

# Cancer Control Strategies Used in the US: Past 10 years

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# Population-level cancer control strategies are often more effective and cost-effective than individual-level strategies

- Population-focused:
  - Laws, regulations, policies
- Individual-focused:
  - Clinical and public health recommendations and guidelines
- Will mention a mix of these types of strategies

# Evolution of evidence and thus recommendations for cancer control strategies

- Necessary to optimize benefits to harms
  - Including for subpopulations
- Need to communicate this to the public and providers
  - Otherwise, lose confidence cancer control strategies
- Epidemiology, a research approach, has:
  - Surveilled cancer and its risk factors over time and within US sub-populations;
  - Identified risk factors and preventive factors for cancer;
  - Tested cancer control strategies (interventions in trials);
  - Evaluated the effectiveness of these strategies after deployment.
  - Contributed information to support the evolution of these strategies.

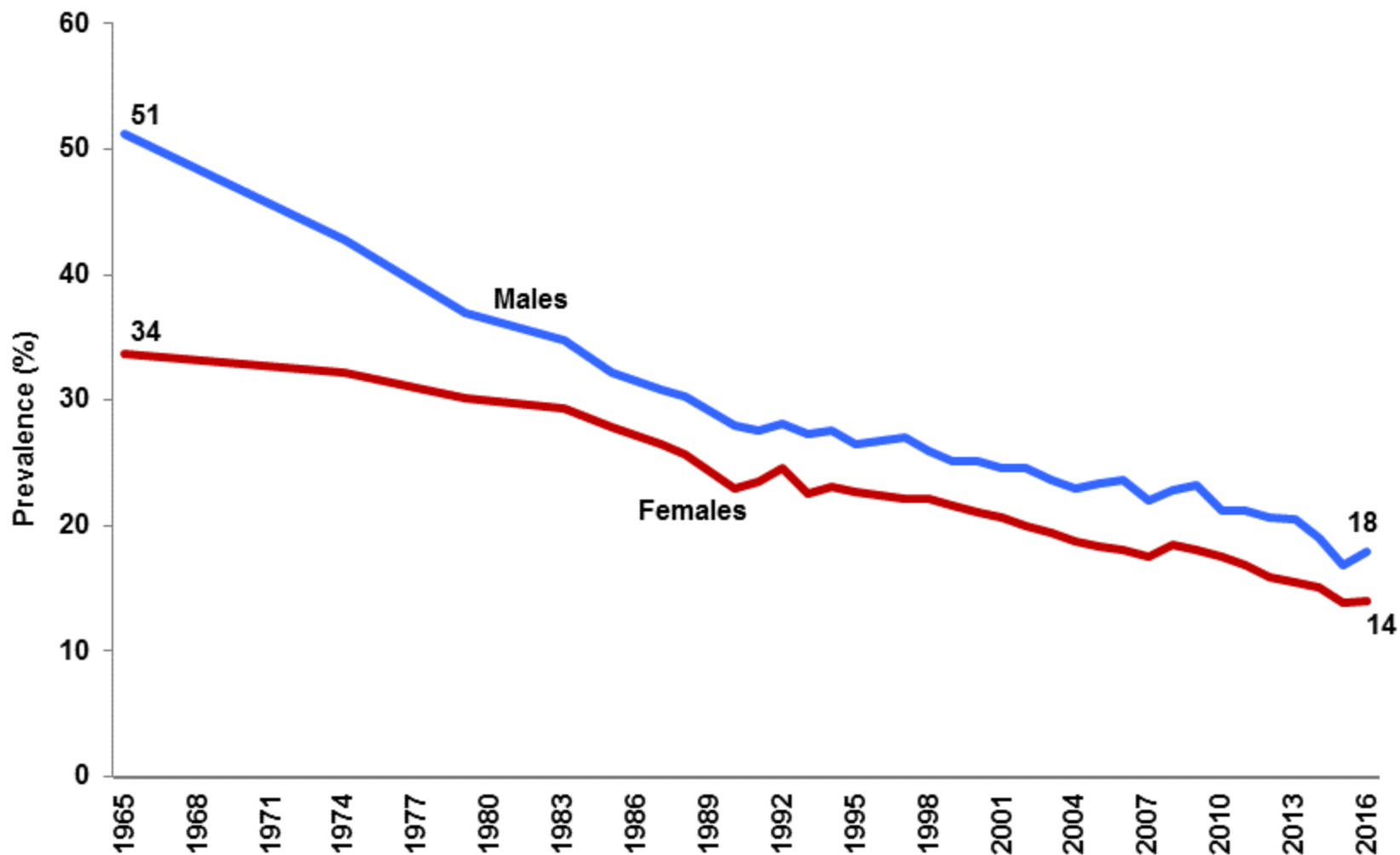
# Cancer control strategies

- Tobacco and the combination of obesity, inactivity, and poor diet account for ~40% of all cancers.
- Will focus on these first.

# Tobacco control as a strategy for the primary prevention of lung cancer and other smoking-associated cancers

- Remarkable declines in cigarette smoking since the 1964 US Surgeon General's report on Smoking and Health.
  - Multiple strategies
- Led to remarkable declines in cancer mortality, especially and other smoking-associated cancers.
  - First evident in 1990s in men and 2000s in women

# Trends in Current Cigarette Smoking\* by Sex, Adults 18 and Older, US, 1965-2016

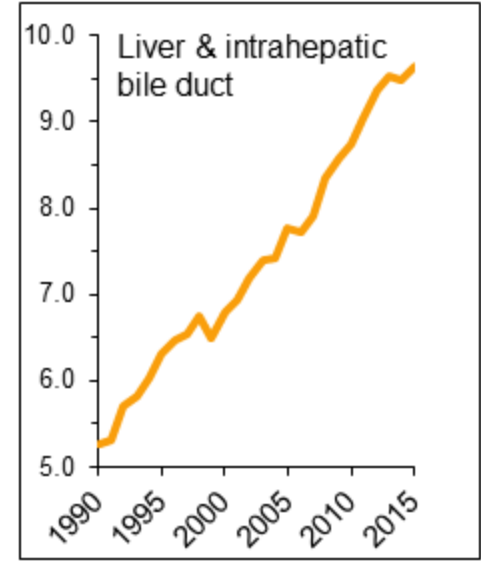
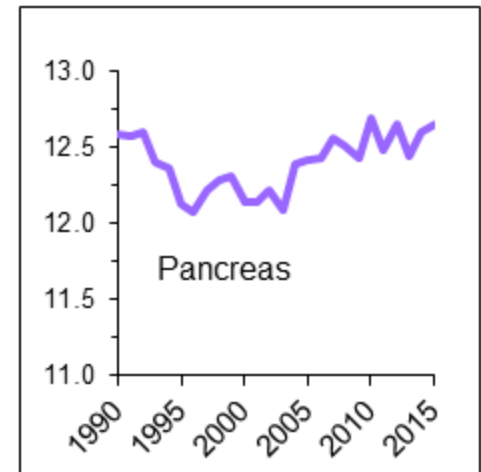
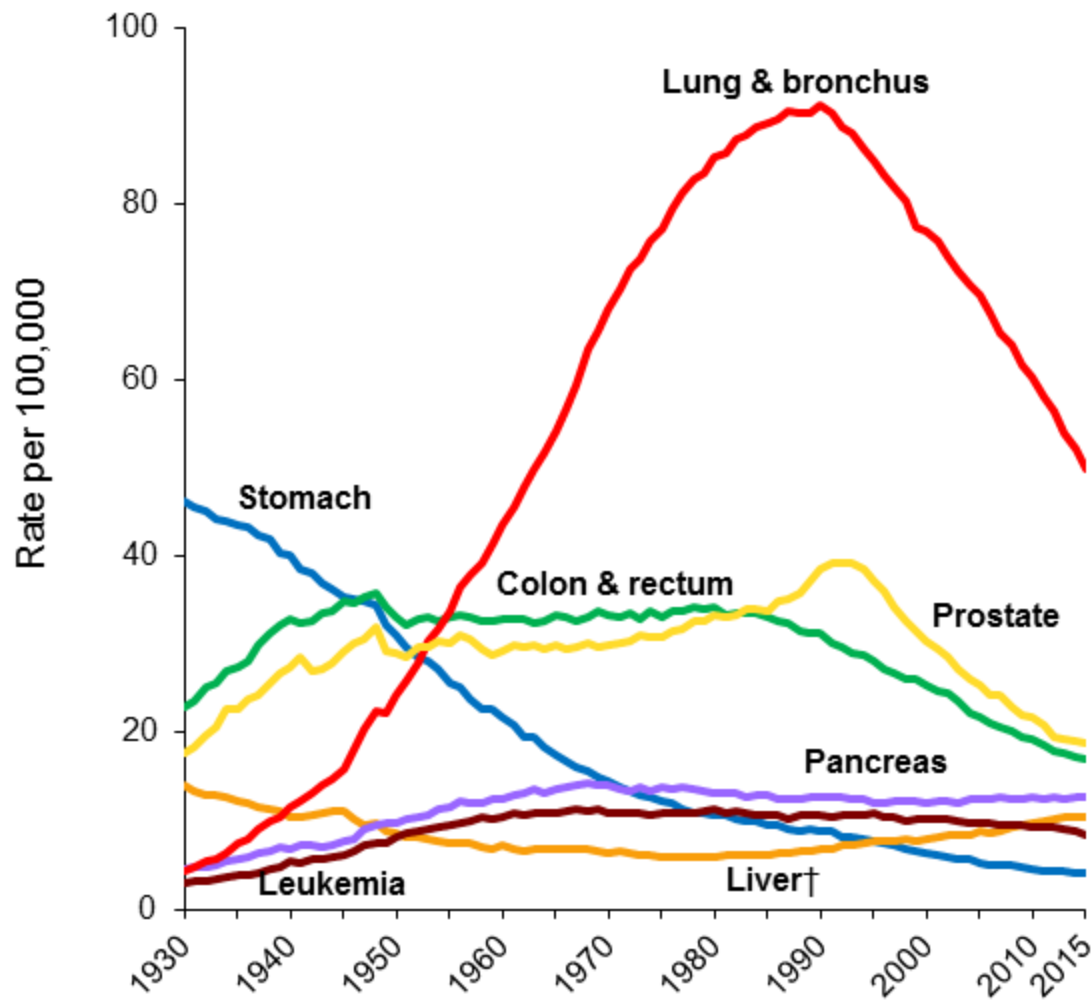


<https://www.cancer.org/research/cancer-facts-statistics/cancer-prevention-early-detection.html>

\*Ever smoked 100 cigarettes in lifetime and smoking every day or some days at time of survey. Note: Redesign of survey in 1997 may affect trends. Estimates are age-adjusted to the 2000 US standard population.

Source: National Health Interview Surveys, see notes for citation.

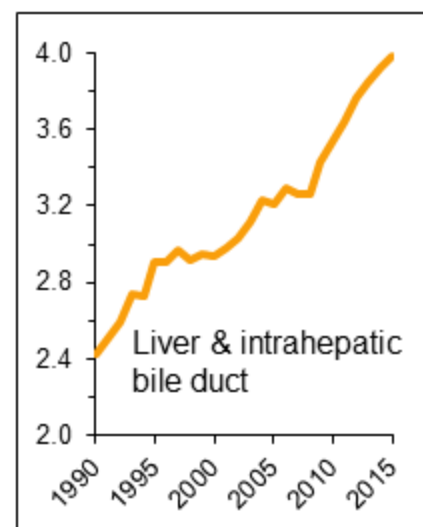
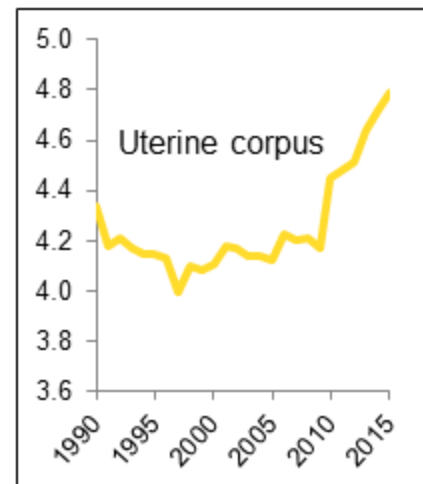
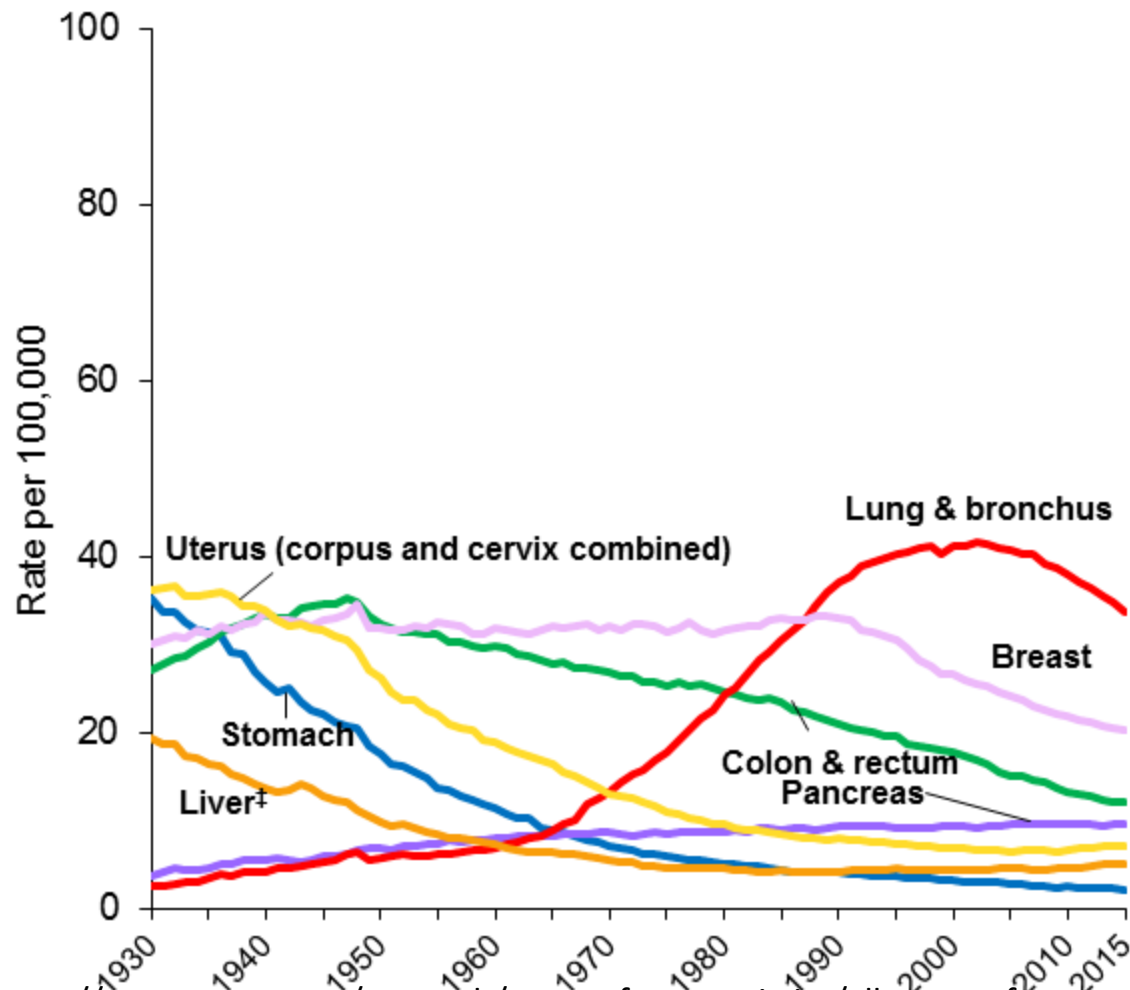
# Trends in Cancer Death Rates\* Among Males, US, 1930-2015



<https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2018.html>

\*Age-adjusted to the 2000 US standard population. †Includes intrahepatic bile duct, gallbladder, and other biliary.  
 NOTE: Due to International Classification of Diseases coding changes, numerator information for colorectal, liver, and lung cancers has changed over time  
 Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2017.

# Trends in Cancer Death Rates\* Among Females, US, 1930-2015



<https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2018.html>

\*Age-adjusted to the 2000 US standard population. †Uterus includes uterine corpus and uterine cervix combined. ‡Includes intrahepatic bile duct, gallbladder, and other biliary.

NOTE: Due to International Classification of Diseases coding changes, numerator information for colorectal, liver, lung, and uterine cancers has changed over time.

Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2017.



# Tobacco control strategies – past 10 years

- Federal Family Smoking Prevention and Tobacco Control Act – 2009 law
  - Gave FDA authority to regulate manufacturing, marketing and sale of tobacco products, including
    - Banning flavored cigarettes, strengthening controls on marketing to children, prohibiting misleading labels (“light”, “low tar”)
- Tobacco-free college and university campus initiatives (**new strategy**) - universally adopted
- Tobacco cessation for cancer patients (**new population**)
  - National Comprehensive Cancer Network guidelines
  - Linking of some electronic medical records systems to state quit lines (**new strategy**)
- Text options for state quitlines (**new communication**)
  - (<https://smokefree.gov/tools-tips/get-extra-help/speak-to-an-expert>)

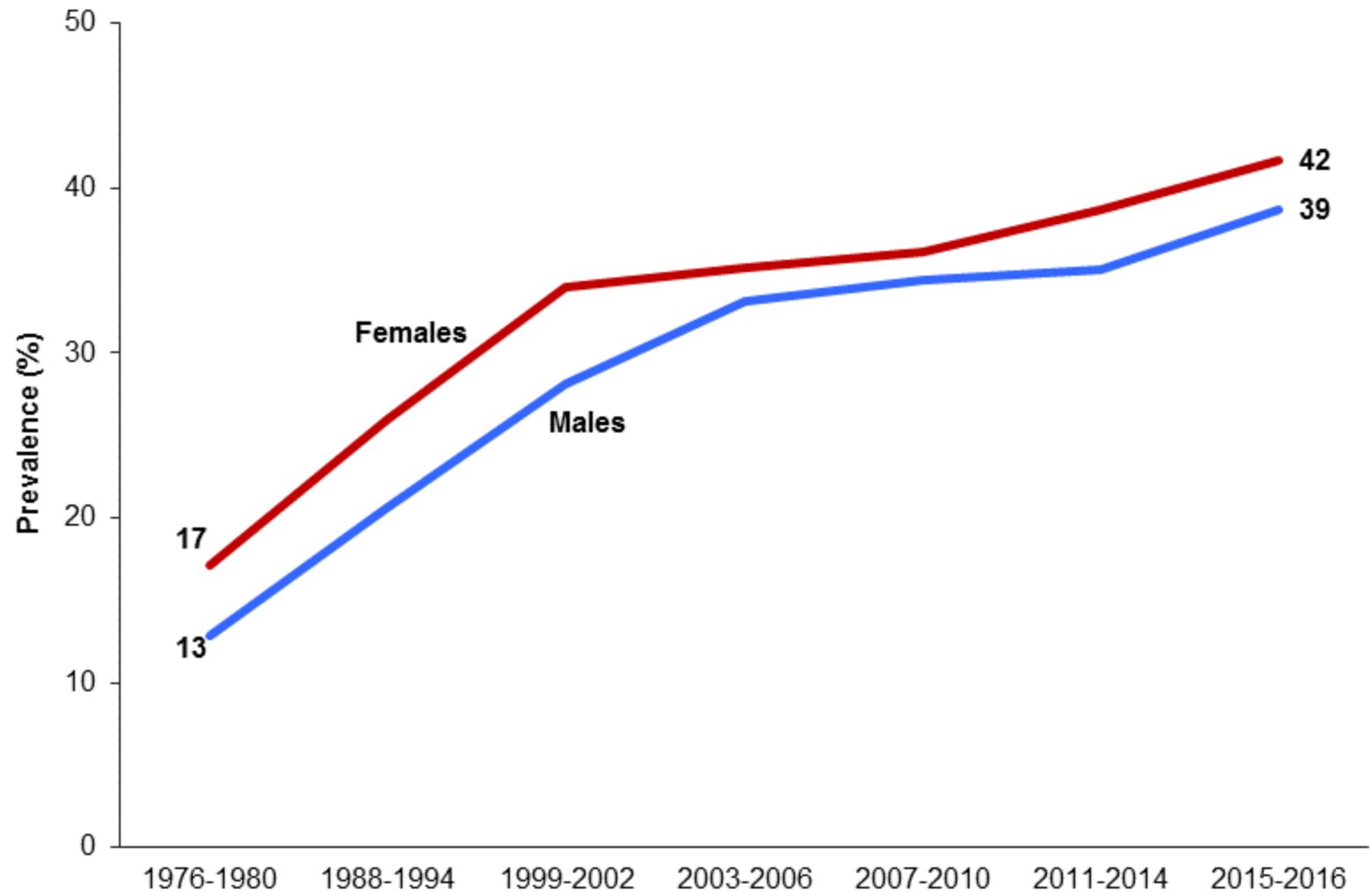
# Lung cancer control strategies beyond primary prevention – past 10 years

- 2013 – USPSTF - Screening of eligible current and former smokers with spiral CT for the early detection of lung cancer (**new tool, new recommendation**)
  - Secondary prevention
  - Barriers to uptake remain
  - <https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/lung-cancer-screening>
- Development of effective immunotherapy for lung cancer (**new tool**)
  - Tertiary prevention
  - 2014 first FDA approved for lung
  - Molecular markers to inform immunotherapy decision-making

# Obesity, physical inactivity, suboptimal diet as targets for cancer control – past 10 years

- Labeling of calorie content – chain restaurant menus and vending machines (**new regulatory strategy**)
  - FDA regulations 2014 – effective date May 7, 2018
  - <https://www.fda.gov/food/labelingnutrition/ucm217762.htm>
- Guidelines specific to cancer regularly updated (**new evidence**)
  - e.g., AICR/WCRF - 3rd Expert Report - May 2018
  - <https://www.wcrf.org/dietandcancer/resources-and-toolkit>
- Guidelines for cancer patients (**new population**)
  - e.g. NCCN guidelines on survivorship
    - Physical activity, nutrition and weight management
    - [https://www.nccn.org/professionals/physician\\_gls/default.aspx](https://www.nccn.org/professionals/physician_gls/default.aspx)

# Trends in Obesity\* Prevalence by Sex, Adults 20 to 74 Years, US, 1976-2016

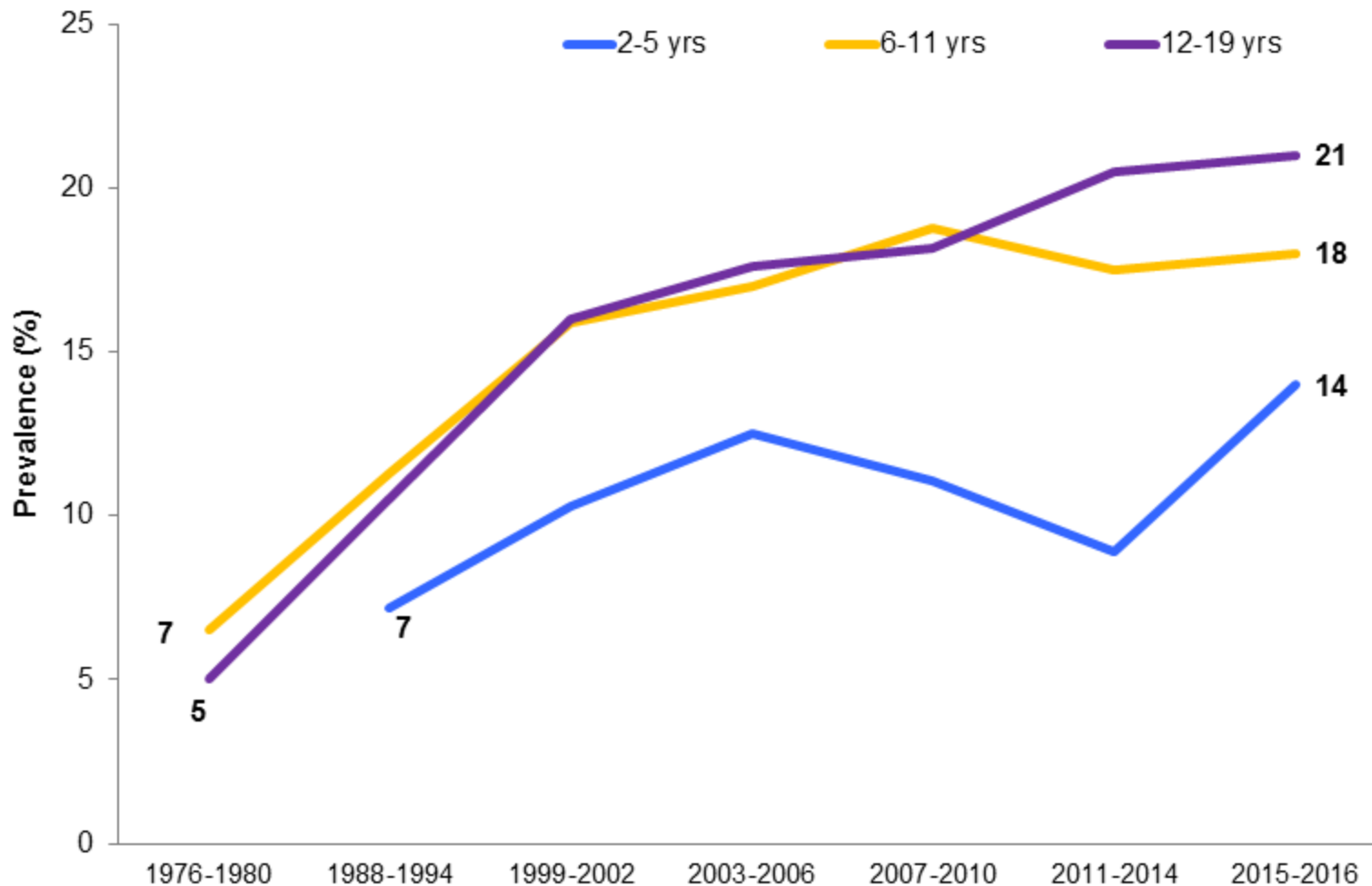


<https://www.cancer.org/research/cancer-facts-statistics/cancer-prevention-early-detection.html>

\*Obesity=body mass index  $\geq 30$  kg/m<sup>2</sup>. Note: Estimates are age-adjusted to the 2000 US standard population.

Source: National Health and Nutrition Examination Survey, see notes for citation.

# Trends in Obesity\* Prevalence, Youth 2 to 19 Years, US, 1976-2016



<https://www.cancer.org/research/cancer-facts-statistics/cancer-prevention-early-detection.html>

\*Obesity: body mass index at or above 95<sup>th</sup> percentile cutoff points from CDC growth charts.

Source: National Health and Nutrition Examination Survey, see notes for citation.

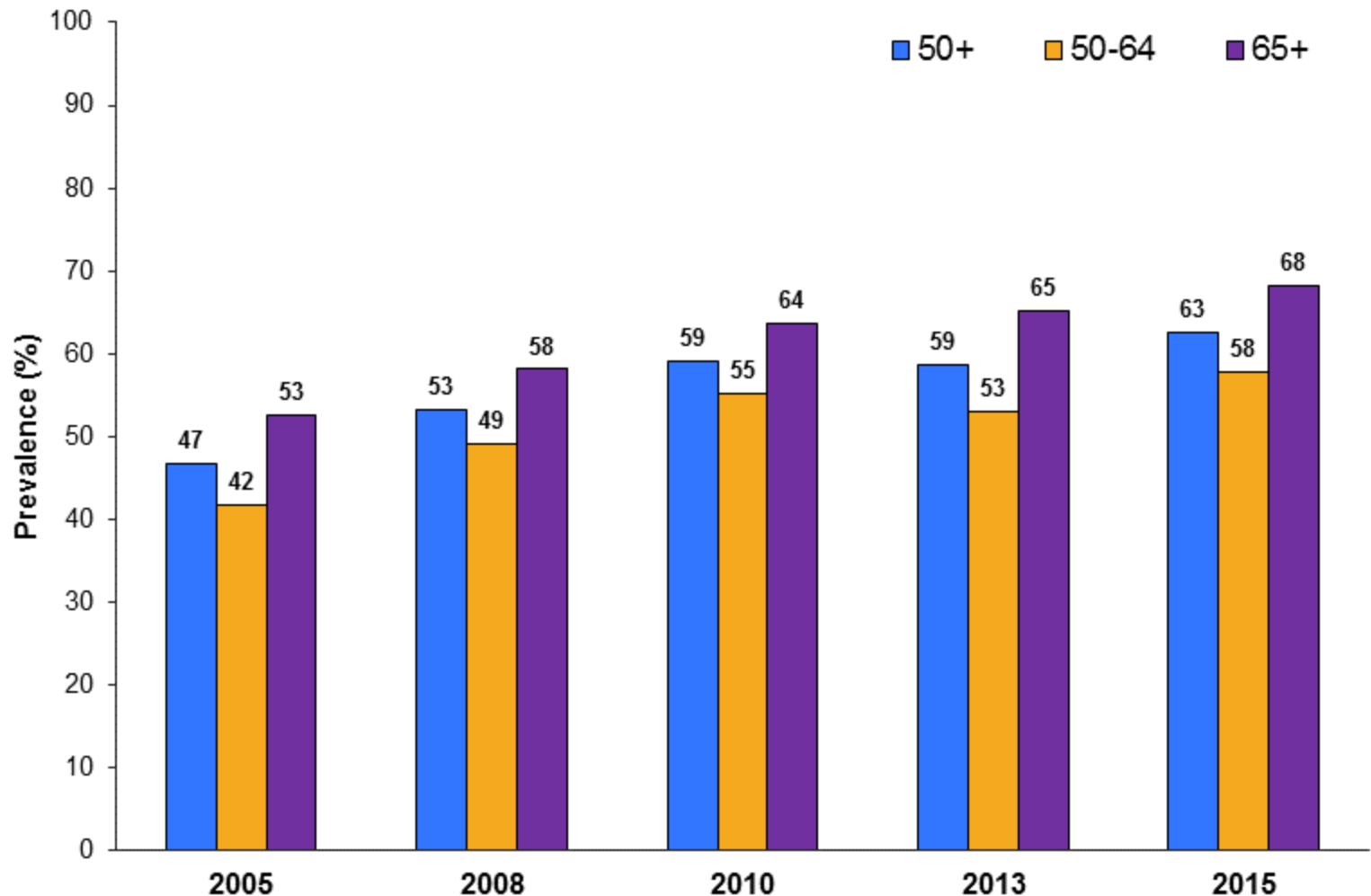
# Additional examples of US cancer control strategies – past 10 years

- Targeting other important cancer risk factors or cancers
  - Colorectal cancer screening evolution
  - PSA-based prostate cancer screening evolution
  - HPV vaccination
  - Cervical cancer screening evolution
  - HCV screening
  - Tanning bed policies
  - Palliative care guidelines

# Colorectal cancer screening as a cancer control strategy – past 10 years

- Steady rise in uptake of colorectal cancer screening (colonoscopy)
  - Including over past 10 years (about an absolute increase of 10%)
  - Still have suboptimal uptake
  - Disparities in uptake
- Led to remarkable declines in colorectal cancer incidence and mortality rates
  - Rates falling in everyone, but disparities remain

# Trends in Colorectal Cancer Screening\* by Age, Adults 50 Years and Older, US, 2005-2015



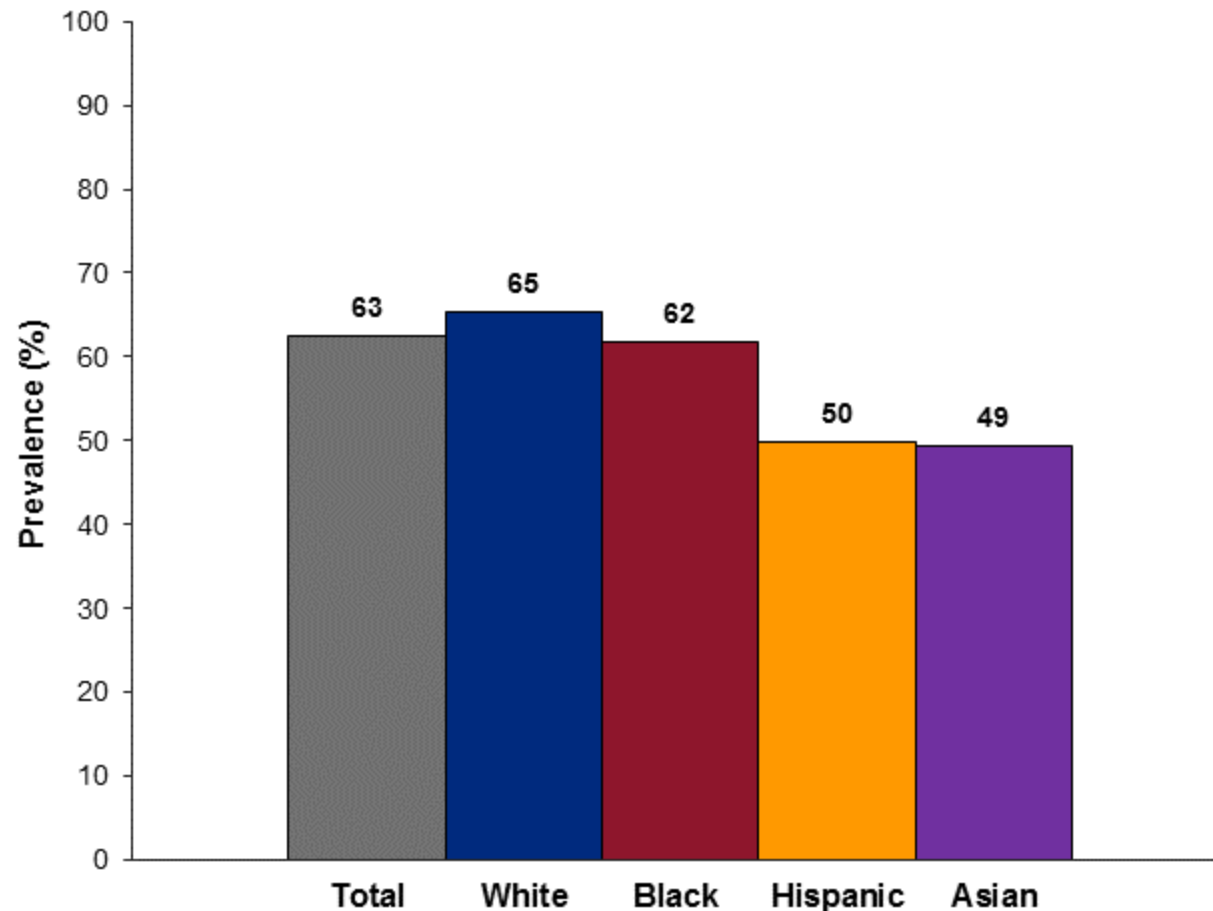
<https://www.cancer.org/research/cancer-facts-statistics/cancer-prevention-early-detection.html>

\*Stool test within the past year or sigmoidoscopy within the past 5 years or colonoscopy within the past 10 years. Note: Estimates are age-adjusted to the 2000 US standard population and do not distinguish between examinations for screening and diagnosis.

Source: National Health Interview Survey, see notes for citation.



# Prevalence of Colorectal Cancer Screening\*, Adults 50 Years and Older, by Race/Ethnicity†, US, 2015

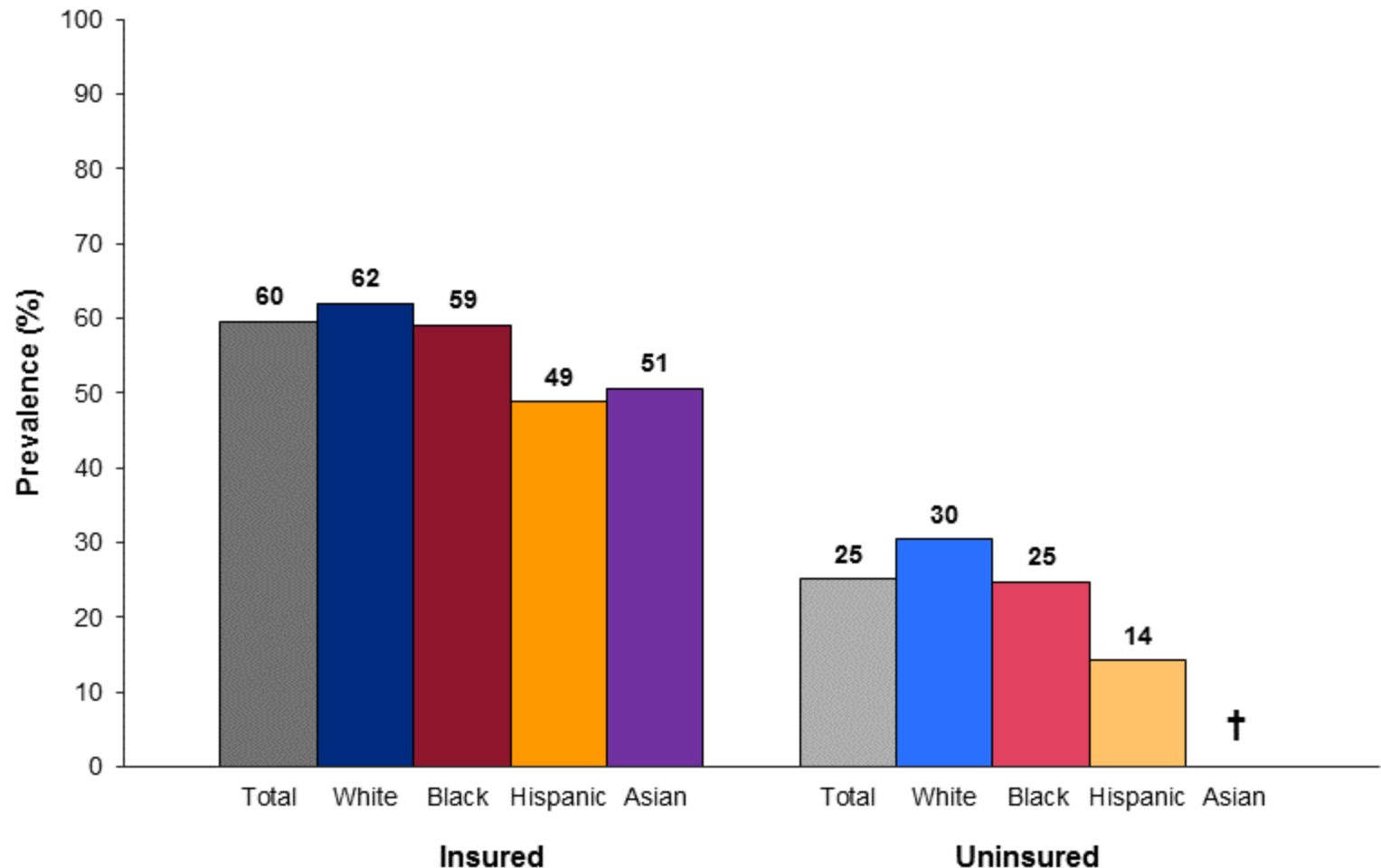


<https://www.cancer.org/research/cancer-facts-statistics/cancer-prevention-early-detection.html>

\*Stool test within the past year or sigmoidoscopy within the past 5 years or colonoscopy within the past 10 years. †Estimates for white, black, and Asian are among non-Hispanics. Estimates for Asians do not include Native Hawaiians or other Pacific Islanders. Note: Estimates are age-adjusted to the 2000 US standard population and do not distinguish between examinations for screening and diagnosis.

Source: National Health Interview Survey, see notes for citation.

# Prevalence of Colorectal Cancer Screening\*, Adults 50 to 64 Years, by Race/Ethnicity†, US, 2015

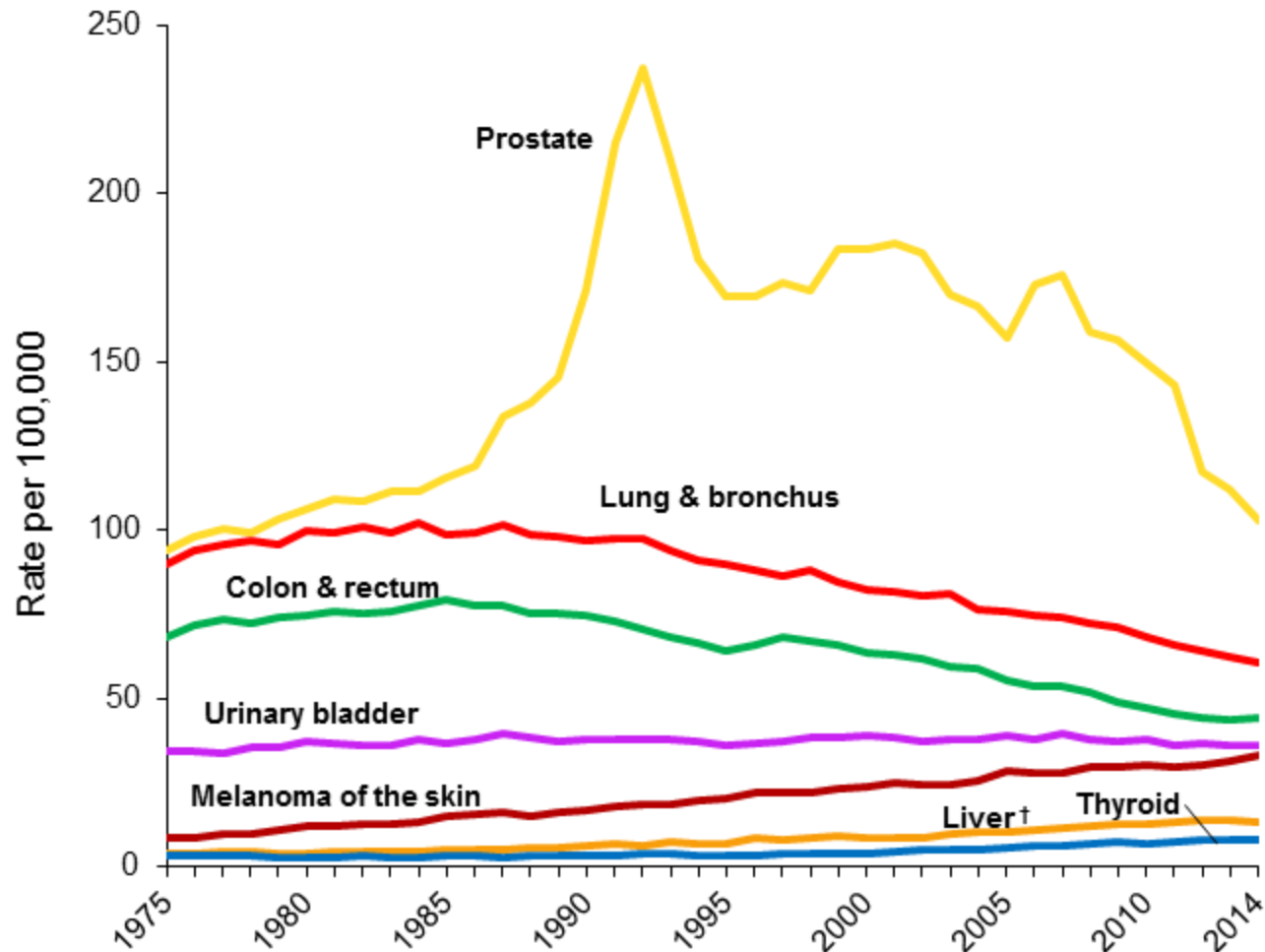


<https://www.cancer.org/research/cancer-facts-statistics/cancer-prevention-early-detection.html>

\*Stool test within the past year or sigmoidoscopy within the past 5 years or colonoscopy within the past 10 years. †Estimates for white, black, and Asian are among non-Hispanics. Estimates for Asians do not include Native Hawaiians or other Pacific Islanders. Note: Estimates are age-adjusted to the 2000 US standard population and do not distinguish between examinations for screening and diagnosis.

Source: National Health Interview Survey, see notes for citation.

# Trends in Cancer Incidence Rates\* Among Males, US, 1975-2014

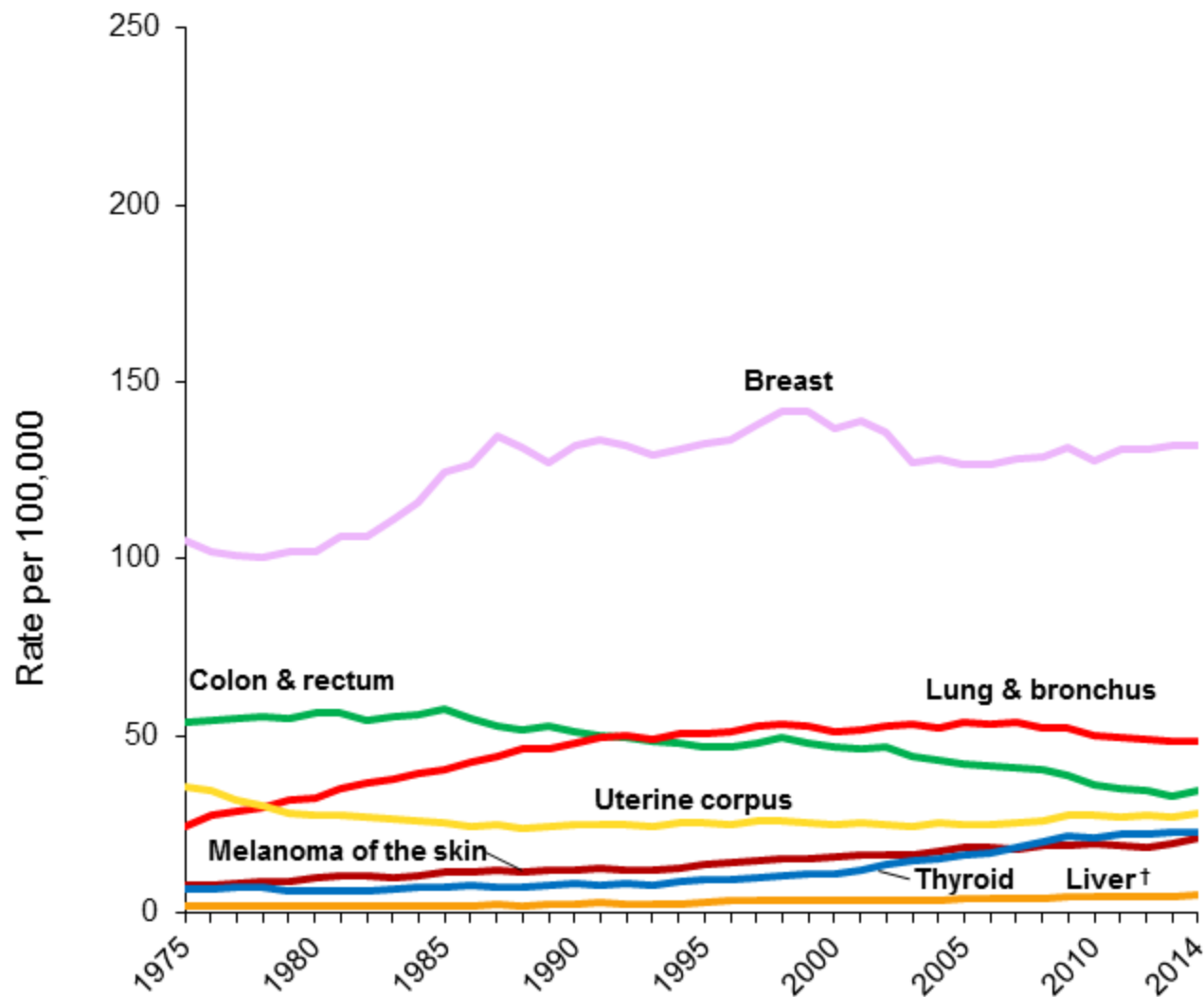


<https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2018.html>

\*Age-adjusted to the 2000 US standard population and adjusted for delays in reporting. †Includes the intrahepatic bile duct.

Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2017.

# Trends in Cancer Incidence Rates\* Among Females, US, 1975-2014



<https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2018.html>

\*Age-adjusted to the 2000 US standard population and adjusted for delays in reporting. †Includes the intrahepatic bile duct.

Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2017.

# Colorectal cancer screening – evolution of recommendations – past 10 years

- Over the years, evolution in recommendations to optimize benefits versus harms, included
  - Changes in screening modalities, include detection of tumor DNA in stool (FDA approved in 2014; **new tool**)
    - Reduce barriers, reduce disparities (e.g., FIT as an option)
  - Tailoring by age (older adults)
  - Tailoring by changing patterns in age at diagnosis over time (**new population**)

# Colorectal cancer screening – evolution of recommendations – past 10 years

- USPSTF – 2016

- <https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/colorectal-cancer-screening2>

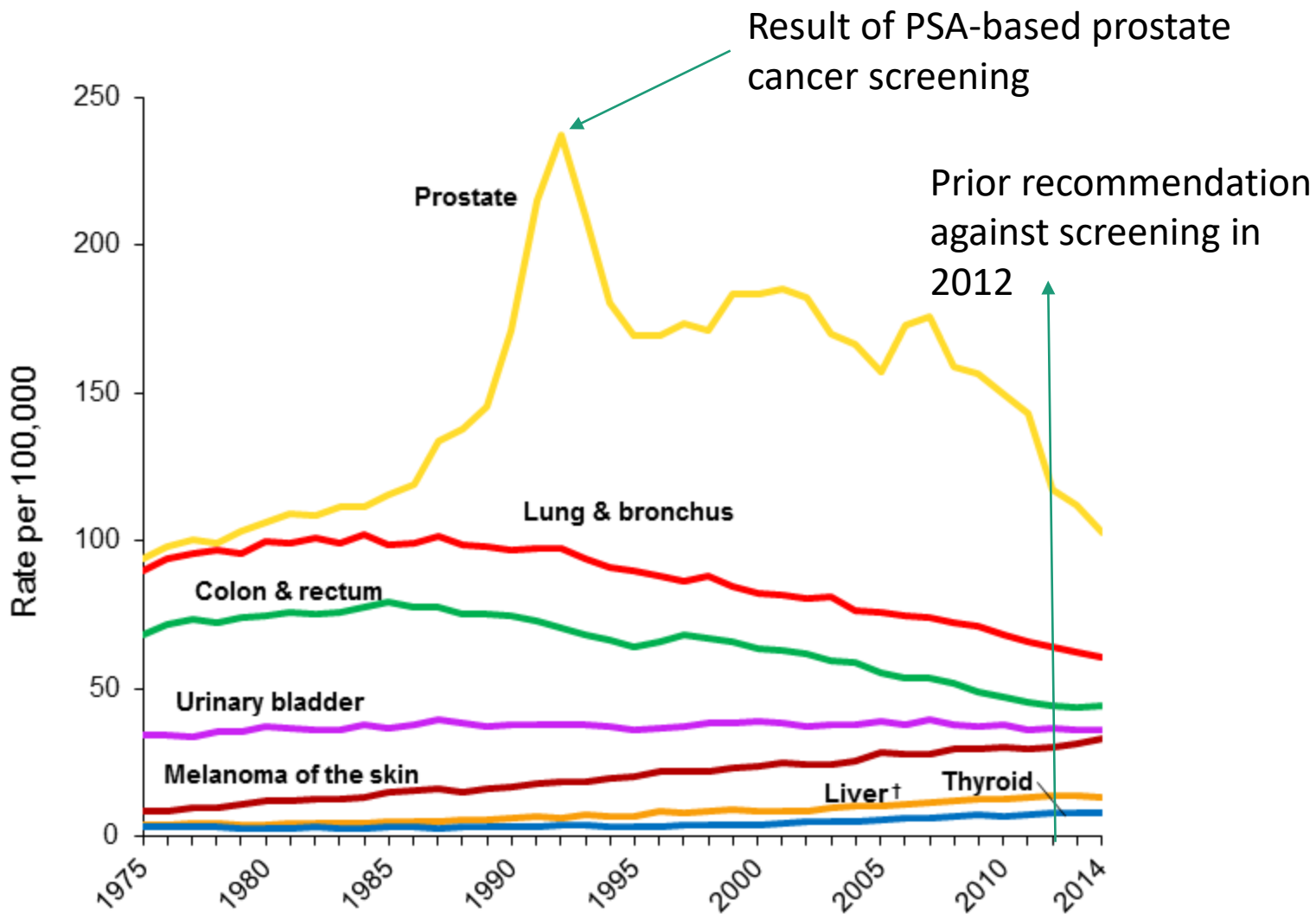
- American Cancer Society – May 30, 2018

- Reduced at to first start screening to 45 years old (from 50)
  - Increase in the incidence rate in younger adults over the past decade of 1.6% per year in adults <50 years old from 2009 to 2013
  - <https://www.cancer.org/cancer/colon-rectal-cancer/detection-diagnosis-staging/acs-recommendations.html>
  - <https://www.cancer.org/research/cancer-facts-statistics/colorectal-cancer-facts-figures.html>

# PSA-based prostate cancer screening – evolution of recommendations – past 10 years

- Over the years, evolution in recommendations to optimize benefits versus harms, incorporated changing evidence from trials and reducing overdiagnosis and thus over treatment
  - Highly controversial changes in recommendations over time – communications complexities about the changes
- USPSTF recommendations – May 2018 (**new consideration**)
  - <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/prostate-cancer-screening1>
  - “For men aged 55 to 69 years, the decision to undergo periodic prostate-specific antigen (PSA)–based screening for prostate cancer should be an individual one. Before deciding whether to be screened, men should have an opportunity to discuss the potential benefits and harms of screening with their clinician **and to incorporate their values and preferences** in the decision.”

# Trends in Cancer Incidence Rates\* Among Males, US, 1975-2014



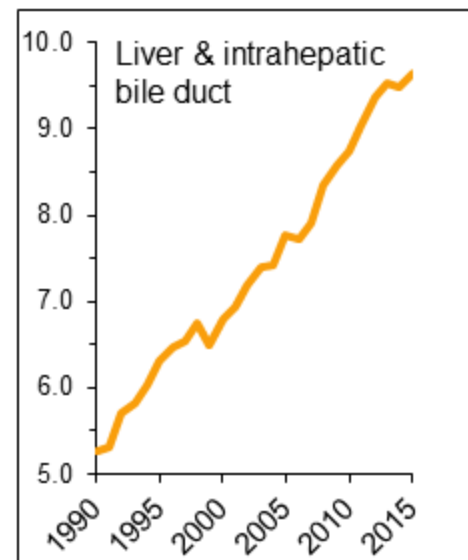
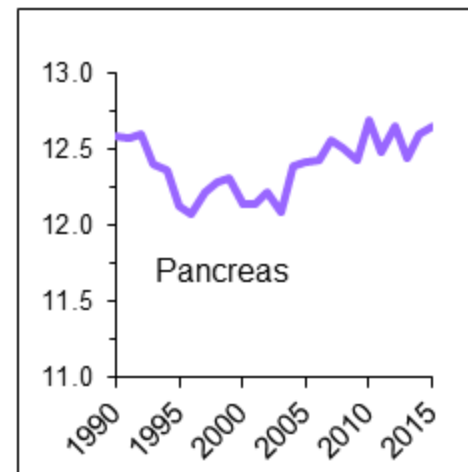
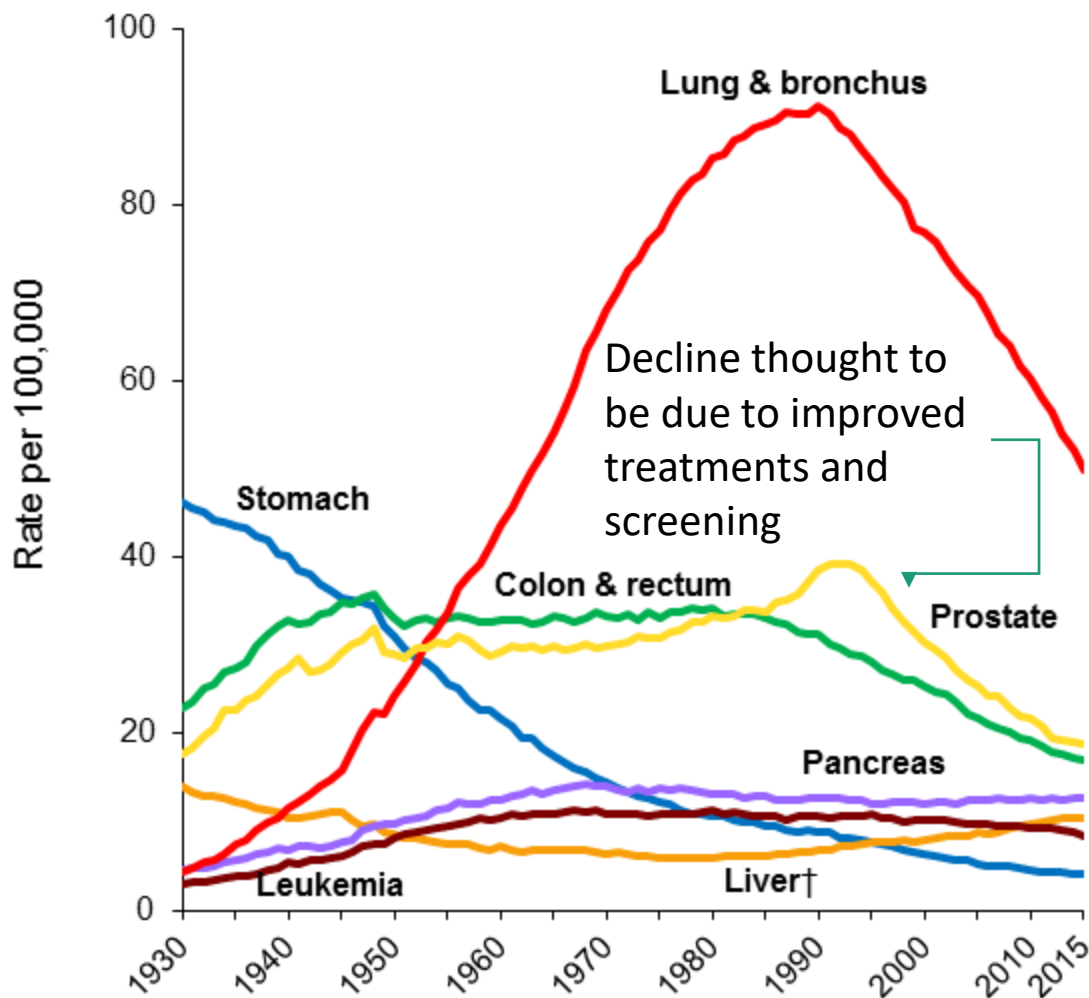
<https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2018.html>

\*Age-adjusted to the 2000 US standard population and adjusted for delays in reporting. †Includes the intrahepatic bile duct.

Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2017.



# Trends in Cancer Death Rates\* Among Males, US, 1930-2015



<https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2018.html>

\*Age-adjusted to the 2000 US standard population. †Includes intrahepatic bile duct, gallbladder, and other biliary.

NOTE: Due to International Classification of Diseases coding changes, numerator information for colorectal, liver, and lung cancers has changed over time  
Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2017.

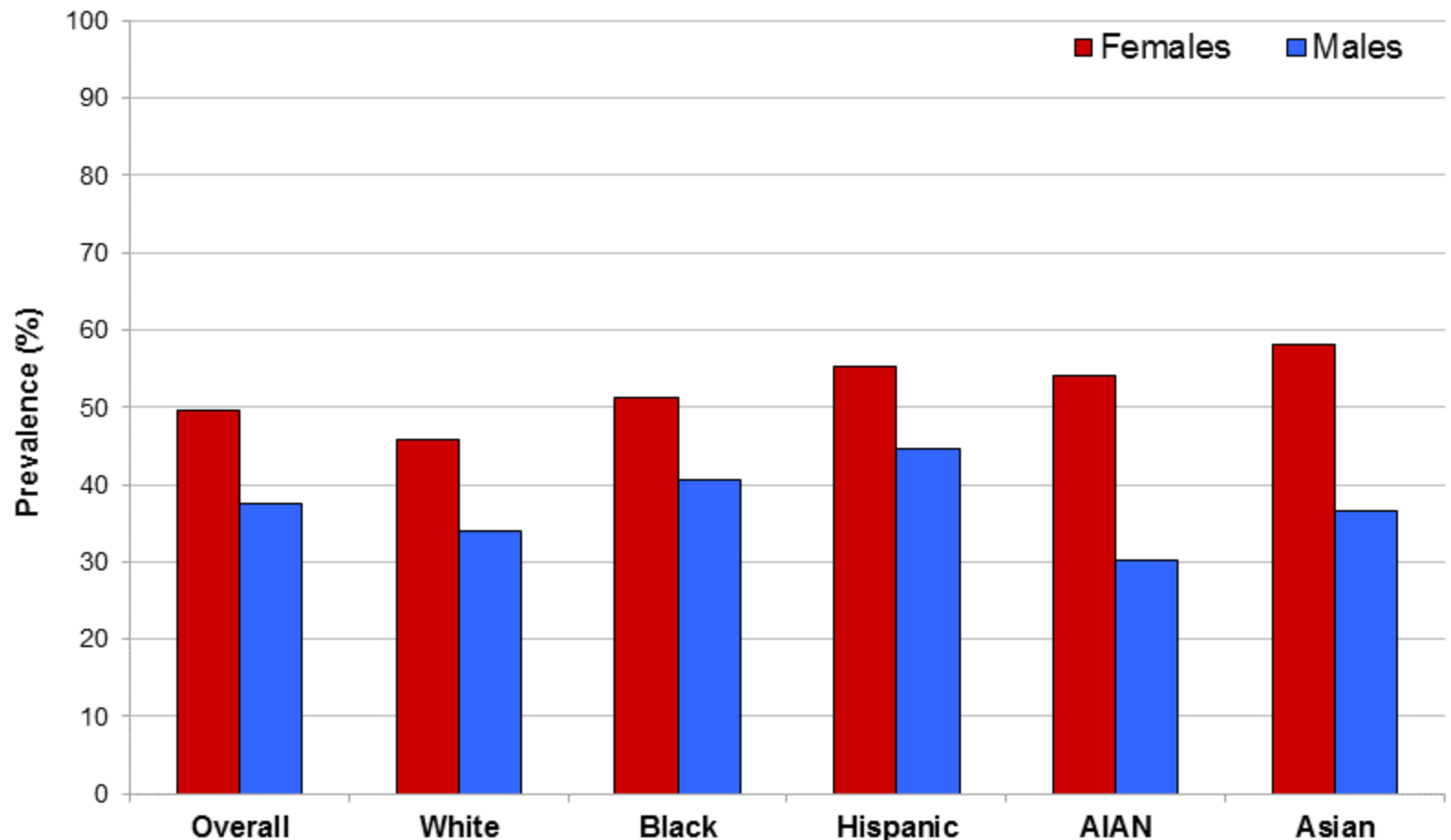
# Active surveillance as a prostate cancer control strategy – past 10 years

- Tertiary prevention
- For men with low risk disease, adoption of active surveillance rather than immediate definitive treatment (**new strategy**)
  - Supportive trials published in 2011 and 2012
- Was a response to the likely overdiagnosis and thus, treatment of men diagnosed in the PSA era.

# HPV vaccination as a cancer control strategy – past 10 years

- HPV is a necessary cause of cervical cancer and a cause of anal, penile, and certain head and neck cancers
  - >36,000 cancers are caused by HPV in US women and men each year.
  - HPV is very common.
- Safe and effective HPV vaccines (**new tool**)
  - First – FDA approved in 2006
  - Latest – FDA approved in 2017 – Gardasil9 (protects against 9 HPV types)
- Current CDC recommendations based on the Advisory Committee on Immunization Practices (ACIP)
  - Girls and boys 11 or 12 years old - 2 shots of HPV vaccine spaced 6 to 12 months apart. If <5 months apart, a 3rd shot of HPV vaccine is necessary.
  - Barriers, uptake still not as high as needed.
- References:
  - <https://www.cdc.gov/hpv/parents/vaccine.html>
  - <https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet>

# Prevalence of Up-to-Date Human Papillomavirus Vaccination\*, Adolescents 13 to 17 Years, by Sex and Race/Ethnicity†, US, 2016



AIAN-American Indian/Alaska Native. \*Includes those who received  $\geq 3$  doses, and those who received 2 doses when the first HPV vaccine dose was initiated before age 15 years and the time between the first and second dose was at least 5 months minus 4 days. See citation for more information. †Estimates for white, black, AIAN, and Asian are among non-Hispanics. Those identified as Hispanic might be of any race. Native Hawaiian or other Pacific Islanders were not included due to small sample sizes.

Source: National Immunization Survey-Teen, see notes for citation.

# HPV vaccination – evidence evolution

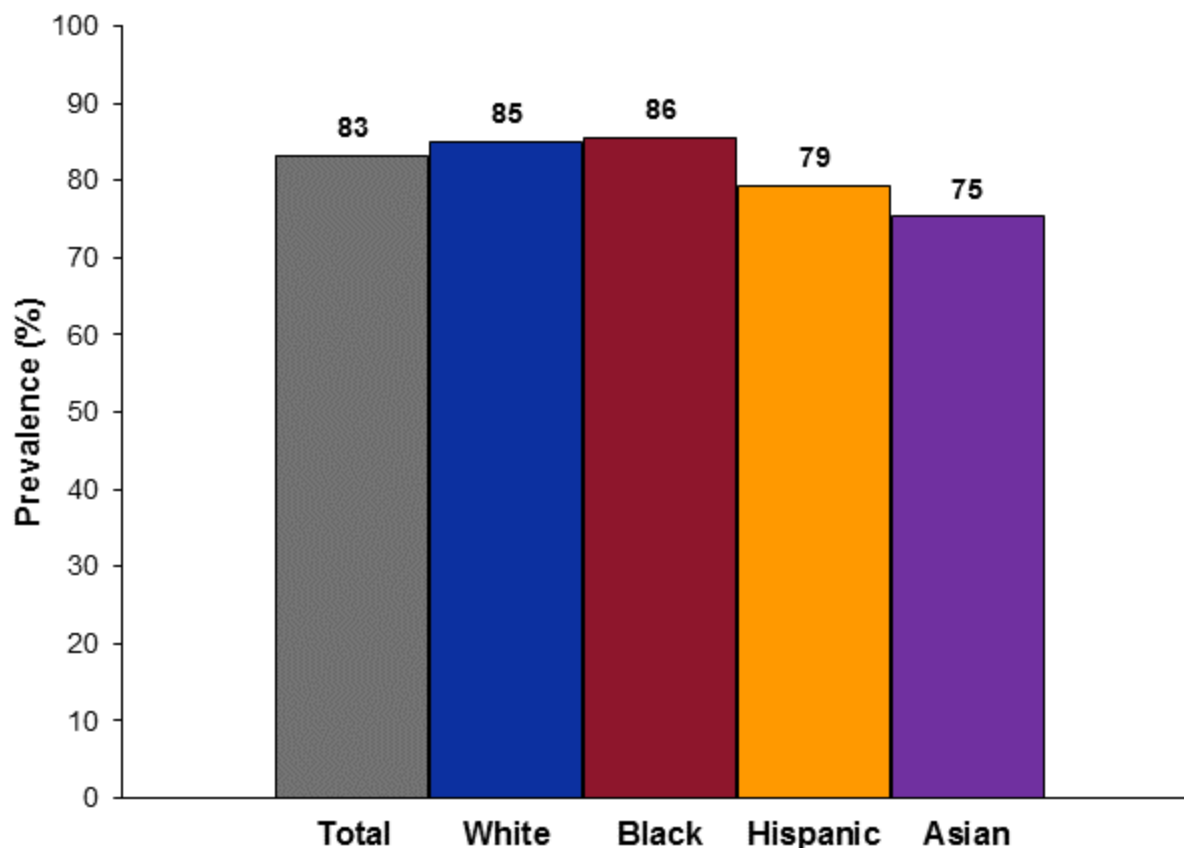
## – past 10 years

- Prior recommendation was 3 shots (initial, 2 booster)
- New data from clinical trials
  - Showed that 2 shots of HPV vaccine in 9-14 year olds produced a similar or stronger immune response than 3 shots in those 16-26 years old.
- October 2016, CDC updated recommendation from 3 to 2 shots, if received before age 15.
  - “These updated recommendations are an example of using the latest available evidence to provide the best possible protection against serious diseases.”  
<https://www.cdc.gov/media/releases/2016/p1020-HPV-shots.html>
- Fewer shots could reduce a barrier to uptake and completion.

# Cervical cancer screening – evolution – past 10 years

- Over the years, evolution in recommendations to optimize benefits versus harms, included
  - Adding HPV testing (HPV as a necessary cause) and co-testing with Pap smears (cytology) (**new strategy**)
  - Refining recommendations for subpopulations
    - Women <30 years (who tend to clear HPV)
    - Older women
- US Preventive Services Task Force Recommendations
  - Current – 2012
    - <https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/cervical-cancer-screening>
  - Draft - 2018
    - <https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryDraft/cervical-cancer-screening2>

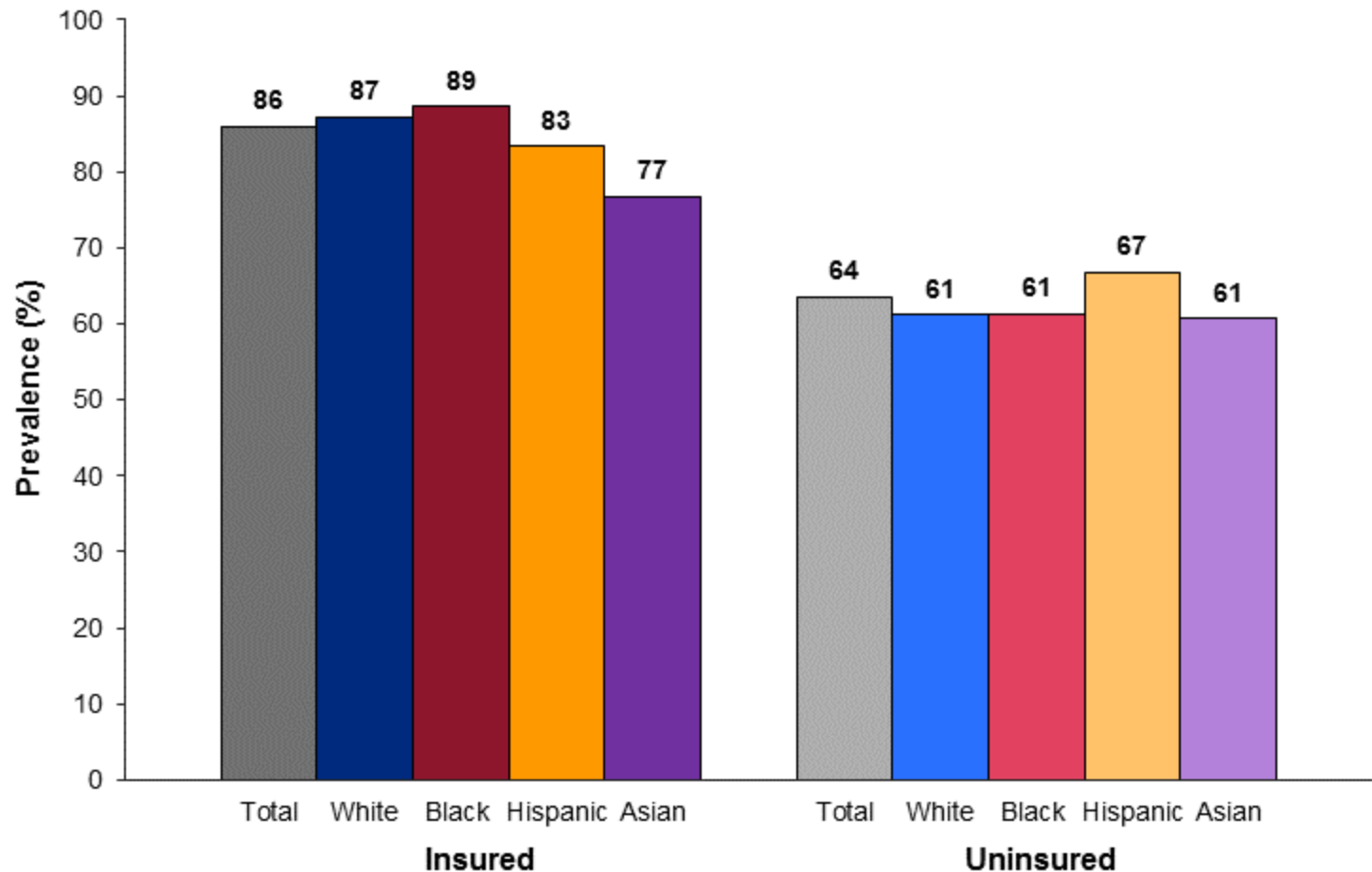
## Prevalence of Cervical Cancer Screening\* by Race/Ethnicity†, Women 21 to 65 Years, US, 2015



\*Pap test in the past 3 years among women 21-65 years of age OR Pap test and HPV test within the past 5 years among women 30-65 years of age, among women with intact uteri. †Estimates for white, black, and Asian are among non-Hispanics. Estimates for Asians do not include Native Hawaiians or other Pacific Islanders. Note: Estimates are age-adjusted to the 2000 US standard population and do not distinguish between examinations for screening and diagnosis.

Source: National Health Interview Survey, see notes for citation.

# Prevalence of Cervical Cancer Screening\* by Race/Ethnicity† and Insurance Status, Women 21 to 64 Years, US, 2015



\*Pap test in the past 3 years among women 21-64 years of age OR Pap test and HPV test within the past 5 years among women 30-64 years of age, among women with intact uteri. †Estimates for white, black, and Asian are among non-Hispanics. Estimates for Asians do not include Native Hawaiians or other Pacific Islanders. Note: Estimates are age-adjusted to the 2000 US standard population and do not distinguish between examinations for screening and diagnosis.

Source: National Health Interview Survey, see notes for citation.



# NCI-Designated Cancer Centers Endorse Goal of Eliminating HPV-Related Cancers

Cancers caused by the human papillomavirus (HPV) are a significant public health problem. The National Cancer Institute (NCI)-designated cancer centers fully endorse the goal of eliminating cancers caused by HPV through gender-neutral HPV vaccination and evidence-based cancer screening. These practices offer a rare opportunity to prevent 12,000 cervical cancers and nearly 40,000 other HPV-related cancers (oropharyngeal, anal, penile, vulvar, and vaginal cancers) among men and women annually in the United States.

An effective and safe vaccine is available that prevents the large majority of cancer-causing HPV infections. In addition, healthcare providers can use proven methods to screen for and treat cervical pre-cancers.

Unfortunately, HPV vaccination completion rates across the U.S. remain low. According to the Centers for Disease Control and Prevention (CDC), 49.5 percent of girls and only 37.5 percent of boys, ages 13-17 years, in the U.S. completed the vaccine series in 2016. These rates are significantly lower than those for other recommended adolescent vaccinations and fall well below the nation's goal of 80 percent coverage by the end of this decade (U.S. Department of Health and Human Service's Healthy People 2020 objective).

Increased HPV vaccination rates combined with appropriate cervical cancer screening measures could soon eliminate cervical cancer, with other HPV-related cancers in males and females to follow. Therefore, as national leaders in cancer research and cancer care, we issue the following Call to Action in alignment with the nation's Healthy People 2020 goals:

- Vaccination of more than 80 percent of males and females ages 13-15 by 2020;
- Screen 93 percent of age-eligible females for cervical cancer by 2020; and
- Provide prompt follow up and proper treatment of females who screen positive for high grade cervical pre-cancerous lesions.

In addition, we strongly encourage:

- Young men and women up to age 26, who were not previously vaccinated, to complete the recommended HPV vaccine series;
- Health care providers to make clear and strong recommendations for HPV vaccination and cervical cancer screening; and
- The health care community to educate parents, guardians, community members, and colleagues about the goal of eliminating cancers caused by HPV in the US.

High HPV vaccination rates combined with cervical cancer screening and treatment will result in the elimination of cervical cancer in the near future and elimination of other HPV-related cancers thereafter.

The HPV vaccine PREVENTS CANCER. Make sure your loved ones are vaccinated and protected. More information is available from the [CDC](http://www.cdc.gov).

*This statement is supported by the American Cancer Society (ACS), the American Association for Cancer Research (AACR), the American Society for Clinical Oncology (ASCO), the Prevent Cancer Foundation, the American Society for Preventive Oncology (ASPO) and the Association of American Cancer Institutes (AACI).*



# Cancer centers as a force in cancer control (released today – June 7, 2018)

NCI P30 Cancer Center Support Grant  
supplements

Conference:  
<http://huntsmancancer.org/education/conferences-seminars/hpv-vaccination-meeting/index.php>



# HCV screening and treatment as a cancer control strategy – last 10 years

- Hepatitis C virus (HCV) is a cause of liver cancer
- 2013 - USPSTF recommendation for a 1-time HCV screening in those born 1945 to 1965 (**new tool**)
  - <https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/hepatitis-c-screening>
- Update in process:
  - <https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryDraft/hepatitis-c-screening1>
- Curative (95%) FDA-approved treatments for HCV now available (**new treatment**)
  - <https://www.fda.gov/ForPatients/Illness/HepatitisBC/ucm408658.htm>
  - 2014 first FDA approved drug
  - 2017 – approved drug to treat HCV in 8 weeks
  - Barriers to access, including high prevalence of insurance denials (press release U Penn today 6/7/2018)

# Skin cancer – cancer control policies – past 10 years

- Exposure to UV in childhood and adolescence a strong risk factor for skin cancer, including melanoma
- State laws restricting indoor sunlamp and tanning bed use by minors
  - 44 states and DC
- FDA regulation - 2014
  - Black box warning -should not be used by people <18 years old
  - Proposing additional restrictions
- References:
  - <http://www.ncsl.org/research/health/indoor-tanning-restrictions.aspx>
  - <https://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/Tanning/default.htm>

# Palliative care as cancer control strategy – past 10 years

- Tertiary prevention strategy
- Guidelines for uptake of palliative care starting at the time of diagnosis (new strategy)
  - NCCN, ASCO guidelines: <https://www.asco.org/practice-guidelines/quality-guidelines/guidelines/patient-and-survivor-care#/9671>
  - Evidence building for benefit
    - Prolonged survival
    - Quality of life
    - Cost-effectiveness
- Reference: <https://www.cancer.gov/about-cancer/advanced-cancer/care-choices/palliative-care-fact-sheet>

# Newer forces in cancer control

In addition to state and local comprehensive cancer control efforts:

- Affordable Care Act – 2010 (**new law**)
  - Provisions led to expanded health insurance coverage
  - Mandating coverage of certain primary and secondary preventive services without cost sharing (e.g., HBV vaccination, HPV vaccination, HCV screening)  
<https://www.healthcare.gov/coverage/preventive-care-benefits>
  - Evidence that the ACA is improving cancer control
    - e.g, studies by the the Surveillance and Health Services Research Program of the American Cancer Society (eg., PMID: 26042576, 27140956, 28885865)
- NCI-Designated Cancer Centers stepping up to support and provide cancer prevention and control practices
  - Mandate becoming more explicit for their catchment areas

# What can we learn from global cancer control?

- Low cost strategies and reducing barriers to uptake
  - e.g., UK – colon cancer screening
    - Annual FIT (rather than every 10 year colonoscopy)
    - Program administered through the mail
- Incorporating cost-effectiveness into programmatic decision-making and population-level strategies
  - e.g., Canada, UK

# Only touched on a small number of cancer control strategies used in the US in the past 10 years

Didn't discuss, but are important, for example:

- Chemoprevention (primary prevention)
  - e.g., Aspirin for the prevention of CRC
    - USPSTF 2016  
<https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/aspirin-to-prevent-cardiovascular-disease-and-cancer>
- Genetic testing in high risk individuals and associated interventions
  - E.g., germline BrCa mutations and chemoprevention
- Breast cancer cancer control strategies
  - Screening, chemoprevention for women at high risk
- Survivorship, caregiver strategies
- Tailored strategies for under-studied, vulnerable, and/or emerging populations
  - e.g., rural, refugee, LGBTQ