:1041-53.
13. Swan, GE, Carmelli, D. Behavior genetic investigations of cigarette smoking and related issues. In: Noble EP, Blum K, eds. *Handbook of Psychiatric Genetics*. Boca Raton, FL: CRC Press; 1997:379-98.
14. Swan GE, Jack LM, Curry SJ, et al. Bupropion SR and counseling for smoking cessation in actual practice: Predictors of outcome. *Nicotine & Tobacco Research*. In press.
15. Westermeyer J, Boedicker AE. Course, severity, and treatment of substance abuse among women versus men. *American Journal of Drug and Alcohol Abuse*. 2000;26: 523-35.
16. Institute of Medicine. *Biological Contributions to Human Health, Does Sex Matter?* Washington, DC: National Academy of Sciences; 2001.
17. Zang EA, Wynder EL. Differences in lung cancer risk between men and women: Examination of the evidence. *Journal of the National Cancer Institute*. 1996;88:183-92.
18. Taioli E, Wynder EL. Re: endocrine factors and adenocarcinoma of the lung in women. *Journal of the National Cancer Institute*. 1994;86:869-87.
19. Bain C, Feskanich D, Speizer FE, et al. Lung cancer rates in men and women with comparable histories of smoking. *Journal of the National Cancer Institute*. 2004;96:826-34.
20. Breslau N, Kilbey MM, Andreski P. Nicotine dependence and major depression. New evidence from a prospective investigation. *Archives of General Psychiatry*. 1993;50:31-5.
21. Borrelli B, Bock B, King T, Pinto B, Marcus BH. The impact of depression on smoking cessation in women. *American Journal of Preventive Medicine*. 1996;12:378-87.
22. Hall SM, Munoz RF, Reus VI, Sees KL. Nicotine, negative affect, and depression. *Journal of Consulting and Clinical Psychology*. 1993;61:761-7.
23. Ahijevych K. Nicotine metabolism variability and nicotine addiction. *Nicotine & Tobacco Research*. 1999;2: S59-62.
24. Giovino GA. Surveillance of patterns and consequences of tobacco use: USA. *Tobacco Control*. 2000;9:232-3.

25. Centers for Disease Control and Prevention. Prevalence of current cigarette smoking among adults and changes in prevalence of current and someday smoking—United States, 1996–2001. *Morbidity and Mortality Weekly Report*. 2003;52:303-4,306-7.
26. Bjornson W, Rand C, Connett JE, et al. Gender differences in smoking cessation after 3 years in the Lung Health Study. *American Journal of Public Health*. 1995;85:223-30.
27. Fiore MC, Kenford SL, Jorenby DE, Wetter DW, Smith SS, Baker TB. Two studies of the clinical effectiveness of the nicotine patch with different counseling treatments. *Chest*. 1994;105:524-33.
28. Wetter D, Smith SS, Kenford SL, et al. Smoking outcome expectancies: Factor structure, predictive validity, and discriminant validity. *Journal of Abnormal Psychology*. 1994;103:801-11.
29. Wetter DW, Kenford SL, Smith SS, Fiore MC, Jorenby DE, Baker TB. Gender differences in smoking cessation. *Journal of Consulting and Clinical Psychology*. 1999;67:555-62.
30. Hughes JR, Gust SW, Keenan RM, Fenwick JW, Healey ML. Nicotine vs. placebo gum in general medical practice. *Journal of the American Medical Association*. 1989;261:1300-5.
31. Killen JD, Fortmann SP, Varady A, Kraemer HC. Do men outperform women in smoking cessation trials? Maybe, but not by much. *Experimental & Clinical Psychopharmacology*. 2002;10:295-301.
32. Sachs DP, Sawe U, Leischow SJ. Effectiveness of a 16-hour transdermal nicotine patch in a medical practice setting, without intensive group counseling. *Archives of Internal Medicine*. 1993;153:1881-90.
33. DiFranza JR, Rigotti NA, McNeill AD, et al. Initial symptoms of nicotine dependence in adolescents. *Tobacco Control*. 2000;9:313-9.
34. Gritz ER, Prokhorov AV, Hudmon KS, et al. Cigarette smoking in a multiethnic population of youth: Methods and baseline findings. *Preventive Medicine*. 1998;27:365-84.
35. Hughes JR. Identification of the dependent smoker: Validity and clinical utility. *Behavioral Medicine Abstracts*. 1985;5:202-4.
36. Lombardo TW, Hughes JR, Fross JD. Failure to support the validity of the Fagerström Tolerance Questionnaire as a measure of physiological tolerance to nicotine. *Addictive Behaviors*. 1988;13:87-90.
37. Shiffman S, Hickcox M, Gnys M, Paty JA, Kassel JD. The nicotine dependence syndrome scale: Development of a new measure. Presented at: Annual Meeting of the Society for Research on Nicotine and Tobacco; March 1995; San Diego, CA.
38. Moolchan ET, Radzius A, Epstein DH, Uhl G, Gorelick DA, Cadet JL, Henningfield JE. The Fagerström test for nicotine dependence and the diagnostic interview schedule: Do they diagnose the same smokers? *Addictive Behaviors*. 2002;27:101-13.
39. DeFlora S, Agostini FD, Balansky R, et al. Modulation of cigarette smoke-related endpoints in mutagenesis and carcinogenesis. *Mutation Research*. 2003;523-4,237-52.
40. Ossip-Klein DJ, Carosella AM, Kruch DA. Self-help interventions for older smokers. *Tobacco Control*. 1997;6:188-93.
41. Pomerleau CS, Pomerleau OF, Namenek RJ, Mehringer AM. Short-term weight gain in abstaining women smokers. *Journal of Substance Abuse Treatment*. 2000;18:339-42.
42. Pomerleau CS, Zucker AN, Stewart AJ. Characterizing concerns about post-cessation weight gain: Results from a national survey of women smokers. *Nicotine & Tobacco Research*. 2001;3:51-60.
43. Hymowitz N. Community and clinical trials of disease prevention: Effects on cigarette smoking. *Public Health Reviews*. 1987;15:45-81.
44. Siegel M. The effectiveness of state-level tobacco control interventions: A review of program implementation and behavioral outcomes. *Annual Review of Public Health*. 2002;23:45-71.
45. Centers for Disease Control and Prevention. *Best Practices for Comprehensive Tobacco Control Programs—August 1999*. Atlanta, GA: 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; August 1999.

46. National Cancer Institute. *Community-Based Interventions for Smokers: The COMMIT Field Experience*. Smoking and Tobacco Control Monograph no. 6. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; August 1995. NIH Pub. No. 95-4028.
47. Haug N, Stitzer M, Svikis D. Smoking during pregnancy and intention to quit: A profile of methadone-maintained women. *Nicotine & Tobacco Research*. 2001;3:333-9.
48. Hotham E, Atkinson E, Gilbert A. Focus groups with pregnant smokers: Barriers to cessation, attitudes to nicotine patch use and perceptions of cessation counseling by care providers. *Drug & Alcohol Review*. 2002;21:163-8.
49. Collins P, Maguire M, O'Dell L. Smokers' representations of their own smoking: A Q-methodological study. *Journal of Health Psychology*. 2002;7:641-52.
50. Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 2001. *Morbidity and Mortality Weekly Report*. 2002;52:953-6.
51. U.S. Department of Health and Human Services. *Tobacco Use Among U.S. Racial/Ethnic Minority Groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: 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; 1998.
52. Kelley K, Bond R, Abraham C. Effective approaches to persuading pregnant women to quit smoking: A meta-analysis of intervention evaluation studies. *British Journal of Health Psychology*. 2001;6:207-28.
53. Dino GA, Horn KA, Goldcamp J, Maniar SD, Fernandes A, Massey CJ. Statewide demonstration of Not On Tobacco: A gender-sensitive teen smoking cessation program. *Journal of School Nursing*. 2001;17:90-7.
54. Wakefield M, Morley C, Horan J, Cummings K. The cigarette pack as image: New evidence from tobacco industry documents. *Tobacco Control*. 2002;11:73-80.
55. Ayanian JZ, Cleary PD. Perceived risks of heart disease and cancer among cigarette smokers. *Journal of the American Medical Association*. 1999;281:1019-21.
56. Lu Y, Tong S, Oldenburg B. Determinants of smoking and cessation during and after pregnancy. *Health Promotion International*. 2001;16:355-65.
57. Krummel DA, Koffman DM, Bronner Y, et al. Cardiovascular health interventions in women: What works? *Journal of Women's Health & Gender-Based Medicine*. 2001;10:117-36.
58. King TK, Borrelli B, Black C, Pinto BM, Marcus BH. Minority women and tobacco: Implications for smoking cessation interventions. *Annals of Behavioral Medicine*. 1997;19:301-13.
59. U.S. Department of Health and Human Services. *National Survey on Drug Use & Health*. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration; 2000.
60. Disney JL, Gelb J. Feminist organizational "success": The state of U.S. women's movement organizations in the 1990s. *Women & Politics*. 2000;21:39-76.
61. Burns DM. Epidemiology of smoking-induced cardiovascular disease. *Progress in Cardiovascular Diseases*. 2003;46:11-29.
62. Ross JS, Stagliano NE, Donovan MJ, Breitbart RE, Ginsburg GS. Atherosclerosis and cancer: Common molecular pathways of disease development and progression. *Annals of the New York Academy of Sciences*. 2001;947:271-93.
63. Giovino GA. Epidemiology of tobacco use in the United States. *Oncogene*. 2002;21:7326-40.
64. Giovino GA. Surveillance of patterns and consequences of tobacco use: USA. *Tobacco Control*. 2000;9:232-3.
65. The STATE system: State Tobacco Activities Tracking and Evaluation. Centers for Disease Control and Prevention Web site. Available at: <http://www2.cdc.gov/nccdphp/osh/state>.
66. World Health Organization. *Guidelines for Controlling and Monitoring the Tobacco Epidemic*. Geneva: World Health Organization; 1998.
67. National Tobacco Information Online System. Centers for Disease Control and Prevention Web site. Available at: <http://apps.nccd.cdc.gov/nations/>.

Appendix A: Breakout Sessions

Biology and Cancer Breakout Session

Co-Chairs	David Burns	Carolyn Dresler	Jill Siegfried
Participants	Lucy Anderson	Joachim Liehr	Katherine Pisters
	Alice Boylan	Assieh Melikian	Linda Sarna
	Mirjana Djordjevic	James Mulshine	Simon Spivack
Science Writer	Frances McFarland Horne		
Lead Author	Pamela Hershberger		

Overview

Two major barriers to research in lung cancer biology were identified: the diversity of biological processes that contribute to lung carcinogenesis, and the stigma associated with tobacco-related disease. Relevant research questions are often dismissed as too difficult to study, given the complexity of the exposure (since tobacco smoke is a complex mixture) and other factors (such as underlying lung disease and genetic variation in how tobacco carcinogens are metabolized) that contribute to lung cancer development. In addition, a sense that smokers are behaviorally responsible for their tobacco-related illnesses inhibits the allocation of sufficient resources to this field of study. Another barrier is that researchers in the tobacco field often do their research in isolation. Lack of multidisciplinary collaboration can increase research costs while limiting the understanding of tobacco injury from the cellular through the population levels.

Tobacco-induced cancers are late-onset diseases resulting from chronic long-term exposure to tobacco combustion products. The multitude of combustion products results in a complex set of possible initiation and promotion events that are also affected by individual variation. Neither the steps in cancer initiation nor those in cancer promotion are fully understood because they involve dynamic interplay between tobacco smoke constituents and the susceptible cells of the smoker.

Most of what we know about the effects of tobacco is based on extrapolations of single-agent carcinogen exposure studies. However, cigarette smoke is a mixture of more than 4,000 compounds, more than 60 of which are known carcinogens (1). Therefore, focusing on exposure to smoke as a mixture would allow investigators to determine what happens in the “real world,” although single-agent research is still needed to

confirm mechanistic insights beyond tobacco carcinogenesis. Continued studies on nicotine are especially useful now that smoking cessation efforts are moving toward nicotine replacement therapy. In addition, the presence of nicotinic receptors on lung tumor cells (2) suggests that nicotine can affect lung tumor biology directly.

Across all diseases, tobacco use has been postulated to modulate quality of life, comorbidities, response to treatment, and overall survivorship of patients with lung cancer. However, minimal prospective data are available (reviewed in 3), and at present, clinical trials do not routinely collect these types of data. A recent paper by Videtic and colleagues (4) has confirmed a previous study that found significantly better outcomes in patients with small-cell lung cancer who do not smoke during their combination chemo-/radiation therapy. Future studies should include prospective analyses that can determine outcome differences and treatment side effects related to sex and tobacco use, including tobacco-attributable comorbidities as mediating variables in treatment side effects and efficacy, and investigate the impact of smoking cessation on the physical health and quality of life of cancer survivors.

Recommendations

Research

- *1. Support further research into cross-disciplinary interactions in tobacco-related disease mechanisms, especially gene-hormone-environment interactions.**

Estrogen status is recognized as a factor that affects lung cancer risk in women. Evidence also indicates a positive interaction between estrogen replacement therapy, smoking,

* Recommendations with an asterisk are those identified by the breakout groups as their top three recommendations.

and the development of adenocarcinoma of the lung (5). Estrogen or one of its metabolites may be a weak carcinogen, but this has not been studied in depth, particularly in relation to tobacco smoking. Estrogen metabolites can cause various types of DNA damage (6), and estrogens may induce lung tumors through these types of DNA alterations. Cigarette smoking alters the metabolism of endogenous estrogens, although possible interactions among estrogen metabolism, tobacco exposure, DNA adducts, and lung cells are unclear. Lung tumor cells express estrogen receptors and are induced to proliferate in response to estrogen exposure both *in vitro* and *in vivo* (7). Thus, once tumors are induced, estrogens may also drive proliferation of mutated cells. This raises the possibility that estrogen plays a role in both premalignant disease and malignant disease progression. An understanding of the role of estrogens in the pathogenesis of lung cancer should facilitate the selection and evaluation of antiestrogen therapies for the treatment of this disease.

Partners

- National Institute of Environmental Health Sciences (NIEHS)
- Environmental Protection Agency (EPA)
- Centers for Disease Control and Prevention (CDC)
- Breast, Lung, and Transdisciplinary Tobacco Use Research Centers (TTURCs)
- Specialized Programs of Research Excellence (SPORES)
- American Lung Association
- American Thoracic Society
- Department of Defense Breast Cancer Research Program
- National Institutes of Health (NIH)
- Pharmaceutical industry
- Susan G. Komen Breast Cancer Foundation
- State health departments

Impact

This area of research can influence recommendations on tobacco cessation, chemoprevention, disease prevention, and issues of hormone replacement therapy and phytoestrogens. Researchers can also identify noncancer sex effects and obtain biological evidence relating environmental tobacco smoke to breast and other sex-related cancers. This research will affect multiple disease processes.

*2. Validate biologically relevant measures of tobacco smoke exposure, injury, and recovery.

This includes linking measures of exposure to those of injury in biological models and measures of injury to outcomes, examining modifying factors of injury from exposure, and investigating new tobacco products. At present, little or no data link molecular changes of intermediate biomarkers—which may be observed prior to the clinical appearance of disease and bear some relationship to its development (8)—to actual tobacco exposure and disease occurrence. Complex dose-response relationship phenomena point to a need to identify the intermediate markers between injury and disease. For example, chemoprevention data from a randomized Phase III trial of isotretinoin suggest that the therapy is effective in those who have never smoked and former smokers but not in current smokers (9). Pathways of disease progression associated with low-level exposures may differ from those associated with high-level exposures. Although several good models are available for study (reviewed in 10), identifying the effects of tobacco exposure in these models is time consuming. This points to a need for accelerated models, as well as for mixture and single-agent models.

Partners

- CDC
- National Cancer Institute (NCI) and Cancer Centers
- National Heart, Lung, and Blood Institute (NHLBI)
- National Institute of Child Health and Human Development (NICHD)
- National Institute on Drug Abuse (NIDA)
- TTURCs
- Society for Research on Nicotine and Tobacco
- Society of Toxicology
- EPA
- Flight Attendant Medical Research Institute
- Pharmaceutical industry
- Robert Wood Johnson Foundation
- American Lung Association
- American Heart Association
- American Cancer Society (ACS)
- California Tobacco-Related Disease Research Program

Impact

Research in this area will result in the identification of biomarkers that can be used to determine intermediate outcomes in long-term studies. This knowledge will provide a more specific and efficient tool to assess biological exposure and effect and, thus, to identify persons at risk. Ultimately, this knowledge will influence policy on exposure dosage and affect multiple disease processes.

***3. Support further research into cross-disciplinary interactions in tobacco-related disease mechanisms, specifically sex differences in carcinogenic and disease pathways.**

This exploration of mechanisms should include the early premetastatic stage and chemoprevention so that pharmaceutical agents can be developed to treat these early stages of tobacco combustion exposure. Some epidemiologic evidence from case-control studies suggests that women are more susceptible than men to tobacco-induced carcinogenesis, after taking into account baseline exposure, body weight, body height, and body mass index (11), although cohort studies have not confirmed this. Nevertheless, women with lung cancer have been shown to have a higher level of smoking-induced pulmonary DNA adducts (12) and decreased DNA repair capacity (13) than men with lung cancer. DNA adduct levels are determined, in part, by the relative activity of phase I and phase II detoxifying enzymes. Phase I enzymes, such as cytochrome P4501A1 (CYP1A1), activate the carcinogens in cigarette smoke, whereas phase II enzymes, such as glutathione-S-transferase M1 (GSTM1), convert tobacco carcinogens to inactive conjugates. The CYP1A1 mutant/GSTM1 null genotype has been found to be more common in women with lung cancer than in controls, suggesting that alteration in the activity of these enzymes contributes to lung cancer risk (14). Clinical studies are required to show that such differences are important. Further insight into sex-specific pathways for lung carcinogenesis may be gained through the use of proteomic and genomic approaches in the analysis of established tumors and early lesions collected from both men and women.

Partners

- Society of Toxicology
- Molecular Epidemiology Group, American Association for Cancer Research
- Breast cancer, lung cancer, and TTURC SPORES

- NCI
- NIDA
- NIEHS
- Society for Research on Nicotine and Tobacco
- ACS
- Office of Research on Women's Health

Impact

Research in this area will uncover real differences and potentially identify new targets for interventions. This research will affect multiple disease processes.

4. Support further research into cross-disciplinary interactions in tobacco-related disease mechanisms, especially inflammation.

Common pathways may exist between inflammation and tobacco-related disease. In addition to the carcinogen exposure inherent in tobacco use, chronic injury and inflammation may contribute to cancer risk. Consistent with this hypothesis, it has been shown that among male smokers, airway obstruction is a better indicator of lung cancer risk than either age or level of smoking (15). History of prior lung disease (asthma, chronic bronchitis) is associated with a significantly increased risk of lung cancer in nonsmoking women (16). To date, relatively little research has focused on the interplay between inflammation and the development of lung cancer. In mouse models, a positive correlation has been found between inflammation and susceptibility to lung tumors (17). However, subsequent studies showed that agents that reduce pulmonary inflammation do not necessarily suppress lung tumorigenesis (18). Thus, the relationship between these two processes requires further clarification. Inflammatory cells that migrate into the lungs of cigarette smokers may increase the oxidative stress produced by inhaling cigarette smoke. Consequently, further understanding of the effects of oxidative stress on lung biology and the mechanisms controlling the expression and release of proinflammatory mediators in the lung may lead to the development of new therapies to prevent inflammation and, thus, potentially have an impact on lung tumorigenesis.

5. Support further research into cross-disciplinary interactions in tobacco-related disease mechanisms, especially promotional mechanisms.

Tobacco smoke contains many constituents, such as nicotine, that may not be directly carcinogenic but may influence

disease pathways. Nicotine may protect normal human airway epithelial cells and tumor cells from apoptosis (19, 20) and stimulate blood flow to tumors (21). Understanding the variety of cellular processes regulated by nicotine and other tobacco smoke constituents may provide new therapeutic targets for intervention in tobacco-related diseases. Further understanding of the mechanisms by which nicotine alters cell growth will also be important in evaluating nicotine supplementation for smoking cessation. Given that such approaches can result in serum concentrations of nicotine close to those achieved in active smokers (22), determining the impact of chronic nicotine supplementation on disease processes is required. Since the effects of nicotine alone on epithelial and endothelial cells may be different than the effect of cigarette smoke, future studies will also be required to determine whether single-agent exposure and exposure to mixtures will have similar consequences.

6. Encourage transdisciplinary investigations into common pathways of tobacco-related cancer, heart disease, and lung disease.

Smoking is a well-known risk factor for vascular disease (23-25). Although progress is being made in understanding its pathogenesis, the precise mechanisms by which smoking affects vascular disease have not yet been fully elucidated. Epidemiologic data support the notion that common mechanisms may exist for cigarette smoke-induced carcinogenesis and cardiovascular disease. For example, the *MspI* polymorphism in the cytochrome P450 enzyme CYP1A1 increases both lung cancer risk and the risk of cardiovascular disease in light smokers (26, 27). Recent studies have defined common biological pathways that may be important to the pathogenesis of tobacco-related diseases (reviewed in 28); one notable example is nicotine stimulation of endothelial cell proliferation in the setting of both tumor growth and atherosclerosis (21). Further characterization of these common pathways, combined with the use of mouse models that have disruptions in genes that confer disease susceptibility, may allow for the development of targeted intervention and treatment strategies for all tobacco-related diseases.

References

- Hoffmann D, Hoffmann I, El-Bayoumy K. The less harmful cigarette: A controversial issue. A tribute to Ernst L. Wynder. *Chemical Research in Toxicology*. 2001;14:768-90.
- Maneckjee R, Minna JD. Opioid and nicotine receptors affect growth regulation of human lung cancer cell lines. *Proceedings of the National Academy of Science*. 1990;87:3294-8.
- Dresler CM. Is it more important to quit smoking than which chemotherapy is used? *Lung Cancer*. 2003;39:119-24.
- Videtic GM, Stitt LW, Dar AR, et al. Continued cigarette smoking by patients receiving concurrent chemoradiotherapy for limited-stage small-cell lung cancer is associated with decreased survival. *Journal of Clinical Oncology*. 2003;21:1544-9.
- Taioli E, Wynder EL. Re: endocrine factors and adenocarcinoma of the lung in women. *Journal of the National Cancer Institute*. 1994;86:869-70.
- Roy D, Liehr JG. Estrogen, DNA damage and mutations. *Mutation Research*. 1999;424:107-15.
- Stabile LP, Gaither Davis AL, Gubish CT, et al. Human non-small cell lung tumors and cells derived from normal lung express both estrogen receptor a and b and show biological responses to estrogen. *Cancer Research*. 2002;62:2141-50.
- Cohen V, Khuri FR. Chemoprevention of lung cancer: Current status and future prospects. *Cancer and Metastasis Reviews*. 2002;21:349-62.
- Lippman SM, Lee JJ, Karp DD, et al. Randomized phase III Intergroup trial of isotretinoin to prevent second primary tumors in stage I non-small-cell lung cancer. *Journal of the National Cancer Institute*. 2001;93:605-18.
- DeFlora S, Agostini FD, Balansky R, et al. Modulation of cigarette smoke-related endpoints in mutagenesis and carcinogenesis. *Mutation Research*. 2003;523-4,237-52.
- Zang EA, Wynder EL. Differences in lung cancer risk between men and women: Examination of the evidence. *Journal of the National Cancer Institute*. 1996;88:183-92.
- Ryberg D, Hewer A, Phillips DH, Haugen A. Different susceptibility to smoking-induced DNA damage among male and female lung cancer patients. *Cancer Research*. 1994;54:5801-3.
- Wei Q, Cheng L, Amos CI, et al. Repair of tobacco carcinogen-induced DNA adducts and lung cancer risk: A molecular epidemiologic study. *Journal of the National Cancer Institute*. 2000;92:1764-72.

14. Dresler CM, Fratelli C, Babb J, Everley L, Evans AA, Clapper ML. Gender differences in genetic susceptibility for lung cancer. *Lung Cancer*. 2000;30:153-60.
15. Tockman MS, Anthonisen NR, Wright EC, Donithan MG. Airways obstruction and the risk for lung cancer. *Annals of Internal Medicine*. 1987;106:512-8.
16. Wu AH, Fontham ET, Reynolds P, et al. Previous lung disease and risk of lung cancer among lifetime nonsmoking women in the United States. *American Journal of Epidemiology*. 1995;141:1023-32.
17. Bauer AK, Dwyer-Nield LD, Keil K, Koski K, Malkinson AM. Butylated hydroxytoluene (BHT) induction of pulmonary inflammation: A role in tumor promotion. *Experimental Lung Research*. 2001;27:197-216.
18. Kisley LR, Barrett BS, Dwyer-Nield LD, Bauer AK, Thompson DC, Malkinson AM. Celecoxib reduces pulmonary inflammation but not lung tumorigenesis in mice. *Carcinogenesis*. 2002;23:1653-60.
19. West KA, Brognard J, Clark AS, et al. Rapid Akt activation by nicotine and a tobacco carcinogen modulates the phenotype of normal human airway epithelial cells. *Journal of Clinical Investigation*. 2003;111:81-90.
20. Mai H, May S, Gao F, Jin Z, Deng X. A functional role for nicotine in bcl2 phosphorylation and suppression of apoptosis. *Journal of Biological Chemistry*. 2003;278:1886-91.
21. Heeschen C, Jang JJ, Weis M, et al. Nicotine stimulates angiogenesis and promotes tumor growth and atherosclerosis. *Nature Medicine*. 2001;7:833-9.
22. Zevin S, Gourlay SG, Benowitz NL. Clinical pharmacology of nicotine. *Clinics in Dermatology*. 1998;16:557-64.
23. Whisnant JP, Homer D, Ingall TJ, Baker HL, O'Fallon WM, Wiebers DO. Duration of cigarette smoking is the strongest predictor of severe extracranial carotid artery atherosclerosis. *Stroke*. 1990;21:707-14.
24. Freund KM, Belanger AJ, D'Agostino RB, Kannel WB. The health risks of smoking. The Framingham Study: 34 years of follow-up. *Annals of Epidemiology*. 1993;3:417-24.
25. Humphries SE, Talmud PJ, Hawe E, Bolla M, Day INM, Miller GJ. Apolipoprotein E4 and coronary heart disease in middle-aged men who smoke: A prospective study. *Lancet*. 2001;358:115-9.
26. Ishibe N, Wiencke JK, Zuo ZF, McMillan A, Spitz M, Kelsey KT. Susceptibility to lung cancer in light smokers associated with CYP1A1 polymorphisms in Mexican- and African-Americans. *Cancer Epidemiology Biomarkers and Prevention*. 1997;6:1075-80.
27. Wang XL, Greco M, Sim AS, Duarte N, Wang J, Wilcken DEL. Effect of CYP1A1 MspI polymorphism on cigarette smoking related coronary artery disease and diabetes. *Atherosclerosis*. 2002;162:391-7.
28. Ross JS, Stagliano NE, Donovan MJ, Breitbart RE, Ginsburg GS. Atherosclerosis and cancer: Common molecular pathways of disease development and progression. *Annals of the New York Academy of Sciences*. 2001;947:271-93.

Addiction Breakout Session

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Overview

Tobacco smoke, whether inhaled directly or as secondhand smoke, contains more than 4,000 different compounds, many of which are proven carcinogens (1). Substantial evidence indicates that nicotine plays a pivotal role in mediating the addictive nature of tobacco dependence in humans (2). Most research examining nicotine dependence has focused on males, since initially, a larger portion of the male population smoked (over 50 percent in the mid-1960s) (3). However, by 2001, the gender gap between adult smokers had narrowed such that 24 percent of women smoked, compared with 29 percent of men (4). In light of the overwhelming evidence of the negative health consequences related to smoking, women are still at risk, and an urgent need exists to understand why women become and remain nicotine dependent.

We need to understand the different stages of the nicotine addiction process in women, including initiation, maintenance, withdrawal, and relapse. Women differ from men in their biological responses to nicotine, progression to nicotine dependence, and patterns of intake and have higher rates of relapse and a greater risk of smoking-related health problems (5-12). Thus, the Addiction Breakout Group identified specific areas of needed research, including understanding sex differences in neuroanatomy; the biology of nicotine receptors, particularly in the brain; and the genetic basis of nicotine dependence. Of particular importance was the overwhelming gap in knowledge of the effects of nicotine on the menstrual cycle and on such hormones as estrogen and progesterone.

Other female-related issues regarding nicotine addiction have not been studied. For example, the effect of oral contraceptives on smoking rates, relapse, and craving is not

understood. Also, very little is known about the effects of menopause and/or hormone replacement therapy on desire for smoking, smoking rates, and relapse. The menstrual cycle, puberty, pregnancy, and menopause should be primary foci of research on nicotine dependence and smoking to determine, for example, whether nicotine has a disruptive effect on hormones and whether hormones can affect craving and rates of relapse in women.

In addition, since a large proportion of smokers report being depressed (13-17), studies are needed to examine whether any gender differences exist in the relationship between smoking and depression relative to other psychological factors, including anger and personality traits. Studies of smoking and depression and the development of interventions must take into account the multiple demands and unique stressors in the daily lives of women. Examining all aspects of nicotine addiction and understanding gender differences will help create prevention and cessation programs that are tailored to the needs of women.

Also discussed was the need to address nicotine dependence using animal models. Animal models complement clinical studies and provide an arena in which various environmental and genetic factors can be teased apart and tested in a controlled setting (18). The self-administration paradigm has been used to examine the reinforcing effects of nicotine in male animals (19-22). Only a handful of studies has examined the reward effects of nicotine in female animals, and very little is known about the effects of the menstrual cycle and gonadal hormones such as estrogen and progesterone on nicotine addiction.

Recommendations

Research

*1. Understand sex differences in the mechanisms and processes involved in all phases of nicotine use and addiction.

The group gave this recommendation the highest priority because of the many gaps in our understanding of sex differences in nicotine use and addiction. An examination is needed of the environmental, behavioral, genetic, molecular, cellular, neurobiological, and hormonal sources of variation and their interactions in animals and humans during all phases of nicotine addiction, including initiation, maintenance, withdrawal, and relapse. This recommendation encompasses a vast array of preclinical and clinical research.

Preclinical. Animal models make it possible to examine the reinforcing effects of nicotine that are highly relevant to tobacco dependence in humans and that cannot easily be studied in human subjects—mainly for ethical reasons. In animals, potential behavioral effects of pharmacological agents can be more fully characterized. Furthermore, these animal models allow the investigation of the basic underlying behavioral and neurochemical mechanisms that are relevant to nicotine addiction (for reviews, see 5, 18).

Behavioral studies of rodents suggest that females are more sensitive than males to repeated nicotine exposure, as demonstrated by a more rapid onset of nicotine-induced behaviors (23). The reinforcing effects of nicotine have been examined in female rats. In one study, female rats self-administered nicotine and, when compared to males, showed a higher motivation to obtain nicotine because they acquired self-administration capabilities of low doses of nicotine, whereas male rodents did not (24). In this study, different stages of the estrous cycle did not affect nicotine self-administration. However, since rodents have drastically shortened cycles (4-5 days in length), heterogeneity within each cycle stage (i.e., animals reaching a stage of the cycle at different times) may have limited the ability of the authors to find a relationship between the estrous cycle and the reinforcing effects of nicotine.

Research should be conducted in animals that have pharmacologically synchronized estrous cycles to reduce variability in hormonal levels, thereby providing a more accurate picture of whether hormone levels can affect nicotine intake. This procedure has been used to establish a relationship between

the estrous cycle and ethanol self-administration in rats. In females whose estrous cycles were synchronized, ethanol was found to be more reinforcing during the diestrus phase than during the estrus and proestrus phases (25). The effects of hormones have been examined in a more stable condition; specifically, self-administration of heroin and cocaine has been examined in ovariectomized female animals. When ovariectomized rats were treated with estradiol benzoate, these animals initiated heroin self-administration sooner and consumed greater amounts than ovariectomized rats that did not receive estrogen replacement (26). Animals that were ovariectomized exhibited less response for cocaine, and compared to the intact animals, fewer of these animals acquired cocaine self-administration (27). However, nicotine self-administration has not been examined in ovariectomized female rats.

As illustrated above, the self-administration paradigm can provide a valid measure of the reinforcing effects of nicotine in females and can be further extended to examine the potential role of gene/environment interactions for nicotine addiction. A recent study has shown that male mice lacking a $\beta 2$ subunit of the high-affinity neuronal nicotinic acetylcholine receptor (nAChR) self-administer nicotine at much lower levels than wild-type mice following cocaine self-administration (28). *Thus, the effects of mutations in nAChR as well as mutations in other receptor systems, such as the dopaminergic system (an important neurotransmitter system that is linked to the addiction process), can be further examined in relation to the reinforcing effects of nicotine in female knockout mice.*

In addition to genetic issues, animal models can be used to examine the effects of environmental factors, such as stressors. Social stressors have been established in animals, and the effect of one such stressor, social defeat stress, further sensitizes cocaine-induced hyperlocomotion, activates cocaine-induced self-administration, and increases the rate of acquisition of cocaine self-administration in male animals (29-31). *The effect of social stressors has yet to be determined in female and nicotine-dependent animals.* Further down the line, the development of animal models of gene/environment interactions in nicotine addiction will provide clues as to whether the interactions can be demonstrated (using the stress and nicotine self-administration model in wild-type and transgenic mice), the magnitude of their effect, the conditions under which the interactions vary in strength, and whether any sex differences exist.

* Recommendations with an asterisk are those identified by the breakout groups as their top three recommendations.

The Addiction Breakout Group also suggested that these animal models be extended to examine sex differences in the neurobiological basis of nicotine addiction. For example, previous research has shown that sex differences exist in dopaminergic function in the brain (32). Finally, different stages of addiction, including acquisition, maintenance, extinction, and relapse, can be studied in female animals using the self-administration model, as has been done in male rodents (33, 34). In adolescence, animal research is needed on all phases of the addiction process, and thus, the development of adolescent nicotine addiction should be examined as well as differences between the sexes. As shown above, much more research is required to understand nicotine addiction in female animals.

Clinical. Naturalistic and epidemiological research in twin, family, and adoption studies has addressed the role of genes and the environment in complex traits such as nicotine dependence. Environmental influences on the development of tobacco dependence are well documented and include peer and familial influences as the strongest contributors in determining how and when cigarette experimentation occurs among young people (for reviews, see 35, 36). However, studies based on twin samples support the hypothesis that genetic influences also underlie the initiation and lifetime use of tobacco (10, 37, 38). Twin studies reveal that approximately 50 percent of the variance in tobacco dependence is attributable to genetic influences (39). Interestingly, the majority of twin studies have been carried out in male twins, and very few studies have examined sex-specific differences. In a recent meta-analysis of twin studies, it was reported that genetic and environmental factors might differentially determine smoking initiation and persistence in male and female smokers (39). *Further studies are needed to fully appreciate genetic and environmental factors in all aspects of nicotine addiction, as well as delineating gender differences.*

In the laboratory, human studies have focused mainly on relapse and have examined responses to drug cues. Few studies have fully examined sex-moderating effects in cue reactivity, even though men and women respond differently to internal and external drug cues. External functions play a greater role in maintenance of and relapse to smoking in women, whereas internal cues are more prominent for males (8). Sex differences in reactivity among the types of cues have also been reported (8, 40).

In humans, although ovarian hormones in females may modulate responses to drugs and could potentially explain different drug responses between males and females, very few studies have examined the role of hormonal influences

in women across different stages of nicotine addiction (for a recent review, see 5).

Disparities

This recommendation entails a vast arena of research that could lead to a basic understanding of sex differences in different phases of nicotine addiction. These approaches will identify individual differences that may inform effective interventions.

Partners

Governmental agencies that fund basic addiction research, such as the National Institute on Drug Abuse (NIDA), and other interested funders can help provide funding for the vast arena of projects proposed above.

Impact

With different research groups examining the various aspects of nicotine addiction in both the preclinical and clinical models, we will substantially enhance our understanding of basic biological differences in males and females in 2 to 5 years. This holds promise for understanding susceptibility to nicotine addiction and designing treatments to prevent and help alleviate nicotine dependence.

2. Gender differences in the measurement/definition of addiction, including novel measurements.

Several authors have hypothesized that addiction/dependence is multidimensional and includes physical, behavioral, and physiological components (41-44). Assessment of tobacco dependence has relied largely upon the Fagerström Tolerance Questionnaire (45) and its more recent variant, the Fagerström Test for Nicotine Dependence (FTND) (46) or the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) criteria, an approach derived from the need to include tobacco dependence in psychiatric nomenclature and classification and that attempts to adhere to classic definitions of drug dependence (47, 48). The state of the art in the assessment of nicotine dependence is best summarized in a recent paper by Moolchan et al. (44), who directly tested the concordance between dependence as determined by DSM or FTND criteria (≥ 7). The highest kappa value obtained was 0.21, which is just beyond the upper end of the “poor” range for agreement (49). The authors concluded that multiple instruments should be used to assess nicotine dependence because each may be evaluating separate and independent dimensions. *To date, none of the instruments commonly used to assess nicotine dependence assess all aspects, and their intercorrelation is surprisingly low* (44).

Research is needed on:

- *The definition of nicotine addiction/dependence and the development of measurements to identify differences between men and women and between adults and adolescents.* In most behavior genetic and genetic epidemiologic studies, “smoking” has been assessed as a static phenotype, as if the behavior is a trait that remains constant over time. Not only do reasons and motivations for smoking vary across individuals, but motivations (biological, social, and psychological—individually and in combination) probably vary across different population subgroups, as well as across time and situations (36, 50, 51), making the need for a dynamic definition of nicotine addiction more pressing. A more accurate definition of nicotine addiction will make it possible to better define sex-relevant experimental parameters.
- *Differences in brain neurochemistry between men and women, especially as these differences relate to nicotine dependence.* Sex differences in brain regions and neurotransmitter systems associated with addiction have been observed in smokers and nonsmokers. Women have higher dopamine and serotonin transporter availability than men, regardless of smoking status (52).
- *Gender differences in Fagerström (physiological) and Glover-Nilsson (behavioral) measures of dependence.* The FTND has been used extensively and is thought to be a valid measure for physiological assessment (it can assess a smoker’s nicotine intake [53]), whereas the Glover-Nilsson Smoking Behavioral Questionnaire was recently developed to assess behavioral dependence (54). Further studies with a variety of population subgroups, including women and adolescents, are necessary.
- *Biomarkers for nicotine addiction in women versus men that could be implemented in the field.*
- *Sex differences in nicotine metabolism.*

3. Sex differences in genetic influences.

Biometric Studies of Twins and Families

It is known that smoking behavior is influenced by both genetic and environmental factors (18, 55). Twin studies have indicated that heritability rates are as high as 47 to 76 percent for smoking initiation and 62 percent for persistence or dependence (56, 57). Family studies have also been used to assess genetic components of vulnerability to nicotine addiction (58). However, sex differences have not been thoroughly studied (see below).

Measured Genetic Studies

Once it is determined that a complex trait is heritable, linkage analysis can be used to determine whether certain chromosomal regions may contain genes that contribute to the trait of interest. With the advent of the Human Genome Project and advances in molecular genetic technologies, candidate genes that map to the regions identified by the linkage analysis can be tested for association with phenotypic data.

Research is needed on:

- *Genetic studies and microarray technologies.* Several candidate genes may contribute to nicotine addiction. Thus far, research suggests that polymorphisms for genes encoding for cytochrome P450 enzymes are involved in nicotine and cotinine metabolism (e.g., *CYP2A6*) (59) and affect the dopamine system, especially the *DRD2* receptor and enzymes that control dopamine metabolism (a crucial player in the reward effects of nicotine) (60, 61). For example, an association has been reported between variations in genes that influence dopamine metabolism and smoking; this relationship is stronger among whites and women (62). Research in this area with respect to sex differences is lacking, and the advent of newer techniques, such as microarrays, that provide faster screening and detection of multiple gene variations may provide answers in a more efficient and cost-effective manner.
- *Identification of genetic markers and predictors.* Several candidate genes are thought to be involved in nicotine addiction. We can obtain further insight into other novel genes of interest by linkage analysis, which provides analysis of chromosomal regions and localization of genes that contribute to phenotypes associated with smoking. This methodology has provided inconclusive data but has the ability to help identify specific genes involved in nicotine dependence and to further examine sex differences (63).
- *Genetic components and predictors of relapse.* Genetic influences on different stages of smoking, such as initiation, maintenance, cessation, and relapse, may not be identical. A study examining female twins has shown that although risk factors overlap for smoking initiation and dependence, a distinct set of factors was specific for nicotine dependence (64). For cessation treatments, an association between genetic variations in the *CYP2D6* gene and increased incidence of bupropion adverse effects were reported in female patients (65). Data for

genetic predictors of relapse in females and males are lacking.

- *Gene/environment interactions.* As in other fields, such as cancer epidemiology (66, 67), nicotine dependence may also be influenced by gene/environment interactions (68, 69). Nicotine dependence exhibits characteristics of a complex genetic trait (e.g., gene/gene, gene/environment, and genotypic heterogeneity) (70-72). It has been shown that, depending on the nature of the gene/environment interaction (e.g., additive, multiplicative, or synergistic), the potential impact on the prevention of regular tobacco use could be quite high, thereby providing substantial motivation for pursuing an integrative understanding of how genes and the environment interact to increase susceptibility to tobacco use (73).

4. Sex differences in laboratory-based human studies.

Laboratory-based human studies are needed to investigate all aspects of nicotine addiction. These could include cue reactivity studies (e.g., 74), nicotine sensitivity studies (e.g., 75), functional magnetic resonance imaging (fMRI) studies of brain activation (e.g., 76), prepulse inhibition (e.g., 77), and some forms of electroencephalogram-based studies (e.g., 78).

Sex-based research is needed on:

- *Neurobiology of relapse and laboratory-based predictors of relapse.*
- *Risk and protective factors for nicotine dependence/addiction.*
- *Nicotine as a reinforcer and non-nicotine aspects of smoking reinforcements.*
- *An integrated, systematic approach to laboratory-based human studies and field studies.*

5. Human research on gender differences in natural history.

Conducting gender-based studies in naturalistic settings to understand the progression to dependence, quitting, and relapse is important. Thus, gender differences must be examined at different stages of life, taking into consideration biological, brain, behavioral, and environmental factors. The available data suggest that both trajectories of tobacco use and dimensions of adult dependence are strongly influenced by gender. Specifically, girls tended to have greater rates of change than boys in the use of tobacco (79); younger females

had greater development of cigarette use than younger males (80) (younger females typically exceeded males in cigarette use [81, 82]); and females had higher initial status than males and increased less rapidly in their use of tobacco (83). White et al. found that while males and females did not differ significantly in frequency or quantity of smoking at most ages, females began to smoke at younger ages than males and at higher rates during adolescence (84).

Based on the results of a factor analysis of 42 items assessing smoking behaviors in 150 French smokers (50 percent male), Gilliard and Bruchon-Schweitzer (85) used principal components analysis and Varimax rotation to identify four factors explaining 52 percent of the total variance: dependence (automatism, lack of control, urge to smoke); social integration (socially acceptable behaviors, impressing other people); regulation of negative affect (management of anxiety, sadness, anger); and hedonism (pleasant smoking-related gestures, seeking relaxation and pleasure). The authors then used multiple-regression analysis to examine—separately for men and women—the relationships among a variety of sociodemographic, personality, and dependence measures. Of note is the finding that correlates of smoking factors were uniformly different for men than for women. For example, being single and being susceptible to boredom were associated with dependence in men, while the use of other psychoactive substances was most strongly related to dependence in women.

Gender-based research is needed on:

- *Natural history of progression to dependence.*
- *Overcoming limitations of current research with adolescents.*
- *Brain imaging in adolescents at multiple timepoints to monitor smoking and other outcomes.*
- *Gender differences in relapse factors.*
- *The menstrual cycle as a primary focus in research on smoking (puberty, pregnancy, postmenopause).*
- *Sex differences in the rate of maturation of the relevant metabolic and receptor systems.*
- *Gender differences in self-quitting versus treatment-based quitting.*

6. Gender differences in depression, stress, and coping.

People with depression have a higher incidence of smoking (13-17). High levels of depression are associated with higher dependency on smoking (14). Depressed individuals may

self-medicate to alleviate symptoms of depression, and this behavior could be an important factor in tobacco dependence. However, it could also be that a common genetic basis exists for the association of the two conditions (14, 86). *Since females are twice as likely as males to experience mood disorders, depression is an especially important factor to consider with respect to prevention, treatment, withdrawal effects, and relapse.*

Smokers also report that while stress induces smoking behavior, smoking can alleviate stress (2, 87, 88). Women are more likely than men to smoke in response to stress and negative affect (3, 89, 90). A higher level of perceived stress was also identified as a risk factor for smoking in women following physician advice and nicotine replacement therapy (NRT) for cessation, but not in men (91). However, the underlying mechanisms of the relationship between smoking and stress are not fully understood.

Release of glucocorticoid hormones—cortisol in humans and corticosterone in rodents—is one of the final steps resulting in activation of the hypothalamo-pituitary-adrenal (HPA) axis and serves as one of the principal biological responses to stress (92-94). Preclinical studies that examine how nicotine alters the relationship between sex hormones and the HPA axis are lacking. Research has shown that the HPA axis can be differentially regulated in female and male rats in response to alcohol. For example, relative to males, female rats release more corticosterone when they are exposed to alcohol (95). *Thus, research should identify stressors that are unique to women and examine how these stressors affect coping and relapse rates.*

Research is needed on:

- *Depression, stress, and the onset of smoking or differences in smoking between adolescent males and females, and between adolescent and adult females.*
- *The utility of nicotine for young women versus young men.*
- *Hormonal factors in nicotine addiction, especially since phase of the menstrual cycle can affect mood.*
- *Nicotine and stress hormones.*
- *The role of psychiatric comorbidities, including subclinical comorbidities, and how to provide support and treatment.*
- *The relationship between smoking and autoimmune diseases, since stress as well as smoking can affect the progression and severity of autoimmune diseases.*
- *Whether nicotine plays a therapeutic role in depression.*

7. Sociocultural determinants.

We need to understand disparities in smoking prevalence among women by socioeconomic status, race, and ethnicity. For example, certain ethnic groups have a higher prevalence of smoking than the general population (96), and predictors of initiation and persistence of smoking vary across ethnic groups (97). Thus, prevention and cessation programs targeting these particular groups should take into account cultural and potential biological differences, such as nicotine metabolism (98).

Research is needed on:

- *Cultural differences between African Americans and whites in cigarette choice.*
- *Reasons for the high smoking rate among American Indian women, including a better understanding of the social and cultural values adolescents attach to smoking (99).*

In addition, naturalistic observation studies are needed of smoking in people from different cultures as they enter the United States.

Translation

*8. Use evidence from animal studies, pilot projects, and small-scale clinical studies to develop, refine, and evaluate promising interventions.

As illustrated in the above recommendations, animal studies can be used to understand the role of behavioral, hormonal, genetic, neurobiological, and environmental factors in nicotine addiction. These models will help in the development of potential behavioral and pharmacologic interventions for the prevention and cessation of nicotine addiction. For example, treatments based on extinction might be more effective for females than for males.

Research is needed on:

- *Effective treatments from the field of depression and other psychiatric comorbidities.* Pharmacological interventions from these fields can be tested in animal models, and these studies can very quickly provide data to start pilot clinical studies.
- *Menstrual cycle effects on craving and withdrawal symptomatology.* Previous research has shown that when premenstrual symptoms were highest in the late luteal phase of the cycle, women reported an increase in the desire to smoke to alleviate negative symptoms and

minor weight gain following short-term abstinence; thus, women smokers might have better results quitting during the follicular phase of the cycle (100-102).

- *Cognitive behavioral therapy regarding weight gain concerns versus preventing weight gain.* Previous research has indicated that weight gain occurring during an initial short-term period of smoking cessation can constitute a serious barrier to cessation. Weight-concerned women are less likely to seek treatment or attempt to quit on their own (103, 104). Also, weight-concerned women are willing to tolerate only a minimal weight gain, as they expect to gain more weight, and this may hamper their efforts to quit smoking (105). In fact, cognitive behavior therapy that focuses on reducing weight gain concerns improves smoking cessation outcome in weight-concerned women (106).

Disparities

The development of gender-specific treatments should be enhanced, with a view toward targeting priority female subgroups.

Partners

Partners include NIH and private foundations.

Impact

Within 2 to 5 years, we will know the limits and promise of new treatments and have feedback to refine animal models.

Application

*9. Use or modify existing infrastructure (e.g., NIDA Clinical Trials Network) to rapidly evaluate the efficacy of promising treatments and the effectiveness and cost-effectiveness of proven small-scale interventions.

Women are less successful than men at quitting smoking, and those who seek help respond differently to cessation pharmacotherapies (8, 11, 107, 108). For example, in a recent effectiveness trial of bupropion SR (11), the 12-month nonsmoking rate for women (25 percent) was significantly lower than that for men (32.8 percent; $p < 0.01$); women were 45 percent more likely than men to be smoking at 12 months post treatment, after adjustment for other pretreatment characteristics and form of treatment; odds ratio (95 percent confidence interval)=1.45 (1.16, 1.82). This finding is consistent with the report by Dale et al. (109), in which women were 67 percent more likely than men to be smoking at the end of treatment with bupropion

SR. The finding that women are more likely to return to smoking following treatment has also come from studies of the effectiveness of unassisted cessation (110-112), community-based interventions (113), behavioral treatment (9, 110, 114), nicotine replacement therapy (10, 114-118), and fluoxetine treatment (119). The basis for lower cessation rates among women remains unknown and may be due to a number of factors, including the presence of undetected subgroups among female quitters that vary with respect to treatment outcome (120). Relatively little work has been done to identify such subgroups, and no published evidence is available within the context of combined bupropion SR and behavioral counseling. *Such information could be useful for understanding whether all, or only certain subgroups of women are at increased risk for smoking following treatment and will help provide the path to cessation therapies tailored to the needs of women.*

Research is needed on:

- *Maximizing the effectiveness of NRT for women,* because gender differences with respect to nicotine sensitivity during withdrawal have been reported. Hormonal effects may alter nicotine sensitivity, but few studies have examined hormonal influences on responsiveness to NRT. Recently, Allen and colleagues (121) reported that women treated with transdermal nicotine patches reported a decrease in craving in the late luteal phase of their menstrual cycles relative to the follicular phase. This indicates that to maximize the effects of NRT, the menstrual cycle should be taken into consideration.
- *Gender differences in non-NRT pharmacotherapies.* In this category, bupropion is currently the only non-NRT pharmacotherapy approved for smoking cessation (for a recent review, see 122). Thus, much work is needed to determine, for example, the dose ranges of effective medications for females. This pharmacotherapy may be especially useful for women, because studies have shown that bupropion may reduce withdrawal symptoms and weight gain—a major concern for women.
- *Combinations of medications and behavioral treatments.* In a study of quit rates following nicotine therapy, women scored higher on behavioral measures of nicotine dependence and lower on physiological measures than men, indicating that, ideally, behavioral therapy should be combined with nicotine treatment and tailored to the individual's needs (107).

- *Applying treatments for other disorders (e.g., depression) to nicotine dependence*, especially since evidence suggests that women smokers who have a history of depression are less likely to quit (9, 115, 123, 124).
- *More-intensive versus less-intensive treatments*. This research could be expanded to include treatments delivered in the “real world.”

Disparities

Ascertain efficacy and effectiveness in priority subgroups.

Partners

- NIDA and Veterans Affairs Clinical Trials Network
- NCI’s Clinical Cancer Oncology Program
- Substance Abuse and Mental Health Services Administration
- Foundations (e.g., Robert Wood Johnson Foundation)
- Pharmaceutical industry

Impact

Within 5 years, we may have improved the delivery of effective treatments to priority subgroups.

References

1. Roberts DL. Natural tobacco flavor. *Recent Advances in Tobacco Science*. 1998;14:49-113.
2. U.S. Department of Health and Human Services. *The Health Consequences of Smoking: Nicotine Addiction: A report of the Surgeon General*. Washington, DC: U.S. Government Printing Office; 1998.
3. U.S. Department of Health and Human Services. *Women and Smoking: A Report of the Surgeon General*. Atlanta, GA: 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; 2001.
4. Centers for Disease Control and Prevention. Prevalence of cigarette use among 14 racial/ethnic populations—United States, 1991-2001. *Morbidity and Mortality Weekly Report*. 2004;53:49-52.
5. Lynch WJ, Roth ME, Carroll ME. Biological basis of sex differences in drug abuse: Preclinical and clinical studies. *Psychopharmacology*. 2002;164:121-37.
6. Perkins KA, Grobbs JE, Stiller RL, Fonte C, Goettler JE. Nasal spray nicotine replacement suppresses cigarette smoking desire and behavior. *Clinical Pharmacology and Therapeutics*. 1992;52:627-34.
7. Perkins KA, Donny E, Caggiula AR. Sex differences in nicotine effects and self-administration: Review of human and animal evidence. *Nicotine & Tobacco Research*. 1999;1:301-15.
8. Perkins KA. Smoking cessation in women. Special considerations. *CNS Drugs*. 2001;15:391-411.
9. Swan GE, Ward MM, Carmelli D, Jack LM. Differential rates of relapse in subgroups of male and female smokers. *Journal of Clinical Epidemiology*. 1993;46:1041-53.
10. Swan, GE, Carmelli, D. Behavior genetic investigations of cigarette smoking and related issues. In: Noble EP, Blum K, eds. *Handbook of Psychiatric Genetics*. Boca Raton, FL: CRC Press; 1997:379-98.
11. Swan GE, Jack LM, Curry SJ, et al. Bupropion SR and counseling for smoking cessation in actual practice: Predictors of outcome. *Nicotine & Tobacco Research*. 2003;5:911-21.
12. Westermeyer J, Boedicker AE. Course, severity, and treatment of substance abuse among women versus men. *American Journal of Drug and Alcohol Abuse*. 2000;26:523-35.
13. Balfour DJ, Ridley DL. The effects of nicotine on neural pathways implicated in depression: A factor in nicotine addiction? *Pharmacology, Biochemistry, and Behavior*. 2000;66:79-85.
14. Breslau N, Kilbey MM, Andreski P. Nicotine dependence and major depression: New evidence from a prospective investigation. *Archives of General Psychiatry*. 1993;50:31-5.
15. Choi WS, Pierce JP, Gilpin EA, Farkas AJ, Berry CC. Which adolescent experimenters progress to established smoking in the United States? *American Journal of Preventive Medicine*. 1997;13:385-391.
16. Covey LS, Glassman AH, Stetner F. Cigarette smoking and major depression. *Journal of Addictive Diseases*. 1998;17:35-46.
17. Kelder SH, Murray NG, Orpinas P, et al. Depression and substance use in minority middle-school students. *American Journal of Public Health*. 2001;91:761-6.

18. Swan GE, Hudmon KS, Khroyan TV. Tobacco dependence. In: Nezu A, Nezu C, eds. *Health Psychology*. New York: Wiley; 2003;147-68.
19. Bardo MT, Green TA, Crooks PA, Dwoskin LP. Nicotine is self-administered intravenously by rats. *Psychopharmacology*. 1999;146:290-6.
20. Corrigan WA, Coen KM. Nicotine maintains robust self-administration in rats on a limited-access schedule. *Psychopharmacology*. 1989;99:473-8.
21. Donny EC, Caggiula AR, Knopf S, Brown C. Nicotine self-administration in rats. *Psychopharmacology*. 1995;122:390-4.
22. Donny EC, Caggiula AR, Rowell PP, et al. Nicotine self-administration in rats: Estrous cycle, sex differences and nicotine receptor binding. *Psychopharmacology*. 2000;151:392-405.
23. Tessari M, Valerio E, Chiamulera C, Beardsley PM. Nicotine reinforcement in rats with histories of cocaine self-administration. *Psychopharmacology*. 1995;121:282-3.
24. Booze RM, Welch MA, Wood ML, Billings KA, Apple SR, Mactutus CF. Behavioral sensitization following repeated intravenous nicotine administration: Gender differences and gonadal hormones. *Pharmacology, Biochemistry, and Behavior*. 1999;64:827-39.
25. Roberts AJ, Smith AD, Weiss F, Rivier C, Koob GF. Estrous cycle effects on operant responding for ethanol in female rats. *Alcoholism, Clinical and Experimental Research*. 1998;22:1564-9.
26. Roth ME, Casimir AG, Carroll ME. Influence of estrogen in the acquisition of intravenously self-administered heroin in female rats. *Pharmacology, Biochemistry, and Behavior*. 2002;72:313-8.
27. Lynch WJ, Roth ME, Mickelberg JL, Carroll ME. Role of estrogen in the acquisition of intravenously self-administered cocaine in female rats. *Pharmacology, Biochemistry, and Behavior*. 2001;68:641-6.
28. Picciotto MR, Zoli M, Rimondini R, et al. Acetylcholine receptors containing the beta2 subunit are involved in the reinforcing properties of nicotine. *Nature*. 1998;391:173-7.
29. Haney M, Maccari S, Le Moal M, Simon H, Piazza PV. Social stress increases the acquisition of cocaine self-administration in male and female rats. *Brain Research*. 1995;698:46-52.
30. Miczek KA, Mutschler NH. Activational effects of social stress on IV cocaine self-administration in rats. *Psychopharmacology*. 1996;128:256-64.
31. Nikulina EM, Marchand JE, Kream RM, Miczek KA. Behavioral sensitization to cocaine after brief social stress is accompanied by changes in Fos expression in the murine brainstem. *Brain Research*. 1998;810:200-10.
32. Becker JB. Gender differences in dopaminergic function in striatum and nucleus accumbens. *Pharmacology, Biochemistry, and Behavior*. 1999;64:803-12.
33. Caggiula AR, Donny EC, White AR, et al. Environmental stimuli promote the acquisition of nicotine self-administration in rats. *Psychopharmacology*. 2002;163:230-7.
34. Pich EM, Chiamulera C, Tessari M. Neural substrate of nicotine addiction as defined by functional brain maps of gene expression. *Journal of Physiology, Paris*. 1998;92:225-8.
35. Gritz ER, Prokhorov AV, Hudmon KS, et al. Cigarette smoking in a multiethnic population of youth: Methods and baseline findings. *Preventive Medicine*. 1998;27:365-84.
36. U.S. Department of Health and Human Services. *Preventing Tobacco Use Among Young People: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1994.
37. Heath AC, Madden PA. Genetic influences on smoking behavior. In: Turner JR, Cardon LR, eds. *Behavior Genetic Approaches in Behavior Medicine*. New York: Plenum Press; 1995:45-66.
38. Sullivan PF, Kendler KS. The genetic epidemiology of smoking. *Nicotine & Tobacco Research*. 1999;1:S51-7.
39. Li MD, Cheng R, Ma JZ, Swan GE. A meta-analysis of estimated genetic and environmental effects on smoking behavior in male and female adult twins. *Addiction*. 2003;98:23-32.
40. Niaura R, Shadel WG, Abrams DB, Monti PM, Rohsenow DJ, Sirota A. Individual differences in cue reactivity among smokers trying to quit: Effects of

- gender and cue type. *Addictive Behaviors*. 1999;23:209-24.
41. Hughes JR. Identification of the dependent smoker: Validity and clinical utility. *Behavioral Medicine Abstracts*. 1985;5:202-4.
 42. Lombardo TW, Hughes JR, Fross JD. Failure to support the validity of the Fagerström Tolerance Questionnaire as a measure of physiological tolerance to nicotine. *Addictive Behaviors*. 1988;13:87-90.
 43. Shiffman S, Hickcox M, Gnys M, Paty JA, Kassel JD. The nicotine dependence syndrome scale: Development of a new measure. Presented at: Annual Meeting of the Society for Research on Nicotine and Tobacco; March 1995; San Diego, CA.
 44. Moolchan ET, Radzius A, Epstein DH, Uhl G, Gorelick DA, Cadet JL, et al. The Fagerström test for nicotine dependence and the diagnostic interview schedule: Do they diagnose the same smokers? *Addictive Behaviors*. 2002;27:101-13.
 45. Fagerström KO. Measuring degree of physical dependence to tobacco smoking with reference to individualization of treatment. *Addictive Behaviors*. 1978;3:235-41.
 46. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström Test for Nicotine Dependence: A revision of the Fagerström Tolerance Questionnaire. *British Journal of Addiction*. 1991;86:1119-27.
 47. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 4th ed. Washington, DC: American Psychiatric Association; 1994.
 48. Robins L, Helzer J, Cottler L, Goldring E. NIMH *Diagnostic Interview Schedule Version III (DIS-III-R)*. St Louis, MO: Department of Psychiatry, Washington University Medical School; 1988.
 49. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*. 1977;33:159-74.
 50. Hiatt RA, Rimer BK. A new strategy for cancer control research. *Cancer Epidemiology, Biomarkers, and Prevention*. 1999;8:957-64.
 51. Petraitis J, Flay BR, Miller TQ. Reviewing theories of adolescent substance use: Organizing pieces in the puzzle. *Psychological Bulletin*. 1995;117:67-86.
 52. Staley JK, Krishnan-Sarin S, Zoghbi S, et al. Sex differences in [123I]beta-CIT SPECT measures of dopamine and serotonin transporter availability in healthy smokers and nonsmokers. *Synapse*. 2001;41:275-84.
 53. Radzius A, Gallo J, Epstein D, et al. A factor analysis of the Fagerström Test for Nicotine Dependence (FTND). *Nicotine & Tobacco Research*. 2003;5:255.
 54. Glover ED, Nilsson F, Westin A. The Glover-Nilsson Smoking Behavioral Questionnaire (GN-SBQ). Poster presented at: Society for Research on Nicotine and Tobacco Third European Conference; 2001; Paris.
 55. Carmelli D, Swan GE, Robinette D, Fabsitz R. Genetic influence on smoking—a study of male twins. *New England Journal of Medicine*. 1992;327:829-33.
 56. Heath AC, Madden PA, Slutske WS, Martin NG. Personality and the inheritance of smoking behavior: A genetic perspective. *Behavior Genetics*. 1995;25:103-17.
 57. Hughes JR, Giovino GA, Klevens RM, Fiore MC. Assessing the generalizability of smoking studies. *Addiction*. 1997;92:469-72.
 58. Niu T, Chen C, Ni J, et al. Nicotine dependence and its familial aggregation in Chinese. *International Journal of Epidemiology*. 2000;29:248-52.
 59. Pianezza ML, Sellers EM, Tyndale RF. Nicotine metabolism defect reduces smoking. *Nature*. 1998;393:750.
 60. Comings DE, Ferry L, Bradshaw-Robinson S, Burchette R, Chiu C, Muhleman D. The dopamine D2 receptor (DRD2) gene: A genetic risk factor in smoking. *Pharmacogenetics*. 1996;6:73-9.
 61. Lerman C, Caporaso NE, Audrain J, et al. Evidence suggesting the role of specific genetic factors in cigarette smoking. *Health Psychology*. 1999;18:14-20.
 62. McKinney EF, Walton RT, Yudkin P, et al. Association between polymorphisms in dopamine metabolic enzymes and tobacco consumption in smokers. *Pharmacogenetics*. 2000;10:483-91.
 63. Batra V, Patkar AA, Berrettini WH, Weinstein SP, Leone FT. The genetic determinants of smoking. *Chest*. 2003;123:1730-9.
 64. Kendler KS, Neale MC, Sullivan P, Corey LA, Gardner CO, Prescott CA. A population-based twin study in

- women of smoking initiation and nicotine dependence. *Psychological Medicine*. 1999;29:299-308.
65. Swan GE, Jack LM, Ton CC, Luce C, Ring HZ. CYP2D6 and adherence to treatment with bupropion SR for smoking cessation. Poster presented at: Society for Research on Nicotine and Tobacco 8th Annual Meeting; 2002; Savannah, GA.
66. Perera, FP. Molecular epidemiology: On the path to prevention? *Journal of the National Cancer Institute*. 2000;92:602-12.
67. Shields PG, Harris CC. Cancer risk and low-penetrance susceptibility genes in gene-environment interactions. *Journal of Clinical Oncology*. 2000;18:2309-15.
68. Johnstone E, Munafo M, Neville M, Griffiths S, Murphy M, Walton R. Pharmacogenomics of tobacco addiction. In: Licinio J, Wong M-L, eds. *Pharmacogenomics: The Search for Individualized Therapies*. Weinheim, Germany: Wiley-VCH; 2002:443-60.
69. Swan GE. Implications of genetic epidemiology for the prevention of tobacco use. *Nicotine & Tobacco Research*. 1999;1:S49-56.
70. Khoury MJ, Beaty TH, Cohen BH. *Fundamentals of Genetic Epidemiology*. New York: Oxford Press; 1993.
71. Lander ES, Schork NJ. Genetic dissection of complex traits. *Science*. 1994;265:2037-48.
72. Ottman R. Gene-environment interaction: Definitions and study designs. *Preventive Medicine*. 1996;25:764-70.
73. Swan GE. Nicotine: Individual risk factors for initiation. *Nicotine & Tobacco Research*. 1999;1:S71-73.
74. Hutchison KE, LaChance H, Niaura R, Bryan A, Smolen A. The DRD4 VNTR polymorphism influences reactivity to smoking cues. *Journal of Abnormal Psychology*. 2002;111:134-43.
75. Picciotto MR. Nicotine as a modulator of behavior: Beyond the inverted U. *Trends in Pharmacological Sciences*. 2003;24:493-9.
76. Kumari V, Gray JA, ffytche DH. Cognitive effects of nicotine in humans: An fMRI study. *NeuroImage*. 2003;19:1002-13.
77. Semenova S, Beshpalov A, Markou A. Decreased prepulse inhibition during nicotine withdrawal in DBA/2J mice is reversed by nicotine self-administration. *European Journal of Pharmacology*. 2003;472:99-110.
78. Slawecki CJ, Ehlers CL. Lasting effects of adolescent nicotine exposure on the electroencephalogram, event related potentials, and locomotor activity in the rat. *Brain Research. Developmental Brain Research*. 2002;138:15-25.
79. Duncan SC, Duncan TE. Modeling incomplete longitudinal substance use data using latent variable growth curve methodology. *Multivariate Behavioral Research*. 1994;29:313-38.
80. Duncan SC, Duncan TE. A multivariate latent growth curve analysis of adolescent substance use. *Structural Equation Modeling*. 1996;3:323-47.
81. Bachman JG, Johnston LD, O'Malley PM. Smoking, drinking, and drug use among American high school students: Correlates and trends, 1975-1979. *American Journal of Public Health*. 1981;71:59-69.
82. Kandel DB. Developmental stages in adolescent drug involvement. *NIDA Research Monograph*. 1980;30:120-7.
83. Andrews JA, Hops H, Duncan SC. Adolescent modeling of parent substance use: The moderating effect of the relationship with the parent. *Journal of Family Psychology*. 1997;11:259-70.
84. White HR, Pandina RJ, Chen PH. Developmental trajectories of cigarette use from early adolescence into young adulthood. *Drug and Alcohol Dependence*. 2002;65:167-178.
85. Gilliard J, Bruchon-Schweitzer M. Development and validation of a multidimensional smoking behaviour questionnaire. *Psychological Reports*. 2001;89:499-509.
86. Kendler KS, Neale MC, MacLean CJ, Heath AC, Eaves LJ, Kessler RC. Smoking and major depression: A causal analysis. *Archives of General Psychiatry*. 1993;50:36-43.
87. McKennell AC. Smoking motivation factors. *British Journal of Social and Clinical Psychology*. 1970;9:8-22.
88. Gilbert DG. *Smoking: Individual Differences, Psychopathology and Emotion*. London, England: Taylor and Francis; 1995.
89. Borrelli B, Bock B, King T, Pinto B, Marcus BH. The impact of depression on smoking cessation in women. *American Journal of Preventive Medicine*. 1996;12:378-87.
90. Hall SM, Munoz RF, Reus VI, Sees KL. Nicotine, negative affect, and depression. *Journal of Consulting and Clinical Psychology*. 1993;61:761-7.

91. D'Angelo ME, Reid RD, Brow, KS, Pipe AL. Gender differences in predictors for long-term smoking cessation following physician advice and nicotine replacement therapy. *Canadian Journal of Public Health*. 2001;92:418-22.
92. Seyle H. The evolution of the stress concept. *American Scientist*. 1973;61:692-9.
93. Münck A, Guyre PM, Holbrook NJ. Physiological functions of glucocorticoids in stress and their relation to pharmacological actions. *Endocrine Reviews*. 1984;5:25-44.
94. Piazza PV, Le Moal M. Glucocorticoids as a biological substrate of reward: Physiological and pathophysiological implications. *Brain Research. Brain Research Reviews*. 1997;25:359-72.
95. Rivier C. Female rats release more corticosterone than males in response to alcohol: Influence of circulating sex steroids and possible consequences for blood alcohol levels. *Alcoholism, Clinical, and Experimental Research*. 1993;17:854-9.
96. Lawrence D, Graber JE, Mills SL, Meissner HI, Warnecke R. Smoking cessation interventions in U.S. racial/ethnic minority populations: An assessment of the literature. *Preventive Medicine*. 2003;36:204-16.
97. Griesler PC, Kandel DB, Davies M. Ethnic differences in predictors of initiation and persistence of adolescent cigarette smoking in the National Longitudinal Survey of Youth. *Nicotine & Tobacco Research*. 2002;4:79-93.
98. Ahijevych K. Nicotine metabolism variability and nicotine addiction. *Nicotine & Tobacco Research*. 1999;2:S59-62.
99. Quintero G, Davis S. Why do teens smoke? American Indian and Hispanic adolescents' perspectives on functional values and addiction. *Medical Anthropology*. 2002;16:439-57.
100. Allen SS, Hatsukami DK, Christianson D, Nelson D. Withdrawal and pre-menstrual symptomatology during the menstrual cycle in short-term smoking abstinence: Effects of menstrual cycle on smoking abstinence. *Nicotine & Tobacco Research*. 1999;1:129-42.
101. Allen SS, Hatsukami DK, Christianson D, Brown S. Energy intake and energy expenditure during the menstrual cycle in short-term smoking cessation. *Addictive Behaviors*. 2000;25:559-72.
102. Perkins KA, Gerlach D, Vender J, Grobe J, Meeker J, Hutchison S. Sex differences in the subjective and reinforcing effects of visual and olfactory cigarette smoke stimuli. *Nicotine & Tobacco Research*. 2001;3:141-50.
103. Pomerleau CS, Pomerleau OF, Namenek RJ, Mehringer AM. Short-term weight gain in abstaining women smokers. *Journal of Substance Abuse Treatment*. 2000;18:339-42.
104. Pomerleau CS, Zucker AN, Stewart AJ. Characterizing concerns about post-cessation weight gain: Results from a national survey of women smokers. *Nicotine & Tobacco Research*. 2001;3:51-60.
105. Levine MD, Perkins KA, Marcus MD. The characteristics of women smokers concerned about postcessation weight gain. *Addictive Behaviors*. 2001;26:749-56.
106. Perkins KA, Marcus MD, Levine MD, et al. Cognitive-behavioral therapy to reduce weight concerns improves smoking cessation outcome in weight-concerned women. *Journal of Consulting and Clinical Psychology*. 2001;69:604-13.
107. Bohadana A, Nilsson F, Rasmussen T, Martinet Y. Gender differences in quit rates following smoking cessation with combination nicotine therapy: Influence of baseline smoking behavior. *Nicotine & Tobacco Research*. 2003;5:111-6.
108. Swan GE, Jack LM, Ward MM. Subgroups of smokers with different success rates after use of transdermal nicotine. *Addiction*. 1997;92:207-17.
109. Dale LC, Glover ED, Sachs DP, et al. Bupropion for smoking cessation: Predictors of successful outcome. *Chest*. 2001;119:1357-64.
110. Fortmann SP, Killen JD. Who shall quit? Comparison of volunteer and population-based recruitment in two minimal-contact smoking cessation studies. *American Journal of Epidemiology*. 1994;140:39-51.
111. Godtfredsen NS, Prescott E, Osler M, Vestbo J. Predictors of smoking reduction and cessation in a cohort of Danish moderate and heavy smokers. *Preventive Medicine*. 2001;33:46-52.
112. Kabat GC, Wynder EL. Determinants of quitting smoking. *American Journal of Public Health*. 1987;77:1301-5.

113. Hymowitz N, Cummings KM, Hyland A, Lynn WR, Pechacek TF, Hartwell TD. Predictors of smoking cessation in a cohort of adult smokers followed for five years. *Tobacco Control*. 1997;6 Suppl 2:S57-62.
114. Ockene JK, Emmons KM, Mermelstein RJ, et al. Relapse and maintenance issues for smoking cessation. *Health Psychology*. 2000;19 Suppl 1:17-31.
115. Bjornson W, Rand C, Connett JE, et al. Gender differences in smoking cessation after 3 years in the Lung Health Study. *American Journal of Public Health*. 1995;85:223-30.
116. Nides MA, Rakos RF, Gonzales D, et al. Predictors of initial smoking cessation and relapse through the first 2 years of the Lung Health Study. *Journal of Consulting and Clinical Psychology*. 1995;63:60-9.
117. Norregaard J, Tonnesen P, Petersen L. Predictors and reasons for relapse in smoking cessation with nicotine and placebo patches. *Preventive Medicine*. 1993;22:261-71.
118. Wetter DW, Fiore MC, Young TB, McClure JB, de Moor CA, Baker TB. Gender differences in response to nicotine replacement therapy: Objective and subjective indexes of tobacco withdrawal. *Experimental and Clinical Psychopharmacology*. 1999;7:135-44.
119. Borrelli B, Spring B, Niaura R, Hitsman B, Papandonatos G. Influences of gender and weight gain on short-term relapse to smoking in a cessation trial. *Journal of Consulting and Clinical Psychology*. 2001;69:511-5.
120. Wetter DW, Kenford, SL, Smith SS, Fiore MC, Jorenby DE, Baker TB. Gender differences in smoking cessation. *Journal of Consulting and Clinical Psychology*. 1999;67:555-62.
121. Allen SS, Hatsukami DK, Christianson D, Brown S. Effects of transdermal nicotine on craving, withdrawal and premenstrual symptomology in short-term smoking abstinence during different phases of the menstrual cycle. *Nicotine & Tobacco Research*. 2000;2:231-41.
122. Richmond R, Zwar N. Review of bupropion for smoking cessation. *Drug and Alcohol Review*. 2003;22:203-20.
123. Anda RF, Williamson DF, Escobedo LG, Mast EE, Giovino GA, Remington PL. Depression and the dynamics of smoking. A national perspective. *Journal of the American Medical Association*. 1990;264:1541-5.
124. Glassman AH, Helzer JE, Covey LS, et al. Smoking, smoking cessation, and major depression. *Journal of the American Medical Association*. 1990;264:1583-4.

Epidemiology and National Surveillance Breakout Session

Co-Chairs	Matthew Farrelly	Gary Giovino	Corinne Husten
Participants	Lisa Begg	Sherry Emery	Linda Pederson
	Naomi Breslau	Virginia Ernster	Steve Stellman
	Francisco Buchting	Pat Hysert	Mike Thun
	Vilma Cokkinides	Gary King	David Wetter
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Overview

In epidemiology and public health, surveillance systems are designed to provide timely information on the occurrence of particular diseases and conditions, the presence of risk factors for those conditions, and the effects of disease control programs (1). Epidemiological and surveillance data are necessary to monitor tobacco use in women and trace the epidemic as it develops globally.

More specifically, epidemiology and surveillance data are needed to:

- *Understand the natural history and trends of tobacco use and the consequences of such use (2, 3).*
- *Justify and evaluate policies, programs, and legislation, taking into account numerous pro- and antitobacco influences (4).*
- *Set realistic objectives for program goals (4, 5).*
- *Assess the consequences of various harm-reduction strategies (1).*
- *Identify groups that are at high risk for various forms of tobacco use (6-8).*
- *Justify and conduct research initiatives, including ones that examine gender-specific differences and similarities in outcome and process (6).*

A comprehensive surveillance system would include information about the host (the smoker or potential smoker), agent (tobacco products), vector (tobacco industry activities), and the environment (economic, cultural, political, and historical activities and interventions that support or discourage tobacco use) (3, 9). Although current surveillance systems have the most information about the host, critical

data are missing even in this area, particularly regarding the natural history of smoking and factors influencing tobacco use in diverse populations globally (6). In addition, our current surveillance systems focus largely on the host and do not systematically collect information to adequately describe the agent, vector, or environment (9). This information is important because it provides the basis for policy interventions and health communication messages. For example, information on product constituents from the industry (the agent), marketing of the products (the vector), and smoking prevalence (the host) is crucial for monitoring smoking-related disease incidence and prevalence. In many cases, however, the methods for such a comprehensive surveillance system still need to be developed.

In spite of the increasing amount of research on women and tobacco that appeared after the 1980 Surgeon General's report on women and smoking (10), many questions remain unanswered. In fact, some issues have not been addressed at all (see below).

Research is needed on both methods and content in:

- *Measurement and sampling issues (e.g., how to access samples from diverse populations and how to ensure that measurements are culturally and community competent).*
- *Better measures of the program capacity of tobacco control in each state, assessment of how funds are being used, and what capacities are being built to help establish programmatic priorities (11-15).*
- *Better measurement of adverse and protective comorbidities and identification of the impact of comorbidities on disease risk and smoking uptake and cessation (e.g., multiple drug use, weight concerns).*

- *The natural history of smoking in women (initiation, maintenance, cessation) versus men, taking into account the possibility that natural history varies by population subgroup.*
- *Psychosocial factors associated with smoking initiation, maintenance, and cessation.*
- *The differential health and economic effects of smoking on different populations and subpopulations.*
- *Disease reduction (i.e., harm minimization) in men and women from different subpopulations who are former users.*
- *Interactions among infectious diseases, smoking, and cancer.*
- *Anti-estrogenic effects of tobacco.*
- *Triggers of smoking cessation.*
- *Cost-effectiveness of smoking cessation interventions.*
- *Effective ways to minimize weight gain with cessation.*
- *Data at the state level on smoking, pregnancy, and teen smokers.*

Recommendations

Research

*1. Identify disparities.

To more precisely identify where disparities lie, it is necessary to assess the interrelationships among specific population characteristics (race and ethnicity, sexual orientation, socioeconomic status, gender, age, disabilities, and others) as they influence tobacco use, exposure to secondhand smoke, and disease risk. The allocation of resources and programs is contingent on the identification of disparities.

Tobacco use varies by population group, and the adverse effects of tobacco are concentrated in certain populations. For example, African Americans smoke fewer cigarettes but have a higher prevalence of lung cancer than whites (7, 16-18). However, adequate data on tobacco use are lacking for many population groups (e.g., Asian/Pacific Islanders, American Indians), and even more striking is the absence of information on subgroups of these population groups. For example, little or no information is available to compare the smoking behavior of women from different American Indian groups (Navajo, Ojibwa, etc.) or women with different Asian backgrounds (from Japan, Taiwan, mainland China, Hong Kong, or Vietnam), including both those born in the United

States and those born elsewhere. Given the host of possible influences on these diverse groups within one major racial or ethnic group, smoking behavior could vary widely (19).

Disparities

This recommendation focuses on disparities. Implementing it will help clearly define who is most at risk for initiation and continued use of tobacco products.

Partners

Populations must be involved in the development and implementation of this initiative. Partners should also include state legislative groups, state tobacco control programs, advocates, researchers, community-based organizations, and interventionists.

Impact

Within 2 years, this should be established as a priority, and information on what is currently known about tobacco use in various populations should be increased. Within 5 years, data should be used to inform interventions; more targeted interventions should be developed to reduce disparities; existing data should be completely analyzed; and better surveillance systems should be developed.

*2. State and local monitoring.

To better measure the extent of state and local tobacco control activities, tobacco use surveillance must be enhanced at the state and local levels, and creative, user-friendly measures must be developed to report the impact of tobacco control interventions on smoking and exposure to secondhand smoke.

Standardized monitoring of state and local tobacco control activities will provide the information needed for optimal program development, implementation, and evaluation. These measures can then be linked with measures of tobacco use to document pre- and postintervention behavior changes (20). These measures must be easy to use to ensure that they will be employed.

To determine “best practices” for tobacco control interventions, we must be able to understand the levels and types of interventions being implemented and their effects. For example, without adequate measurement of school programs and policies, cigarette prices, sales to minors, and possession, use, and purchase laws, it will not be clear whether reductions in the use of tobacco among adolescents are associated with specific state or local programs (21-24).

* Recommendations with an asterisk are those identified by the breakout groups as their top three recommendations.

Disparities

This recommendation will make it possible to assess how well tobacco control measures are reaching disparate groups, measure progress in different groups, obtain measures of the reach of programs to generate interest in participating in state and local tobacco prevention and control activities, and facilitate buy-in from involved populations.

Partners

Partners include all funding agencies, states, health services researchers, advocacy groups, purchasers, insurers, and health care systems.

Impact

Within 2 years, the ability to document activities will be increased; methods for assessing programs should be developed; funding should be maintained and increased; and success stories should be disseminated. Within 5 years, funding should be maintained and increased, and more rigorous assessment methods developed under the 2-year plan should be implemented.

3. Natural history of tobacco use.

We must document the natural history and etiology of smoking initiation, maintenance, and cessation among diverse populations by gender (including rolling cohorts with adequate duration and frequency of follow-up and documentation of relevant genetic and molecular markers).

Most current surveillance data are cross-sectional; information on tobacco use and risk factors is collected at the same point in time. Thus, we lack historical data on the natural history of tobacco use, including initiation, maintenance, cessation, and relapse (9). Such data are particularly important because some recent data indicate that the patterns of initiation and maintenance may be changing. Less-than-daily smoking is more common in some states and among specific groups than it was a decade ago (25). This apparent change in behavior may be related to future changes in smoking prevalence and the incidence and prevalence of tobacco-related morbidity and mortality. To determine whether identifiable subgroups adopt a behavior, variables associated with the behavior must be determined. Furthermore, we must determine if the predictions by college students that they will quit when they leave college are accurate (26). The question remains whether the patterns noted are similar for different subpopulation groups. Also, little is known about the relationship between the ceremonial use of tobacco among different American Indian tribes and the use of manufactured cigarettes.

Disparities

Disparities are a focus of this priority.

Partners

- Tobacco Etiology Research Network
- National Organization of Tobacco Use Research Funders
- Potential to tap into other existing cohort studies (e.g., those of the U.S. Environmental Protection Agency, National Institute of Child Health and Human Development, National Center for Health Statistics, U.S. Census Bureau, or Community Intervention Trial for Smoking Cessation [COMMIT])

Impact

Within 2 years, methods for the study or studies should be developed. Within 5 years, study implementation and data collection should begin.

4. Methodology.

To achieve the recommendations listed above, methodological research needs to be conducted, including questionnaire development, sampling strategy development, and validation of reported histories of smoking and exposure to secondhand smoke.

Improving current surveillance systems will require the development of methods, particularly around measuring disparities, and of systems to monitor the host, agent, vector, and environment. Surveillance systems needed to monitor these factors in diverse populations rapidly become complex. Given the cultural diversity of the population, questions regarding attempts to determine patterns of tobacco use may not be similar. For example, the interpretation may vary widely among different subgroups for a question about whether someone currently smokes some days, every day, or not at all. Moreover, sanctions in different subcultures against women who smoke could preclude them from answering honestly if they do smoke. In addition, mechanisms must be developed to ensure that the individuals who are sampled are representative of the target populations, as response rates for different groups may vary widely.

Disparities

Key methodological gaps exist in survey questions and sampling strategies, especially with regard to diverse populations.

Partners

Partners will include members of specific populations, survey methodologists, and survey funders.

Impact

Within 2 years, some instruments and sampling strategies should be developed, and pilot studies should be conducted. Within 5 years, the lessons learned from the pilot studies should be implemented through local, state, and national surveys.

Application***5. Tobacco marketing.**

Tobacco advertising and promotion targeted to diverse populations of women domestically and internationally need to be monitored and publicized to help stem the tide of tobacco use by women. This information is important for countermarketing programs to educate women and for policy and program planning to address industry messages.

The tobacco industry spends billions of dollars annually to market and advertise its products (27). For example, the tobacco industry supports women's magazines through advertising dollars (6). One such ad campaign was the Philip Morris Company's "Find Your Voice" campaign, which stressed the liberation of women from a broad range of cultures. The impact of the tobacco industry's efforts can be seen in attempts to control advertising through policies at the state (28), national (29), and international levels (30). Information on tobacco company advertising and promotion activities could be used to show women that they have options for becoming liberated and independent other than smoking cigarettes.

Disparities

This recommendation affects diverse groups internationally and domestically.

Partners

- Women's organizations
- Schools
- Industry researchers
- Consumer groups
- Social scientists
- Community organizations representing specific populations

- Tobacco control programs
- Advocates
- World Health Organization
- International Network of Women Against Tobacco
- American Medical Women's Association

Impact

Within 2 years, partnerships should be built; examples of targeted marketing should be documented; and pilot studies should be conducted on how to perform more systematic studies. Within 5 years, systematic studies should begin and hard data should be gathered.

6. Global surveillance.

Gender-based global surveillance is needed of tobacco use and exposure to secondhand smoke among adults and children, using standardized measures so that cross-country comparisons are available. Because of the range of support, both cultural and financial, and the differences in infrastructure for surveillance activities in different countries (31), this recommendation is critically important for cross-national programs. Ensuring that surveillance and monitoring are comparable across countries is a complex and difficult task (32); particularly in low- and middle-income countries, surveillance systems for monitoring tobacco use and its health consequences are very limited. One model of a standardized and cost-effective approach is the Global Youth Tobacco Survey (33), in which standard training is provided for data collection and analysis (34, 35).

Disparities

This recommendation addresses diverse populations globally.

Partners

- World Health Organization
- Nongovernmental organizations
- Specific governments

Impact

Within 2 years, methods for adult surveys should be developed. Within 5 years, pilot surveys for adults should begin.

References

1. Stratton K, Shetty, P, Wallace R, Bondurant S, eds. *Clearing the Smoke: Assessing the Science Base for Tobacco*

- Harm Reduction*. Washington, DC: National Academy Press; 2001.
2. Novotny TE, Giovino GA. Tobacco use. In: Bownson RC, Remington PL, Davis JR, eds. *Chronic Disease Epidemiology and Control*. 2nd Ed. Washington, DC: American Public Health Association; 1998: 117-48.
 3. Giovino GA. Epidemiology of tobacco use in the United States. *Oncogene*. 2002;21:7326-40.
 4. MacDonald G, Starr G, Schooley M, Yee SL, Klimowski K, Turner K. *Introduction to Program Evaluation for Comprehensive Tobacco Control Programs*. Atlanta, GA: Centers for Disease Control and Prevention; 2001.
 5. Yee SL, Schooley M. *Surveillance and Evaluation Data Resources for Comprehensive Tobacco Control Programs*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2001.
 6. U.S. Department of Health and Human Services. *Women and Smoking: A Report of the Surgeon General*. Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Office of the Surgeon General; 2001.
 7. U.S. Department of Health and Human Services. *Tobacco Use Among U.S. Racial/Ethnic Minority Groups: A Report of the Surgeon General*. Atlanta, GA: 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; 1998.
 8. U.S. Department of Health and Human Services. *Preventing Tobacco Use Among Young People: A Report of the Surgeon General*. Atlanta, GA: 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; 1994.
 9. Giovino GA. Surveillance of patterns and consequences of tobacco use: USA. *Tobacco Control*. 2000;9:232-3.
 10. U.S. Department of Health and Human Services. *The Health Consequences of Smoking for Women: A Report of the Surgeon General*. Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Office of the Assistant Secretary for Health, Office on Smoking and Health; 1980.
 11. Stillman F, Harman A, Graubard B, et al. The American Stop Smoking Intervention Study: Conceptual framework and evaluation design. *Evaluation Review*. 1999;23:259-80.
 12. Trends in tobacco use. American Lung Association Web site. Available at: <http://www.lungusa.org/data/smoke/SMK1.pdf>. Accessed December 8, 2003.
 13. Centers for Disease Control and Prevention. *Investment in Tobacco Control: State Highlights—2001*. Atlanta, GA: 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; 2002.
 14. Centers for Disease Control and Prevention. *Tobacco Control State Highlights 2002: Impact and Opportunity*. Atlanta, GA: 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; 2002.
 15. National Women's Law Center, Oregon Health & Science University. *Women and Smoking: A National and State-by-State Report Card*. National Women's Law Center Web site. Available at: <http://www.nwlc.org/pdf/Women&SmokingReportCard2003.pdf>. Accessed December 8, 2003.
 16. Cancer Facts and Figures, 2003. American Cancer Society Web site. Available at: http://www.cancer.org/docroot/STT/stt_0.asp. Accessed December 8, 2003.
 17. Cancer Facts and Figures for African Americans, 2003. American Cancer Society Web site. Available at: http://www.cancer.org/docroot/STT/stt_0.asp. Accessed December 8, 2003.
 18. Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 2001. *Morbidity and Mortality Weekly Report*. 2003;52:953-6.
 19. Centers for Disease Control and Prevention. Surveillance for health behaviors of American Indians and Alaska Natives: Findings from the Behavioral Risk Factor Surveillance System, 1997-2000. *Morbidity and Mortality Weekly Report Surveillance Summaries*. 2003;52:1-13.
 20. The STATE system: State Tobacco Activities Tracking and Evaluation. Centers for Disease Control and Prevention Web site. Available at: <http://www2.cdc.gov/nccdphp/osh/state/>. Accessed December 8, 2003.

21. Centers for Disease Control and Prevention. Usual sources of cigarettes for middle and high school students—Texas, 1998–1999. *Morbidity and Mortality Weekly Report*. 2002; 51:900-1.
22. Centers for Disease Control and Prevention. Tobacco use among middle and high school students—New Hampshire, 1995–2001. *Morbidity and Mortality Weekly Report*. 2003;52:7-9.
23. Preliminary Report: 2002 South Dakota Adult Tobacco Survey. South Dakota Department of Health Web site. Available at: <http://www.state.sd.us/doh/Tobacco/2002ATS.pdf>. Accessed December 8, 2003.
24. Results from the 2002 Indiana Adult Tobacco Survey. Indiana Tobacco Prevention and Cessation Web site. Available at: http://www.in.gov/itpc/files/research_78.pdf. Accessed December 8, 2003.
25. Centers for Disease Control and Prevention. Prevalence of current cigarette smoking among adults and changes in prevalence of current and some day smoking—United States, 1996–2001. *Morbidity and Mortality Weekly Report*. 2003;52:303-4,306-7.
26. Griffith R, Pederson LL, Trosclair A. It's my party: Young adults flirt with tobacco addiction. Paper presented at: National Conference on Tobacco or Health; November 2002; San Francisco.
27. Federal Trade Commission Cigarette Report. Federal Trade Commission Web site. Available at: <http://www.ftc.gov/os/2003/06/2001cigreport.pdf>. Accessed December 8, 2003.
28. Nixon ML, Glantz SA. Tobacco Industry Political Activity and Tobacco Control Policy Making in Washington: 1996-2000. Center for Tobacco Research and Education Web site. Available at: <http://repositories.cdlib.org/ctcre/tcpmus/WA1996>. Accessed December 8, 2003.
29. Nixon ML, Glantz SA. Tobacco Industry Activity and Tobacco Control Policy Making in Texas: 1980-2002. Center for Tobacco Research and Education Web site. Available at: <http://repositories.cdlib.org/ctcre/tcpmus/TX2002/>. Accessed December 8, 2003.
30. Neuman M, Bitton N, Glantz S. Tobacco industry strategies for influencing European Community tobacco advertising legislation. *Lancet*. 2002;359:1323-30.
31. World Health Organization. *Guidelines for Controlling and Monitoring the Tobacco Epidemic*. Geneva: World Health Organization; 1998.
32. National Tobacco Information Online System. Centers for Disease Control and Prevention Web site. Available at: <http://apps.nccd.cdc.gov/nations/>. Accessed December 8, 2003.
33. Global Youth Tobacco Survey. Centers for Disease Control and Prevention Web site. Available at: <http://www.cdc.gov/tobacco/global/GYTS.htm>. Accessed December 8, 2003.
34. Global Youth Tobacco Survey Collaborative Group. Tobacco use among youth: A cross country comparison. *Tobacco Control*. 2002;11:252-70.
35. Global Youth Tobacco Survey Collaborative Group. Differences in worldwide tobacco use by gender: Findings from the Global Youth Tobacco Survey. *Journal of School Health*. 2003;73:207-15.

Interventions for Prevention and Treatment Breakout Session

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Overview

Although many in the tobacco control community assume that the most effective interventions are those that are personalized in some manner (targeted or tailored), it is not yet known whether women and men respond differently to prevention and treatment interventions or would benefit from different intervention strategies. Some clinical studies have found gender differences in treatment outcomes, suggesting that women have greater difficulty in quitting smoking than men. However, other clinical and population-level studies have not supported these findings. The majority of studies have not been designed to adequately address the issue of sex or gender differences in the methods used or preferred by men and women or in the outcomes they achieve. The nature of the differences, whether they are determined or mediated by genetic or biological factors, cultural or learning influences, or access to care and support during cessation, is not understood. Although researchers have not yet collected the data needed to resolve this issue, a combination of meta-analysis with new research could address the question.

Smoking is clearly a women's health issue in that it has a unique impact on women. Prevention and intervention efforts aimed at the requirements of women are needed.

Partnering in the area of prevention and treatment should focus on finding available funds and increasing awareness among various organizations that tobacco control is part of their charge. Using models of well-organized health activist groups, such as those focused on breast cancer and HIV/AIDS, might yield strategies to funnel funds toward tobacco control research. While most grassroots organizations focused on eliminating specific diseases have attracted large

numbers of those affected by these diseases, this has not occurred among smokers. Establishing such a “community” among smokers might be difficult because of the blame and stigma associated with smokers who develop cancer and other comorbidities, as well as their socioeconomic characteristics. Indeed, the tobacco industry has used this very strategy to promote “smokers’ rights” organizations. Working with family members of those suffering or dying from tobacco-caused diseases might be more a promising approach.

Recommendations

Research

*1. Continue to evaluate whether gender differences exist in prevention and treatment efficacy.

The 1980 Surgeon General's Report suggested that women have more difficulty than men in quitting smoking (1). While some studies have supported this finding (e.g., 2-5), others have not (e.g., 6-8). Methodological limitations—including *post hoc* analysis, lack of statistical power to identify sex differences, and reliance on convenience samples that may not be representative of the general population—have complicated these analyses. Therefore, studies specifically designed with adequate statistical power to test for sex differences must be conducted to address this issue.

- Explore the mediating or moderating factors that may produce sex differences. Even more important than establishing sex differences in outcomes is understanding why they occur; this involves examining which physiological, psychological, and behavioral factors

* Recommendations with an asterisk are those identified by the breakout groups as their top three recommendations.

mediate or moderate sex differences. A number of factors may underlie sex differences, including demographics, addiction (nicotine dependence and withdrawal), mood (depression), cognitive factors (expectations, weight concerns), social factors (coping styles, social support), and pharmacological factors (differential responses to agents such as nicotine replacement therapy and bupropion). These issues have not been systematically addressed. Although most studies examining gender differences have used *post hoc* analysis, studies need to be designed with adequate power, and they must stratify for sex to properly examine these differences.

Women may also respond differentially to treatment. For instance, Ossip-Klein et al. (9) found differences between older men and women in response to telephone quit-line use and support, with women showing greater benefit. Lerman and colleagues (10) examined the interaction among sex, genotype, and treatment and found that bupropion attenuated the effect of genotype among female smokers. Women also may have health benefits that differ from men's. In the Lung Health Study, Connett and colleagues (11) found that among persons at risk for chronic obstructive pulmonary disease, women who quit smoking showed greater improvement than men in lung function.

- *Explore factors unique to women that may influence prevention and treatment.* In addition to identifying any sex differences in factors that influence both sexes, a number of factors unique to women may influence smoking behavior and treatment efficacy. These factors, such as menstrual cycle, pregnancy, and menopause, may influence women's motivation and ability to quit smoking. While some factors, such as pregnancy, have been recognized as windows of opportunity for increasing quit rates, others—such as the impact of menopause or the role of hormone replacement therapy (HRT)—have not been well explored. Such factors may play a direct role, or they may influence other factors that act as mediators. For example, one study found that women taking HRT experienced an increase in depressive symptoms in the second week of smoking cessation (12). Another study found that women quitting during the luteal phase reported greater depressive symptoms and increases in withdrawal than women quitting during the follicular phase of their cycle (13).

By targeting these events, we can capitalize on a window of opportunity. However, a better understanding of how

interventions can be targeted to these events and whether current interventions can be used or would be more efficacious if tailored requires additional research.

Disparities

Research on sex differences is anticipated to have a significant impact. Differences exist in sex role socialization, norms, and cultural influences for women and girls in different income and racial or ethnic groups. These differences need to be taken into account in developing motivation and treatment strategies. In addition, literacy levels need to be taken into account. While most research examining gender differences has been conducted through clinic-based intervention trials, future research should include all modes of intervention and prevention work, including community-based interventions, self-help-focused interventions, and clinical trials. By conducting research on sex differences across all types of interventions and all settings, we can help ensure that results are generalizable to all women.

Partners

All research funding organizations and agencies willing to support primary and secondary analyses can serve as partners in this research endeavor. Collaborations with appropriate research networks and other investigators conducting sex research are suggested.

Impact

Identifying whether gender differences exist and understanding the factors that contribute to how gender affects smoking initiation, maintenance, and cessation will permit better targeting and tailoring of prevention and intervention efforts. Current interventions targeted to women would benefit from a more comprehensive understanding of differences in the trajectories of tobacco initiation and cessation and the mechanisms of addiction and effective treatment.

***2. Understand if—and how—gender, context, and culture affect prevention and treatment.**

Little attention has been paid to the role of gender, context, and culture in prevention and treatment. Many ethnic differences in tobacco use have been established, and race, ethnicity, and culture may all play a role in initiation, maintenance, and cessation of tobacco use. For example, in the United States, blacks start smoking at a later age, smoke fewer cigarettes per day, and are more likely to smoke menthol cigarettes than whites, and Hispanic women smoke at significantly lower rates than Hispanic men. Evidence is accumulating that suggests that biological and cultural factors

combine to create these differences. Understanding how these cultural differences affect smoking behavior and addiction will help us reduce disparities and understand social and contextual factors that could be used to aid in prevention and treatment for all women.

To do this, we must first address these questions:

- *Do specific protective factors emerge from the interaction of race, ethnicity, culture, and gender?* Social and cultural norms may play a significant role in smoking initiation. For example, parental pressure may contribute to the delay in smoking initiation among black teens (14, 15). Cultural factors may also explain the gender difference in smoking rates in the Hispanic community. A better understanding of these factors would inform prevention and intervention efforts.

Is social pressure the key factor in creating these differences, or do biological differences interact with social factors? As cultures become more “westernized” and accepting of smoking among women (e.g., in China and India), will we see increasing smoking rates among women worldwide? We need to learn how to capitalize on protective factors while fostering independence, education, and professional development. For example, in developing nations with traditionally low tobacco use prevalence among women (e.g., China, Korea, Malaysia), smoking is not considered “feminine” or part of women’s approved social behavior. What is greatly needed in such cultures is a way to reframe refraining from smoking as liberated, socially responsible, and protective of the health of women and their families. If this is accomplished, as the status of women becomes more equal to that of men in terms of education, professional opportunity, and human rights, smoking will not be seen as synonymous with freedom and liberated social roles.

- *Are we excluding individuals from prevention or treatment because their patterns of use differ from those of the majority populations?* Are blacks, for example, being excluded or benefiting less than whites from prevention and treatment interventions aimed at young children? School-based and mass-media campaigns that target children and young teens and are aimed at prevention might exclude populations that initiate smoking at older ages. More research is needed to ensure that prevention campaigns reach all appropriate audiences.

Treatment efforts might also unintentionally exclude populations that differ in use patterns from the majority. For example, treatment studies typically involve nicotine

replacement products. These studies often require that participants smoke a minimum number of cigarettes per day (such as 10 or more). These studies may inadvertently exclude minority or low socioeconomic status (SES) populations (with limited financial resources) that typically smoke smaller numbers of cigarettes per day or use other forms of tobacco (such as chewing tobacco).

- *Do existing interventions address important cultural and racial differences?* Ethnicity may be correlated with specific concerns about quitting smoking. For example, although weight gain has been found to be a predictor of smoking initiation and a barrier to cessation (e.g., 16-18), this finding has not been replicated in several populations, including lower SES groups (19) and minority groups (20). Are some populations less concerned about gaining weight, or are they in fact gaining less weight following cessation? While concerns about weight gain appear to be less prominent among black female smokers, obesity is an important health concern that needs to be addressed in this population (21).
- *What is the impact of religious injunctions on smoking initiation among women?* Some religions specifically prohibit the use of tobacco—usually through an injunction against the use of substances that harm the body, but sometimes directly as well. For example, a *fatwa* (religious proclamation) against smoking has been issued by Islamic leaders. Although the Islamic ruling on tobacco smoking is not as well defined as the ruling on alcohol, general guidelines found in the Q’uran and in the words of Muhammed clearly indicate that smoking is forbidden (*haram*) or considered “strongly abominable.” However, in many Islamic countries, such as Malaysia and Indonesia, smoking remains high among men and very low among women largely because of social custom.

In the Church of Jesus Christ of Latter-Day Saints (Mormons), *The Word of Wisdom* (a guiding revelation of faith) proposes that believers abstain from tobacco and other harmful substances such as tea, coffee, and whiskey (strong drink or alcoholic beverages). This commandment is primarily spiritual, even though it is directed at promoting greater health. Interestingly, David O. MacKay, Past President of the Church of Jesus Christ of Latter-Day Saints, specifically commented in 1949 on the history of marketing cigarettes to women in the 1920s and 1930s: “I just ask you ... to recall the methods employed by certain tobacco interests to induce

young women to smoke cigarettes.” He mentioned the early campaign promoting smoking as a means of avoiding weight gain, as well as the gradual transition in advertisements from portraying men smoking and women accompanying them (but not smoking), to women smoking overtly. To this day, Utah has the lowest smoking prevalence rates in the nation: 14 percent of men and 11 percent of women (13 percent overall) (22).

Interventions delivered through African-American churches have also been reported (23, 24), but not in terms of differential success between men and women (although women go to church more often and are less likely to be smokers).

Disparities

This recommendation directly addresses the issue of population disparities. To reduce disparities, we must first understand their causes. Understanding the interactions among gender, race and ethnicity, and culture as they affect smoking initiation, maintenance, and cessation will aid prevention and treatment efforts.

Partners

Partners should include research-funding organizations and agencies willing to support primary and secondary analyses, appropriate research networks, investigators conducting sex research, community-based organizations, and government entities at all levels.

Impact

Within 5 years, prevention strategies and treatment efficacy will be enhanced in specific subgroups, reach will increase, and disparities will be reduced.

Translation

3. Understand critical intervention periods in the continuum from experimentation to addiction and cessation.

- *Experimentation to addiction.* Experimentation and initial exposure to smoking are occurring at increasingly younger ages. In 2002, 13 percent of middle school students and 28 percent of high school students reported current use of tobacco products (25). However, time of initiation differs by ethnicity, with black girls initiating smoking later than white girls. Watson and colleagues found that the mean age of smoking initiation was 20 for blacks and 16 for whites (26). About one-half to one-third of teens who experiment with smoking will become

regular smokers, and 75 percent of teen daily smokers will smoke as adults.

Moreover, the time from experimentation to addiction is very brief. Nicotine dependency does not necessarily take years to develop and is seen in adolescents (27). Ninety percent of adults who smoke began smoking before the age of 18 (28).

Some studies are finding that girls are smoking at higher rates than boys. For example, O’Loughlin et al. (29, study conducted in Montreal) found that 35 percent of females and 29 percent of males were ever smokers ($p = 0.03$) and, among the “ever smokers,” 69 percent of females and 46 percent of males had smoked in the past 3 months ($p < 0.000$). This gender difference may lead to a shift in smoking prevalence such that women may eventually smoke at higher rates than men.

Factors that contribute to experimentation and regular tobacco use are not well understood, but research examining these issues is increasing. Gender needs to be included as an important variable to consider. Gender issues and the interaction of gender, culture, and ethnicity must be taken into account when exploring the continuum from experimentation to addiction. For example, susceptibility to nicotine as well as social role models (movies, popular figures), peer influence, and weight and gender issues should all be examined.

- *Cessation.* Cessation interventions are needed for adolescent smokers, and research suggests that adolescents are interested in quitting. Over one-third of adolescent smokers in one study reported that they were considering quitting within the next 6 months, and 65 percent had made a quit attempt in the past year (30). However, as with prevention efforts, intervention efforts must take into account gender and cultural differences for this age group. Although the effectiveness of adult cessation programs is well recognized, and clinical guidelines have established a standard of care for this population, little is known regarding adolescent cessation; this gap needs to be filled to provide effective interventions (31). As we learn more about the unique needs of the adolescent population, we must study possible gender differences and interactions among gender, social, cultural, and biological factors.

4. Identify the interpersonal, familial, social and cultural contexts for tobacco use by women and priority populations of women.

Social contextual factors, such as spousal and household smoking, social networks, social ties, and discrimination, may all influence tobacco use by women. Interest in cessation and vulnerability to relapse may also be influenced by these factors. Over 90 percent of those who quit smoking do so with no formal assistance (32) and depend on their families and communities for help in achieving and maintaining cessation. Family, social, and cultural factors may be especially important for minority and underserved women who have limited access to care and may depend on existing social networks for support.

Some issues have been singled out for further study:

- *Role of spousal and household smoking.* Spousal and household smoking are important factors in cessation and relapse, and this is especially clear in pregnant women. Pregnancy significantly increases interest in cessation among women who are aware of health concerns related to the fetus. Others in the household, however, may not have the same increased motivation. Spousal support for quitting, in terms of both supportive behaviors and the spouse's own change in smoking behavior, has been identified as an influential type of support for pregnant women (33). Haug, Aaro, and Fugelli (34) found that when pregnant women were encouraged by their partners to stop smoking and perceived that their partners were willing to reduce their own cigarette use, their rate of smoking cessation, negative attitudes toward smoking, and determination to stop smoking were significantly higher. Because smoking relapse often occurs when other smokers are present (35), spouses and partners who continue to smoke may increase the risk of relapse. In pregnant women, socializing or living with a smoker was found to be a significant predictor of smoking relapse (36-38).
- *Role of maternal smoking.* Women influence the smoking behavior of other family members, especially their children. The impact of mothers on smoking initiation appears to be stronger than the impact of fathers (39). Interestingly, maternal smoking has been found to affect the likelihood that their daughters will smoke to a greater extent than that their sons will do so (40).
- *Role of social support and social networks.* Social support for quitting smoking appears to play an important role in cessation and the maintenance of abstinence. The

ratio of positive to negative support may be the most important factor in predicting abstinence (41, 42). Ginsberg, Hall, and Rosinski's (43) Partner Support Smoking Treatment Program showed that failure to quit smoking was predicted by smokers' negative behavior (prosmoking statements, interruptions of the partner, and criticism or rejection of help), and successful cessation was predicted by partners' reinforcement.

Social support may be more important for women than men because rates of depression and negative affect are higher in women. Zelman et al. (44) found supportive counseling to be more effective than coping skills training for smokers with negative affectivity above the median.

Application

*5. Increase access to, demand for, and appeal and use of effective tobacco dependence treatments, especially among women in underserved and priority populations.

Compelling evidence indicates that applying evidence-based treatments to tobacco use and dependence (both counseling and pharmacotherapy) substantially increases success rates among smokers trying to quit. Quit rates for smokers using proven treatments—those recommended in the U.S. Public Health Service clinical practice guidelines (45)—are two to three times higher than those achieved by smokers quitting on their own without formal treatments (46). This has been demonstrated not only for overall populations of men and women smokers, but for pregnant women specifically (47). Similarly, studies of unaided quit attempts suggest that women are more likely to relapse when they quit without assistance (48).

Unfortunately, recent studies indicate that less than 25 percent of quitters currently make use of proven treatments or treatment aids (49) and that while most primary care providers now advise their patients to quit, less than half of providers who do so go on to offer needed treatment (50).

Women with little education are far more likely to smoke than those with more education (51). Access to and use of effective interventions are lowest among men and women with the least education and lowest incomes in the United States, including those in low-income and racial or ethnic minority populations (46). The Surgeon General's recent report on tobacco use among U.S. racial and ethnic minorities concluded that minority smokers were less likely to participate in smoking cessation groups and receive cessation

advice from health care providers due to such barriers as cost, lack of health insurance coverage for proven treatment services, and reduced access to health care services generally, as well as barriers related to transportation (52).

Tobacco control policies and counter-advertising campaigns can substantially increase quitting motivation and quitters' demand for and use of proven treatments. The CDC's *Guide to Community Preventive Services* (53) showed that smoking bans and restrictions, increases in the cost of tobacco products, reduction in smokers' out-of-pocket costs for cessation services, and pro-cessation counter-advertising campaigns significantly increase population quit rates and the use of available quitting services—especially telephone quit lines to which access barriers are minimal. The Surgeon General's report *Women and Smoking* notes that women are more likely than men to state that their smoking patterns are influenced by worksite smoking policies (54). A recent study found that increased cigarette excise taxes had a disproportionate influence on quitting patterns among pregnant smokers (55). The use of targeted messages and media to reach smokers in cessation campaigns aimed at underserved populations, such as African-American smokers, have been found effective for both men and women (56). To generate higher rates of demand and use, the Subcommittee on Cessation of the Interagency Committee on Smoking and Health recently recommended significant tax increases coupled with the creation of a nationwide tobacco cessation quit line; a multifaceted, paid national media campaign to promote quitting; public and private insurance coverage for tobacco-dependence treatment; and increases in the Federal excise tax on cigarettes by \$2.00 per pack as part of an unprecedented national initiative to help smokers quit. The Subcommittee projected that 5 million smokers would quit in the first year alone as a result of its recommendations, which would prevent 3 million premature deaths (46).

Goal areas include:

- *Demand.* The developers of cessation campaigns and messages designed to boost treatment demand and use among women smokers should seek to increase awareness of the need for and benefits of treatment, highlighting the unique health, mood, and cosmetic benefits accrued by women who quit. For example, women fear breast cancer more than lung cancer (57), yet more women die annually from lung cancer. Similarly, most women underestimate their risk for smoking-related cardiovascular disease (57). The role of smoking in health concerns that are unique to women

(such as cervical cancer, reconstructive procedures for breast cancer, oral contraception, hormone replacement therapy, menstrual cycle, infertility issues) are also not widely known or understood. Thus, smoking risks and quitting benefits related to reproductive health (e.g., fertility, pregnancy, fetal and child health outcomes) and children's exposure to environmental tobacco smoke should be highlighted. Cessation messages and campaigns aimed at woman smokers should also address common misconceptions about the effects of quitting on long-term health.

- *Access.* Increasing demand for treatment must be followed by increasing access to care. It is critical to broaden the help offered to women through the health care system by ensuring that every woman receives evidence-based smoking assessment and cessation counseling during routine health care with primary care, obstetrics and gynecology, pregnancy and prenatal care, and pediatric care providers (e.g., the action plan developed by the National Partnership to Help Pregnant Smokers Quit) (58). Cost barriers must be removed, and newer treatments that use such technology as targeted mailings, the Internet, and telephone quit lines may expand access for many. However, interventions that depend on access to Web-based resources, and even telephones, may not reach the most underserved low-income and priority populations.

Disparities

This recommendation directly addresses the issue of health disparities and will have a significant impact by increasing the number of women with access to treatment.

Partners

Partners include traditional and alternative health care systems and providers, community-based organizations, health services payers, media and marketing companies, pharmaceutical companies, patient advocacy groups, faith-based groups, and schools.

Impact

In 5 years, smoking prevalence will change; quit attempts will increase; demand for treatment will increase; awareness of the consequences of smoking will grow; and norms governing smoking will change markedly.

References

1. U.S. Department of Health and Human Services. *The Health Consequences of Smoking for Women: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, Office of the Assistant Secretary for Health, Office on Smoking and Health; 1980.
2. Bjornson W, Rand C, Connett JE, et al. Gender differences in smoking cessation after 3 years in the Lung Health Study. *American Journal of Public Health*. 1995;85:223-30.
3. Fiore MC, Novotny TE, Pierce JP, et al. Methods used to quit smoking in the United States: Do cessation programs help? *Journal of the American Medical Association*. 1990;263:2760-5.
4. Wetter D, Smith SS, Kenford SL, et al. Smoking outcome expectancies: Factor structure, predictive validity, and discriminant validity. *Journal of Abnormal Psychology*. 1994;103:801-11.
5. Wetter DW, Kenford SL, Smith S, Fiore MC, Jorenby DE, Baker TB. Gender differences in smoking cessation. *Journal of Consulting and Clinical Psychology*. 1999;67:555-62.
6. Hughes JR, Gust SW, Keenan RM, Fenwick JW, Healey ML. Nicotine vs. placebo gum in general medical practice. *Journal of the American Medical Association*. 1989;261:1300-5.
7. Killen JD, Fortmann SP, Varady A, Kraemer HC. Do men outperform women in smoking cessation trials? Maybe, but not by much. *Experimental & Clinical Psychopharmacology*. 2002;10:295-301.
8. Sachs DP, Sawe U, Leischow SJ. Effectiveness of a 16-hour transdermal nicotine patch in a medical practice setting, without intensive group counseling. *Archives of Internal Medicine*. 1993;153:1881-90.
9. Ossip-Klein DJ, Carosella AM, Kruch DA. Self-help interventions for older smokers. *Tobacco Control*. 1997;6:188-93.
10. Lerman C, Shields PG, Wiley P, et al. Pharmacogenetic investigation of smoking cessation treatment. *Pharmacogenetics*. 2002;12:627-34.
11. Connett JE, Murray RP, Buist AS, et al. Changes in smoking status affect women more than men: Results of the Lung Health Study. *American Journal of Epidemiology*. 2003;157:973-9.
12. Allen SS, Hatsukami DK, Christianson D. Nicotine withdrawal and depressive symptomatology during short-term smoking abstinence: A comparison of postmenopausal women using and not using hormone replacement therapy. *Nicotine & Tobacco Research*. 2003;5:49-59.
13. Perkins KA, Levine M, Marcus M, et al. Tobacco withdrawal in women and menstrual cycle phase. *Journal of Consulting and Clinical Psychology*. 2000;68:176-80.
14. Taylor WC, Ayars CL, Gladney AP, et al. Beliefs about smoking among adolescents—gender and ethnic differences. *Journal of Child and Adolescent Substance Abuse*. 1999;8:37-54.
15. Mermelstein R. Explanations of ethnic and gender differences in youth smoking: A multi-site, qualitative investigation. *Nicotine & Tobacco Research*. 1999;1:S91-8.
16. Klesges RC, Meyers AW, Klesges LM, LaVasque ME. Smoking, body weight, and their effects on smoking behavior: A comprehensive review of the literature. *Psychological Bulletin*. 1989;106:204-30.
17. Gritz ER, Klesges RC, Meyers AW. The smoking and body weight relationship: Implications for intervention and post-cessation weight control. *Annals of Behavioral Medicine*. 1989;11:144-53.
18. Weekley CK, Klesges RC, Reylea G. Smoking as a weight-control strategy and its relationship to smoking status. *Addictive Behavior*. 1992;17:259-71.
19. Glasgow RE, Strycker LA, Eakin EG, Boles SM, Whitlock EP. Concern about weight gain associated with quitting smoking: Prevalence and association with outcome in a sample of young female smokers. *Journal of Consulting and Clinical Psychology*. 1999;67:1009-11.
20. Gritz ER, Brooks L, Nielsen I. Gender differences in smoking cessation: Where? When? Who? Why? In: *Proceedings of the 9th World Conference on Smoking and Health*; October 10-14, 1994. Paris, France. New York and London: Plenum Press; 1995:411-7.
21. Pollack KI, Namenek Brouwer RJ, Lyna P, Taiwo B, McBride CM. Weight and smoking cessation among low-income African Americans. *American Journal of Preventive Medicine*. 2003;25:136-9.

22. Centers for Disease Control and Prevention. State-specific prevalence of current cigarette smoking among adults—United States, 2002. *Morbidity and Mortality Weekly Report*. 2004;52:1277-80.
23. Schorling JB, Roach J, Siegel M, Guterbock TM, Stewart HL. A trial of church-based smoking cessation interventions for rural African Americans. *Preventive Medicine*. 1997;26:92-101.
24. Voorhees CC, Stillman FA, Swank RT, et al. Heart, body, and soul: Impact of church-based smoking cessation interventions on readiness to quit. *Preventive Medicine*. 1996;25:277-85.
25. Centers for Disease Control and Prevention. Tobacco use among middle and high school students—United States, 2002. *Morbidity and Mortality Weekly Report*. 2003;52:7-9.
26. Watson JM, Scarinci IC, Klesges RC, et al. Relationship among smoking status, ethnicity, socioeconomic indicators, and lifestyle variables in a biracial sample of women. *Preventive Medicine*. 2003;37:138-47.
27. DiFranza JR, Rigotti NA, McNeill AD, Ockene JK, et al. Initial symptoms of nicotine dependence in adolescents. *Tobacco Control*. 2000;9:313-9.
28. Gilpin E, Lee L, Evans N, Pierce J. Smoking initiation rates in adults and minors: US 1944-1988. *American Journal of Epidemiology*. 1994;140:535-43.
29. O'Loughlin J, DiFranza J, Tyndale RF, et al. Nicotine-dependency symptoms are associated with smoking frequency in adolescents. *American Journal of Preventive Medicine*. 2003;25:210-25.
30. Gritz ER, Prokhorov AV, Hudmon KS, et al. Cigarette smoking in a multiethnic population of youth: Methods and baseline findings. *Preventive Medicine*. 1998;27:365-84.
31. Curry S. Youth tobacco cessation: Filling the gap between what we do and what we know. *American Journal of Health Behavior*. 2003;27:S99-102.
32. Fiore MC, Kenford SL, Jorenby DE, Wetter D, Smith SS, Baker TB. Two studies of the clinical effectiveness of the nicotine patch with different counseling treatments. *Chest*. 1994;105:524-33.
33. Havassy BE, Hall SM, Wasserman DA. Social support and relapse: Commonalities among alcoholics, opiate users, and cigarette smokers. *Addictive Behaviors*. 1991;16:235-46.
34. Haug K, Aaro LE, Fugelli P. Smoking habits in early pregnancy and attitudes towards smoking cessation among pregnant women and their partners. *Family Practice*. 1992;9:494-9.
35. Shiffman S. A cluster-analytic classification of smoking relapse episodes. *Addictive Behaviors*. 1986;11:295-307.
36. McBride CM, Pirie PL. Postpartum smoking relapse. *Addictive Behavior*. 1990;15:165-8.
37. McBride CM, Pirie PL, Curry SJ. Postpartum relapse to smoking: A prospective study. *Health Education Research*. 1992;7:381-90.
38. Severson HH, Andrews JA, Lichtenstein E, Wall M, Zoref L. Predictors of smoking during and after pregnancy: A survey of mothers of newborns. *Preventive Medicine*. 1995;24:23-8.
39. Rohde P, Lewinsohn PM, Brown RA, Gau JM, Kahler CW. Psychiatric disorders, familial factors and cigarette smoking: Associations with smoking initiation. *Nicotine & Tobacco Research*. 2003;5:85-98.
40. Lloyd-Richardson EE, Papandonatos G, Kazura A, Stanton C, Niaura R. Differentiating stages of smoking intensity among adolescents: Stage-specific psychological and social influences. *Journal of Consulting and Clinical Psychology*. 2002;70:998-1009.
41. Cohen S, Lichtenstein E. Partner behaviors that support quitting smoking. *Journal of Consulting and Clinical Psychology*. 1990;58:304-9.
42. Mermelstein R, Lichtenstein E, McIntyre K. Partner support and relapse in smoking cessation programs. *Journal of Consulting and Clinical Psychology*. 1983;51:465-6.
43. Ginsberg D, Hall SM, Rosinski M. Partner interaction and smoking cessation: A pilot study. *Addictive Behaviors*. 1995;16:195-202.
44. Zelman DC, Brandon TH, Jorenby DE, Baker TB. Measures of affect and nicotine dependence predict differential response to smoking cessation. *Journal of Consulting and Clinical Psychology*. 1992;60:943-52.
45. Fiore MC. Treating tobacco use and dependence: An introduction to the U.S. Public Health Service Clinical Practice Guideline. *Respiratory Care*. 2000;45:1196-9.

46. Fiore MC, Croyle RT, Curry SJ, et al. Preventing 3 million premature deaths and helping 5 million smokers quit: A national action plan for tobacco cessation. *American Journal of Public Health*. 2004;94:205-10.
47. Orleans CT, Barker DC, Kaufman NJ, Marx JF. Helping pregnant smokers quit: Meeting the challenge in the next decade. *Tobacco Control*. 2000;9 Suppl 3:III6-11.
48. Ward KD, Klesges RC, Zbikowski SM, Bliss RE, Garvey AJ. Gender differences in the outcome of an unaided smoking cessation attempt. *Addictive Behaviors*. 1997;22:521-33.
49. Gilpin EA, Emery SL, Farkas AJ, et al. *The California Tobacco Control Program: A decade of progress, 1989-1999*. La Jolla, CA: University of California at San Diego; 2001.
50. Orleans CT, Alper J. Closing the gap between what we know and what we do about treating tobacco dependence. In: S. Isaacs and J. Knickman, eds. *To Improve Health and Health Care, Volume VI: The Robert Wood Johnson Foundation Anthology*. San Francisco, CA: Jossey Bass; 2002: 125-49.
51. Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 2001. *Morbidity and Mortality Weekly Report*. 2003;52:953-6.
52. U.S. Department of Health and Human Services. *Tobacco Use Among U.S. Racial/Ethnic Minority Groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A Report of the Surgeon General*. Atlanta, GA: 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; 1998.
53. Centers for Disease Control and Prevention. The guide to community preventive services: Tobacco use and prevention reviews, recommendations and expert commentary. *American Journal of Preventive Medicine*. 2001;20(2 Suppl);16-66.
54. U.S. Department of Health and Human Services. *Women and Smoking: A Report of the Surgeon General*. Rockville: MD: U.S. Department of Health and Human Services, Public Health Service, Office of the Surgeon General; 2001.
55. Ringel JS, Evans WN. Cigarette taxes and smoking during pregnancy. *American Journal of Public Health*. 2001;91:1851-6.
56. Boyd NR, Sutton C, Orleans CT, et al. Quit Today! A targeted communications campaign to increase use of the Cancer Information Service as a quit smoking resource among African American smokers. *Preventive Medicine*. 1998;27:S50-60.
57. Gritz ER, Heaton CG, Haviland M, Allen JA. Conspiracy of silence: The impact on adult knowledge of cancer risks from smoking. Paper presented at: Annual Meeting of the Society for Research on Nicotine and Tobacco; February 19, 2004; Scottsdale, AZ.
58. Robert Wood Johnson Foundation. *The National Partnership to Help Pregnant Smokers Quit: Action Plan*. Princeton, NJ: Robert Wood Johnson Foundation; 2002.

Awareness, Risk Perception, and Communications Breakout Session

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Overview

Women often act as influencers and gatekeepers in family health (1-3) and thus are an important target audience for smoking cessation messages. Informational and persuasive messages must be crafted in such a way that women will carry these messages through their webs of exposure, affiliation, and influence. However, messages must resonate with women before they will disseminate them, so the messages must reflect the cultural or social groups to which women belong, including groups based on ethnicity, race, sexual orientation, religion, and worldviews and values. Furthermore, effective messages must take into account women's current understanding of the health risks associated with smoking and the perceived barriers that counter cessation efforts (4).

Evidence-based research is the key to developing best practices that effect behavioral changes in women's tobacco use reduction and prevention (5, 6). Given that the science is rapidly evolving, these best practices must be disseminated promptly to practitioners and consumers who can provide feedback to ensure that researchers generate information that is useful and applicable. A potentially effective means of information dissemination is to target existing groups that already support women and women's causes. Such groups will need to understand how to process and filter new findings and media portrayals of emerging scientific information in order to use this information effectively. Researchers and public health professionals have a responsibility to translate basic research into effective smoking cessation and prevention messages that can be disseminated by women's groups and the media for broad public impact.

Recommendations

Research

*1. Understand knowledge and risk perceptions.

Basic and applied research are needed on women's current level of knowledge about the risks of smoking and their assessment of personal risk. To be effective, risk communication needs to be based on an understanding of: (a) accuracies and inaccuracies in women's knowledge about tobacco use, prevention, and cessation; and (b) the interplay of affective (experiential) and analytic approaches to assessing risk and deciding what course of action to take. This research should identify mechanisms to which women will respond and focus on different ethnic, socioeconomic, and health status groups across the lifespan.

Examples of specific topics include:

- *Knowledge of addiction.* Little is known about women's perceptions of the addictiveness of cigarette smoking and their understanding of the process by which they become addicted. Research does show, however, that girls may lack a basic understanding of the power of nicotine. In a 2001 study, investigators found that 24 percent of girls ages 12 to 18 believed, "Even if I smoke cigarettes regularly, I could stop anytime I want" (7). This misperception was even more common (41 percent) among girls who were already tobacco users. Further research is needed to explore how beliefs about the addictiveness of tobacco are formed and how prevention messages can counteract inaccurate impressions of individual control.

* Recommendations with an asterisk are those identified by the breakout groups as their top three recommendations.

- *Knowledge of health consequences and risk perception.* Some smokers may not be aware of the connection between their behavior and their health. For example, investigators on one study found that current smokers were less likely than those who had never smoked to agree that health risk behaviors associated with smoking may increase risk for breast cancer (8). Are some specific groups of women simply unaware of the risks associated with smoking? How do we reach these women who have not been hearing the message? Even if women are aware of the health risks associated with smoking, they often have a perception of personal safety or “self-exemption” from the consequences. Smokers exhibit more perceived self-exemption than nonsmokers from both smoking and nonsmoking health risks (9). Further research is needed to explore how, other than through actual experience, women can be encouraged to view the dangers of smoking as personally relevant.

Disparities

Research on risk perception can address disparities by including groups of women who have not typically responded to tobacco control messages in the conduct of the research. Application of the research results could make these groups more likely to attend to and make use of information to induce needed change.

Partners

Government needs to play a critical role in providing funding for basic research and earmarking funding for the evaluation of communication efforts. Scientists and health researchers should develop proposals for government research spending and establish partnerships with community-based organizations that have the ability to implement education efforts at a grassroots level. These community-based organizations must have an active role in designing and implementing evaluation research to ensure the appropriateness of the programs and create a sense of ownership that will lead to continued efforts beyond government funding periods. Nontraditional partners (e.g., business, industry, the entertainment field, women’s groups, ethnic organizations, etc.) can support community-based efforts by providing leadership, resources, and additional funding.

Impact

Basic and applied risk-perception research will allow antitobacco groups to effectively target young girls prior to smoking initiation as well as current smokers who have thus far been unable or unwilling to define themselves as being at

risk for chronic health conditions. Continual monitoring of the impact of education efforts will inform researchers as to which messages are most effective and help them maximize the potency of messages to enhance prevention and cessation efforts.

***2. Develop and disseminate targeted messages.**

The social marketing agenda must be advanced using qualitative and quantitative methods and focusing on the psychological, sociocultural, and economic segmentation of women. On its own, recognition of the personal health risks of smoking does not often lead to cessation (10). Awareness of smoking risks needs to be combined with decreased benefits from and increased barriers to smoking and social and environmental support for not smoking. The key is to identify sets of attitudes and values in women who can be targeted for cessation, prevention, and advocacy messages for environmental change. Further research can explore how women experience smoking as an affordable pleasure and how tobacco products fit into women’s views of affordable routine pleasure.

Some prime areas for research include:

- *Identifying target groups.* Using lifestyle risk factors, sociodemographics, and health perceptions to group people has been considered a useful way to create target audiences for health messages (11, 12). Some researchers also suggest that understanding the diversity of smokers’ representations and explanations of their own smoking may play a useful role in developing effective messages (13). For particular groups of women, additional factors may play a role. For example, in a study of pregnant women, depression was found to be a significant predictor of smoking during pregnancy, even after controlling for other factors such as the desirability of the pregnancy and the presence of other smokers in the household (14). Thus, comprehensive models of smoking addiction are clearly needed that take into account various influences in women’s lives.
- *Understanding target groups.* Although some formative focus group research has helped elucidate the benefits of and barriers to smoking cessation for particular groups of women (15), few large-scale studies of the “hot buttons” that motivate women to take action against tobacco have been conducted. Reviews of tobacco company literature suggest that “systematic and extensive research is carried out by tobacco companies to ensure that cigarette packaging appeals to selected target groups, including young adults and women” (16). Antitobacco campaigns

need to be based on at least a similar level of systematic and extensive research. This research should provide a clear picture of the attitudes, values, and needs of target groups, including those at risk for smoking, current smokers, and women's health advocates.

- *Message and intervention evaluation.* Although message concepts are routinely tested among target audiences, large-scale message and intervention results are not as commonly catalogued and monitored. For researchers to hone new research quickly and effectively, a comprehensive feedback system is needed.

Disparities

Specific populations need to be primary target groups. By conducting research in different sociodemographic and cultural groups, disparities in tobacco use and cessation can be addressed through tailored messages to priority populations.

Partners

Academic institutions (including schools of public health, psychology, communication, and anthropology) should be tasked with performing and sharing research. Marketing firms can assist academic institutions by providing target-audience information from national communication databases. Marketing firms must also play a strategic role in developing and implementing social marketing plans to effect social change. Key partners include existing women's groups that are (or are not) already active in tobacco control. Women's groups should be active in both the planning and implementation of social marketing efforts.

Impact

Within 2 years, this work should make it possible to identify priorities, focus resources, and develop specific prevention and cessation strategies, including effective messages and channels for communication. Surveillance over 5 years will monitor and evaluate the effectiveness of these interventions among various segments of the population. If the work is done well, new messages could be delivered that counter the effects of tobacco industry messages (e.g., for women of low socioeconomic status, the goal would be to counter the notion of attractiveness or pleasurable aspects/ideology that surrounds tobacco use).

3. Understand positive positioning of tobacco.

Tobacco marketers have successfully positioned tobacco use as an affordable pleasure for women, and many women smokers report that tobacco use is a positive and meaningful part of their lives (13). Further research is needed to explore

this positive association, including how women experience smoking as an affordable pleasure and how tobacco products fit into women's views of affordable routine pleasures. This research can assist in understanding the benefits women associate with smoking, provide ways to counter those benefits, and identify complementary benefits associated with quitting smoking.

Disparities

Examining the positive perceptions of tobacco use among women in different socioeconomic and cultural groups will facilitate the development of tailored messages addressing each of these perceptions.

Partners

Marketing firms, women's groups, and businesses that market "safe pleasures" to women could partner with academic institutions. Marketing firms could assist by providing target-audience information from national communication databases, and businesses might provide additional insights into women's needs and desires. They might also participate by developing alternative low-cost pleasures for women who are trying to quit smoking. Women's groups could work with these organizations to design and implement pilot programs to counter the "affordable pleasure" aspect of tobacco marketing to women.

Impact

New messages could be delivered to counter the effects of tobacco industry messages that promote the attractive and pleasurable aspects of tobacco.

Translation

4. **Use available evidence and gather additional evidence about health- and non-health-related messages that would interest women and engage them in tobacco cessation and antitobacco advocacy.**

It is generally agreed that women do not understand the full impact of smoking on their health (17, 18). However, effective ways to communicate this message may vary depending on a woman's age, smoking status, and economic status and whether or not she is pregnant. Meta-analyses of female-specific interventions reveal how these factors are significantly related to how women approach cessation (19-21).

Available evidence to date and additional ongoing research (outlined above) will serve to segment priority audiences and provide insights into appropriate channels and tactics to reach

them. However, to ensure that progress is made in reducing tobacco initiation among women and increasing successful cessation efforts among women who smoke, translation and outreach efforts must be appropriately tracked and evaluated so that best practices can be identified and replicated.

Target audiences include:

- *Pregnant smokers.* One high-priority audience is pregnant smokers. The current best-practice intervention is in-office counseling by trained providers, which has been shown to double, and in some cases triple, successful quit attempts by pregnant women (22). Efforts should be made to increase use of this intervention among providers, increase knowledge among women that assistance is available, and support public policy efforts to ensure that health insurers pay for such counseling. In addition, tobacco use among high-priority populations, such as American Indians, must be evaluated. However, because of the complex physiological and psychological issues related to tobacco addiction during pregnancy (23), additional research on alternative approaches must be conducted. Such research should include the investigation of pharmacotherapy for pregnant smokers.
- *Young women.* Because the average age at tobacco use initiation among women has been declining (24), outreach to young women is another priority activity. Efforts should be made to increase knowledge of young women's receptiveness to tobacco industry messages, create effective counter-marketing messages, and develop channels and tactics through which such messages can be disseminated. Increased understanding of the role tobacco plays in young women's perceptions of themselves and in defining certain key attributes they crave (e.g., sexiness, adulthood) should also be examined, and mechanisms to define such attributes for young women in alternative ways should be developed.

Disparities

Research and evaluation must be designed to determine the effectiveness of different messages and approaches for different subgroups of women and the appropriateness of developing tailored messages and strategies to address disparities.

Partners

The media can be educated about appropriate messages and materials and urged to promote appropriate messages in reaching out to women on this issue. National health and advocacy groups such as the American Legacy Foundation, the American Cancer Society, and the American Lung

Association can gather information about current programs and provide data to the tobacco control community. Tobacco settlement funds can be used by state health departments to track results and promote appropriate interventions through state public health programs.

Impact

By positioning tobacco cessation as a primary factor in overall women's health and economic well-being and by showing that coordinated efforts can lead to declines in women's tobacco use, additional attention can be called to tobacco control as an issue of concern for all women. As a result, women's engagement with tobacco issues will increase.

5. Fund pilot or demonstration projects and related research to understand how to convert women's broad-based support for tobacco control policy and programs into active involvement in advocacy.

Systemic change requires involvement from a wide cross-section of society. Broad-based women's groups have an enormous impact on how society views and acts upon matters that are considered "women's issues" (25). The tobacco control community must do a better job of educating these groups about the toll tobacco use takes on women and of engaging them in tobacco control activities.

Research on competing issues and the overall agendas of various women's organizations will provide insights into how to approach these groups about adding tobacco control to their programs. By funding pilot or demonstration projects with certain organizations, it is possible to ascertain how to effectively engage women's leaders, create effective grassroots advocacy programs in conjunction with women's groups, and activate local leaders on the issue. It is especially important that interventions found to be effective in general populations be evaluated in women of specific ethnicities to ensure that no unintended consequences of messages or approaches occur or, if such consequences are found, that appropriate corrections are made for these audiences.

Research to advance this goal might include:

- *A review of other successful women-led social change movements.* The review would identify how these movements have succeeded in engaging and activating women.
- *An analysis of issues on which national organizations are focusing and the reasons for selecting these issues.* Target organizations might include the National Organization

for Women and the National Partnership for Women and Families.

- *An analysis of issues in which women are involved at the grassroots and “grasstops” levels.* This analysis would identify why these are considered priority issues and how seriously tobacco control is seen in comparison.
- *Evaluation of previous pilot programs directed toward women.* This will determine which programs might be effectively expanded to reach new audiences.
- *Development and evaluation of pilot projects.* This would enable the tobacco control community to ascertain how to effectively engage women leaders, create effective grassroots advocacy programs in conjunction with women-led community groups, and activate local leaders on the issue.

Based upon the results of this research, appropriate messages and materials can be developed for use in reaching out to organizations that have not been involved in tobacco control to date.

Disparities

By reaching out to organizations representing populations that are disproportionately affected by tobacco but have not heretofore been involved in antitobacco advocacy, policies/ programs can be launched to evaluate the effectiveness of various interventions with their target populations, eventually improving these populations' health.

Partners

National health and advocacy groups, such as the American Legacy Foundation, the American Cancer Society, and the American Lung Association, can conduct planning research and develop templates for pilot programs. To reach new audiences, pilot programs can be undertaken by antitobacco advocacy organizations in conjunction with nontraditional partners such as labor organizations, faith-based organizations, businesses, women's business interests, women's advocacy organizations, and social service organizations. These organizations can be galvanized to use their existing communication channels to carry tobacco prevention and cessation messages to a broader audience of women.

Impact

By positioning tobacco cessation as a primary factor in overall women's health and economic well-being and by showing that coordinated efforts can lead to declines in women's tobacco use, women's engagement with tobacco issues will increase,

and the political base of support for tobacco control will expand.

Application

*6. Maximize dissemination of tobacco control research findings using state-of-the-art communication strategies.

The tobacco control research community is relatively small and tightly knit, but the universe of practitioners and tobacco users who will benefit from research findings and best-practice interventions is much larger. To be effective, research findings must be efficiently and quickly disseminated from the tobacco control community to the broader health care and media communities and, eventually, to consumers. Increasing communication between researchers and practitioners will help refine interventions by ensuring that research designs are informed by practitioners' constraints and that researchers are investigating issues that reflect the target population. Increased collaboration will aid in the development of the most cost-effective and efficient practices possible. Because research findings can at times be contradictory, increasing communication to assist practitioners in understanding and explaining contradictory information to their patients is also important.

Implementing this recommendation will involve:

- *Creating a clearinghouse.* An organization or system should be created that is responsible for identifying individual and/or policy-relevant tobacco control research findings (from within and outside the academic community) and for using state-of-the-art communication strategies to maximize dissemination to relevant audiences. This might include polling and marketing research, journal articles, research abstracts, and examples of communication materials used to support best-practice interventions.
- *Reaching out to health providers.* The tobacco control community should reach out to health provider organizations to incorporate training on best-practice cessation interventions at national, state, and local meetings. These opportunities should be made available to nurses, nurse practitioners, social workers, obstetrician/gynecologists, internists, dentists, and all other medical specialists who may serve as primary care providers. By using effective provider-centered communication strategies (26) and making it easy to update providers' skills in counseling and aiding patients to successfully quit smoking, the importance of the issue

will be elevated among these key audiences, and they will be encouraged to keep informed of the latest advances.

- *Effectively using the media.* Media briefings should be designed to both educate and inform the media so that they understand the context in which new findings are released. The briefings would not only explain the new research findings, but would also cover the expected impact or use of the findings and an overview of other research that the new findings support or refute.

Disparities

To establish feedback loops with priority populations, outreach is needed to medical professional organizations that represent minority practitioners, and relationships must be created with the media and other communication channels that serve priority populations.

Partners

Potential partners include the tobacco control research community to actively present and share information with providers and other target audiences. Mass-media outlets would be engaged to provide liaison to and feedback from consumers. Funders must be engaged to underwrite the necessary infrastructure, and the advocacy community must be empowered and encouraged to share nonproprietary survey, focus group, and opinion poll data.

Impact

Key information will be disseminated more rapidly and completely to the general public and among the decision-making elite. Partnerships will open communication channels from consumers back to researchers to help inform and shape future research agendas and to refine and improve current best-practice interventions.

References

1. Roos E, Lahelma E, Virtanen M, Praetiaelae R, Pietinen P. Gender, socioeconomic status, and family status as determinants of food behaviour. *Social Science and Medicine*. 1998;46:1519-29.
2. Cutting TM, Fisher JO, Grimm-Thomas K, Birch LL. Like mother, like daughter: Familial patterns of overweight are mediated by mothers' dietary disinhibition. *American Journal of Clinical Nutrition*. 1999;69:608-13.
3. Wild RA, Taylor EL, Knehans A, Cleaver V. Matriarchal model for cardiovascular prevention. *Obstetrical & Gynecological Survey*. 1994;49:147-52.
4. Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the health belief model. *Health Education Quarterly*. 1988;15:175-83.
5. Kelley K, Bond R, Abraham C. Effective approaches to persuading pregnant women to quit smoking: A meta-analysis of intervention evaluation studies. *British Journal of Health Psychology*. 2001;6:207-28.
6. Dino GA, Horn KA, Goldcamp J, Maniar SD, Fernandes A, Massey CJ. Statewide demonstration of Not On Tobacco: A gender-sensitive teen smoking cessation program. *Journal of School Nursing*. 2001;17:90-7.
7. YouthStyles 2002 [communications database on youth behavior]. Washington, DC: Porter Novelli.
8. Messina C, Kabat G, Lane D. Perceptions of risk factors for breast cancer and attitudes toward mammography among women who are current, ex- and non-smokers. *Women & Health*. 2002;36:65-82.
9. Markowitz LJ. Smokers' perceived self-exemption from health risks. *Psi Chi Journal of Undergraduate Research*. 2000;5:119-24.
10. Haug N, Stitzer M, Svikis D. Smoking during pregnancy and intention to quit: A profile of methadone-maintained women. *Nicotine & Tobacco Research*. 2001;3:333-9.
11. Schuit A, van Loon A, Tijhuis M, Ocke M. Clustering lifestyle risk factors in a general adult population. *Preventive Medicine*. 2002;35:219-24.
12. Maibach E, Maxfield A, Ladin K, Slater M. Translating health psychology into effective health communication: The American Healthstyles Audience Segmentation Project. *Journal of Health Psychology*. 1996;1:261-77.
13. Collins P, Maguire M, O'Dell L. Smokers' representations of their own smoking: A Q-methodological study. *Journal of Health Psychology*. 2002;7:641-52.
14. Zhu S, Valbo A. Depression and smoking during pregnancy. *Addictive Behaviors*. 2002;27:649-58.
15. Hotham E, Atkinson E, Gilbert A. Focus groups with pregnant smokers: Barriers to cessation, attitudes to nicotine patch use and perceptions of cessation counseling by care providers. *Drug & Alcohol Review*. 2002;21:163-8.

16. Moran S, Glazier G, Armstrong K. Women smokers' perceptions of smoking-related health risks. *Journal of Women's Health*. 2003;12:363-71.
17. Wakefield M, Morley C, Horan J, Cummings K. The cigarette pack as image: New evidence from tobacco industry documents. *Tobacco Control*. 2002;11:73-80.
18. Ayanian JZ, Cleary PD. Perceived risks of heart disease and cancer among cigarette smokers. *Journal of the American Medical Association*. 1999;281:1019-21.
19. Lu Y, Tong S, Oldenburg B. Determinants of smoking and cessation during and after pregnancy. *Health Promotion International*. 2001;16:355-65.
20. Krummel DA, Koffman DM, Bronner Y, et al. Cardiovascular health interventions in women: What works? *Journal of Women's Health & Gender-Based Medicine*. 2001;10:117-36.
21. King TK, Borrelli B, Black C, Pinto BM, Marcus BH. Minority women and tobacco: Implications for smoking cessation interventions. *Annals of Behavioral Medicine*. 1997;19:301-13.
22. Melvin CL, Dolan-Mullen P, Windsor RA, Whiteside HP, Goldenberg RL. Recommended cessation counseling for pregnant women who smoke: A review of the evidence. *Tobacco Control*. 2000;9:III80-4.
23. Affonso DD, De AK, Korenbrot CC, Mayberry LJ. Cognitive adaptation: A women's health perspective for reducing stress during childbearing. *Journal of Women's Health & Gender-Based Medicine*. 1999;8:1285-94.
24. U.S. Department of Health and Human Services. *National Survey on Drug Use & Health* (formerly called the National Household Survey on Drug Abuse). U.S. Department of Health and Human Services, Substance Abuse and Mental Services Administration: Rockville, MD; 2000.
25. Disney JL, Gelb J. Feminist organizational "success": The state of U.S. women's movement organizations in the 1990s. *Women & Politics*. 2000;21:39-76.
26. Grimshaw JM, Shirran L, Thomas R, et al. Changing provider behavior: An overview of systematic reviews of interventions. *Medical Care*. 2001;39:II2-45.

Community and Policy Interventions Breakout Session

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Overview

The Impact of Policy Interventions

Policy interventions are now a well-recognized component of tobacco control and prevention efforts. In the United States, early Federal policy-making efforts focused on cigarette advertising and promotion. In the 1970s and 1980s, nonsmokers’ rights organizations began pressing for policies to protect nonsmokers from environmental tobacco smoke (ETS) and, later, for other policy measures (1). Over time, the success of these and other policy-focused efforts has helped establish public policy as an important component of tobacco control and prevention.

Research now demonstrates the effectiveness of policy interventions to prevent and decrease tobacco use. Among the most powerful interventions is increasing tobacco excise taxes. As noted in *Reducing Tobacco Use: A Report of the Surgeon General*, “Increases in cigarette prices lead to substantial reductions in cigarette smoking by deterring smoking initiation among youth, promoting smoking cessation among adults, and reducing the average cigarette consumption among continuing smokers” (2). The impact of price increases is not limited to the United States; the World Bank reports that, on average, a price increase of 10 percent per pack would reduce demand for cigarettes by about 4 percent in higher-income countries and by about 8 percent in lower- and middle-income countries (3).

Policies to restrict smoking in indoor locations such as workplaces and public areas (“clean indoor air” laws) are effective in reducing nonsmokers’ exposure to ETS. These policies are also credited with increasing the rate at which smokers attempt to quit, increasing the success rates of these

attempts, and reducing the number of cigarettes smoked per day by those who continue to smoke (4, 5). In addition, a recent study suggests that the broad decline in the percentage of children exposed to ETS in the home is due, in part, to efforts to decrease ETS in worksites and public places (6). The laws and the effort required to enact them may have helped change social norms, including the attitudes of parents who smoke toward exposing their children to ETS in the home. In addition, many countries have either banned or severely restricted tobacco advertising and promotion in response to its impact on youth and adults (7).

Community-Level Programs and Policies

Community-level intervention research has contributed greatly to our understanding of effective state- and community-level programs and policies. The North Karelia Project (Finland) and the Stanford Three-Community Study (United States) were key early community-level intervention trials aimed at preventing cardiovascular disease (8). These studies, which demonstrated the potential impact of community-level interventions, were followed by others, including many aimed specifically at reducing tobacco use (9). The potential of community-based interventions to provide persistent and inescapable messages to quit smoking formed the basis for the NCI Community Intervention Trial for Smoking Cessation (COMMIT), begun in September 1986 (10). Its successor, the American Stop Smoking Intervention Study (ASSIST), which began in October 1991, focused on changing policy to alter the social, cultural, economic, and environmental factors that promote smoking (11). More recently, increased emphasis has been placed on conducting research that is truly “community centered” or “community based”—defined as a “collaborative approach to research

that equitably involves, for example, community members, organizational representatives, and researchers in all aspects of the research process” (12). Community intervention and community-based research have helped make state- and community-level interventions, both programmatic and policy, an important part of efforts to reduce tobacco use (13, 14).

Community activism and advocacy, including media advocacy, are a critical part of efforts to implement effective tobacco control and prevention policies. Community activism can be effective even when legislation is not enacted; the process of community activism serves to educate the community and change social norms and, on occasion, results in changes in private policy. For example, many large businesses, including several nationwide restaurant chains, have implemented 100 percent smoke-free policies in the absence of laws requiring them to do so.

Reducing Women’s Risk

Lung cancer has been the leading cause of cancer death in women for many years, having overtaken breast cancer death in white women in 1986 and in black women in 1990 (15). However, while awareness of the risk of breast cancer is widespread, research suggests that few women are aware of the grave danger they face from lung cancer. For example, a January 2001 survey conducted by the American Legacy Foundation found that 80 percent of women believed that breast cancer is the leading cause of cancer death among U.S. women (16). Few women’s and girls’ organizations are involved in tobacco control and prevention, and this issue is rarely visible on the agenda of the women’s advocacy community.

Certain groups of women are at increased risk for tobacco use and tobacco-related disease. Overall, in 2002, 20 percent of women aged 18 and older were current smokers; however, prevalence varied sharply by level of educational attainment, race/ethnicity, and economic status. Women with a graduate degree had the lowest smoking prevalence (6 percent). In sharp contrast, women with low levels of education had the highest prevalence: 31 percent of women with 9-11 years of education and 37 percent of women with a GED smoked. Women at or above the poverty level were much less likely to smoke than those living below the poverty level (20 percent vs. 30 percent, respectively) (17). Lastly, a recent study documented enormous variation in cigarette smoking among different racial and ethnic groups. In 1999-2001, the prevalence of cigarette smoking was 40 percent among American Indian/Alaska Native women, 26 percent among

white women, 22 percent among black women, 17 percent among Hispanic women, and 9 percent among Asian women. Variation among different Hispanic and Asian subgroups was also demonstrated (18).

Data on tobacco use by American Indian/Alaska Native women have some significant limitations; for example, the National Health Interview Study did not identify American Indian/Alaska Native respondents until 1978. Despite this, it is clear that American Indian/Alaska Native men and women have had significantly higher smoking rates than any other group for many years. Furthermore, the overall figure masks significant variation among tribal groups. For example, a threefold variation in prevalence was observed among American Indian/Alaska Native women of different geographic regions: 14 percent of women in the Southwest were current smokers, compared with 38 percent of women in the Northern Plains (1988-1992 aggregate data). Cigarette smoking by American Indian/Alaska Native women of reproductive age remained at 36 to 44 percent between 1978 and 1995, and even higher rates were observed among American Indian/Alaska Native women of reproductive age with less than a high school education (47 to 82 percent). Relatively little quitting behavior has been found in this population (19), and some data also indicate high rates of smokeless tobacco use among specific groups of American Indian/Alaska Native women (20, 21).

Many challenges exist in reducing tobacco use by American Indian/Alaska Native women. These include the community’s enormous diversity, poverty, and deprivation and the fact that conventional service organizations often do not operate on Indian reservations. Interventions will need to be tailored to the specific community served; partnering with organizations that already operate on Indian reservations, especially American Indian/Alaska Native organizations, may be particularly valuable.

Research Barriers, Gaps, and Opportunities

Numerous barriers to research on effective community and policy interventions exist, including insufficient resources, capacity, infrastructure, leadership, and researchers capable of conducting community-based research. In addition, research on effective community and policy interventions is often not amenable to the use of randomized controlled trials, generally considered the “gold standard” of research (22). For this and other reasons, community-based researchers often have greater difficulty than their more traditional counterparts in securing funding for their work (12).

Important gaps in this area include the need for a better understanding of differences in smoking prevalence among ethnic groups and the cultural and gender-specific factors that influence exposure to ETS. Often, research fails to consider culture; as a result, many “best practices” are not especially effective in reaching priority populations. Segmented, targeted social marketing research is especially needed to counter the extensive qualitative and quantitative research conducted by the tobacco industry. Research is also needed to determine the effects of tobacco control and prevention policies implemented at technical schools and other institutions that serve young women who do not attend college.

Important community and policy research opportunities exist in many areas, including lessons learned from changes in societal attitudes toward tobacco use; factors that motivate policy makers to support tobacco control policies; successful strategies to convey smoking cessation messages to subpopulations characterized by isolation, low socioeconomic status, and/or low literacy; Internet sales of tax-free or low-tax tobacco products by Indian reservations; the impact of smoking bans in bars, casinos, and other venues; and whether analysis of existing surveillance data can identify gaps in knowledge about gender, ethnicity, and culturally specific issues related to tobacco use. Past research has rarely studied the impact of policies and interventions on women; gender-specific research represents an important opportunity for future work.

Recommendations

Research

*1. Encourage funding organizations to embrace participatory research.

New funding mechanisms are needed to support culturally relevant community-based participatory research. Funding organizations should increase their commitment to support institutions and organizations that are committed to forging research partnerships with community organizations. True partnerships are bidirectional—community-based collaborators receive training in research methodology while academic researchers receive training in culturally and community-tailored interventions—and require a commitment to joint decision making and shared ownership of the project. The breakout group recommends increased funding for collaborative research projects, including applied research and “community action research,” to encourage

partnerships between community-based organizations and academic researchers.

California’s Tobacco-Related Disease Research Program’s Participatory Research Awards may be a useful model for other research funding organizations to consider. These awards (Community-Academic Research Awards and School-Academic Research Awards) are designed to stimulate and support collaborations between academic investigators and community-based organizations, local tobacco control initiatives, and schools to perform scientifically rigorous research.

Because other health conditions are prominent among smokers, NCI should consider partnering with other National Institutes of Health (NIH) Institutes to study such issues as tobacco use in people with diabetes and hypertension or the interaction of alcohol and tobacco policies. To counter discrimination based on race and ethnicity, gender, and social class, research subjects—people who smoke, community-based organizations, communities of color, and other groups—should have a voice in determining future research funding.

Impact

Within 5 years, an increased level of active participatory research will be under way.

*2. Develop funding mechanisms that foster partnerships between research institutions and organizations that serve high-risk populations.

At present, funding mechanisms do not often facilitate partnerships with community organizations; at times, they even create barriers to these partnerships. Partnerships are especially needed with organizations serving populations at high risk for tobacco use. American Indians/Alaska Natives are a particular focus, given the magnitude and persistence of the problem of tobacco use in this population. Tribal colleges, tribal health departments, and other institutions that serve these communities should be especially targeted for research partnerships.

Impact

Within 2 years, funding mechanisms will incorporate culturally competent approaches and language to facilitate greater involvement by culturally diverse organizations and researchers.

* Recommendations with an asterisk are those identified by the breakout groups as their top three (or four) recommendations.

*3. Fund strategic policy research to increase our knowledge of the impact of public and private tobacco control policies on women and girls.

Despite the well-recognized role of policy interventions in tobacco control and prevention, relatively little research has focused on the differential impact of policies, if any, on women and girls. A better gender-based understanding of the impact of current policies (at the community, state, national, and international levels) on attitudes, behaviors, and health effects is needed. Gender-based analyses of newer policy efforts, such as the impact of family and home-based policies and policies related to health systems change, are needed as well. Research can also provide and test models to understand how various policies alter social norms and behaviors, clarify the policy development process, and offer an understanding of how best to communicate and collaborate with policy makers to enact and enforce effective policy measures.

Impact

Within 5 years, research findings will be analyzed and published that will guide the development of evidence-based tobacco control policy and its impact on gender differences.

*4. Support research to identify messages and strategies to engage women's and girls' organizations and their constituents in tobacco control and prevention efforts.

Long-term, sustained, and coordinated strategies are needed to engage women's and girls' organizations in tobacco issues and to incorporate the issue of tobacco into the women's health agenda. Women's and girls' organizations are appropriate partners to determine how best to communicate to women the enormity and importance of the problem of tobacco use and their potential role in addressing this problem.

Impact

Within 3 years, a functional, operative network will exist, will have established relationships with key women's and girls' organizations, and will support a growing constituent base.

5. Consider replicating the applied research model used for NCI's American Stop Smoking Intervention Study (ASSIST).

ASSIST was a public-private partnership between NCI and the American Cancer Society aimed at using policy strategies to change the social, cultural, economic, and environmental factors that promote smoking. ASSIST demonstrated that strong tobacco control programs and effective policies

lower smoking rates (11). Lessons learned from the ASSIST project could be applied to the development of public-private partnerships to decrease women's tobacco use. For example, the NIH Office of Research on Women's Health, the U.S. Department of Agriculture's Women, Infants, and Children (WIC) program, and a foundation that focuses on women's or health issues could work together to design and implement programs and policies at WIC clinics to assist women to quit smoking and reduce children's ETS exposure. Successful projects could then be considered for nationwide dissemination. Research and demonstration projects are also needed to understand how to convert broad community support—especially women's and girls' support—for tobacco control policies into active community involvement in their development and enforcement.

References

1. Bloch MH. Tobacco control and prevention. In: Brobeck S, ed. *Encyclopedia of the Consumer Movement*. Santa Barbara, CA: ABC-CLIO; 1997: 564-8.
2. U.S. Department of Health and Human Services. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA: 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.
3. Jha P, Chaloupka FJ. *Curbing the Epidemic: Governments and the Economics of Tobacco Control*. Washington, DC: World Bank; 1999.
4. Hopkins DP, Briss, PA, Ricard CJ, et al. Reviews of evidence regarding interventions to reduce tobacco use and exposure to environmental tobacco smoke. *American Journal of Preventive Medicine*. 2001;20(2S):16-66.
5. National Cancer Institute. *Population-Based Smoking Cessation: Proceedings of a Conference on What Works to Influence Cessation in the General Population*. Smoking and Tobacco Control Monograph No. 12. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; November 2000. NIH Pub. No. 00-4892.
6. Soliman S, Pollack HA, Warner KE. Decrease in the prevalence of environmental tobacco smoke exposure in the home during the 1990s in families with children. *American Journal of Preventive Medicine*. 2004;94:314-20.

7. Roemer R. *Legislative Action to Combat the World Tobacco Epidemic*. 2nd ed. Geneva: World Health Organization; 1993.
8. Sorensen G, Emmons K, Hunt MK, et al. Implications of the results of community intervention trials. *Annual Review of Public Health*. 1998;19:379-416.
9. Hymowitz N. Community and clinical trials of disease prevention: Effects on cigarette smoking. *Public Health Reviews*. 1987;15:45-81.
10. National Cancer Institute. *Community-Based Interventions for Smokers: The COMMIT Field Experience*. Smoking and Tobacco Control Monograph No. 6. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; August 1995. NIH Pub. No. 95-4028.
11. Stillman FA, Hartman AM, Graubard BI, Gilpin EA, Murray DM, Gibson JT. Evaluation of the American Stop Smoking Intervention Study (ASSIST): A report of outcomes. *Journal of the National Cancer Institute*. 2003;95:1681-91.
12. Israel BA, Schulz AJ, Parker EA. Review of community-based research: Assessing partnership approaches to improve public health. *Annual Review of Public Health*. 1998;19:173-202.
13. Siegel M. The effectiveness of state-level tobacco control interventions: A review of program implementation and behavioral outcomes. *Annual Review of Public Health*. 2002;23:45-71.
14. Centers for Disease Control and Prevention. *Best Practices for Comprehensive Tobacco Control Programs—August 1999*. Atlanta, GA: 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; August 1999.
15. Mortality trends for selected smoking-related cancers and breast cancer—U.S., 1950-1990. *Morbidity and Mortality Weekly Report*. 1993;42:857,863-66.
16. American Legacy Foundation. *Women and Lung Cancer Survey*. Washington, DC: American Legacy Foundation; January 2001.
17. Centers for Disease Control and Prevention. Cigarette smoking among adults—U.S., 2002. *Morbidity and Mortality Weekly Report*. 2004;53:427-31.
18. Centers for Disease Control and Prevention. Prevalence of cigarette use among 14 racial/ethnic populations—U.S., 1999-2001. *Morbidity and Mortality Weekly Report*. 2004;53:49-52.
19. U.S. Department of Health and Human Services. *Tobacco Use Among U.S. Racial/Ethnic Minority Groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A Report of the Surgeon General*. Atlanta, GA: 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; 1998.
20. Kaplan SK, Lanier AP, Merritt RK, et al. Prevalence of tobacco use among Alaska Natives: A review. *Preventive Medicine*. 1997;26:460-5.
21. Spangler JG, Case LD, Bell RA, et al. Tobacco use in a tri-ethnic population of older women in southern North Carolina. *Ethnicity & Disease*. 2003;13:226-32.
22. Sackett DL, Rosenberg WMC, Muir Gray JA, Hanyes RB, Richardson WS. Evidence based medicine: What it is and what it isn't. *British Medical Journal*. 1996;312:71-2.

Global Issues Breakout Session

Co-Chairs	Nancy Kaufman	Joyal Mulheron	Judith Wilkenfeld
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Overview

An essential tool to combat the tobacco industry's aggressive targeting of women is accurate, timely information. But worldwide, the reasons for the relatively low prevalence of tobacco use among women (about 12 percent) and high prevalence among men (about 48 percent) are difficult to identify, especially in developing countries where reliable surveillance and monitoring data are generally absent (1, 2). Similarly, little information exists on the social, cultural, and economic context of gender and tobacco related to the variety of tobacco used and methods of tobacco initiation, uptake, and prevention (3). And, while recent global surveys have reported data on women and smoking, gaps in data collection make it difficult to monitor progress or develop national tobacco control plans (4, 5). For example, in many regions, including Africa, Asia, and the Eastern Mediterranean, other ways to use tobacco, such as in hookahs and rolled tobacco, are popular but seldom included in national surveys (4). As the rates of tobacco use among women and girls rise, improving scientific research about gender and tobacco becomes an urgent matter. Adult smoking prevalence is higher among women than men in the five countries of the Cook Islands, Nauru, Norway, Papua New Guinea, and Sweden, and recent increases in female smoking prevalence have been reported in Cambodia, Malaysia, and Bangladesh (4).

The World Health Organization (WHO) Framework Convention on Tobacco Control (Framework Convention) is an international public health treaty that is legally binding on all parties. Adopted by the WHO World Health Assembly in May 2003, it will go into force once 40 countries have

ratified it. The Framework Convention promises to stimulate demand for better and more data on important issues, including price structure and advertising expenditures (6). Long-term improvements in national databases will progress as governments that ratify the treaty report to an international monitoring body. Nongovernmental organizations (NGOs), such as the Framework Convention Alliance (an NGO network whose primary objective is to support the development of a strong Framework Convention and related protocols), will also seek to conduct better research in order to submit shadow reports. However, gender analysis in tobacco control research needs stronger financial and political support to ensure high-quality national reporting. The tobacco control movement can expand its organizational and financial resources by reaching out to new partners among women's organizations, health care professionals, nurses, unions, and human rights and environmental groups.

Funders, government agencies, and NGOs in the United States have important roles to play in assisting developing countries. Best practices in the United States should be shared, but adapted to the cultural, social, and economic needs of local communities. For example, mass-media campaigns can be modified in countries where community leaders have more influence than print media among illiterate women. Bearing in mind the need to strengthen leadership from developing countries, greater efforts must also be made to exchange knowledge and success stories between economically developed and developing countries.

Recommendations

Research

*1. Surveillance and monitoring.

The working group gave highest priority to strengthening national surveillance, including monitoring trends in tobacco use, changing patterns of use, and factors that affect use (4).

Possible research questions are:

- *What evidence exists to show that rates of tobacco use are increasing rapidly among girls?*
- *Do gender differences exist in response to changes in taxation policies?*

Research on uptake should cover new patterns, such as the use of smokeless tobacco among youth. Standardized survey questions could be based on norms for populations in industrialized countries—as long as they are adapted to developing countries' cultures and tobacco use patterns. Although using common definitions is often a complex matter, the effort to do so will improve comparability on a global basis, as well as the ability to conduct meta-analyses. The Global Youth Tobacco Survey is an example of how trends around the world can be monitored (6).

Examples of specific research topics include:

- *Behavior of the tobacco industry.* One area of surveillance that is too often omitted by health officials is tracking the tobacco industry's behavior. For example, data on advertising and promotion expenditures like those reported by the U.S. Federal Trade Commission do not exist in most developing countries. As marketing, product design, and promotion influence susceptibility to and initiation of smoking, understanding the behavior of the tobacco industry will prove essential in designing public policies (7). Such information can also arm tobacco control advocates with evidence to mobilize women's organizations and warn them of tactics used by the tobacco industry to "buy" their loyalty (8). Another justification for further research on this topic is that tobacco industry data related to marketing are useful in litigation (9).
- *A map of who uses which tobacco products by country and changing patterns of use.* Basic information concerning the variety of tobacco products used by women, such as chewing tobacco and that used in hookahs, is

generally absent, as are data on changing patterns of use related to marketing of products. In addition, little information is available on tobacco use among female nurses and doctors. The WHO has begun to address this issue through collaboration with the World Medical Association and International Council of Nurses to monitor tobacco use among health professionals in Bahrain, Iran, Kuwait, Oman, and the Republic of Korea (4). Research that maps national trends is vital to developing gender-sensitive counter-advertising campaigns.

- *Factors contributing to the uptake of tobacco use where prevalence is low among women and protective factors now exist.* Research on nonsmokers by gender and age would yield data on initiation, quitting, and acceptable prevention methods. Little is known about what makes young women choose not to smoke even when they are exposed to tobacco advertisements and promotions. A research question might be: What factors differentiate teenage girls who smoke from those in the same social and economic environments who do not? An important supplement to conventional epidemiological surveillance is monitoring cultural and social factors that protect women against tobacco use (keeping in mind that the objective is to uphold women's freedoms as well as prevent tobacco uptake). Factors to consider are traditional values, lack of disposable income, life skills that prevent women from using tobacco, and family pressure. A historical perspective is useful, such as comparing traditional and new gender norms as they relate to changes in tobacco use. These data are needed to maintain low prevalence rates among women and girls as an integral part of public policy.
- *The meaning of tobacco use to women.* In developing countries, the meanings of tobacco use to women, such as independent self-image and rebellion, are important to understand in their historical social context. Researchable topics would include:
 - ◆ How do women interpret package designs that promote images of glamorous Western women?
 - ◆ Do health education programs address gender issues adequately?

* Recommendations with an asterisk are those identified by the breakout groups as their top three recommendations.

Investigation of the knowledge, attitudes, and practices of women who use smokeless tobacco is also important, particularly in developing countries. In India, for example, some rural women are reported to believe that chewing tobacco is healthy (10).

Disparities

If more accurate and timely data were available, tobacco control advocacy groups could create a call for action based on evidence that women are being targeted. National programs would know where to intervene for the highest impact and how to reduce disparities such as those affecting American Indian populations.

Partners

Partners should be involved in collecting, funding, disseminating, and using research. Among the potential partners are these agencies and organizations:

- Federal Trade Commission
- Centers for Disease Control and Prevention
- National Institutes of Health/Fogarty International Center
- American Cancer Society
- International Union Against Cancer
- U.S. Agency for International Development
- American Legacy Foundation

National agencies in developing countries, such as the Centers for Disease Control in China and the National Cancer Institute in Brazil, are also partners, both as users and sponsors of research. A stimulus for global cooperation concerning gender and tobacco will also come from the Framework Convention, because the countries that ratify the treaty will report on progress made. Linkages of these and U.S. partners with the international women's movement and research centers will be critical to monitoring and evaluating programs. However, more effort must be made to include women's NGOs, health care professionals, national ministries for women's affairs, national centers of excellence that teach gender studies, and women's studies centers—particularly in developing countries. Finally, many international development and funding agencies can cooperate, such as the WHO, United Nations regional economic and social commissions, and the World Bank.

Impact

One impact of improving research would be the creation of baselines for monitoring the Framework Convention and establishing global indicators on gender and tobacco. The number of high-quality grant applications from researchers in developing countries for research on gender and tobacco could increase as more data become available on measurable outcomes. Better data can also have a positive political impact, since children's rights organizations and women's groups will need evidence to be persuaded to join the tobacco control movement.

*2. Policy-related research.

Data are seldom rigorous enough to convince policy makers in developing countries that tobacco control measures are successful. Two major areas of concern should be the progress of Framework Convention implementation (including tax/price, advertising/promotion, labeling, and environmental tobacco smoke) and multicountry studies of national and local policies designed for international comparisons (11).

This research would also help answer questions such as:

- *If countries enforce a total ban on advertising, what happens?*
- *What is the impact of legislation on environmental tobacco smoke on women's health?*

Examples of specific research issues are:

- *Awareness and risk behavior.* Levels of awareness and risk behavior among women vary widely by social, economic, and cultural context—even within a country—and subgroups should be identified in policy-related research. For example, although many urban dwellers with access to modern communication systems may be aware of the health hazards of passive smoke, health messages may fail to reach the majority of women living in poor, rural areas. In addition, ethnic, religious, and linguistic diversity can act as communication barriers and affect levels of awareness among women and girls.
- *Impact of the Framework Convention.* The feasibility studies and evaluation and monitoring of policies resulting from enforcement of the Framework Convention should be built into a gender and tobacco strategy. Multicountry studies that measure the impact of specific measures, such as changes in taxation and price, on women's tobacco use will provide important comparative data. Accurate evaluations are also needed

of new legislation, such as bans on smoking in work- and public places. Also, women's health as a human right is an important issue in the Framework Convention that needs close monitoring (12).

- *The role of law and governance.* Tobacco control programs should conduct research to improve legal and governance structures for tobacco control. For example, the report on the history of Thailand's tobacco control program emphasized the importance of accurate reports and evaluations of law enforcement (13). Monitoring and evaluating existing and new laws is necessary to ensure compliance and identify reasons for non-enforcement. Questions arise about how to use public opinion to assist law enforcement agencies. Other research questions are:
 - ◆ What do countries need most to draw upon the U.S. experience in litigation and corporate responsibility?
 - ◆ Does women's participation in decision making help improve the implementation of national policies?
- *Communications and media outreach.* Research is needed to develop culturally relevant messages and entry points that respond to women's perceived needs. For example, data concerning the impact of maternal and paternal smoking on fetal health in countries such as Korea, Kenya, and Vietnam would arouse public interest and provide an entry point to maternal and child health and tobacco programs. The role of men in the protection of women's health also needs further investigation. For example, in many developing countries where it is difficult for women to influence public policy or defend their right to a smoke-free environment, communications research should target men.
- *Media literacy.* Counter-advertising can work, but better methods are needed to decode and debunk industry messages and counter their persuasive power (7). Redefining women's liberation should take into account women's own perceptions, and the tobacco industry must be prevented from "owning" gender images of modernity. The ultimate goal should be to use media and communication strategies to create demand for prevention and cessation. An example is the U.K. Health Education Authority's "Put smoking out of fashion" project that involved the fashion industry and media in a teen antismoking effort (14).
- *Women as tobacco workers.* A major gap in research lies in the impact of tobacco production and processing

on women tobacco workers (15). In many tobacco-producing countries, women and girls who work on tobacco farms are exposed to environmental hazards such as pesticides, and their labor is exploited under poor working conditions (16). Epidemiological and surveillance data, as well as social, economic, and cultural research, are needed to develop appropriate health policies for these workers. Priority should be given to their knowledge, attitudes, and practices related to risk behavior. Data on reproductive health are also poorly collected.

Disparities

Improving policy-related research would contribute to earlier intervention in the tobacco epidemic curve. Targeting diverse groups of women and girls with gender-sensitive interventions could be more effectively planned.

Partners

Research partners would be similar to those already mentioned for surveillance. In addition, United Nations (UN) agencies committed to strengthening policies related to women's health as a human right, such as the Commission on the Status of Women, the UN Division for the Advancement of Women, and funders of women's and development projects, should become more involved. A positive step was taken by the Swedish International Development Agency to support gender and tobacco research. In cooperation with the government of South Africa and the Women's Health Project, the Swedish International Development Agency sponsored seven studies in the region and will fund Africa's first regional meeting on gender and tobacco.

Impact

As with surveillance, policy-related research would arm advocates to hold governments accountable for treaty implementation. NGOs can also use information to "shame" governments into taking action and increasing awareness in the public about the importance of gender-based policies. Tobacco control programs could target advocacy to policies that work best to reduce tobacco use among women and girls.

Translation

*3. Make research data available to policy makers and the public.

More efforts are needed to make data on surveillance and policy research, as well as those from social, economic, and cultural studies, available to policy makers and the public. In particular, international cooperation in research must respond

to rapidly changing political challenges posed by the tobacco industry in an attempt to undermine scientific evidence. General principles of good project planning apply, such as ensuring that policy makers and women leaders are involved from the beginning in identifying priorities and in planning. Knowing how to identify the most effective messengers to reach policy makers depends upon savvy political know-how and close cooperation among researchers, the media, and tobacco control activists.

Some suggestions for action are:

- *Mobile technical assistance teams.* A quick-response strategy could involve mobile technical teams in responding to national emergency situations, such as an impending national law to ban advertising. Led by partners in developing countries, teams would draw upon the expertise of NGOs and governments in the international tobacco control movement. Criteria for selection of team members would include gender balance, interdisciplinary mix, and cultural sensitivity. These technical assistance teams could help national tobacco control leaders train investigators in research and evaluation techniques, assist in the transfer of treatment technologies, help build a stronger NGO infrastructure, and develop capacity training in advocacy, communications, and legal counseling.
- *Using the Internet and new information technologies to reach audiences worldwide.* The Internet is one of the most cost-effective media for rapidly disseminating information and can respond to political action and campaigns internationally. An important initiative has been undertaken by the WHO and the U.S. Centers for Disease Control and Prevention to initiate the National Tobacco Information Online System (NATIONS). Operated in partnership with the American Cancer Society, World Bank, UN Children's Fund, and International Union Against Cancer, NATIONS is an electronic system for tracking country-specific information and a potential source of updated data on women and tobacco (17). In the future, it will be essential to ensure that such Web sites are multilingual if they are to be accessible worldwide. Using new information technologies, local groups can also receive better training in how to use research results for global action. Recent experiences of the Framework Convention Alliance demonstrate that documents can be translated into different languages—such as French,

Spanish, Chinese, and Arabic—at little cost; this can have long-lasting benefits.

- *Cooperation with the Framework Convention Conference of Parties to help disseminate research results.* The Framework Convention Conference of Parties, which will oversee the implementation and monitoring of the tobacco treaty, should be encouraged to provide training and technical assistance to countries for dissemination of gender and tobacco research. The Conference of Parties can also be an important catalyst to translate research results into policies. NGOs that are actively involved in monitoring progress would also be important allies in the exchange and dissemination of information.

Disparities

The Framework Convention process, the Internet, and mobile teams would help balance the flow of knowledge between economically developed and developing countries and promote rapid diffusion of innovations. Sharing strategies to combat tobacco industry tactics could jump-start a movement that could act as a catalyst for change.

Partners

Two important partners in teamwork between economically developed and developing countries would be the NGO members of the Framework Convention Alliance and governments represented in the Framework Convention Conference of Parties process. As these groups have developed expertise in a wide range of gender and tobacco issues, as well as international law and national tobacco control, they can be drawn upon to work closely with local leaders. Funders and supporters might include public and private foundations, government agencies that provide international aid, and NGOs, such as those working in women's health and consumer protection. Technical expertise can be mobilized through gender research centers and international and regional women's research networks, such as FEMNET in sub-Saharan Africa. Litigation consortiums may also be established to support national efforts and bring expertise related to international law and treaties such as the Framework Convention.

Impact

The impact of a multipronged strategy that includes rapid-response teamwork could be significant. For example, such teamwork could help promote speedy exchange of know-how and arm NGOs with examples of industry tactics. A train-the-trainers approach could also be supported for rapid

diffusion of skills and information. Other positive outcomes would be to increase accountability through media attention, link local to international networks, decrease tobacco use through better cessation treatments, and promote strong national and local legislation. If litigation teams are successful, national tobacco control programs might also raise revenues for tobacco control.

References

1. World Health Organization. *Women and the Tobacco Epidemic—Challenges for the 21st Century*. Geneva: World Health Organization; 2001.
2. Mackay J, Eriksen M. *The Tobacco Atlas*. Geneva: World Health Organization; 2002.
3. World Health Organization. *Confronting the Epidemic: A Global Agenda for Tobacco Control Research*. Geneva: Research for International Tobacco Control and World Health Organization; 1999.
4. American Cancer Society. *Tobacco Control Country Profiles*. Atlanta: American Cancer Society; 2003.
5. Morrow M, Barraclough S. Tobacco control and gender: A need for new approaches for the Asia-Pacific region. *Development Studies Network Development Bulletin*. 2001;54:23-6.
6. Warren W, Riley L, Asma S, et al. Tobacco use by youth: A surveillance report from the Global Youth Tobacco Survey project. *WHO Bulletin*. 2000;78:868-73.
7. U.S. Department of Health and Human Services. *Women and Smoking: A Report of the Surgeon General*. Rockville: MD: U.S. Department of Health and Human Services, Public Health Service, Office of the Surgeon General; 2001.
8. Kaufman NJ, Nichter M. The marketing of tobacco to women: Global perspectives. In: Samet JM, Yoon S-Y, eds. *Women and the Tobacco Epidemic. Challenges for the 21st Century*. Geneva: World Health Organization; 2001.
9. Blanke DD. Towards health with justice: Litigation and public inquiries as tools for tobacco control. *Tobacco Control. Reports on Industry Activity*. 2002. Available at <http://repositories.cdlib.org/tc/whotcp/WHO1/>. Accessed June 23, 2004.
10. Aghi M, Asma S, Yeong CC, Vaithinathan R. Initiation and maintenance of tobacco use. In: Samet JM, Yoon S-Y, eds. *Women and the Tobacco Epidemic. Challenges for the 21st Century*. Geneva: World Health Organization; 2001.
11. The World Bank. *Curbing the Epidemic*. Washington, DC: The World Bank; 1999.
12. Cook R. *Women's Health and Human Rights*. Geneva: World Health Organization; 1994.
13. Supawongse C, ed. *The Evolution of Tobacco Consumption Control in Thailand*. Thailand: WHO; 1999.
14. Joossens L. Some like it 'light.' Paper presented at: European Network for Smoking Prevention conference: Tobacco and Women: Understanding the Past, Changing the Future; November 23-24, 1998; Paris, France.
15. Christofides N. Gender issues in tobacco control: Highlighting some developing country issues. In: Flowers MK, ed. *Smoking and Women's Health: "Les Liaisons Dangereuses."* New York: Global Alliance for Women's Health; 1999.
16. Campaign for Tobacco-Free Kids. *Golden Leaf, Barren Harvest*. Washington, DC: Campaign for Tobacco-Free Kids; 2001.
17. NATIONS Web site. Available at: <http://apps.nccd.cdc.gov/nations>. Accessed October 28, 2003.

Appendix B: About the Women, Tobacco, and Cancer Working Group

The Women, Tobacco, and Cancer (WTC) Working Group was formed by the National Cancer Institute (NCI) to stimulate scientific research and the translation of evidence-based knowledge into effective interventions to reduce and ultimately prevent tobacco-related cancers.

When the Working Group was formed in late 2001, no major Federal efforts were addressing the recommendations of the 2001 Surgeon General's report, *Women and Smoking*, and other reports on women and tobacco-related diseases. The WTC Working Group was the result of meetings between staff of the NCI Office of Women's Health, Tobacco Control Research Branch, and Office of Communications and staff of the Department of Health and Human Services (DHHS) Office of Women's Health and the National Institutes of Health (NIH) Office of Research on Women's Health. Two highly respected experts from the extramural research community were invited to serve as Co-Chairs of the Working Group.

Planning for the Working Group

The Co-Chairs of the Working Group and the Federal coordinators nominated 16 members to serve on the WTC Steering Committee, which includes prominent members of the scientific, medical, public health, and advocacy communities. These individuals were selected for their expertise in all areas associated with tobacco-related cancers in women. At a June 13, 2002, planning meeting, the Steering Committee discussed goals and provided guidance for expanding the WTC Working Group and planning a Working Group meeting. During subsequent conference calls among Working Group meeting organizers, the format and agenda for the meeting were finalized; breakout group topics were selected; breakout group Co-Chairs (Steering Committee and non-Steering Committee members) were selected; and plenary session speakers were identified.

The goals of the WTC Working Group meeting were to:

- *Identify gaps and research priorities.* Identify and prioritize research needs to increase our understanding of the cancer-related biological effects of women's tobacco use and environmental tobacco smoke (ETS) exposure and develop better interventions to decrease women's and girls' tobacco use and ETS

exposure. Research areas might include the biology of addiction, cancer susceptibility and disease-related consequences, biobehavioral aspects of tobacco use, social/environmental factors affecting tobacco use, and communications and interventions research.

- *Identify and prioritize needs in dissemination and application.* Identify and prioritize ways to disseminate and apply current and future research to prevent or reduce women's and girls' tobacco use and ETS exposure. Strategies might include intervention, communication, program, and policy.

During the planning period, several experts were invited to serve as breakout group Co-Chairs at the Working Group meeting. These experts identified and invited other experts from multiple disciplines to join the Working Group and participate in its meeting.

Prior to the meeting, Working Group members were asked for preliminary thoughts on priorities and important areas of focus. Specifically, they received the following instructions:

In order to reduce the impact of tobacco and tobacco-related cancers on women and girls, identify for your breakout session topic:

Research

- The three most critical gaps in knowledge.
- The three most important research opportunities.
- The three most critical barriers that must be overcome to move forward.

Application

- The three most critical gaps in available interventions.
- The three most important opportunities for applying what we know.
- The three most critical barriers that must be overcome in order to apply what we know.

The input of the Working Group members was provided to breakout group Co-Chairs to assist in planning their sessions and to meeting participants to aid in discussions.

As a resource for participants, meeting staff prepared a detailed overview of current (2001 and 2002) funded grants and activities related to women and tobacco in the areas of addiction, use, and cessation, as well as tobacco-related cancers. These grants and activities were identified by querying the database of the National Organization of Tobacco Use Research Funders (NOTURF) and the NIH Scientific Projects database, searching NOTURF member organization Web sites, contacting NOTURF organizations directly, and searching the Internet with the Google search engine. More than 160 research grants and activities were identified and grouped by breakout group topic to assist breakout group participants in their discussions. The report is available online at <http://planning.cancer.gov/whealth/abstract/index.htm>.

Working Group Meeting

The WTC Working Group meeting was held in Houston, Texas, February 3-5, 2003. At the meeting, participants heard presentations on the current state of research on women and tobacco, a panel discussion on the three cross-cutting themes described below, and reports on relevant activities and initiatives by public and private funders. The meeting also included an interactive demonstration by Step Afrika, a U.S.-based percussive dance ensemble, on tobacco risk education for African-American youth.

Participants were asked to consider three cross-cutting themes throughout the meeting:

- *Translation.* The critical need to translate current knowledge and research into practical actions for change.
- *Health disparities.* The disproportionate burden of tobacco-related issues across population groups and the vulnerability of some of these groups to the use of tobacco.
- *Global tobacco control.* The widening reach of the tobacco epidemic internationally and the challenge of translating what has been learned from the experiences of developed countries into actions to prevent the spread of tobacco use and tobacco-related disease in other countries.

Each of the approximately 125 participants joined one of the seven breakout groups. Each of these groups, which were selected by the meeting organizers based on the deliberations of the Working Group Steering Committee, addressed one of the following topics:

- Addiction
- Awareness, Risk Perception, and Communications
- Biology and Cancer
- Community and Policy Interventions
- Epidemiology and National Surveillance
- Global Issues
- Interventions for Prevention and Treatment

Breakout group members identified up to nine recommendations in three categories (at least one recommendation in each category) to:

- Fill critical knowledge gaps in basic and applied science.
- Translate what we know into effective interventions.
- Apply new and proven interventions.

For each of the recommendations identified, the breakout groups addressed:

- *Disparities.* How can action on this recommendation reduce disparities among women?
- *Partners.* Which agencies and organizations can work together to implement this recommendation?
- *Impact.* What are the expected outcomes at 2 and 5 years if this recommendation is implemented?

The breakout groups developed a total of 42 recommendations. Each breakout group presented its three highest priority recommendations for discussion at the final plenary session.

Report

Breakout session summary reports were subsequently developed by subject matter experts, nearly all of whom had participated in those sessions. These summaries provide background and justification for the breakout groups' recommendations and are included in their entirety in this Report as Appendix A.

Using the breakout group summaries and recommendations as guidance, the Working Group leadership prepared a report identifying goals in five cross-cutting areas: Discovery, Development, Delivery, Partnerships, and Evaluation and Surveillance. All of the recommendations in the Working Group's Report and the corresponding strategies for achieving the cross-cutting goals reflect the recommendations and deliberations of the seven Working Group breakout groups.

Appendix C: Working Group Meeting Agendas

**Women, Tobacco, and Cancer
Steering Committee Meeting
Conference Room F1/F2, Natcher Conference Center, 45 Center Drive
NIH Campus, Bethesda, MD
June 13, 2002**

7:30 a.m. **Continental Breakfast**

8:30 a.m. **Welcome and Introductions**

8:50 a.m. **Charge to Steering Committee and Meeting Overview**
Marianne H. Alciati, Ph.D., Management Solutions for Health, Inc.

The goal for this meeting is to develop a clear plan for the fall conference on Women, Tobacco, and Cancer, including:

- Primary and related products
- Topics to be addressed *and* their organization
- Structure of the meeting (plenary and breakout sessions)
- Guidelines to be provided to participants
- Techniques for facilitating the conference process
- Conference participants and roles

9:00 a.m. **Conference Goals**
All participants

Goal 1: Identify Gaps and Research Priorities

Identify and prioritize research needs to increase our understanding of the cancer-related biological effects of women's tobacco use and ETS exposure, and develop better interventions to decrease women's and girls' tobacco use/ETS exposure. Research areas may include, but are not limited to, the biology of addiction, cancer susceptibility, behavioral aspects of tobacco use, social/environmental factors affecting tobacco use, and communications and intervention (prevention and cessation) research.

Goal 2: Identify and Prioritize Needs in Dissemination and Applications

Identify and prioritize ways to disseminate and apply current and future research to prevent or reduce women's and girls' tobacco use and ETS exposure. Strategies may include, but are not limited to, intervention, communication, policy, and program.

Underlying premise: Partnerships and collaborations will be essential to implementing recommended strategies.

(June 13, 2002, Agenda, continued)

9:20 a.m.	Conference Product(s)
10:00 a.m.	Conference Topics and Organization
10:45 a.m.	Break
11:00 a.m.	Conference Topics and Organization
11:45 a.m.	Conference Structure (Plenary and Breakout Sessions)
12:15 p.m.	Working Lunch
12:45 p.m.	Techniques for Facilitating the Conference Process
1:15 p.m.	Guidelines for Conference Participants
1:45 p.m.	Conference Participants and Roles
2:30 p.m.	Summary and Next Steps
3:00 p.m.	Adjourn

**Women, Tobacco, and Cancer:
An Agenda for the 21st Century
Inter-Continental Hotel, Houston, Texas
February 3–5, 2003**

Monday, February 3rd

- 5:30 p.m. **Reception**
- 6:00 p.m. **Welcome**
Michele Bloch, Ellen Gritz, C. Tracy Orleans
Conference Charge and Overview
Ellen Gritz, C. Tracy Orleans
Introductions
Ellen Gritz, C. Tracy Orleans
- 6:30 p.m. **Presentations**
Virginia Ernster
Video and Presentation
Cheryl Healton, Circle of Friends (American Legacy Foundation)
- 7:30 p.m. **Dinner**
- 8:45 p.m. **Adjourn**

Tuesday, February 4th

- 7:30 a.m. **Breakfast**
- 8:15 a.m. **Welcome and Instructions for Day 2**
- 8:25 a.m. **Panel Moderator**
Julia Rowland
- 8:35 a.m. **Panel Presentations and Discussions**
Translation: From Research to Practice to Policy
Presenter, Jessie Gruman; Discussant, Sharon Carothers
Health Disparities: Narrowing the Gap
Presenter, Sherry Mills; Discussant, Grace Ma
Global Tobacco Control
Presenter, Nancy Kaufman; Discussant, Soon-Young Yoon
- 10:20 a.m. **Break**
- 10:35 a.m. **Breakout Sessions**
Addiction
Awareness, Risk Perception, and Communications
Biology and Cancer
Epidemiology and National Surveillance
Community and Policy Interventions
Global Issues
Interventions for Prevention and Treatment

(February 4, 2003, Agenda, continued)

- 12:15 p.m. **Funders Panel and Lunch**
Panel Chair, Wanda Jones
Federal Programs (including NCI, NIDA, and CDC)
Michele Bloch
State of California (Tobacco-Related Disease Research Program)
Francisco Buchting
Legacy Foundation
Helen Lettlow
Robert Wood Johnson Foundation
C. Tracy Orleans
- 1:30 p.m. **Breakout Sessions Continue**
- 2:30 p.m. **Break and Discussion Across Breakout Sessions**
- 3:00 p.m. **Breakout Sessions Continue**
- 4:30 p.m. **Adjourn**
- 6:00 p.m. **Reception**
Introduction
Mildred Morse
Presentation: Step Afrika!
A demonstration presenting tailored health messages through stepping
- 7:30 p.m. **Dinner**

Wednesday, February 5th

- 7:30 a.m. **Breakfast**
- 8:30 a.m. **Welcome and Instructions for Day 3**
Ellen Gritz, C. Tracy Orleans
- 8:45 a.m. **Breakout Session Presentations**
- 10:30 a.m. **Break**
- 10:45 a.m. **Breakout Session Presentations Continue**
- 12:00 p.m. **Concluding Remarks**
Michele Bloch, Ellen Gritz, C. Tracy Orleans
- 12:30 p.m. **Adjourn**

Appendix D: Working Group Steering Committee

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C. Tracy Orleans, Ph.D.
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