

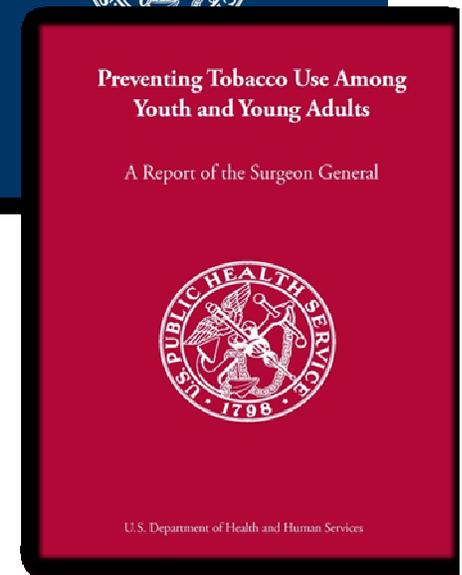
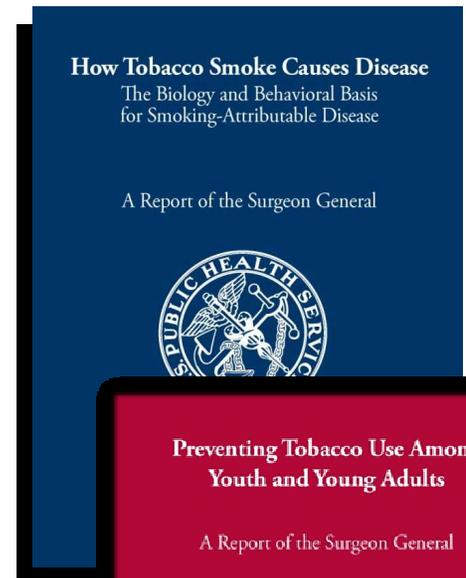
# Reducing Tobacco-Related Cancer Incidence and Mortality

## Findings from Recent SGRs

### How Tobacco Smoke Causes Disease, 2010 and *Preventing Tobacco Use Among Youth and Young Adults, 2012*

Terry Pechacek, PhD  
*Associate Director for Science*  
CDC Office on Smoking and Health

*National Cancer Policy Forum Workshop on Reducing Tobacco-  
Related Cancer Incidence and Mortality*  
*Institute of Medicine – June 11-12, 2012*



*National Cancer Policy Forum Workshop on Reducing Tobacco-Related Cancer Incidence and Mortality  
Institute of Medicine – June 10, 2012*

*The findings and conclusions in this presentation are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention.  
The responsibility for all of the presented material rests exclusively with the author.*



**Tobacco smoke contains a complex mixture of thousands of compounds including more than 60 well-established carcinogens.**

**Considerable evidence indicates that in human cancers caused by cigarette smoking, PAHs, N-nitrosamines, aromatic amines, and certain volatile organic agents play a major role.**

**The major pathways of cancer causation by cigarette smoke have been established:**

- Formation of covalent bonds between carcinogens and DNA
- Accumulation of permanent somatic mutations in critical genes
- Somatic mutations lead to clonal outgrowths and, through accumulation of additional mutations, to cancers

## **Smoking can cause cancer almost anywhere in your body.**

Here are some of the cancers that researchers know smoking causes.

mouth, nose,  
and throat

larynx

trachea

esophagus

lungs

stomach

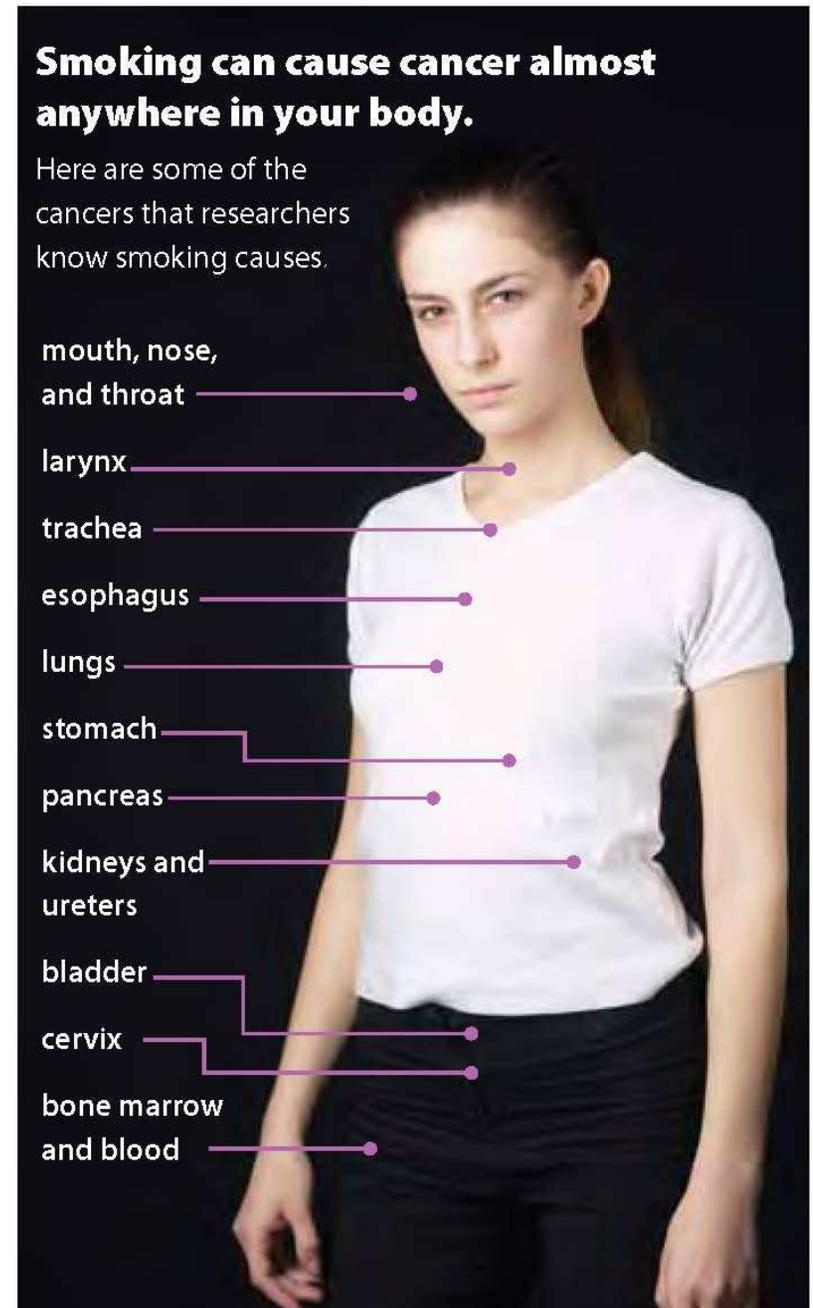
pancreas

kidneys and  
ureters

bladder

cervix

bone marrow  
and blood

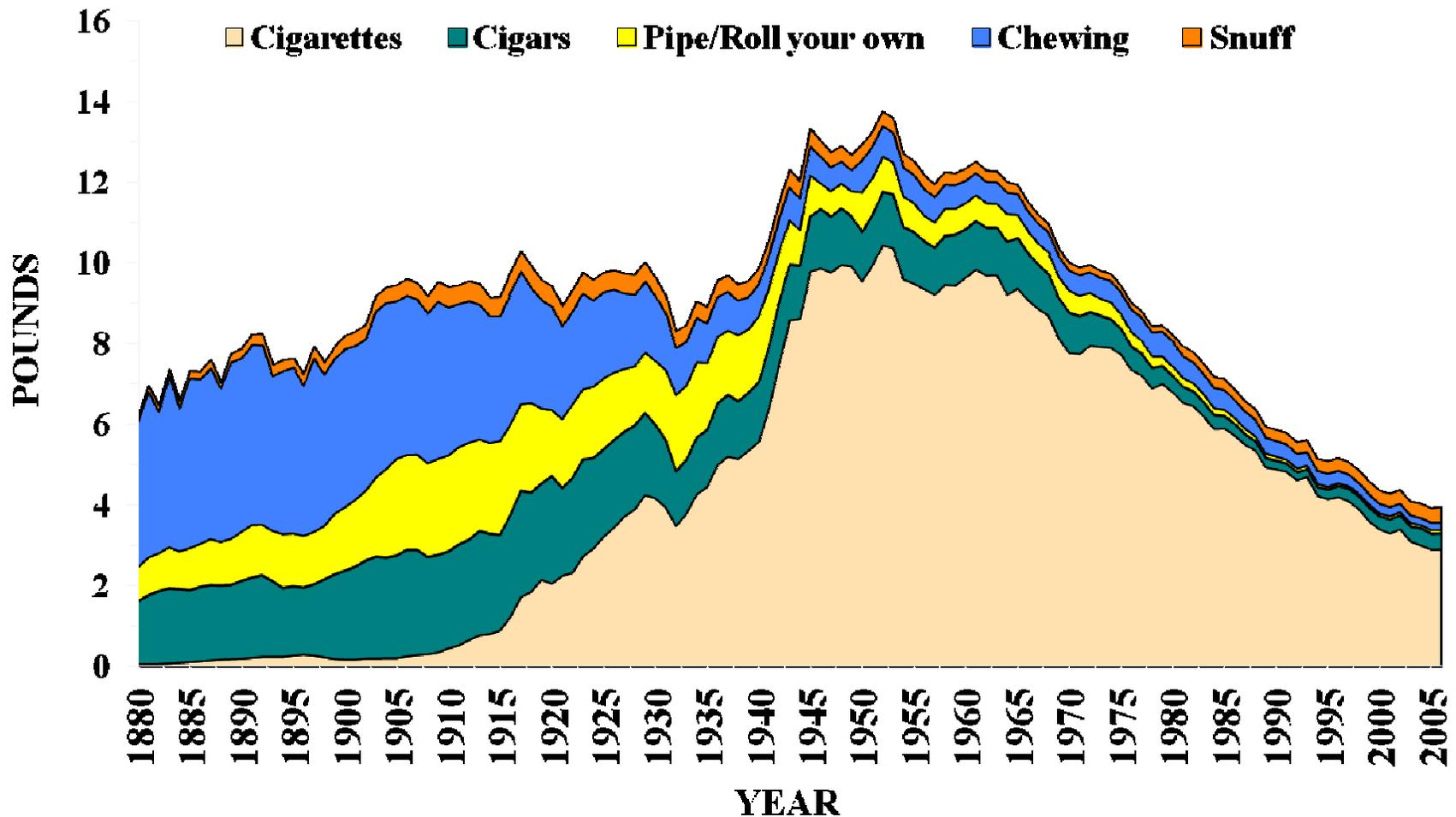


## ***2010 SGR MAJOR CONCLUSION #2***

***“Inhaling the complex chemical mixture of combustion compounds in tobacco smoke causes immediate damage to the body and can lead to adverse health outcomes.”***

**Related Fact:** Inhaling tobacco smoke has been a common practice for centuries, but the development of the cigarette from flue-cured tobacco which produced smoke that was more easily inhaled into the lungs began replacing other forms of tobacco use in the early 20<sup>th</sup> Century.

# Trends in Per Capita Consumption of Various Tobacco Products – United States, 1880-2006



Source: US Department of Agriculture

## ***2010 SGR MAJOR CONCLUSION #4***

***“Sustained use and long-term exposure to tobacco smoke are due to the powerfully addicting effects of tobacco products.”***

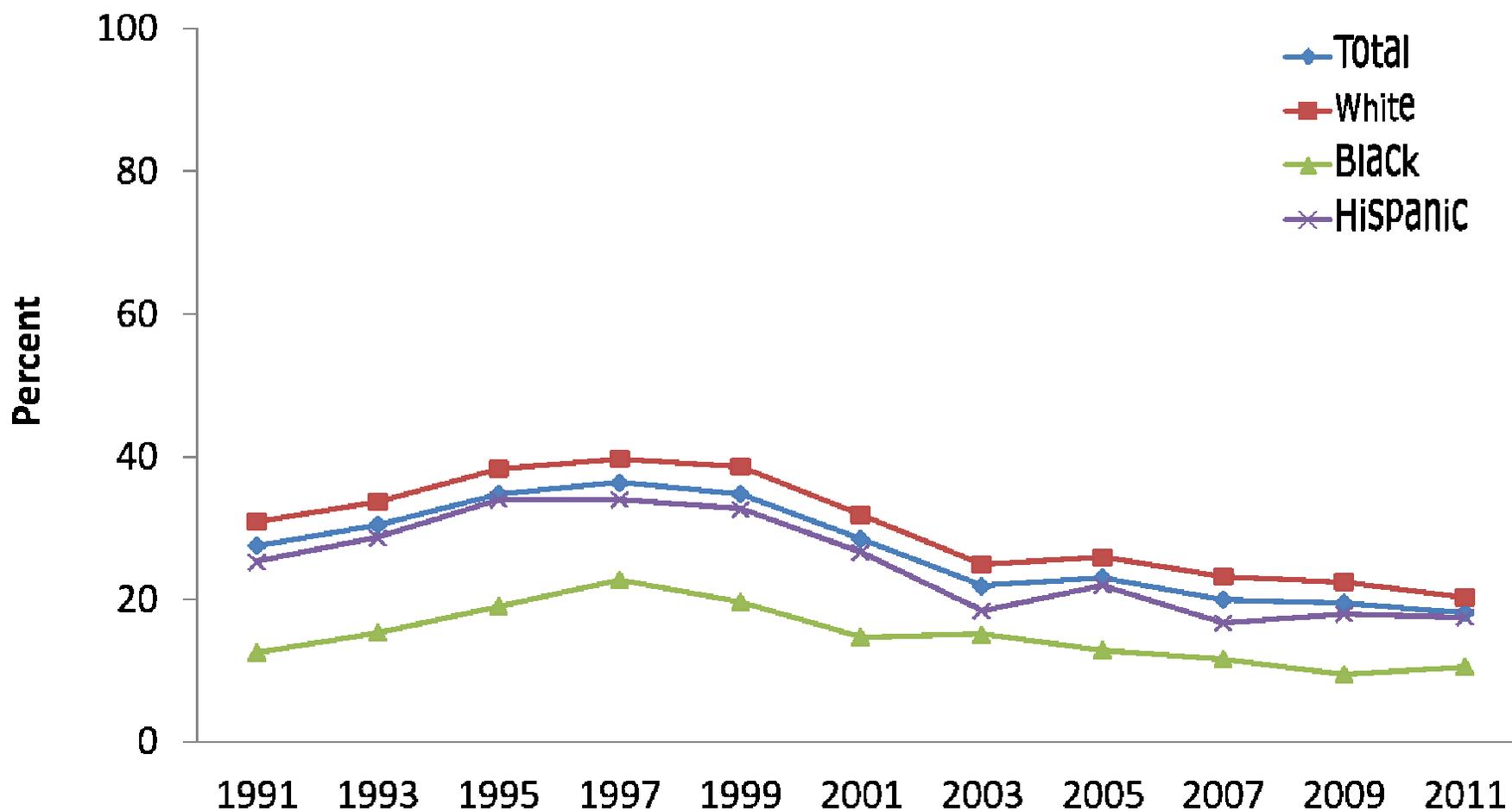
**2012 SGR Finding:** Prevention efforts must focus on young adults ages 18 through 25, too. Almost no one starts smoking after age 25. Nearly 9 out of 10 smokers started smoking by age 18, and 99% started by age 26. Progression from occasional to daily smoking almost always occurs by age 26.

## ***2012 SGR MAJOR CONCLUSION #4***

***“After years of steady progress, declines in the use of tobacco by youth and young adults have slowed for cigarette smoking and stalled for smokeless tobacco use.”***

**Related Findings:** There could be 3 million fewer young smokers today if success in reducing youth tobacco use that was made between 1997 and 2003 had been sustained. One out of five high school males smokes cigars, and cigar use appear to be increasing among other groups.

# Percentage of High School Students Who Reported Current Cigarette Use,\* 1991 – 2011<sup>†</sup>

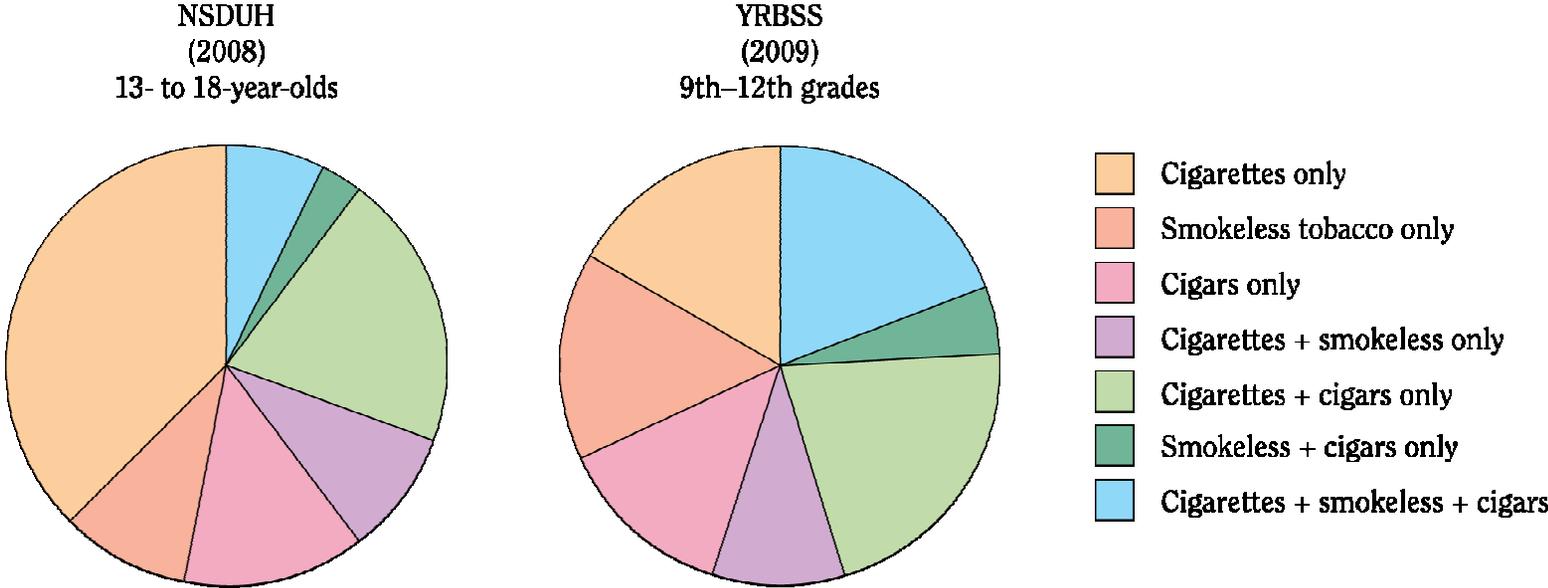


\* Smoked cigarettes on at least 1 day during the 30 days before the survey.

<sup>†</sup> Total - Increased 91–97, Decreased 97–11; White - Increased 91–97, Decreased 97–11; Black - Increased 91–97, Decreased 97–11; Hispanic - Increased 95–97, Decreased 95–11

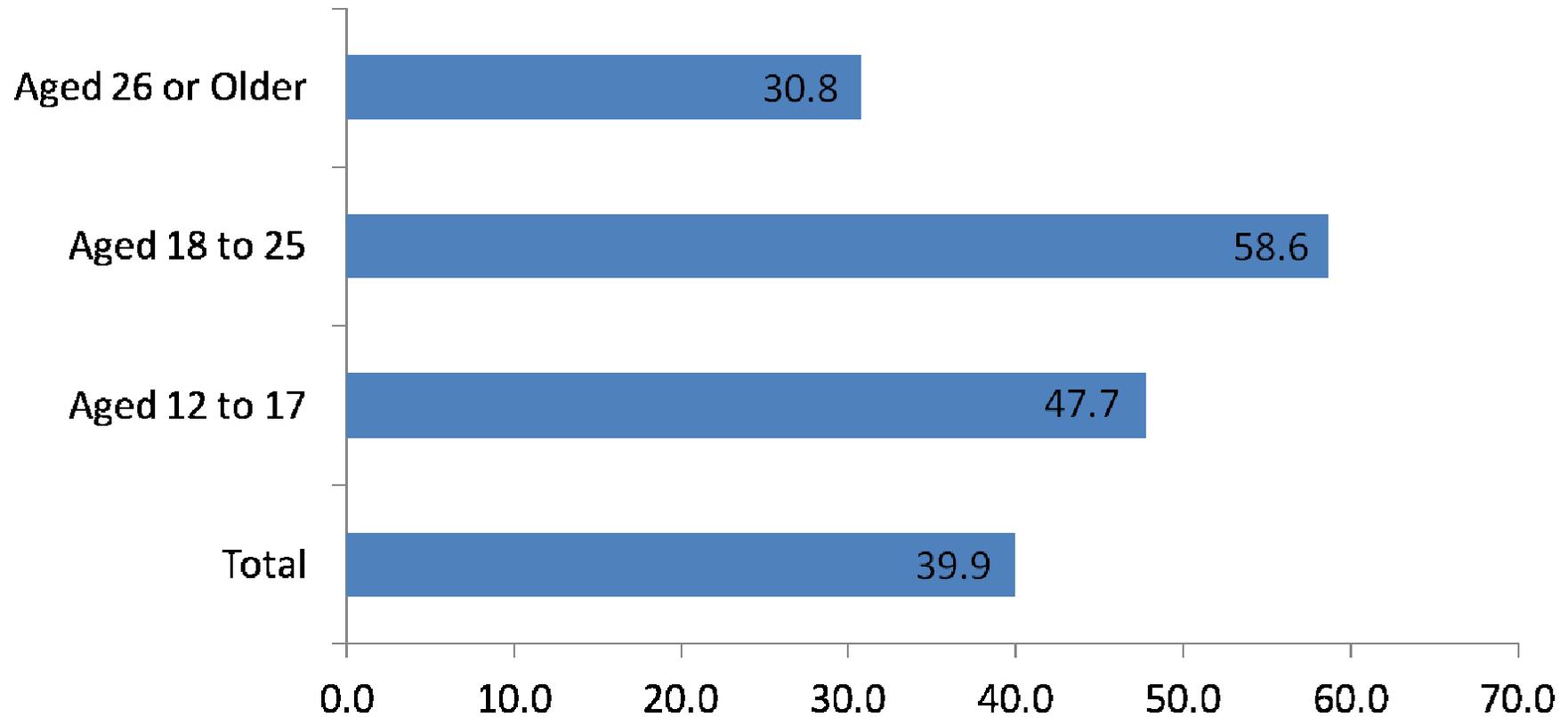
# Prevalence of current use of multiple tobacco products among males of high school age who report using tobacco; NSDUH 2008 and YRBSS 2009

**B. Males of high school age who report using tobacco**



Source: 2008 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data); 2009; YRBSS: Centers for Disease Control and Prevention, Division of Adolescent and School Health (unpublished data).

# Past Month Cigarette Use among Past Month Smokeless Tobacco Users, by Age Group, 2010



**Source: National Survey on Drug Use and Health, 2010**

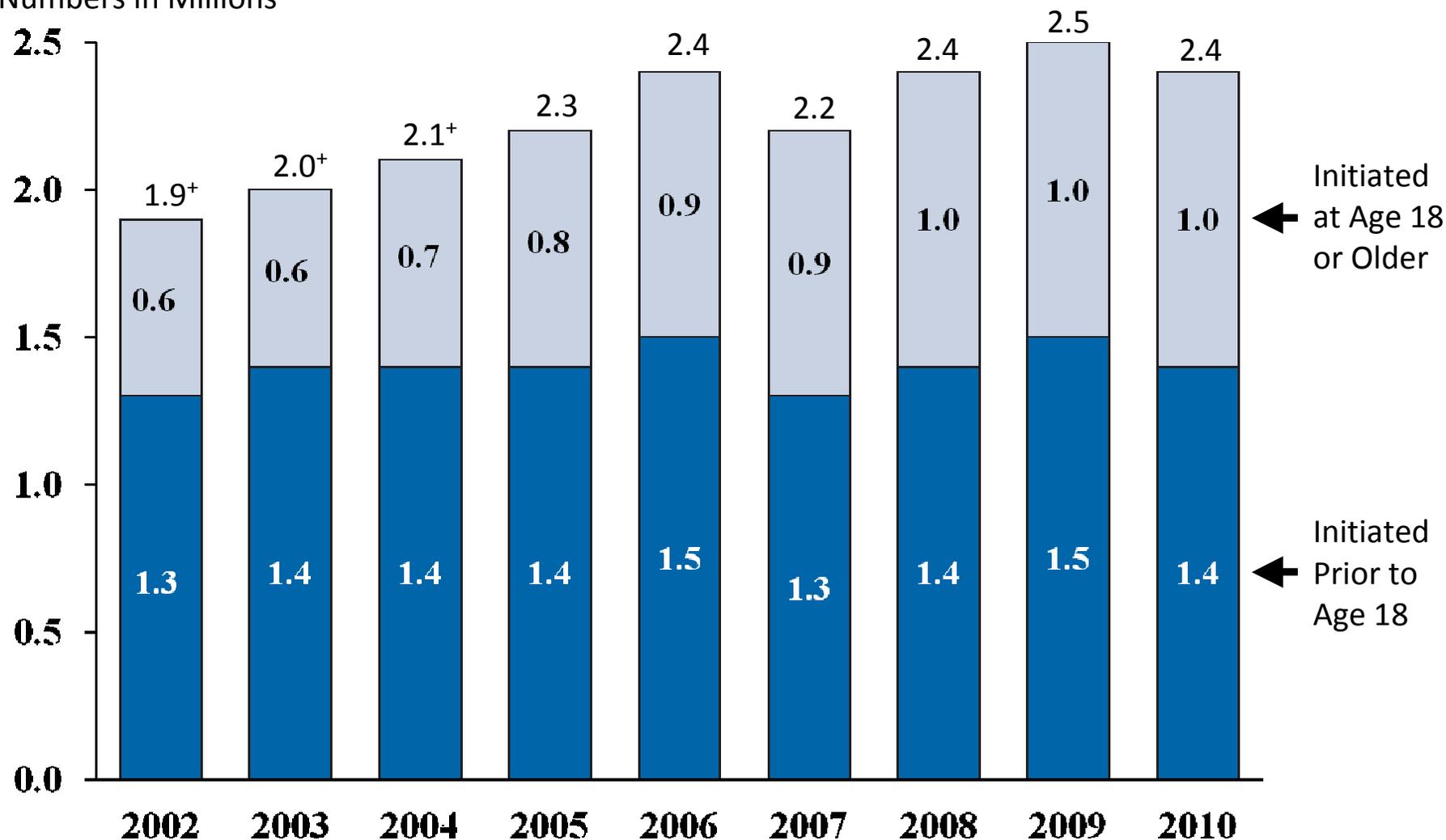
## ***2010 SGR MAJOR CONCLUSION #3***

***“The risk and severity of many adverse health outcomes caused by smoking are directly related to the duration and level of exposure to tobacco smoke.”***

**Related Finding:** Exposure levels in birth cohorts is primarily a function of level of smoking initiation in adolescence, progression to daily use in young adulthood, and rate of cessation in adulthood.

## Past Year Cigarette Initiates among Persons Aged 12 or Older, by Age at First Use: NSDUH 2002-2010

Numbers in Millions



<sup>+</sup> Difference between this estimate and the 2010 estimate is statistically significant at the .05 level.

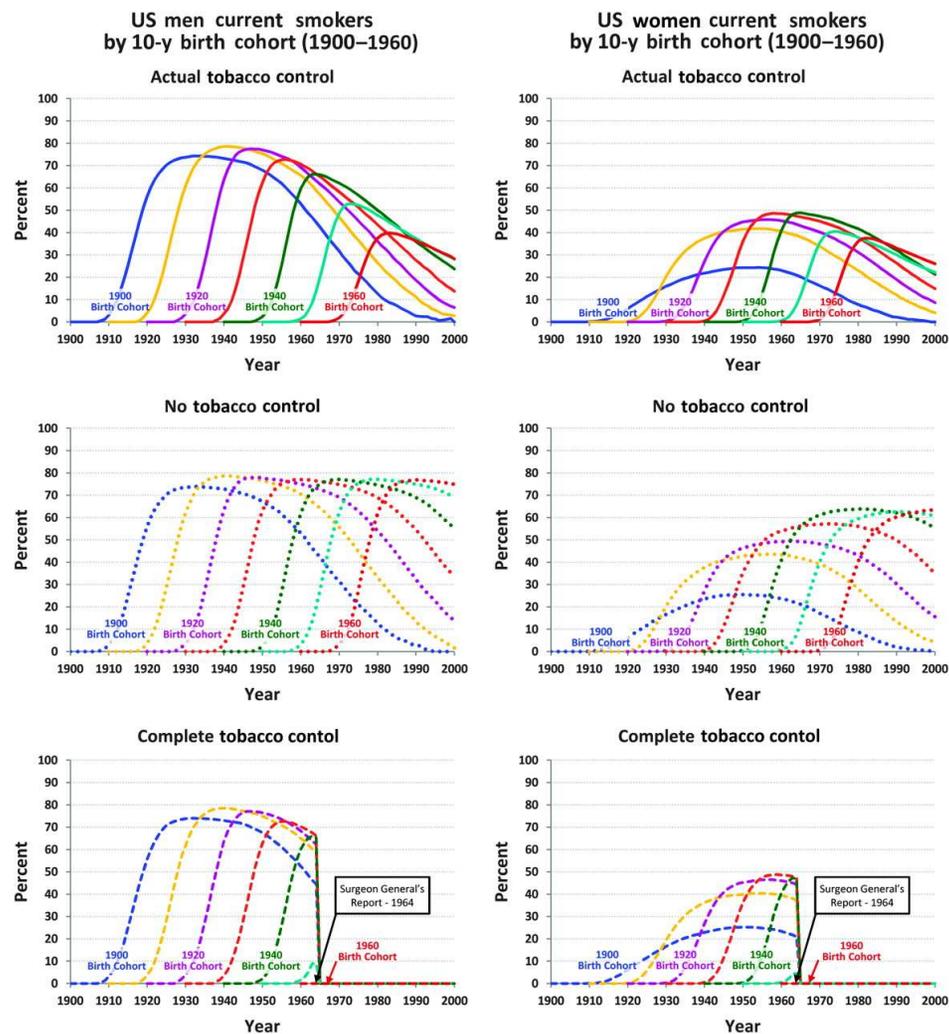
Note: Due to rounding, the stacked bar totals may not add to the overall total.

# Average Annual Rates of Change NHIS 1974-2010

- 1974 *adj.* (37.8%) – 2010 (19.4%) = -0.51%
- 1974 (37.1%) – 1990 (25.5%) = -0.73%
- 1990 *adj.* (26.2%) – 1997 (24.7%) = -0.21%
- 1997 (24.7%) – 2004 (20.9%) = -0.54%
- 2004 (20.9%) – 2010 (19.4%) = -0.25%
- 1990 *adj.* (26.2%) – 2010 (19.4%) = -0.34%

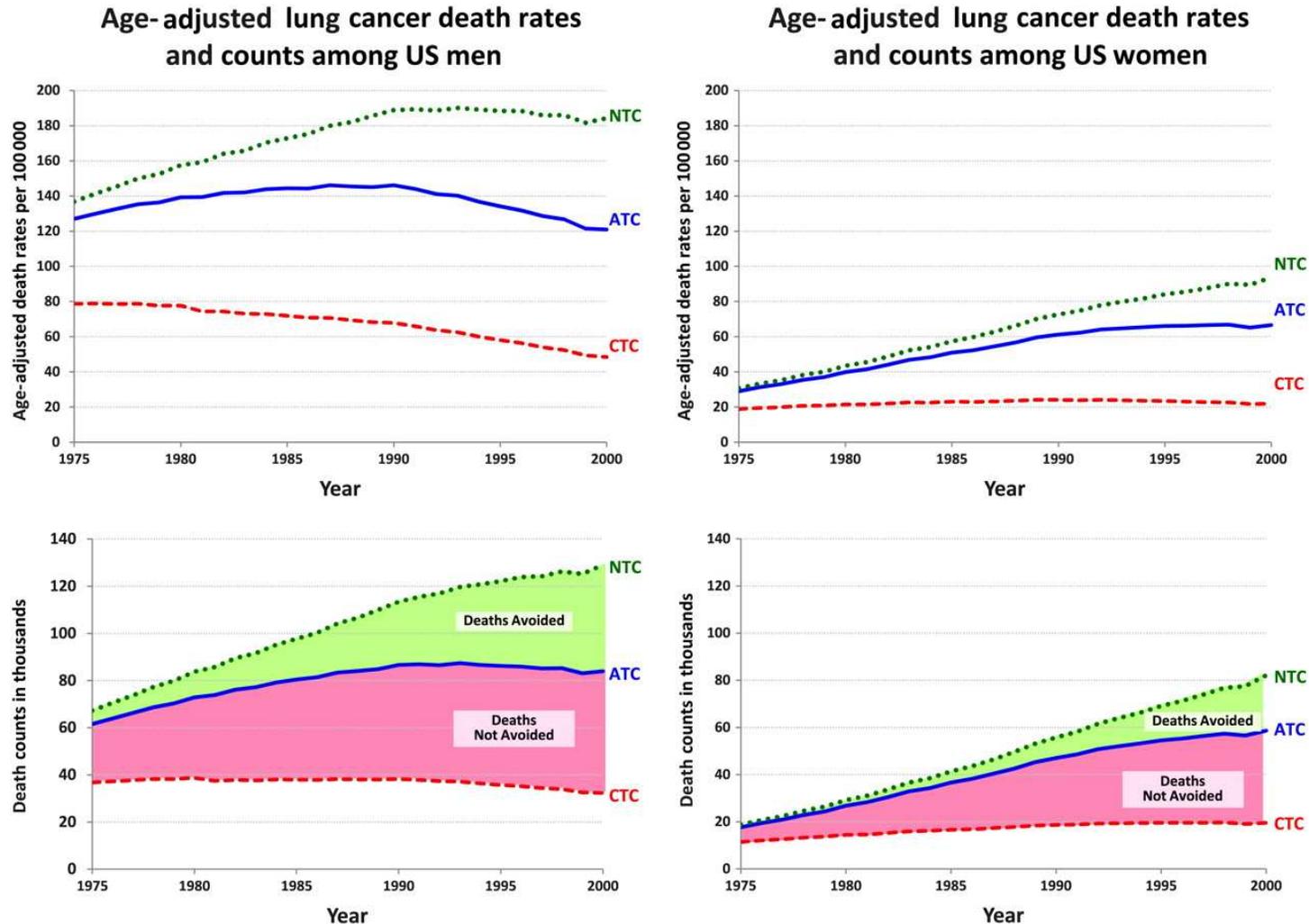
\**adj* (definition change in 1992 – adjusted estimates used in analysis of rates of change)

## Percentage of current smokers in the US population by sex and birth cohort, assuming three different tobacco control scenarios.



Moolgavkar S H et al. JNCI J Natl Cancer Inst  
2012;104:541-548

## Lung cancer death rates and counts for men and women aged 30-84 years as observed and for modeled tobacco control scenarios.



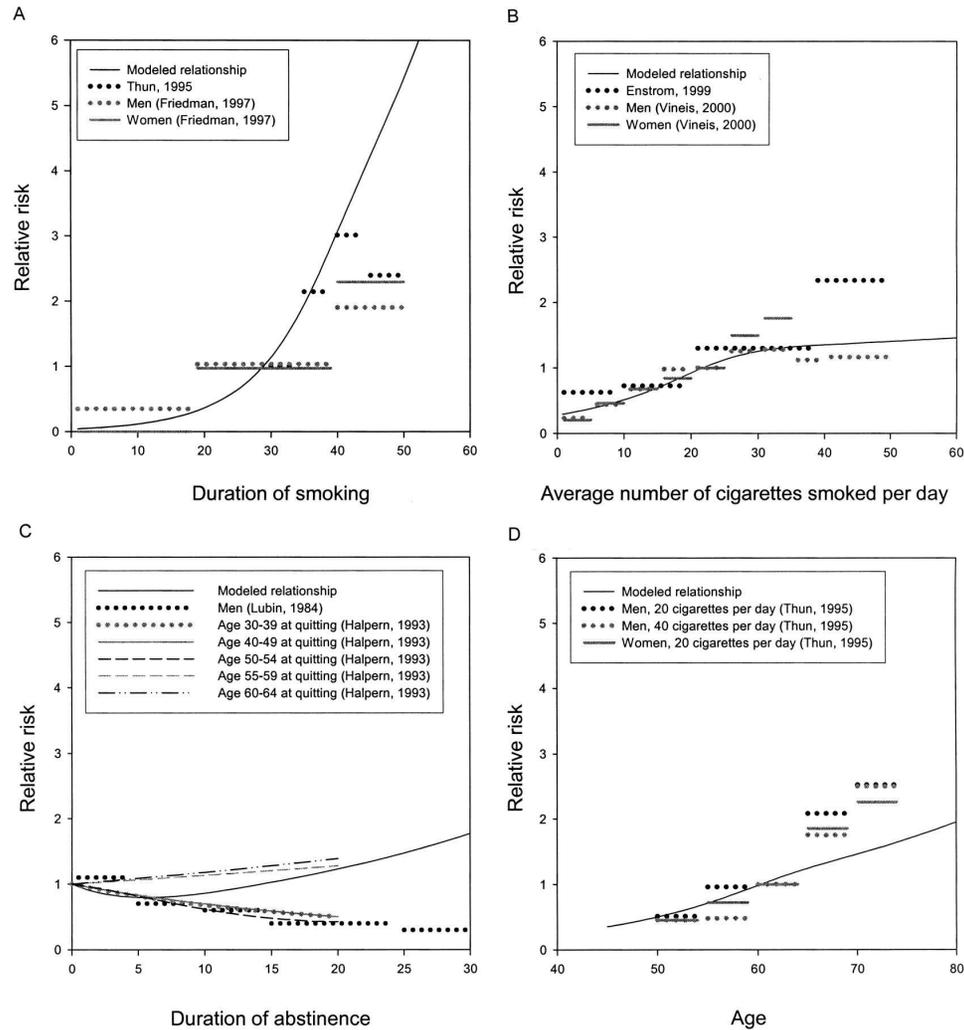
Moolgavkar S H et al. JNCI J Natl Cancer Inst 2012;104:541-548

## ***2010 SGR MAJOR CONCLUSION #6***

***“There is insufficient evidence that modifying tobacco products to lower emissions of specific toxicants reduces risk for major adverse health outcomes.”***

**Related Findings:** Evidence indicates that lung cancer risk increases far more strongly with each additional year of smoking than it increases for higher average number of cigarettes smoked per day. Substantial population risks may be associated with any product that delay complete cessation among smokers.

# Modeled multivariable relations between 1-year lung cancer risk and each of the four continuous predictors.

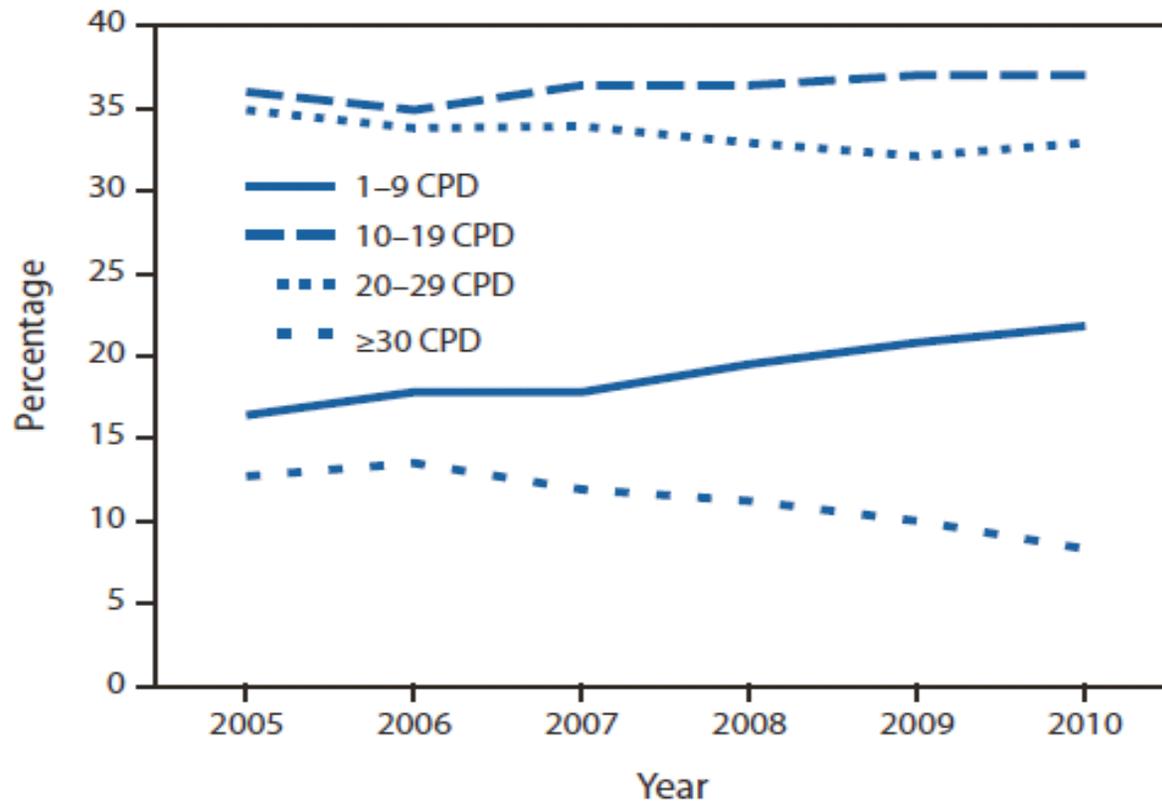


Bach P B et al. JNCI J Natl Cancer Inst 2003;95:470-478

# Emerging Changes in Tobacco Use

- Reducing number of cigarettes smoked per day
- Use of other tobacco products besides cigarettes
- Pattern of using two or more tobacco products
- Use of cigarettes together with other combusted tobacco product is special concern

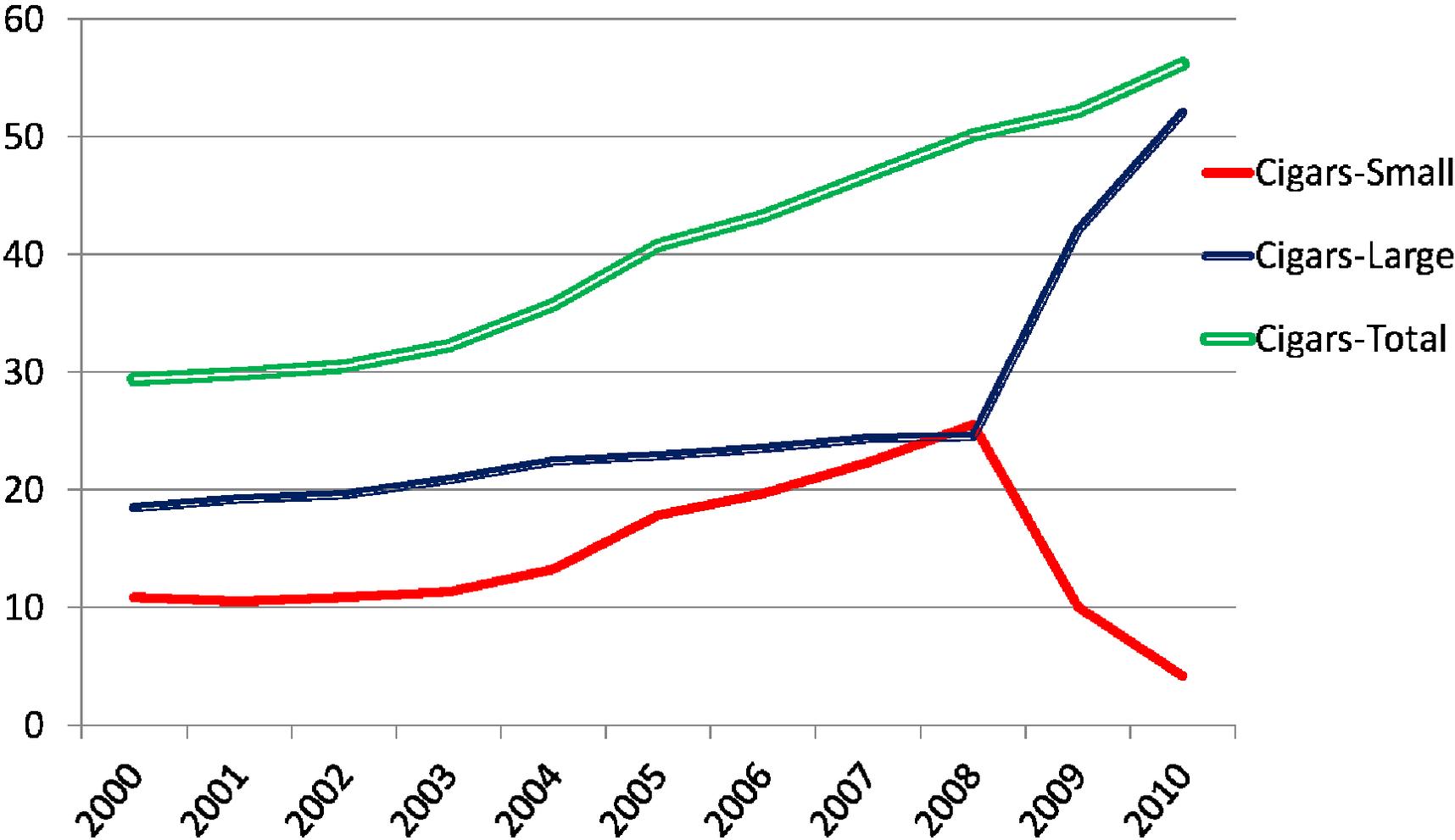
# Percentage of daily smokers\* aged $\geq 18$ years, by number of cigarettes smoked per day (CPD) and year, NHIS, United States, 2005--2010



•Persons who reported smoking at least 100 cigarettes during their lifetime and who, at the time of the survey, reported smoking cigarettes every day.

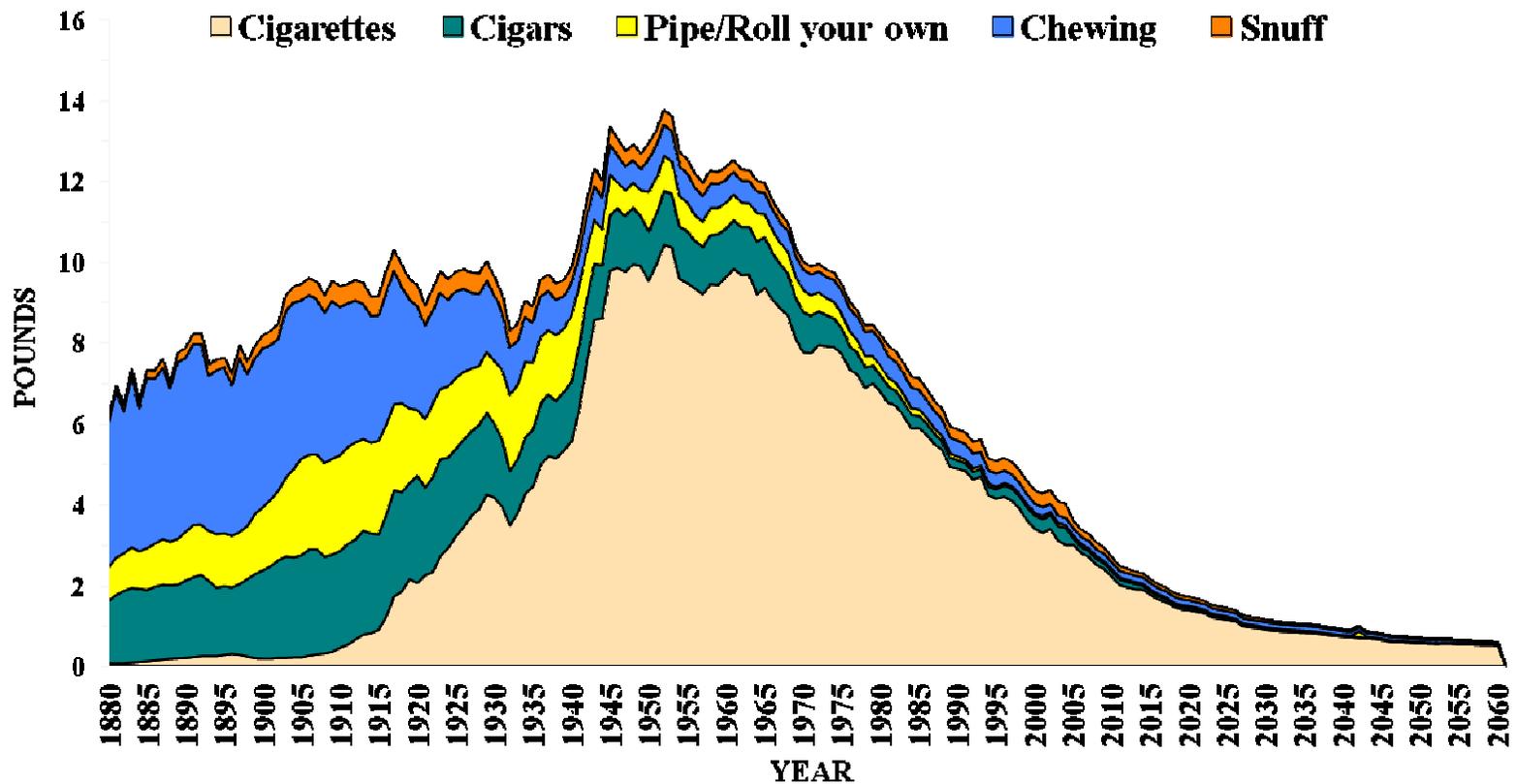
•**Source:** CDC. Vital Signs: Current Cigarette Smoking Among Adults Aged  $\geq 18$  Years—US, 2005-2010. MMWR 60 (Early Release); 1-6

# Per Capita Consumption of Cigars (Number of Sticks) – 2000-2010



Source: US Department of Treasury; Alcohol and Tobacco Tax and Trade Bureau

# Trends in Per Capita Consumption of Various Tobacco Products – United States, 1880-2004 and Asymptotic Projection to 2060



Source: Dr. Gary Giovino, University of Buffalo School of Public Health and Health Professions, 2011

# Potential Population Risks of Alternatives to Cigarettes

- Use of other tobacco products may delay cessation of cigarettes
- Prolonging smoking substantially increases risk
- Duration is a stronger determinant of risk than intensity (i.e., amount smoked per day)
- Significant health benefits from reducing the amount smoked or short-term cessation have not been demonstrated.

# National Surveillance of Tobacco Product Use

- Use of all tobacco products, not just cigarettes
- Use of combinations of tobacco products, rather than monitoring use of each product in isolation
- Prevalence of use of all combusted tobacco products combined
- Impact of alternative or new tobacco products on cessation of smoking

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