Cancer Screening in the United States, 2007: A Review of Current Guidelines, Practices, and Prospects

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ABSTRACT Each year, the American Cancer Society (ACS) publishes a summary of its recommendations for early cancer detection, including guideline updates, emerging issues that are relevant to screening for cancer, and a summary of the most current data on cancer screening rates for US adults. In 2006, there were no updates to ACS guidelines for early cancer detection. In this issue of the journal, we describe criteria for successful screening, discuss recent evidence and policy changes that have implications for cancer screening, summarize the ACS guidelines and describe guidelines reviews that are underway, and provide an update of the most recent data pertaining to participation rates in cancer screening from the Centers for Disease Control and Prevention’s (CDC’s) Behavioral Risk Factor Surveillance System (BRFSS) and the National Health Interview Survey (NHIS). (CA Cancer J Clin 2007;57:90–104.) © American Cancer Society, Inc., 2007.

INTRODUCTION

In 2000, the American Cancer Society (ACS) inaugurated a yearly report in CA: A Cancer Journal for Clinicians on its cancer detection guidelines. The first report included a description of the ACS process for the development or update of a cancer screening guideline,1 and that report and subsequent reports have provided an annual summary and update of ACS cancer screening guidelines, guidance to the public about testing for early detection for select cancers where mass screening is not recommended, and the most recent data on cancer screening rates.1 ACS staff and advisory committees regularly review the scientific literature for new evidence that may warrant a change in recommendations for cancer screening in average- or high-risk groups. Guidelines are reviewed and updated at least every 5 years, but may be updated more frequently if evidence warrants an updated or new recommendation to health professionals and the public. The annual guideline reviews, as well as the more detailed guideline updates published as standalone articles, are available online at http://CAonline.AmCancerSoc.org. Table 1 shows the recent history of guidelines updates, as well as those in progress.

SCREENING FOR BREAST CANCER

Breast cancer is the most common cancer diagnosed in US women and the second leading cause of death from cancer in US women.10 ACS guidelines for breast cancer screening were last updated in 2003 (Table 1).2 Guidelines for the early detection of breast cancer consist of a combination of clinical breast examination (CBE), counseling to raise awareness of breast symptoms beginning at age 20 years, and regular mammography beginning at age 40 years (Table 2).

Between the ages of 20 to 39 years, women should undergo CBE every 3 years, and annually after age 40 years. This exam, which should take place during periodic health examinations, provides an opportunity for health care professionals to review and update the family history, discuss the importance of early breast cancer detection, and answer any
questions women may have about their own risk, new technologies, or other matters related to breast disease. During these discussions, health care professionals should emphasize the importance of awareness and recognition of breast changes, and if changes occur, the importance of contacting their physician promptly. Although the ACS no longer recommends monthly breast self-examination (BSE), women should be informed about the potential benefits, limitations, and harms (primarily, the possibility of false-positive result) associated with BSE. Women may then choose to do BSE regularly, occasionally, or not at all. If a woman chooses to perform periodic BSE, she should receive instructions in the technique and/or have her technique reviewed periodically.

The ACS recommends that average-risk women should begin annual mammography at the age of 40 years. Women also should be informed about the scientific evidence demonstrating the value of detecting breast cancer before symptoms develop and the importance of adhering to a schedule of regular mammograms. Benefits include a reduction in the risk of dying from breast cancer, less aggressive therapy, and a greater range of treatment options. Women also should be told about the limitations of mammography, specifically that mammography will not detect all breast cancers, and some breast cancers detected with mammography may still have poor prognosis. Further, women should be informed about the potential harms associated with mammographic screening, including false positives, biopsy for abnormalities that prove to be benign, and the short period of anxiety that naturally will accompany the uncertainty about the presence of a malignancy.

There is no specific upper age at which mammography screening should be discontinued. Rather, the decision to stop regular mammography screening should be individualized based on the potential benefits and risks of screening in the context of overall health status and estimated longevity. As long as a woman is in good health and would be a candidate for breast cancer treatment, she should continue to be screened with mammography.

In 2003, the guidelines panel concluded that there was insufficient evidence to recommend a specific surveillance strategy for high-risk women, including women younger than age 40 years who were at significantly elevated risk due to having a known or suspected mutation on a breast cancer susceptibility gene. However, the guidelines panel felt that a growing body of evidence was sufficient to conclude that women at significantly increased risk for breast cancer might benefit from earlier initiation of screening, screening at shorter intervals, and adding additional modalities, such as ultrasound or magnetic resonance imaging (MRI), to mammography and CBE. Based on the accumulation of new evidence since 2002, in late 2005, the ACS initiated an update of these recommendations for high-risk women.

### Table 1: History of Recent Updates to American Cancer Society (ACS) Cancer Early Detection Guidelines

| Cancer Site   | Year                                      |
|---------------|-------------------------------------------|
| Breast cancer | 2003, complete update^2                   |
|               | 2007, guidelines for MRI use in high-risk women^3 |
| Cervical cancer | 2002, complete update^4                 |
|               | 2007, guidelines for HPV vaccine use^5    |
| Colorectal cancer | 2001, complete update^6          |
|               | 2003, technology update^7              |
|               | 2006, update for postpolypectomy and postcolorectal cancer resection surveillance^8,^9 |
|               | 2007, update anticipated                |
| Endometrial cancer | 2001, guidance for counseling, shared decision making, and high-risk women^6 |
| Lung cancer   | 2001, guidance for shared decision making^6 |
| Prostate cancer | 2001, guidance for shared decision making related to testing for early detection, and screening recommendations for higher-risk men^6 |
|               | 2007, update anticipated                |
| Skin cancer   | 2007, update anticipated                |
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TABLE 2  American Cancer Society (ACS) Recommendations for the Early Detection of Cancer in Average-risk Asymptomatic People

| Cancer Site      | Population         | Test or Procedure                          | Frequency                                                                 |
|------------------|--------------------|--------------------------------------------|---------------------------------------------------------------------------|
| Breast           | Women, aged ≥20 years | Breast self-examination (BSE)               | Beginning in their early 20s, women should be told about the benefits and limitations of BSE. The importance of prompt reporting of any new breast symptoms to a health professional should be emphasized. Women who choose to do BSE should receive instruction and have their technique reviewed on the occasion of a periodic health examination. It is acceptable for women to choose not to do BSE or to do BSE irregularly. |
| Clinical breast examination (CBE) | For women in their 20s and 30s, it is recommended that CBE be part of a periodic health examination, preferably at least every 3 years. Asymptomatic women aged ≥40 years should continue to receive a clinical breast examination as part of a periodic health examination, preferably annually. |
| Mammography      | Begin annual mammography at age 40 years.* |
| Colorectal       | Men and women, aged ≥50 years | Fecal occult blood test (FOBT)† or fecal immunochemical test (FIT), or Flexible sigmoidoscopy, or Fecal occult blood test (FOBT)† and flexible sigmoidoscopy, or Double contrast barium enema (DCBE), or Colonoscopy | Annual, starting at age 50 yearsEvery 5 years, starting at age 50 yearsAnnual FOBT (or FIT) and flexible sigmoidoscopy every 5 years, starting at age 50 yearsDCBE every 5 years, starting at age 50 yearsColonoscopy every 10 years, starting at age 50 years |
| Prostate         | Men, aged ≥50 years | Digital rectal examination (DRE) and prostate-specific antigen (PSA) test | The PSA test and the DRE should be offered annually, starting at age 50 years, for men who have a life expectancy of at least 10 years§ |
| Cervix           | Women, aged ≥18 years | Pap test | Cervical cancer screening should begin approximately 3 years after a woman begins having vaginal intercourse, but no later than age 21 years. Screening should be done every year with conventional Pap tests or every 2 years using liquid-based Pap tests. At or after age 30 years, women who have had 3 normal test results in a row may get screened every 2 to 3 years with cervical cytology (either conventional or liquid-based Pap test) alone, or every 3 years with a human papillomavirus DNA test, plus cervical cytology. Women aged ≥70 years who have had 3 or more normal Pap tests and no abnormal Pap tests in the last 10 years and women who have had a total hysterectomy may choose to stop cervical cancer screening. |
| Endometrial      | Women, at menopause | At the time of menopause, women at average risk should be informed about risks and symptoms of endometrial cancer and strongly encouraged to report any unexpected bleeding or spotting to their physicians. |
| Cancer-related check up | Men and women, aged ≥20 years | On the occasion of a periodic health examination, the cancer-related check up should include examination for cancers of the thyroid, testicles, ovaries, lymph nodes, oral cavity, and skin, as well as health counseling about tobacco, sun exposure, diet and nutrition, risk factors, sexual practices, and environmental and occupational exposures. |

*Beginning at age 40 years, annual clinical breast examination should be performed prior to mammography.
†FOBT, as it is sometimes done in physicians’ offices with the single stool sample collected on a fingertip during a DRE, is not an adequate substitute for the recommended at-home procedure of collecting two samples from three consecutive specimens, and is not recommended. Toilet bowl FOBT tests also are not recommended. In comparison with guaiac-based tests for the detection of occult blood, immunochemical tests are more patient-friendly and are likely to be equal or better in sensitivity and specificity. There is no justification for repeating FOBT in response to an initial positive finding. Patients with a positive screening FOBT should undergo colonoscopy.
‡Flexible sigmoidoscopy together with FOBT is preferred compared with FOBT or flexible sigmoidoscopy alone.
§Information should be provided to men about the benefits and limitations of testing so that an informed decision about testing can be made with the clinician’s assistance.

risk women, the results of which appear in this issue of the journal.3

SCREENING FOR CERVICAL CANCER

ACS guidelines for cervical cancer screening were last updated in 2002 (Table 1).4 Cervical cancer screening guidelines reflect the current understanding of the underlying epidemiology of cervical intraepithelial neoplasia (CIN), in particular, the causal role of human papillomavirus (HPV) in the etiology of cervical cancer.12 The guidelines recommend different surveillance strategies and options based on a
woman’s age, her screening history, other risk factors, and the screening and diagnostic technologies she chooses.

The ACS recommends that screening for cervical cancer should begin approximately 3 years after the onset of vaginal intercourse, but no later than age 21 years (Table 2). Until age 30 years, women should receive either annual screening with conventional cervical cytology smears, or biennial screening using liquid-based cytology. At or after age 30 years, a woman who has had 3 consecutive technically satisfactory Pap tests with normal/negative results may undergo screening every 2 to 3 years using either conventional or liquid-based cytology, or alternatively, she may undergo screening every 3 years with the combination of HPV DNA testing and conventional or liquid-based cytology. Women who choose to undergo HPV DNA testing should be informed that (1) HPV infection usually is not detectable or harmful; (2) almost everyone who has had sexual intercourse has been exposed to HPV and that infection is very common; (3) a positive HPV test result does not reflect the presence of a sexually transmitted disease (STD), but rather, a sexually acquired infection; and (4) a positive HPV test result does not indicate the presence of cancer, nor will the large majority of women who test positive for an HPV infection develop advanced cervical neoplasia.

Women who have an intact cervix and who are in good health should continue screening until age 70 years, and afterward may elect to stop screening if (1) they have had no abnormal/positive cytology tests within the 10-year period before age 70 years; and (2) if there is documentation that the 3 most recent Pap tests were technically satisfactory and interpreted as normal. However, screening after age 70 years is recommended for women in good health who have not been previously screened, women for whom information about previous screening is unavailable, and for whom past screening is unlikely.

Guidelines for cervical cancer screening for women with special circumstances differ from the recommendations for average-risk women. Women with a history of cervical cancer or in utero exposure to diethylstilbestrol (DES) should follow the same guidelines as average-risk women before age 30 years, but should continue with that protocol after age 30 years. Women who are immunocompromised by organ transplantation, chemotherapy, or chronic corticosteroid treatment, or who are HIV+, should be tested twice during the first year after diagnosis, and annually thereafter, according to guidelines from the US Public Health Service (USPHS) and Infectious Disease Society of America (IDSA). There is no specific age to stop screening for women with a history of cervical cancer, in utero exposure to DES, and women who are immunocompromised (including HIV+). Women in these risk groups should continue cervical cancer screening for as long as they are in reasonably good health and would benefit from early detection and treatment.

Cervical cancer screening is not indicated for women who have had a total hysterectomy, or who have undergone removal of the cervix, for benign gynecologic disease. However, a woman with a history of CIN2/3, or a woman for whom it is not possible to document the absence of CIN2/3 before or as the indication for the hysterectomy, should continue to be screened until she has a 10-year history of no abnormal/positive cytology tests, including documentation that the 3 most recent consecutive tests were technically satisfactory and interpreted as normal/negative. Women who have had a hysterectomy who also have a history of in utero DES exposure and/or a history of cervical carcinoma should continue screening after hysterectomy for as long as they are in reasonably good health and would benefit from early detection and treatment. Average-risk women who have had a subtotal (supracervical) hysterectomy should be screened following the recommendations for average-risk women who have not undergone hysterectomy.

In 2005, the ACS initiated a guideline development process to develop recommendations for the use of the prophylactic HPV vaccines for the prevention of CIN and cervical cancer. Recommendations addressing the use of prophylactic HPV vaccines, including recommendations related to policy and implementation issues, were published in January 2007. The ACS recommended routine HPV vaccination principally for females aged 11 to 12 years, but also for females aged 13 to 18 years to “catch up” those who missed the opportunity to be vaccinated or who need to
complete the vaccination series. The guidelines panel concluded that there were insufficient data to recommend for or against universal vaccination of females aged 19 to 26 years. Women in this age group who are interested in undergoing vaccination should talk with a health care professional about their risk of previous HPV exposure and potential benefit from vaccination. Screening for CIN and cancer should continue in both vaccinated and unvaccinated women according to current ACS early detection guidelines.

SCREENING AND SURVEILLANCE FOR THE EARLY DETECTION OF ADENOMATOUS POLyps AND COLORECTAL CANCER

ACS guidelines for screening and surveillance for the early detection of adenomatous polyps and colorectal cancer were last completely updated in 2001 (Table 1). In 2003, a technology update was conducted, and recommendations for stool blood testing were modified to include fecal immunochemical tests (iFOBT). and in 2006, the US Multi-Society Task Force and the ACS issued a joint guideline update for postpolypectomy and postcolorectal cancer resection surveillance. The guidelines for postpolypectomy and postcolorectal cancer resection surveillance were revised based on evidence showing that surveillance colonoscopy intervals were highly variable across different professional specialties, and follow-up intervals were often shorter than recommended. Follow-up strategies that are too frequent not only raise costs, but also expose patients to the risk of harms from the procedure.

There are a number of options for colorectal screening that may be chosen based on individual risk, personal preference, and access (Table 2). The ACS recommends that average-risk adults should begin colorectal cancer screening at age 50 years, with one of the following options: (1) annual fecal occult blood test (FOBT) with either a guaiac-based (gFOBT) or immunochemical-based test (iFOBT) following manufacturer’s recommendations for specimen collection; (2) flexible sigmoidoscopy every 5 years; (3) annual gFOBT or iFOBT, plus flexible sigmoidoscopy every 5 years; (4) double contrast barium enema (DCBE) every 5 years; or (5) colonoscopy every 10 years. Single panel FOBT in the medical office using a stool sample collected during a digital rectal exam (DRE) is not a recommended option, due to its very low sensitivity for advanced adenomas and cancer. Health professionals should provide guidance to adults about the benefits, limitations, and potential harms associated with screening for colorectal cancer, including information on test characteristics and requirements for successful testing. For example, when advising patients about FOBT screening, it is important to stress that, unless there is a commitment to annual at-home testing with adherence to manufacturer’s instructions, the poor sensitivity observed with one-time testing would make FOBT a poor choice.

The ACS and other organizations recommend more intensive surveillance for individuals at higher risk for colorectal cancer. Individuals at higher risk for colorectal cancer include (1) individuals with a history of adenomatous polyps; (2) individuals with a personal history of curative-intent resection of colorectal cancer; (3) individuals with a family history of either colorectal cancer or colorectal adenomas diagnosed in a first-degree relative before age 60 years; (4) individuals at significantly higher risk due to a history of inflammatory bowel disease of significant duration; or (5) individuals at significantly higher risk due to a known or suspected presence of one of two hereditary syndromes, specifically, hereditary nonpolyposis colon cancer (HNPCC) or familial adenomatous polyposis (FAP). For these individuals, increased surveillance generally means a specific recommendation for colonoscopy, if available, and may include more frequent exams and exams beginning at an earlier age. As noted above, an update in recommendations for follow-up colonoscopy for individuals with a history of adenomatous polyps or personal history of curative-intent colorectal cancer was issued in 2006 jointly by the ACS and the US Multi-Society Task Force.

SCREENING FOR ENDOMETRIAL CANCER

In 2001, the ACS concluded that there was insufficient evidence to recommend screening women at average risk or somewhat increased risk for endometrial cancer due to history of unopposed estrogen therapy, tamoxifen therapy,
late menopause, nulliparity, infertility or failure to ovulate, obesity, diabetes, or hypertension (Table 1). The ACS recommends that women at average and increased risk should be informed about risks and symptoms of endometrial cancer at the onset of menopause (in particular, unexpected bleeding and spotting), and should be strongly encouraged to immediately report these symptoms to their physicians (Table 2). Women at very high risk for endometrial cancer due to (1) known HNPCC genetic mutation carrier status; (2) substantial likelihood of being a mutation carrier (ie, a mutation is known to be present in the family); or (3) absence of genetic testing results in families with suspected autosomal dominant predisposition to colon cancer should consider beginning annual testing for early endometrial cancer detection at age 35 years. The evaluation of endometrial histology with the endometrial biopsy is still the standard for determining the status of the endometrium. High-risk women should be informed that the recommendation for screening is based on expert opinion, and they also should be informed about potential benefits, risks, and limitations of testing for early endometrial cancer detection.

TESTING FOR EARLY PROSTATE CANCER DETECTION

ACS guidelines for testing for early prostate cancer detection were last updated in 2001, and a review and update of the current guidelines will be initiated in 2007 (Table 1). Because the current evidence about the value of testing for early prostate cancer detection is insufficient to recommend that average-risk men undergo regular screening, the ACS recommendations emphasize the importance of shared decision making about testing. The ACS recommends that the prostate-specific antigen (PSA) blood test and DRE should be offered annually beginning at age 50 years to men who have a life expectancy of at least 10 years, and that a discussion take place about the potential benefits, limitations, and harms associated with testing (Table 2). In men for whom DRE is an obstacle to testing, PSA alone is an acceptable alternative.

The ACS Prostate Cancer Advisory Committee placed strong emphasis on shared decision making between clinicians and patients, emphasizing that clinical policies of not discussing testing, discouraging testing, or recommending testing to all men were inappropriate. In addition, the Advisory Committee also concluded that if men ask the clinician to make the testing decision on their behalf following a discussion about benefits, limitations, and risks associated with prostate cancer testing, they should be tested unless other circumstances, ie, limited longevity, would discourage testing.

Men at high risk, including men of sub-Saharan African descent and men with a first-degree relative diagnosed at a younger age (ie, <65 years), should begin testing at age 45 years. Men at even higher risk of prostate cancer due to more than one first-degree relative diagnosed with prostate cancer before age 65 years could begin testing at age 40 years, although if PSA is less than 1.0 ng/mL, no additional testing is needed until age 45 years. If PSA is greater than 1.0 ng/mL, but less than 2.5 ng/mL, annual testing is recommended. If PSA is 2.5 ng/mL or greater, further evaluation with biopsy should be considered. Informed decision making is no less important for men at high risk, and these recommendations for testing in higher-risk individuals do not preclude the need for testing decisions to be preceded by a process of informed decision making. Men at high risk should have an opportunity to learn about the potential benefits, limitations, and harms associated with testing for and treatment of early-stage prostate cancer.

TESTING FOR EARLY LUNG CANCER DETECTION

At present, neither the ACS, nor any other medical/scientific organization, recommends testing for early lung cancer detection in asymptomatic individuals. However, the ACS historically has recognized that patients at high risk of lung cancer due to significant exposure to tobacco smoke or occupational exposures may decide to undergo testing for early lung cancer detection on an individual basis after consultation with their physicians. Because the likelihood of individuals seeking testing may have increased in recent years due to growing evidence suggesting a potential benefit from testing for early lung cancer detection with spiral computed tomography (ie, spiral...
the ACS issued a narrative in 2001 emphasizing the importance of shared decision making regarding testing for early lung cancer detection (Table 1). The narrative not only emphasized the importance of discussing potential benefits and harms, but also the importance of testing in settings with multidisciplinary expertise in diagnostic workup and treatment. At this time, prospective trials to evaluate the efficacy of lung cancer screening are underway in the United States and Europe, with results expected before the end of the decade. An update to the current narrative about shared decision making related to testing for early lung cancer detection is not anticipated until results from prospective clinical trials currently underway are available.

THE CANCER-RELATED CHECK UP

Periodic encounters with clinicians, either for acute care or for check ups, offer the potential for health counseling, cancer screening, and case finding. In 2006, the National Commission on Prevention Priorities released an update to a 2001 report that ranked preventive services according to importance and cost-effectiveness as a guide to prioritizing preventive services for policy decision makers and health care professionals. Rankings were based on the magnitude of the clinically preventive burden (CPB), which was a measure of the total Quality-adjusted Life Years (QALYs) gained if the service was delivered according to recommendations by the US Preventive Services Task Force (USPSTF). Thus, during visits for acute care where there may be an opportunity to provide counseling for one or several recommended preventive services, the rankings can help health care professionals determine which, among a broad spectrum of services recommended by the USPSTF, should receive prioritization. In the 2006 update, colorectal cancer screening for men and women aged 50 and older ranked in the top 6 clinical services and among the top 3 that had the potential to deliver the greatest number of QALYs. Screening for breast cancer and cervical cancer ranked among the top 12 preventive services.

When individuals see a health care professional for a preventive health examination, these encounters provide the opportunity for more comprehensive counseling and testing. These encounters should include the performance or referral for conventional cancer screening tests as appropriate by age and gender, as described above, but also an opportunity for case-finding examinations of the thyroid, testicles, ovaries, lymph nodes, oral region, and skin. Also, self-examination techniques or increased awareness about signs and symptoms of skin cancer, breast cancer, or testicular cancer can be discussed. Health counseling may include guidance about smoking cessation, diet, physical activity, and shared decision making about cancer screening, or testing for early cancer detection for cancer sites where population-based screening is not yet recommended. Whereas in the past the ACS recommended a “cancer-related check up” in a manner that implied a stand-alone exam, the recommendation now stresses that the occasion of a general periodic health examination provides a good opportunity to address examinations and counseling that could lead to prevention and early detection (see Table 2).

SURVEILLANCE OF CANCER SCREENING: COLORECTAL, BREAST, CERVICAL, AND PROSTATE CANCERS

Data Sources

This section presents surveillance data on national trends in cancer screening for the period of 1987 to 2003, based on the National Health Interview Survey (NHIS) and the most recent estimated proportion (prevalence) of the adult population that undergoes specific tests for early cancer detection in the United States, based on the Behavioral Risk Factor Surveillance System (BRFSS) conducted in 2004 (see Table 3).

The NHIS is a continuing nationwide household survey of the civilian, noninstitutionalized population conducted by the National Center for Health Statistics of the Centers for Disease Control and Prevention (CDC). The NHIS is designed to provide national prevalence estimates on personal, socioeconomic, demographic, and health characteristics of the US population, and it is the official federal monitoring instrument for the cancer screening objectives for the nation outlined in Healthy People 2010. Surveys are...
### Table 3: Prevalence (%) of Recent Cancer Screening Examinations Among US Adults by Health Insurance Coverage and Race and Ethnicity, Behavioral Risk Factor Surveillance System (BRFSS) 2004

| Nonelderly (<65 Years) | Elderly (Age ≥65 Years) | Race/Ethnicity |
|------------------------|-------------------------|----------------|
|                        | US Adults               | Health Insurance | No Health Insurance | With Health Insurance | NH White | NH Black | Hispanic | Other Races | Prevalence (%) | 95% CI (%) | Prevalence (%) | 95% CI (%) | Prevalence (%) | 95% CI (%) | Prevalence (%) | 95% CI (%) | Prevalence (%) | 95% CI (%) |
|                        |                         | 45.6 (45.1–46.1) | 42.2 (41.5–43.0) | 18.8 (17.4–20.4) | 53.1 (52.4–54.0) | 47.0 (46.5–47.5) | 44.3 (42.4–46.3) | 36.2 (33.3–39.3) | 35.2 (31.3–39.3) |
| Colorectal cancer      |                         | 19.0 (18.4–19.1) | 16.5 (16.0–17.0) | 9.3 (8.2–10.5) | 22.6 (22.0–23.2) | 19.4 (19.1–19.8) | 19.2 (17.6–20.8) | 12.1 (10.3–14.2) | 13.6 (11.1–16.5) |
| (adults ≥50 years)     |                         | 52.1 (51.6–52.6) | 49.1 (48.4–49.8) | 24.4 (22.8–26.2) | 59.6 (58.9–60.3) | 53.7 (53.2–54.2) | 51.2 (49.3–53.2) | 41.0 (38.0–44.0) | 40.6 (36.6–44.8) |
| FOBT or endoscopy†     |                         | 58.0 (57.5–58.5) | 60.0 (59.4–60.7) | 33.2 (31.3–35.1) | 62.5 (61.6–63.4) | 58.6 (58.1–59.1) | 59.4 (57.6–61.2) | 54.8 (52.0–57.6) | 52.6 (48.4–55.7) |
| Breast cancer (women |                         | 51.0 (50.4–51.4) | 54.7 (54.0–55.4) | 28.2 (26.4–30.1) | 51.1 (50.1–52.0) | 52.2 (51.6–52.7) | 51.2 (49.4–53.0) | 44.2 (41.4–47.1) | 44.8 (40.7–49.0) |
| ≥40 years)             |                         | 58.0 (57.5–58.5) | 60.0 (59.4–60.7) | 33.2 (31.3–35.1) | 62.5 (61.6–63.4) | 58.6 (58.1–59.1) | 59.4 (57.6–61.2) | 54.8 (52.0–57.6) | 52.6 (48.4–55.7) |
| Mammogram‡             |                         | 85.0 (84.4–85.1) | 90.0 (89.2–90.1) | 75.7 (74.3–77.0) | 72.1 (71.0–73.2) | 85.5 (85.1–85.9) | 86.7 (85.5–88.0) | 82.8 (81.0–84.6) | 76.5 (73.2–79.6) |
| Pap test**             |                         | 54.0 (52.9–54.6) | 50.0 (48.6–51.0) | 25.7 (22.8–28.7) | 62.4 (61.1–63.7) | 55.4 (54.5–56.2) | 50.0 (46.2–53.7) | 43.1 (37.6–48.7) | 48.4 (42.0–54.8) |
| Prostate cancer        |                         | 50.5 (49.6–51.3) | 49.0 (47.7–50.0) | 23.0 (20.5–25.5) | 57.0 (55.4–58.1) | 52.2 (51.4–53.1) | 47.4 (43.7–51.1) | 41.1 (35.7–46.6) | 36.5 (30.8–42.5) |
| (men ≥50 years)        |                         |                  |                  |                  |                  |                  |                  |                  |                  |
| PSA††                  |                         |                  |                  |                  |                  |                  |                  |                  |                  |
| DRE‡‡                  |                         |                  |                  |                  |                  |                  |                  |                  |                  |

CI = confidence interval.

NH = non-Hispanic.

FOBT = fecal occult blood testing.

CBE = clinical breast exam.

PSA = prostate-specific antigen.

DRE = digital rectal exam.

Prevalence is weighted and age adjusted using the 2000 Census.

*Recent sigmoidoscopy or colonoscopy test within the preceding 5 years.

†Recent FOBT using a home kit test performed within the preceding year.

‡Recent FOBT using a home kit test performed within the preceding year or recent sigmoidoscopy or colonoscopy test within the preceding 5 years.

§Women ≥40 years who had a mammogram in the last year.

¶Women ≥40 and older who had a mammogram in the last year and a CBE.

**Women who had a Pap test within the preceding 3 years.

††A PSA test within the past year for men who have not been told they have had prostate cancer.

‡‡A DRE within the past year for men who have not been told they have had prostate cancer.

Data are from Behavioral Risk Factor Surveillance System Public Use Data Tape 2004, Centers for Disease Control and Prevention.27
administered by trained interviewers, and participants within a household are randomly selected to participate in the core health components of the survey. Hispanics and Blacks are oversampled in the survey to help improve the precision of the estimates for those populations.

The NHIS prevalence estimates of cancer screening presented here are weighted and age-adjusted to the 2000 standard population to provide population-based prevalence estimates of the US adult population. The assessment of cancer screening for cervical and breast cancers were available for the following survey years of the NHIS: 1987, 1992, 1998, 2000, and 2003. To better reflect changes in current practice and evidence for the effectiveness of different screening strategies for colorectal cancer screening, in 2000, the NHIS questions were revised to improve the estimates of the proportion of age-eligible adults receiving recommended CRC tests for screening. For example, the NHIS 2000 and 2003 CRC screening questions for FOBT refer specifically to the home-based test method (and exclude FOBT office testing). Although in-office and/or single sample DRE is not recommended since it has very low sensitivity for cancer and advanced adenomas, it nonetheless has been shown to be a common procedure used by health professionals for screening. For CRC screening endoscopy, the NHIS 2000 and 2003 questions ask about the use of any of the three different endoscopy procedures (eg, “Have you ever had a sigmoidoscopy, colonoscopy, or proctoscopy?”), and standard text describing the procedures is read to participants to aid recall. Thus, trends presented here are based on the new set of CRC screening questions in the NHIS 2000 and 2003. Trends in cancer screening by race and ethnicity (non-Hispanic Whites, non-Hispanic Blacks, and Hispanics) are depicted for the period between 1987 to 2003 in Figure 1 (Panels A to C).

The second data source for this section is the CDC’s BRFSS survey conducted in 2004; this is the most recent year that the survey included a comprehensive set of questions to assess prevalence of cancer screening for colorectal, breast, cervical, and prostate cancer. The BRFSS provides state-specific estimates of behavioral risk factors from ongoing statewide telephone surveys.
surveys of civilian, noninstitutionalized adults (ie, persons aged 18 or older living in households with a telephone). The BRFSS is conducted annually in all 50 states, the District of Columbia, and Puerto Rico by state health departments in collaboration with the CDC. The BRFSS survey methodology includes standardized core questionnaires, complex multistage cluster sampling designs, and random-digit dialing methods to select households with telephones. Data are weighted to provide prevalence estimates representative of the state’s adult population. From its inception, the focus of the BRFSS has been to establish a surveillance system for the collection of population-based health behaviors, sociodemographics, use of preventive services (ie, use of early detection tests for cancer), health care access factors (ie, health insurance coverage, having a usual source of care and a regular health care provider), and other health status determinants of the general population.33 A specialized statistical software for the analysis of the survey was used to compute the age-adjusted weighted prevalence estimates (and standard errors) for the United States based on the combined state-level weighted data of states participating in the BRFSS in 2004.34 The 95% confidence intervals (95% CIs) were calculated using information from the standard error of the estimates.

Estimates in Table 3 reflect an assessment of recent use of screening tests for cancers of the breast, cervix, colon and rectum, and prostate based on self-reports. Because the BRFSS does not include additional questions about the frequency of screening during a given period, the data presented in Table 3 cannot be interpreted as a measure of routine use of screening tests for these cancers. Moreover, direct comparisons of estimates derived from the BRFSS and the NHIS cannot be made because of the different methodologies. Table 3 also shows the variation in cancer screening prevalence by race and ethnicity and by health insurance coverage in individuals aged less than 65 years and those aged 65 and older. To highlight the impact of health insurance as a determinant of use of or access to cancer screening, health insurance status for persons aged less than 65 years was classified based on whether they had or did not have any kind of health care coverage.

### Trends in Cancer Screening by Racial and Ethnic Patterns

National trends are monitored to assess the dissemination of established screening modalities into clinical and community practice. When presented by race and ethnicity, it helps identify segments of the population in need of enhanced efforts in cancer control. In this section, results on cancer screening trends for cervical, breast, and colorectal cancer are presented for all race/ethnic groups combined, and separately for non-Hispanic Whites, non-Hispanic Blacks, and Hispanics. Insufficient sample size in the NHIS precludes the estimation of reliable cancer screening estimates for other ethnic groups; however, information about ethnic subgroups is available from other state surveys, such as the California Health Interview Survey.35

**Cervical Cancer Screening Trends.** Between 1987 and 2000, the proportion of women aged 18 and older who had a recent Pap test (within the last 3 years) increased by 11% in women of all race/ethnic groups, with the largest percentage increase (18%) occurring in Hispanic women. From 2000 to 2003, all race/ethnic groups showed a decline in the recent use of the Pap test of about 2 percentage points (Figure 1A). In 2003, 79.2% of women reported a Pap test within the past 3 years.

**Breast Cancer Screening Trends.** Mammography trend data between 1987 and 2000 showed impressive progress in breast cancer screening rates across all race/ethnic groups. In 1987, the proportion of women aged 40 and older reporting a recent mammogram was under 30%, but by 2000, the proportion of women reporting having had a recent mammogram (within the last 2 years) increased by 140% (to 70.3%, overall); similarly, large increases in reported use of mammography occurred in White, Black, and Hispanic women. Notably, during the most recent period of 2000 and 2003, the prevalence of recent mammography continued to increase from 61.8% in 2000 to 65.3% in 2003, and if trends continue, the gap in screening between
White, Black, and Hispanic women may close in the near future (Figure 1B).

*Colorectal Cancer Screening Trends.* Results from the NHIS 2000 and 2003 indicate that recent use of endoscopy examinations for colorectal cancer screening among adults aged 50 and older improved by 19% (from 30% in 2000 to 35.8% in 2003); however, there was little improvement in the use of FOBT screening with the home-kit method, and in fact, a slight decline was observed, from 24% in 2000 to 22.4% in 2003 (Figure 1C). Meissner and colleagues36 have shown much of the recent increase in endoscopy testing for colorectal cancer screening is driven by use of colonoscopy (particularly larger uptake among adults aged 65 and older). Recent sigmoidoscopy screening for colorectal cancer has declined since 2000. The researchers suggest that a possible contributing factor for the faster uptake in colonoscopy for screening is the recent extension of Medicare coverage for screening colonoscopy to average-risk beneficiaries in 2000. Other possible factors include the influence of media and celebrities, such as Katie Couric’s televised colonoscopy,37 and possibly the greater earnings that derive from colonoscopy.

*Skin Cancer Screening Examination by a Provider.* There are no trend data for skin cancer screening since the NHIS only collected data in 2000. Saraiya and colleagues38 analyzed these data and reported that among adults aged 18 and older, 14.5% reported having ever had a skin cancer screening exam by a doctor. Of these, 8.0% reported having had a recent skin cancer screening exam performed by a provider. Uninsured adults were significantly less likely to have a recent skin cancer screening exam, compared with insured adults (3.5% versus 9.1%).

*Prevalence of Cancer Screening by Health Insurance Status and Ethnicity—BRFSS 2004*

*Cervical Cancer Screening.* In 2004, 85.0% of women aged 18 and older with an intact uterus reported having had a Pap test in the preceding 3 years. The lowest prevalence of Pap test screening occurred among women aged 18 to 64 years who lacked health care coverage (75.7%) and in women of other races (76.5%) (Table 3).

*Breast Cancer Screening.* In 2004, the proportion of women aged 40 and older reporting having had a mammogram in the last year was 58%, while 51% of women reported having had both a mammogram and a CBE in the last year. Uninsured women aged 40 to 64 years were less likely to have had a mammogram (33.2%), or both a mammogram and CBE (28.2%) in the previous year, compared with women with health insurance (Table 3). Hispanic women and women of other races were less likely to have had a mammogram (54.8% and 52.6%, respectively), or both a mammogram and CBE (44.2% and 44.8%, respectively), compared with either non–Hispanic White or Black women (Table 3).

*Colorectal Cancer Screening.* The prevalence of recent colorectal cancer screening with endoscopy, ie, either flexible sigmoidoscopy or colonoscopy, was more than twice the prevalence of screening with FOBT in both men and women, consistent with the pattern observed in the NHIS data described earlier. In 2004, among adults aged 50 and older, the prevalence of colorectal cancer screening with endoscopy within the past 5 years was 52.1%, and the prevalence of having done an at-home FOBT within the past year was 19%. Among adults aged 50 and older, the prevalence of having had recent screening with either FOBT or endoscopy was 52.1%. Uninsured nonelderly adults were significantly less likely to report recent colorectal cancer screening, and the differences were more pronounced for recent endoscopy compared with recent FOBT, likely due to the higher cost of those procedures. Whereas 42.2% of adults with health insurance reported recent endoscopy, the rate for uninsured adults was only 18.8% of adults (Table 3). White and Black Hispanics and persons of other races were less likely to report having recent endoscopy or FOBT, compared with both non–Hispanic Whites or Blacks. While this comparison represents an estimate of the prevalence of adults who are currently adherent with ACS guidelines in terms of the kind of recent testing they have undergone, the BRFSS does not distinguish between sigmoidoscopy and colonoscopy, and therefore, individuals who have had colonoscopy more than 5 years, but less than 10 years, before the survey was conducted would not be included in the estimate. No data are available from the BRFSS to estimate use of the double contrast barium enema, which has declined in use.39
Testing for Early Prostate Cancer Detection. Questions about recent testing for early prostate cancer detection are limited to men without a prior diagnosis of prostate cancer. In 2004, the proportion of men aged 50 and older who reported having been tested for early prostate cancer detection with a PSA blood test the past year was 54%, and with a DRE was 50.5%. Men aged 50 to 64 years who lacked health care coverage were about half as likely to have had a PSA blood test or a DRE, compared with men in the same age range who had health care coverage (Table 3). Compared with non-Hispanic White and Black men, Hispanic men and men of other races were less likely to have had a PSA or a DRE (Table 3).

DISCUSSION

The improving rates of cervical and breast cancer screening utilization among minority women since the early 1990s partly may be a reflection of the positive impact the CDC’s National Breast and Cervical Cancer Early Detection Program (NBCCEDP) has had on increasing access to screening. Since its inception in 1991, the NBCCEDP has provided over 5 million screening examinations to underserved women. The NBCCEDP is improving health care for underserved women through outreach, public and professional education, improved access to services, diagnostic evaluation, case management, treatment services, and quality assurance measures. Although Hispanics/Latinos are less likely to report recent cancer screening, compared with Non-Hispanic Whites and Blacks, cancer screening rates for Hispanics are improving. Since 2000, recent rates of colorectal cancer screening (particularly endoscopy testing) have improved, but utilization rates remain under 50%. Thus, further efforts focused on increasing awareness and demand in the public, incentives for health care professionals, and systems that are supportive of regular screening.

Based on national data from the NHIS, the trend in recent mammography use is stable, in contrast to the observed small declines in the prevalence of breast cancer screening between the 2002 and 2004 BRFSS. The proportion of women aged 40 to 64 years who reported a recent mammogram was slightly lower in 2004, compared with 2002 (58% versus 61.3%), as was the proportion of women aged 18 to 64 years reporting a recent Pap test (85% versus 88.2%). Whether or not 2006 BRFSS data will show an additional drop of mammography rates is yet to be determined, but a drop in the breast cancer incidence rate was recently reported between 2002 to 2003, which has been interpreted by Ravdin and colleagues as possibly due to a decline in the use of postmenopausal hormone therapy. An alternative explanation for part or most of this drop in incidence is a decline in mammography utilization that may be attributable to declining access. An immediate effect of a significant decline in mammography utilization rates will be a reduction in the number of occult cancers detected by mammography, since incidence in any year is a combination of symptomatic breast cancers and those detected in asymptomatic women by mammography. Utilization of endoscopy by adults aged 50 to 64 years increased from 2002 to 2004 from 41% to 45.6%, whereas use of at-home FOBT declined from 22% to 19%. Rates of testing for early prostate cancer detection remained the same. Between 2002 and 2004, there was no change in the prevalence of cancer screening reported by individuals without health care coverage. Screening rates for adults without health insurance generally are about half the rate of those with health care coverage, with the exception of cervical cancer screening, where rates are more similar, likely due to the greater availability of publicly supported reproductive health programs.

At present, the ACS and USPSTF and other organizations endorse population screening for cancers of the cervix, breast, and colon and rectum. Where there is insufficient evidence to recommend for or against cancer screening, the ACS and other organizations provide guidance to the public and health care professionals about shared decision making so that individuals can make decisions about testing for early cancer detection in the presence of scientific uncertainty. Cancers of the prostate, endometrium, and lung are notable examples. Likewise, as noted above, regular preventive health examinations, which are not endorsed at this time for adults.
at any periodicity, provide opportunities for counseling, screening, and even case finding. The goal of these guidelines is to reduce cancer-related morbidity and mortality and attendant costs to society. For cancers of the breast, colon and rectum, and cervix alone, the NCI estimates that total premature mortality in 2003 was approximately 1.7 million years of life lost.47

Yet, as the data on cancer screening trends presented in this and previous reports reveal, numerous factors alone and together account for considerable underutilization of cancer screening in the United States. Having health insurance, a regular doctor, and a regular source of usual care all are associated with higher cancer screening rates and receipt of preventive health care, and where these structural supports are absent, cancer screening rates are considerably lower.42,48–53 Current trends suggest that these key structural supports are eroding further. Between 2003 and 2004, the number of Americans without health insurance rose from 45 million to 45.8 million, and there was a decline in the number of people covered by employment-based health insurance (60.4% to 59.8%).54 Not having health insurance makes it less likely that an individual will have a regular doctor and a usual source of care.

Moreover, even among individuals with health insurance, recent screening rates and rates of regular screening55 for most cancers are suboptimal. Setting aside awareness and behavioral factors that contribute to whether or not individuals receive any or regular screening, in addition to health insurance and a regular source of care, other structural factors, such as the various forms of reminder systems, also are very helpful as supportive tools to enhance the likelihood that individuals will receive cancer screening. Perhaps most important is a recommendation from a health care professional, which has been shown to be a key predictor of screening, and the likelihood that patients will receive this recommendation is higher if they see a health care professional for a check up as opposed to episodic care for other reasons.56 However, currently there is a belief that the concept of a periodic preventive health examination lacks supporting evidence,57,58 and thus, the current emphasis on delivery of preventive care is to find opportunities during routine encounters59 or to view the check up, when it does occur, in terms of the opportunity to deliver one or more recommended preventive services.60 Taking advantage of opportunities for prevention during encounters for other reasons is quite sensible, as is setting priorities for choosing among prevention and early detection priorities in order to achieve the fullest potential in terms of lives saved and cost-effectiveness for the patient and for society. As a preventive health strategy, we would never want to abandon a strategy of tailoring priority preventive health to an individual patient whenever the opportunity arose.59 However, as a single strategy for delivering preventive health care, it is hopelessly inefficient and has very limited potential to contribute to the broader range of prevention and early detection recommendations for individuals or for the nation, when considered in the aggregate.61

It is important to view cancer screening trends and the prevalence of cancer screening with an eye to understanding the structural and behavioral factors that contribute to the use of early detection tests. Too many adults are not receiving regular screening, and understanding the reasons why screening rates are not increasing, and why some may be declining, is a national priority and should result in a collective plan of action to apply the knowledge and resources necessary to achieve the fullest potential of what screenings can contribute to the control of cancer.

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