DRAFT RECOMMENDATION STATEMENT
EMBARGOED: MAY 9, 2023, AT 11 AM ET

Screening for Breast Cancer: U.S. Preventive Services Task Force Draft Recommendation Statement

Population	Recommendation	Grade
Women ages 40 to 74 years	The USPSTF recommends biennial screening mammography for women ages 40 to 74 years.	**B**
Women age 75 years or older	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening mammography in women age 75 years or older.	**I**
Women with dense breasts	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of supplemental screening for breast cancer using breast ultrasonography or magnetic resonance imaging (MRI) in women identified to have dense breasts on an otherwise negative screening mammogram.	**I**

See the "Practice Considerations" section for more information on the patient population to whom this recommendation applies and on screening mammography modalities.

Pathway to Benefit

To achieve the benefit of screening and mitigate disparities in breast cancer mortality by race and ethnicity, it is important that all persons with abnormal screening mammography receive equitable and appropriate followup evaluation and additional testing, inclusive of indicated biopsies, and that all persons diagnosed with breast cancer receive effective treatment.

Importance

Among all U.S. women, breast cancer is the second most common cancer and the second most common cause of cancer death. In 2022, an estimated 43,250 women died of breast cancer (1). Non-Hispanic White women have the highest incidence of breast cancer (5-year age-adjusted incidence rate, 137.6 cases per 100,000 women) and non-Hispanic Black women have the second highest incidence rate (5-year age-adjusted incidence rate, 129.6 cases per 100,000 women) (2). Incidence has gradually increased among women ages 40 to 49 years from 2000 to 2015 but increased more noticeably from 2015 to 2019, with a 2.0% average annual increase (3). Despite having a similar or higher rate of mammography screening (4), Black women are more likely to be diagnosed with breast cancer beyond stage 1 than other racial and ethnic groups, are more likely to be diagnosed with triple-negative cancers (i.e., ER-, PR-, and HER2-), which are more aggressive tumors, compared with White women (5), and are approximately 40% more likely to die from breast cancer compared with White women (6).

USPSTF Assessment of Magnitude of Net Benefit

The U.S. Preventive Services Task Force (USPSTF) concludes with moderate certainty that biennial screening mammography in women ages 40 to 74 years has a **moderate net benefit**.

The USPSTF concludes that the **evidence is insufficient** to determine the balance of benefits and harms of screening mammography in women age 75 years or older.

The USPSTF concludes that the **evidence is insufficient** to determine the balance of benefits and harms of supplemental screening for breast cancer with breast ultrasound or MRI, regardless of breast density.

Go to **Table 1** for more information on the USPSTF recommendation rationale and assessment. For more details on the methods the USPSTF uses to determine the net benefit, see the USPSTF Procedure Manual (7).

Practice Considerations

Patient Population Under Consideration

These recommendations apply to cisgender women and all other persons assigned female at birth (including transgender men and nonbinary persons) age 40 years or older at average risk of breast cancer. This is because the net benefit estimates are driven by sex (i.e., female) rather than gender identity, although the studies reviewed for this recommendation generally used the term "women." These recommendations apply to persons with a family history of breast cancer (i.e., those with a first-degree relative with breast cancer) and to persons who have other risk factors such as having dense breasts. They do not apply to persons who have a genetic marker or syndrome associated with a high risk of breast cancer (e.g., *BRCA1* or *BRCA2* genetic mutations), a history of high-dose radiation therapy to the chest at a young age, or previous breast cancer or a high-risk breast lesion on previous biopsies.

Screening Tests

Both digital mammography (DM) and digital breast tomosynthesis (DBT or "3D mammography") are effective mammographic screening modalities. DBT must be accompanied by traditional DM or synthetic DM, which is a two-dimensional image constructed from DBT data (8, 9); hereafter, references to DBT will imply concurrent use with DM or synthetic DM. In general, studies have reported small increases in positive predictive value with DBT compared with DM. Trials reporting on at least two consecutive rounds of screening have generally found no statistically significant difference in breast cancer detection or in tumor characteristics (tumor size, histologic grade, or node status) when comparing screening with DBT vs. DM (4).

The Breast Cancer Surveillance Consortium (BCSC) is a network of six active breast imaging registries and two historic registries, providing a large observational database related to breast cancer screening (10). Collaborative modeling, using inputs from BCSC data, suggests similar benefits and fewer false-positive results with DBT compared with DM (11).

Screening Interval

Available evidence suggests a more favorable trade-off of benefits vs. harms with biennial vs. annual screening. BCSC data showed no difference in detection of stage IIB+ cancers and cancers with less favorable prognostic characteristics with annual vs. biennial screening interval for any age group (12), and modeling data estimate that biennial screening has a more favorable balance of benefits to harms compared with annual screening (11).

Treatment or Intervention

Breast cancer treatment regimens are highly individualized according to each patient's clinical status, cancer stage, tumor biomarkers, clinical subtype, and personal preferences (13). Ductal carcinoma in

situ (DCIS) is a noninvasive condition with abnormal cells in the breast duct lining and there is uncertainty regarding the prognostic importance of DCIS. Consequently, there is clinical variability in the treatment approach when DCIS is identified at screening. It is unknown what proportion of screen-detected DCIS represents overdiagnosis (i.e., a lesion that would not have led to health problems in the absence of detection by screening). In general, DCIS treatment, which may include surgery, radiation, and endocrine treatment, is intended to reduce the risk for future invasive breast cancer.

Disparities in Breast Cancer Outcomes and Implementation Considerations

Mortality from breast cancer is highest for Black women even when accounting for differences in age and stage at diagnosis; mortality is approximately 40% higher for Black women compared with White women (6). While the underlying causes of this disparity are complex, the National Institute of Minority Health and Disparities has developed a framework that recognizes multiple determinants, including the healthcare system, the sociocultural and built environments, behavioral factors, and genetic factors, that can contribute to health inequities (14). Inequities in breast cancer mortality can be examined at each step along the cancer screening, diagnosis, treatment, and survival pathway with these factors in mind. The higher mortality rate for Black women diagnosed with breast cancer in the United States aligns with other health inequities that are attributed to the effects of structural racism, which include inequalities in resources, harmful exposures, and access to and delivery of high-quality healthcare (15-17). Racial and economic residential segregation driven by discriminatory housing policies has been associated with poorer breast cancer survival. Residential segregation also increases exposure to toxic environments such as air pollution, industrial waste, and built environments that do not support health, and stressful life conditions, which can increase cancer risk (18-20).

Black women have a higher incidence of breast cancer with at least one negative molecular marker, and the incidence of triple-negative cancers (i.e., ER-, PR-, and HER2-) is twice as high compared with White women (24.1 vs. 12.4 cases per 100,000 women) (5). The higher incidence of negative hormonal receptor (HR) status leads to worse outcomes because these subtypes are less readily detected through screening and less responsive to current therapy (21), and triple-negative cancers are more likely to be aggressive and diagnosed at later stages than other subtypes. It is important to note that observed regional differences in the incidence of HR-negative cancer within and between racial groups suggest that environmental factors and social determinants of health, including racism, are largely responsible for the differential risk of developing HR-negative cancer (22, 23). Although differences in the incidence of cancer subtypes explain some of the differences in breast cancer mortality, racial differences in mortality within subtypes point to barriers to obtaining high-quality healthcare and disparities in screening followup and treatment initiation as contributors (22).

Of note, Black women have a similar or higher rate of self-reported mammography screening as all women (84.5% vs 78%, respectively, in the past 2 years) (4). However, benefits from mammography screening require initiation and completion of appropriate and effective followup evaluation and treatment. Both screening and guideline-concordant treatment are essential for reducing breast cancer mortality (24), highlighting the importance of timely and effective treatment at the earliest stage of diagnosis. Delays and inadequacies in the diagnostic and treatment pathway downstream from screening likely contribute to increased mortality compared with women receiving prompt, effective care.

Disparities in followup after screening and treatment have been observed for Black, Hispanic, and Asian women (25-34). Adjuvant endocrine therapy reduces the risk of cancer recurrence among individuals with HR-positive cancers, but long-term adherence can be difficult. Black women are more likely to

discontinue adjuvant endocrine therapy compared with White women, in part due to greater physical (vasomotor, musculoskeletal, or cardiorespiratory) and psychological (distress or despair) symptom burdens (33, 34). Improvements in access to effective healthcare, removal of financial barriers, and use of support services to ensure equitable followup after screening and timely and effective treatment of breast cancer have the potential to reduce mortality for individuals experiencing disparities related to racism, rural location (35), low income, or other factors associated with lower breast cancer survival.

Suggestions for Practice Regarding the I Statement

Potential Preventable Burden
Breast cancer incidence increases with age and peaks among persons ages 70 to 74 years, though rates in persons age 75 years or older remain high (460.2 and 416.5 cases per 100,000 women ages 75–79 and 80–84 years, respectively, compared with 477.7 cases per 100,000 women ages 70–74 years), and mortality from breast cancer increases with increasing age (36, 37). However, no randomized clinical trials (RCTs) of breast cancer screening included women age 75 years or older (4). Collaborative modeling suggests that screening in women age 75 years or older is of benefit (11), but a trial emulation found no benefit with breast cancer screening in women ages 75 to 84 years (38). Thus, there is insufficient evidence to recommend for or against screening mammography in women age 75 years or older.

There is insufficient evidence about the effect of supplemental screening using breast ultrasonography or MRI on health outcomes such as breast cancer morbidity and mortality in women with dense breasts who have an otherwise normal screening mammogram. Dense breasts are associated with both reduced sensitivity and specificity of mammography and with an increased risk of breast cancer (39, 40). However, increased breast density itself is not associated with higher breast cancer mortality among women diagnosed with breast cancer, after adjustment for stage, treatment, method of detection, and other risk factors, according to data from the BCSC (41).

Potential Harms
Potential harms of screening mammography include false-positive results, which may lead to psychological harms, additional testing, and invasive followup procedures; overdiagnosis and overtreatment of lesions that would not have led to health problems in the absence of detection by screening; and radiation exposure.

Current Practice
Centers for Disease Control and Prevention data show that as of 2015, over 50% of women age 75 years or older reported having a mammogram within the past 2 years (42). At the present time, 38 states and the District of Columbia require patient notification of breast density when mammography is performed; in some states, legislation also includes notification language informing women that they should consider adjunctive screening (43). Starting in September 2024, the U.S. Food and Drug Administration will require mammography centers to notify patients of their breast density, inform them that dense breast tissue raises the risk of breast cancer and makes it harder to detect on a mammogram, and that other imaging tests may help to find cancer (44).

Additional Tools and Resources
The National Cancer Institute has information on breast cancer screening for healthcare professionals (https://www.cancer.gov/types/breast/hp/breast-screening-pdq) and for patients (https://www.cancer.gov/types/breast/patient/breast-screening-pdq).

The Centers for Disease Control and Prevention has information on breast cancer screening (https://www.cdc.gov/cancer/breast/basic_info/screening.htm).

Other Related USPSTF Recommendations

The USPSTF has made recommendations about the use of medications to reduce women's risk for breast cancer (45), as well as risk assessment, genetic counseling, and genetic testing for *BRCA1*- or *BRCA2*-related cancer (46).

Update of Previous USPSTF Recommendation

When final, this recommendation will update the 2016 recommendation on breast cancer screening. In 2016, the USPSTF recommended biennial screening mammography for women ages 50 to 74 years and individualizing the decision to undergo screening for women ages 40 to 49 years, based on factors such as individual risk and personal preferences and values. The USPSTF concluded that the evidence was insufficient to assess the benefits and harms of DBT as a primary screening method; the balance of benefits and harms of adjunctive screening for breast cancer using breast ultrasonography, MRI, or DBT in women identified to have dense breasts on an otherwise negative screening mammogram; and the balance of benefits and harms of screening mammography in women age 75 years or older (47). For the current draft recommendation, the USPSTF recommends biennial screening mammography for women ages 40 to 74 years. The USPSTF again finds that the evidence is insufficient to assess the balance of benefits and harms of supplemental screening for breast cancer using breast ultrasonography or MRI in women identified to have dense breasts on an otherwise negative screening mammogram and the balance of benefits and harms of screening mammography in women age 75 years or older. Current evidence suggests that both DM and DBT are effective primary screening modalities.

Supporting Evidence

Scope of Review

To update its 2016 recommendation, the USPSTF commissioned a systematic review on the comparative effectiveness of different mammography-based breast cancer screening strategies by age to start and stop screening, screening interval, modality, use of supplemental imaging, or personalization of screening for breast cancer on the incidence and progression to advanced breast cancer, breast cancer morbidity, and breast cancer–specific or all-cause mortality. The review also assessed the harms of different breast cancer screening strategies (4). Evidence from the trials that established breast cancer screening effectiveness has not been updated, as there are no new studies that include a group that is not screened. Analyses from prior reviews of that evidence were considered foundational evidence for the current recommendation.

In addition to the systematic evidence review, the USPSTF commissioned collaborative modeling studies from CISNET (Cancer Intervention and Surveillance Modeling Network) to provide information about the benefits and harms of breast cancer screening strategies that vary by the ages to begin and end screening, screening modality, screening interval, and by race (11). The modeling studies complement the evidence that the systematic review provides.

In alignment with the USPSTF's commitment to improve health equity, the evidence review included contextual questions on the drivers behind and approaches to address disparities in health outcomes

related to breast cancer, particularly the higher mortality in Black women, and the CISNET collaborative modeling investigated outcomes of screening for Black women.

Benefits and Comparative Benefits of Early Detection and Treatment

Randomized trials that began enrolling participants more than 30 to 40 years ago have established the effectiveness of screening mammography to reduce breast cancer mortality. A meta-analysis conducted in support of the 2016 USPSTF breast cancer screening recommendation found that screening mammography was associated with relative risk (RR) reductions in breast cancer mortality of 0.88 (95% confidence interval [CI], 0.73 to 1.00; 9 trials) for women ages 39 to 49 years, 0.86 (95% CI, 0.68 to 0.97; 7 trials) for women ages 50 to 59 years, 0.67 (95% CI, 0.54 to 0.83; 5 trials) for women ages 60 to 69 years, and 0.80 (95% CI, 0.51 to 1.28; 3 trials) for women ages 70 to 74 years (48), and an updated analysis of three Swedish screening trials reported a 15% relative reduction in breast cancer mortality for women ages 40 to 74 years (RR, 0.85 [95% CI, 0.73 to 0.98]) (49). Only one of these trials enrolled a significant proportion of Black women (50). None of the trials nor the combined meta-analysis demonstrated a difference in all-cause mortality with screening mammography. The current USPSTF review focused on the comparative benefits of different screening strategies.

Age to Start or Stop Screening

The USPSTF did not identify any RCTs designed to test the comparative effectiveness of different ages to start or stop screening that reported morbidity, mortality, or quality of life outcomes. One trial emulation study (N=264,274), using a random sample from Medicare claims data, estimated the effect of women stopping screening at age 70 years compared with those who continued annual screening after age 70 years. Based on survival analysis, this study reported that continued screening between the ages of 70 and 74 years was associated with a 22% decrease in the risk of breast cancer mortality, compared with a cessation of screening at age 70 years, and there was no difference in the hazard ratio or absolute rates of breast cancer mortality with continued screening vs. discontinued screening from ages 75 to 84 years (38).

Collaborative modeling data estimated that compared with biennial screening from ages 50 to 74 years, biennial screening starting at age 40 years until 74 years would lead to 1.3 additional breast cancer deaths averted per 1,000 women screened over a lifetime of screening for all women. Modeling also estimated that screening benefits for Black women are similar for breast cancer mortality reduction and greater for life-years gained and breast cancer deaths averted compared with all women. Thus, biennial screening starting at age 40 years would result in 1.8 additional breast cancer deaths averted per 1,000 women screened for Black women (11). Epidemiologic data has shown that the incidence rate of invasive breast cancer for 40- to 49-year-old women has increased an average of 2.0% annually between 2015 and 2019, a higher rate than in previous years (3). These factors led the USPSTF to conclude that screening mammography in women ages 40 to 49 years has a moderate benefit in reducing the risk of breast cancer mortality.

Screening Interval

The USPSTF did not identify any randomized trials directly comparing annual vs. biennial screening that reported morbidity, mortality, or quality of life outcomes. One controlled trial (N=14,765) conducted in Finland during the years 1985 to 1995 assigned participants ages 40 to 49 years to annual or triennial screening invitations based on birth year (even birth year: annual; odd birth year: triennial) and reported similar mortality from incident breast cancer and for all-cause mortality between the two groups, with followup to age 52 years (51).

A nonrandomized study using BCSC data (N=15,440) compared the tumor characteristics of cancers detected following annual vs. biennial screening intervals (12). The relative risk of being diagnosed with a stage IIB or higher cancer and cancer with less favorable characteristics was not statistically different for biennially vs. annually screened women in any of the age categories. The risk of a stage IIB or higher cancer diagnosis and of having a tumor with less favorable prognostic characteristics were higher for premenopausal women screened biennially vs. annually (RR, 1.28 [95% CI, 1.01 to 1.63] and RR, 1.11 [95% CI, 1.00 to 1.22], respectively). However, this study did not conduct formal tests for interaction in the subgroup comparisons and did not adjust for multiple comparisons.

One RCT (n=76,022) conducted between 1989 and 1996 randomized individuals to annual or triennial screening and reported on breast cancer incidence. The number of screen-detected cancers was higher in the annual screening study group (RR, 1.64 [95% CI, 1.28 to 2.09]). However, the total number of cancers diagnosed either clinically or with screening was similar after 3 years of screening. Cancers occurring in the annual screening group (including clinically diagnosed cancers) did not differ by prognostic features such as tumor size, node positivity status, or histologic grade compared with those in the triennial screening group (52).

Collaborative modeling estimated that biennial screening results in greater incremental life-years gained and mortality reduction per mammogram and has a more favorable balance of benefits to harms for all women and for Black women, compared with annual screening. While modeling suggests that screening Black women annually and screening other women biennially would reduce the disparity in breast cancer mortality (11), trial or observational evidence is lacking that screening any group of women annually compared with biennial screening improves mortality from breast cancer (4).

DBT vs. DM

The USPSTF did not identify any RCTs or observational studies that compared screening with DBT vs. DM and reported morbidity, mortality, or quality of life outcomes.

Three RCTs (53-55) and one nonrandomized study (56) compared detection of invasive cancer over two rounds of screening with DBT vs. DM. These trials screened all participants with the same screening modality at the second screening round—DM in two trials and the nonrandomized study, and DBT in one trial. Stage shift or differences in tumor characteristics across screening rounds could offer indirect evidence of potential screening benefit. The trials found no statistically significant difference in detection at the second screening round (pooled RR, 0.87 [95% CI, 0.73 to 1.05]; 3 trials; n=105,064) (4). The nonrandomized study (n=92,404) found higher detection at round one for the group screened with DBT and higher detection at round two for the group screened with DM at both rounds. There were no statistically significant differences in tumor diameter, histologic grade, and node status at the first or second round of screening in any of these studies.

Collaborative modeling data estimated that the benefits of DBT are similar to the estimated benefits of DM (e.g., approximately 5 to 6 more life-years gained per 1,000 women screened) (11).

Supplemental Screening With MRI or Ultrasonography, or Personalized Screening

The USPSTF found no studies of supplemental screening with MRI or ultrasonography, or studies of personalized (e.g., risk-based) screening strategies, that reported on morbidity or mortality or on cancer detection and characteristics over multiple rounds of screening (4). Collaborative modeling studies did not investigate the effects of screening with MRI or ultrasonography. Modeling generally estimated that

the benefits of screening mammography would be greater for persons at modestly increased risk (e.g., the risk of breast cancer associated with a first-degree family history of breast cancer) (11).

Harms of Screening

For this recommendation, the USPSTF also reviewed the harms of screening for breast cancer and whether the harms varied by screening strategy. Potential harms of screening for breast cancer include false-positive and false-negative results, need for additional imaging and biopsy, overdiagnosis, and radiation exposure.

The most common harm is a false-positive result, which can lead to psychological harms, as well as additional testing and invasive followup procedures without the potential for benefit. Collaborative modeling data estimated that a strategy of screening biennially from ages 40 to 74 years would result in 1,376 false-positive results per 1,000 women screened over a lifetime of screening (11).

Overdiagnosis occurs when breast cancer that would never have become a threat to a person's health, or even apparent, during their lifetime is found due to screening. It is not possible to directly observe for any individual person whether they have or do not have an overdiagnosed tumor; it is only possible to indirectly estimate the frequency of overdiagnosis that may occur across a screened population. Estimates of overdiagnosis from RCTs that had comparable groups at baseline, had adequate followup, and did not provide screening to the control group at the end of the trial range from approximately 11% to 19% (4). Collaborative modeling data estimate that a strategy of screening biennially from ages 40 to 74 years would lead to 14 overdiagnosed cases of breast cancer per 1,000 persons screened over the lifetime of screening, though with a very wide range of estimates (4 to 37 cases) across models (11).

Age to Start or Stop Screening

One trial emulation (n=264,274) compared discontinuation of mammography screening at age 70 years or older with continued annual screening beyond this age (38). Overall, the 8-year cumulative risk of a breast cancer diagnosis was higher for the continued annual screening strategy after age 70 years (5.5% overall; 5.3% in women ages 70–74 years; 5.8% in women ages 75–84 years) compared with the stop screening strategy (3.9% overall; same proportion for both age groups). Fewer cancers were diagnosed under the stop screening strategy (ages 70 to 84 years); consequently, there was a lower risk of undergoing followup and treatment. For women aged 75 to 84 years, additional diagnoses did not contribute to a difference in the risk of breast cancer mortality, raising the possibility that the additionally diagnosed cancers represent overdiagnosis.

Collaborative modeling data estimated that lowering the age to start screening to 40 years from 50 years would result in about a 60% increase in false-positive results, and 2 additional overdiagnosed cases of breast cancer (range, 0–4) per 1,000 women over a lifetime of screening (11).

Screening Interval

Rates of interval cancers (cancer diagnosis occurring between screening) reported in screening studies reflect a combination of cancers that were missed during previous screening examinations (false-negative results) and incident cancers emerging between screening rounds. Evidence from studies comparing various intervals and reporting on the effect of screening interval on the rate of interval cancers is mixed. One RCT comparing annual vs. triennial screening reported that the rate of interval cancers was significantly lower in the annual invitation group (1.84 cases per 1,000 women initially screened) than in the triennial invitation group (2.70 cases per 1,000 women initially screened) (RR, 0.68

[95% CI, 0.50 to 0.92]) (52), while a second quasirandomized study, also comparing annual vs. triennial screening, found no difference in the number of interval cancers between the two groups (51).

Based on two studies, false-positive recall was more likely to occur with annual screening compared with longer intervals between screening (57, 58). One of these studies, using data from the BCSC, reported that biennial screening led to a 5% absolute decrease in the 10-year cumulative false-positive biopsy rate compared with annual screening, whether screening was conducted with DBT or DM (57). Collaborative modeling estimated that annual screening results in more false-positive results and breast cancer overdiagnosis. For example, a strategy of screening annually from ages 40 to 74 years would result in about 50% more false-positive results and 50% more overdiagnosed cases of breast cancer compared with biennial screening for all women and a similar increase in false-positive results and a somewhat smaller increase in overdiagnosed cases for Black women (11).

DBT vs. DM

Three RCTs did not show statistically significant differences in the risk of interval cancer following screening with DBT or DM (pooled RR, 0.87 [95% CI, 0.64 to 1.17]; 3 trials; n=130,196) (4). Five nonrandomized studies generally support the RCT findings. Three of the nonrandomized studies found no significant difference in the rate of interval cancers diagnosed following screening with DBT or DM (56, 59, 60), while one study found a slight increased risk with DBT screening (61), and one study found an unadjusted decreased risk with DBT screening (62).

A pooled analysis of three RCTs (n=105,244) comparing screening with DBT vs. DM did not find a difference in false-positive recalls at the second round of screening (4). A nonrandomized study using BCSC data reported that the estimated cumulative probability of having at least one false-positive recall over 10 years of screening was generally lower with DBT screening compared with DM screening (annual screening: 10-year cumulative probability of a false-positive recall was 49.6% with DBT and 56.3% with DM; biennial screening: 10-year cumulative probability of a false-positive recall was 35.7% for DBT and 38.1% for DM). The risk of having a biopsy over 10 years of screening was slightly lower when comparing annual screening with DBT vs. DM but did not differ between DBT and DM for biennial screening (annual screening: 10-year cumulative probability of a false-positive biopsy was 11.2% with DBT and 11.7% with DM; biennial screening: 10-year cumulative probability of a false-positive biopsy was 6.6% for DBT and 6.7% for DM). When results were stratified by breast density, the difference in false-positive recall probability with DBT vs. DM was largest for women with nondense breasts and was not significantly different among women with extremely dense breasts (57). Collaborative modeling, using inputs from BCSC data, estimated that screening women ages 40 to 74 years with DBT would result in 167 fewer false-positive results (range, 166 to 169) per 1,000 persons screened, compared with DM (11).

In the three RCTs cited above, rates of DCIS detected did not differ between persons screened with DBT and DM (53-55).

Screening with DBT includes evaluation of a two-dimensional image, generated either with DM or using the DBT scan to produce a synthetic DM image (8, 9). Studies using DBT with DM screening reported radiation exposure approximately two times higher compared with the DM-only control group (53, 55, 63). Differences in radiation exposure were smaller in studies using DBT/synthetic DM compared with DM (64, 65).

Supplemental Screening With Ultrasonography or MRI

The DENSE RCT, which compared invitation to screening with DM plus MRI compared with DM alone in participants ages 50 to 75 years with extremely dense breasts and a negative mammogram, reported a significantly lower rate of invasive interval cancers—2.2 cases per 1,000 women invited to screening with DM plus MRI, compared with 4.7 cases per 1,000 women invited to screening with DM only (RR, 0.47 [95% CI, 0.29 to 0.77]) (66).

In this trial, the rate of recall among participants who underwent additional imaging with MRI was 94.9 per 1,000 screens, the false-positive rate was 79.8 per 1,000 women screened, and the rate of biopsy was 62.7 per 1,000 women screened (67). In a nonrandomized study using U.S. insurance claims data, individuals who had an MRI compared with those receiving only a mammogram were more likely in the subsequent 6 months to have additional cascade events related to extramammary findings (adjusted difference between groups, 19.6 per 100 women screened [95% CI, 8.6 to 30.7]), mostly additional healthcare visits (68).

In an RCT comparing screening with DM plus ultrasonography vs. DM alone conducted in persons ages 40 to 49 years and not specifically among persons with dense breasts, the interval cancer rates reported were not statistically significantly different between the two groups (RR, 0.58 [95% CI, 0.31 to 1.08]) (69); similarly, in a nonrandomized study comparing DM plus ultrasonography vs. DM alone using BCSC data, there was no difference in interval cancers (adjusted RR, 0.67 [95% CI, 0.33 to 1.37]) (72), though in both studies the confidence intervals were wide for this uncommon outcome. In the BCSC analysis, the rates of referral to biopsy and false-positive biopsy recommendations were twice as high and short interval followup was three times higher for the group screened with ultrasonography (70).

Research Needs and Gaps

See **Table 2** for research needs and gaps related to screening for breast cancer.

Recommendations of Others

The American Cancer Society recommends that women with an average risk of breast cancer should undergo regular screening mammography starting at age 45 years. It suggests that women ages 45 to 54 years should be screened annually, that women age 55 years or older should transition to biennial screening or have the opportunity to continue screening annually, that women should have the opportunity to begin annual screening between the ages of 40 and 44 years, and that women should continue screening mammography as long as their overall health is good and they have a life expectancy of 10 years or longer (71).

The American College of Obstetricians and Gynecologists recommends that women at average risk of breast cancer should be offered screening mammography starting at age 40 years, using shared decision making, and if they have not initiated screening in their 40s, they should begin screening mammography by no later than age 50 years. It recommends that women at average risk of breast cancer should have screening mammography every 1 or 2 years and should continue screening mammography until at least age 75 years. Beyond age 75 years, the decision to discontinue screening mammography should be based on shared decision making informed by the woman's health status and longevity (72).

The American Academy of Family Physicians supports the current USPSTF recommendation on screening for breast cancer (73).

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Table 1. Summary of USPSTF Rationale

Rationale	Assessment
Benefits of screening for breast cancer	• Adequate evidence that biennial screening mammography has a moderate benefit to reduce breast cancer mortality in women ages 40 to 74 years. • Inadequate evidence on the benefits of screening mammography in women age 75 years or older. • Inadequate evidence on the benefits of supplemental screening for breast cancer using breast ultrasonography or MRI after a negative screening mammogram, regardless of breast density.
Harms of screening for breast cancer	• Adequate evidence that the harms of biennial screening mammography in women ages 40 to 74 years are small. • Inadequate evidence on the harms of supplemental screening for breast cancer using breast ultrasonography or MRI.
USPSTF assessment	• The USPSTF concludes with moderate certainty that biennial screening mammography in women ages 40 to 74 years has a **moderate net benefit**. • The USPSTF concludes that the **evidence is insufficient** to determine the balance of benefits and harms of screening mammography in women age 75 years or older. • The USPSTF concludes that the **evidence is insufficient** to determine the balance of benefits and harms of supplemental screening for breast cancer with breast ultrasonography or MRI in women who have a negative screening mammogram, regardless of breast density.

Abbreviations: MRI=magnetic resonance imaging; USPSTF=U.S. Preventive Services Task Force.

Table 2. Research Gaps for Screening for Breast Cancer

To fulfill its mission to improve health by making evidence-based recommendations for preventive services, the USPSTF routinely highlights the most critical evidence gaps for creating actionable preventive services recommendations. The USPSTF often needs additional evidence to create the strongest recommendations for everyone, especially those with the greatest burden of disease. In some cases, clinical preventive services have been well studied, but there are important evidence gaps that prevent the USPSTF from making recommendations for specific populations. In **Table 2**, the USPSTF summarizes the gaps in the evidence for screening for breast cancer and emphasizes health equity gaps that need to be addressed to advance the health of the nation. Although the health equity gaps focus on Black women because they have the poorest health outcomes from breast cancer, it is important to note that all studies should actively recruit enough women of all racial and ethnic groups, including Black, Hispanic, Asian, Native American/Alaska Native, and Native Hawaiian/Pacific Islander participants, to investigate whether the effectiveness of screening, diagnosis, and treatment vary by group.

Research is needed to determine the benefits and harms of screening for breast cancer in women age 75 years or older.
Research is needed to help clinicians and patients appropriately understand and evaluate a finding of dense breast tissue on a screening mammogram, which occurs for over 40% of women screened. • Research is needed to determine the benefits and harms of supplemental screening with ultrasonography or MRI compared with usual care (DBT or DM alone) for women with dense breasts. Specifically, studies are needed that report health outcomes such as the rates of diagnosis of breast cancer in need of treatment and the rates of advanced breast cancers diagnosed across consecutive screening rounds, and breast cancer–associated morbidity and mortality.
Research is needed to understand and address the higher breast cancer mortality among Black women. • Research is needed to understand the underlying causes of the increased risk of breast cancer mortality in Black women, across the spectrum of stages and biomarker patterns. • Research is needed to understand why Black women are more likely to be diagnosed with breast cancers that have biomarker patterns that confer greater risk for poor health outcomes. • Research is needed to determine whether the benefits differ for annual vs. biennial breast cancer screening among women overall, and whether there is a different balance of benefits and harms among Black women compared with White women.
Research is needed to identify approaches to reduce the risk of overdiagnosis leading to overtreatment of breast lesions identified through screening that may not be destined to cause morbidity and mortality, including DCIS. • Research is needed on the natural history of DCIS. • Research is needed to identify prognostic indicators for breast tumors (DCIS and potentially some early-stage invasive breast cancer) that are unlikely to affect quality or length of life. • Research is needed to compare the long-term benefits and harms of immediate treatment vs. observation or surveillance with delayed intervention in persons with screen-detected DCIS.

Abbreviations: DBT=digital breast tomosynthesis; DCIS=ductal carcinoma in situ; DM=digital mammography; MRI=magnetic resonance imaging.