Breast Cancer

Risk Factors
and
Screening

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BACKGROUND

a) Second-leading cause of cancer death among women in the United States
b) In 2018, about 254,744 women were diagnosed with the disease
c) 42,465 women died from it
d) It is most frequently diagnosed among women ages 55 to 64 years
e) Median age of death from breast cancer is 68 years

Female breast cancer- Incident and Mortality

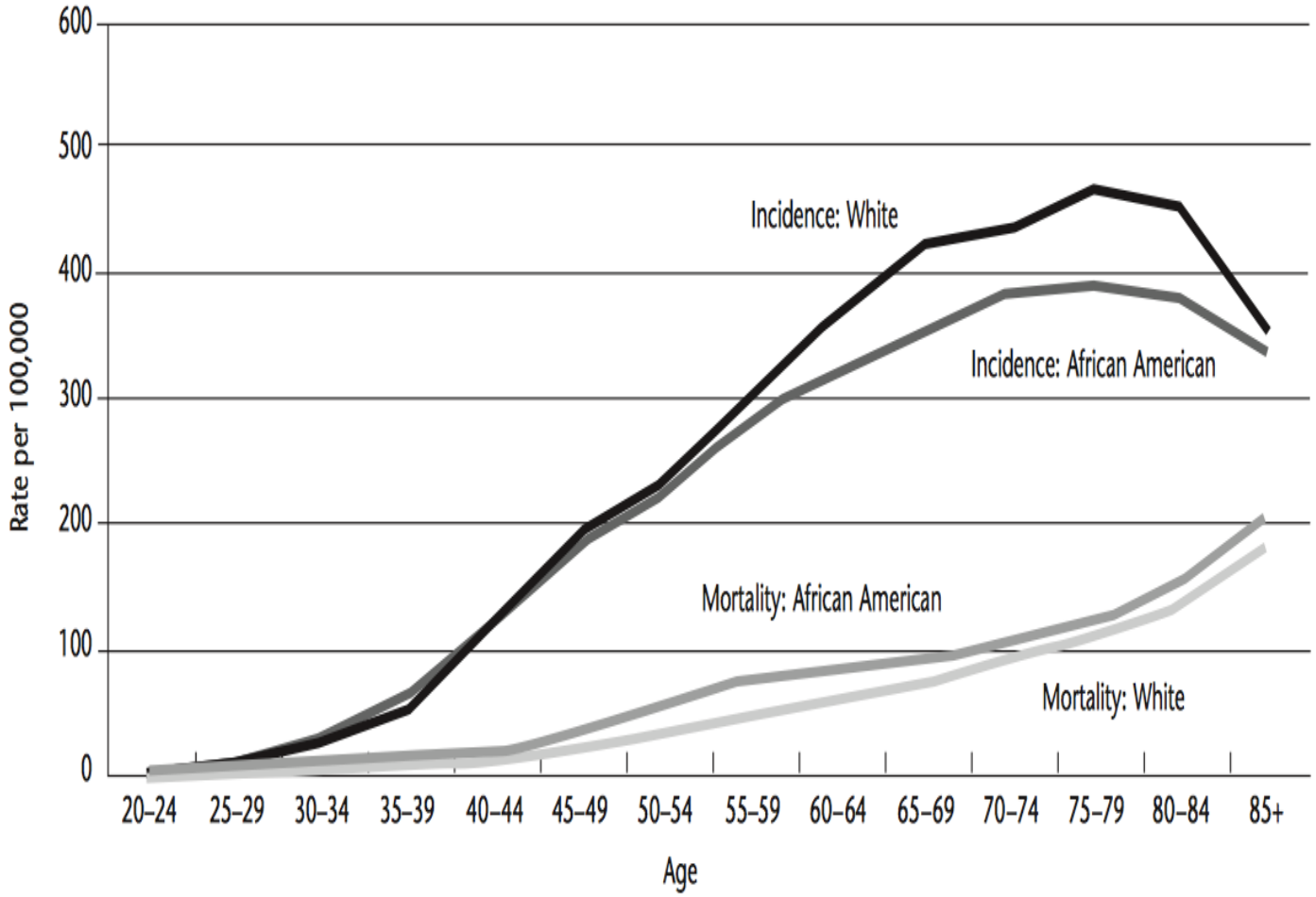


Fig. 1. Female Breast Cancer—Incidence and Mortality Rates by Age and Race, United States, 2002–2006. Data from Incidence—North American Association of Central Cancer Registries, 2009. Mortality—National Center for Health Statistics, Centers for Disease Control and Prevention, 2009. Reprinted with permission from American Cancer Society. Breast Cancer Facts & Figures 2009–2010. Atlanta: American Cancer Society, Inc.

Age-Specific Probabilities of Developing Invasive Female Breast Cancer

If Current Age is…	The Probability of Developing Breast Cancer in the next 10 years	Or 1 in:
20	0.06%	1,760
30	0.44%	229
40	1.44%	69
50	2.39%	42
60	3.40%	29
70	3.73%	27
Lifetime risk	12.08%	8

Table 3. Pooled Relative Risks for Breast Cancer Mortality From Mammography Screening Trials for All Ages

Age	Trials Included, n	RR for Breast Cancer Mortality (95% CrI)	NNI to Prevent 1 Breast Cancer Death (95% CrI)
39–49 y	8*	0.85 (0.75–0.96)	1904 (929–6378)
50–59 y	6†	0.86 (0.75–0.99)	1339 (322–7455)
60–69 y	2‡	0.68 (0.54–0.87)	377 (230–1050)
70–74 y	1§	1.12 (0.73–1.72)	Not available

Abbreviations: CrI, credible interval; NNI, number needed to invite to screening; RR, relative risk; y, years.

Factors that increase relative risk of breast cancer in women

- Female Sex
- Age
- Reproductive History
- Lifestyle Factors
- Obesity
- Long-term Use of Hormones
- Hx of Breast Cancer or Certain Breast Diseases
- Family History of Breast Cancer or Ovarian Cancer
- Genetics
- Dense Breasts
- Radiation exposure to the Chest Wall
- Expose to DES

Relative Risk	Factor
>4.0	Female Age (65+ vs <65 years, although risk increases across all ages until age 80) Certain inherited genetic mutations for breast cancer (*BRCA1* and/or *BRCA2*) Two or more first-degree relatives with breast cancer diagnosed at an early age Personal history of breast cancer High breast tissue density Biopsy-confirmed atypical hyperplasia
2.1-4.0	One first-degree relative with breast cancer High-dose radiation to chest High bone density (postmenopausal)
1.1 - 2.0 Factors that affect circulating hormones	Late age at first full-term pregnancy (>30 years) Early menarche (<12 years) Late menopause (>55 years) No full-term pregnancies Never breastfed a child Recent oral contraceptive use Recent and long-term use of estrogen and progestin Obesity (postmenopausal)
Other factors	Personal history of endometrial or ovarian cancer Alcohol consumption Height (tall) High socioeconomic status Ashkenazi Jewish heritage

Female Sex

BRCA Mutation

- Modified Risk Factors :

- Long-term Use of Hormones
- Overweight or Obesity after Menopause
- Weight
- Physical activity
- Smoking
- Alcohol
- **Diet**

BREAST CANCER SCREENING

BREAST IMAGING

- Mammography (2D Mammography)
- 3D Tomosynthesis (3D Mammography)
- Magnetic Imaging Resonance (MRI)
- Ultrasound

RECOMMENDATION SUMMARY

USPSTF

WOMEN AGES 50 TO 74 YEARS

- The USPSTF recommends biennial screening mammography for women ages 50 to 74 years.

WOMEN AGES 50 TO 74 YEARS (CONT.)

- For women at average risk for breast cancer, most of the benefit of mammography will result from biennial screening during ages 50 to 74 years.
- Of all age groups, women ages 60 to 69 years are most likely to avoid a breast cancer death through mammography screening.

WOMEN AGES 40 TO 49 YEARS

- The decision to start screening mammography in women prior to age 50 years should be an individual one.
- Women who place a higher value on the potential benefit than the potential harms may choose to begin biennial screening between the ages of 40 and 49 years.

WOMEN AGES 40 TO 49 YEARS (CONT.)

- Screening mammography in women ages 40 to 49 years may reduce the risk of dying of breast cancer, but the number of deaths averted is much smaller than in older women and the number of false positive tests and unnecessary biopsies are larger.

WOMENS 40 TO 49 YEARS (CONT.)

- Women with a parent, sibling, or child with breast cancer may benefit more than average-risk women from beginning screening between the ages of 40 and 49 years.

WOMEN AGE 75 YEARS AND 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 and older

Mammogram

- **The US Preventive Services Task Force (USPSTF) screening guidelines recommend the following:** [85]

- **Mammography every 2 years between age 50 and 74 years**
- **For women aged 40-49 years, guidelines advocate an individualized approach in which clinicians should base decisions on the potential benefits and harms of mammography, the woman's preferences, and her breast cancer risk profile**
- **The USPSTF has found insufficient evidence to make a recommendation about breast cancer screening in women younger than 40 years or older than 75 years.**

Breast Cancer Screening (ACS)

- The ACS recommends that women with an average risk of breast cancer should undergo regular screening mammography starting at age 45 years (strong recommendation). Women aged 45 to 54 years should be screened annually (qualified recommendation). Women 55 years and older should transition to biennial screening or have the opportunity to continue screening annually (qualified recommendation). Women should have the opportunity to begin annual screening between the ages of 40 and 44 years (qualified recommendation). Women should continue screening mammography as long as their overall health is good and they have a life expectancy of 10 years or longer (qualified recommendation). The ACS does not recommend clinical breast examination for breast cancer screening among average-risk women at any age (qualified recommendation).

ACOG

Starting 40 years Old
Annual *Mammogram*

- All women undergo regular screening mammography are at risk for the diagnosis and treatment of noninvasive and invasive breast cancer that would otherwise not have become a threat to her health, or even apparent, during her lifetime (known as “over diagnosis”and ”over treatment”.).
- Mammogram may also missed some cancer (False Negative)

Getting screened doesn’t prevent breast cancer, but if you have it, screening gives you a mush better chance of finding it early and of surviving it.

Breast Cancer Risk Assessment Tool

Gail Model :

Age (35 to 85)

Race/ Ethnicity

Age at the start of menstruation

Age at first live birth of a child

Number of first-degree relative (mother, sisters, daughters) with breast cancer

Number of previous breast biopsies (whether positive or negative)

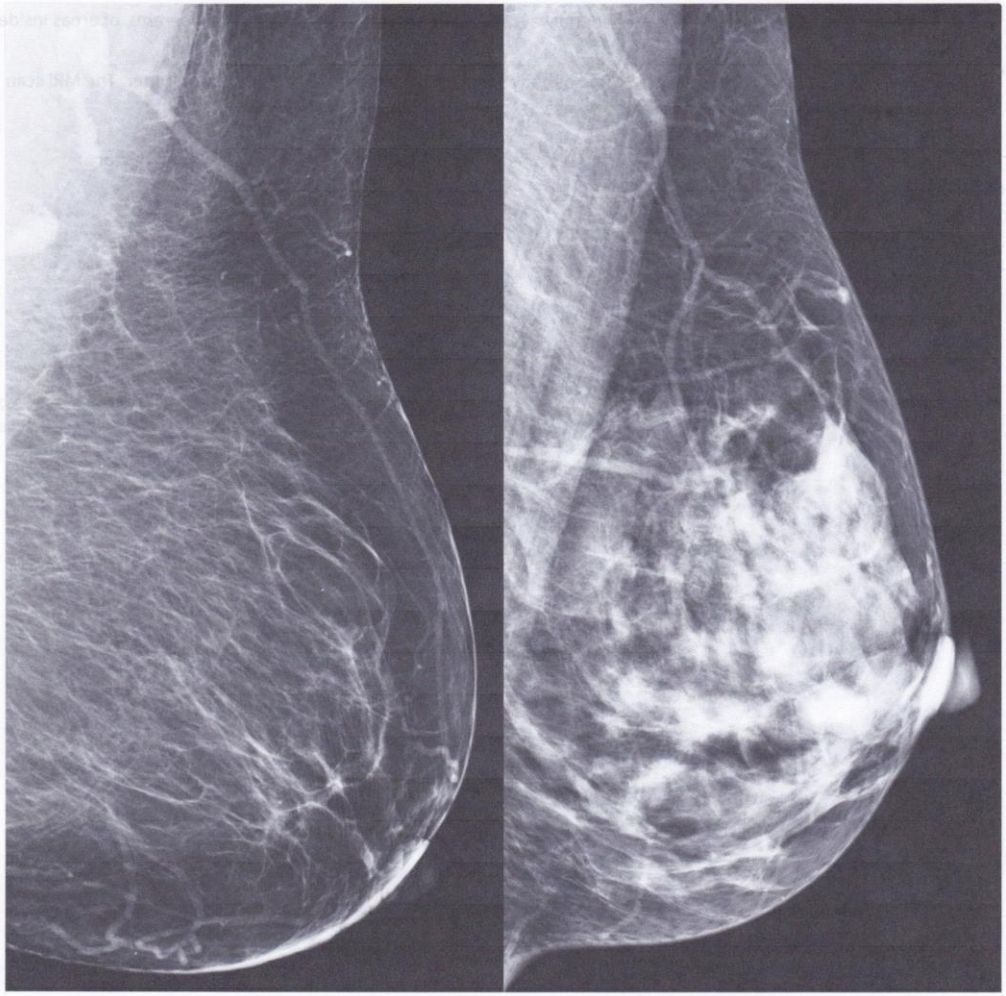
Presence of atypical hyperplasia in a biopsy

(https://bcrisktool.cancer.gov/calculator.htm)

(https://tools.bcsc-scc.org/bc5yearrisk/calculator.htm)

BRCAPRO,BODACEA, or Claus.

Dense Breasts



The image on the left shows a mostly fatty breast, and the image on the right shows a dense breast.

View Larger

Your doctor may suggest one of these tests—

“Level of Density of Breasts”

American College of Radiology's Breast Imagining Reporting and Data System.

BI-RADS

(A) Almost entirely fatty

(B) Scattered fibroglandular density

(C) Heterogeneously dense

(D) Extremely dense

Breast Cancer Surveillance Consortium
BCSC
Working together to advance breast cancer research

Breast Cancer Surveillance Consortium Risk Calculator

Risk Calculator V2

1.	Does the woman have a history of breast cancer or of ductal carcinoma in situ (DCIS), breast augmentation, or mastectomy?	Select
2.	What is the woman's age?	Select
3.	What is the woman's race/ethnicity?	Select
4.	Have any of the woman's first-degree relatives (mother, sister or daughter) been diagnosed with breast cancer?	Select
5.	Has the woman had prior breast biopsies (positive or negative)?	Select Explain these biopsy result terms in a new window
6.	What is the woman's BI-RADS® breast density (radiologic assessment of the density of breast tissue by radiologists who interpret mammograms)?	Select

** You can click a question number for a brief explanation of the risk factor.*

Calculate Risk

3-D TOMOSYNTHESIS

- Increase 41 % invasive cancer detection rate
- Decrease 15 % Recall rate.
- Mean glandular dose to average-sized breast 8 % higher compared with digital mammogram.

ALL WOMEN

- The USPSTF concludes that the current evidence is insufficient to assess the benefits and harms of tomosynthesis (3-D mammography) as a screening modality for breast cancer.

MRI

What is the Tyrer-Cuzick model (IBIS tool) for breast cancer risk assessment?

Updated: Dec 16, 2019
Author: Jessica Katz, MD, PhD, FACP; Chief Editor: Marie Catherine Lee, MD, FACS more...

References

ANSWER

Answer

The Tyrer-Cuzick model, or IBIS tool, is used to calculate a person's likelihood of carrying the *BRCA1* or *BRCA2* mutations. It estimates the likelihood of a woman developing breast cancer in 10 years and over the course of her lifetime. The tool is used to help inform a person's decision-making about genetic counselling and testing. If the model predicts a 10% or greater chance that the woman has a mutation in *BRCA1, BRCA2,* or both, genetic counseling is advised. [53]

The tool estimates breast cancer risk on the basis of the following risk factors [53] :

- Age
- Body mass index
- Age at menarche
- Obstetric history
- Age at menopause (if applicable)
- History of a benign breast condition that increases breast cancer risk (hyperplasia, atypical hyperplasia, LCIS)
- History of ovarian cancer
- Use of hormone replacement therapy
- Family history (including breast and ovarian cancer, Ashkenazi inheritance, genetic testing if done)

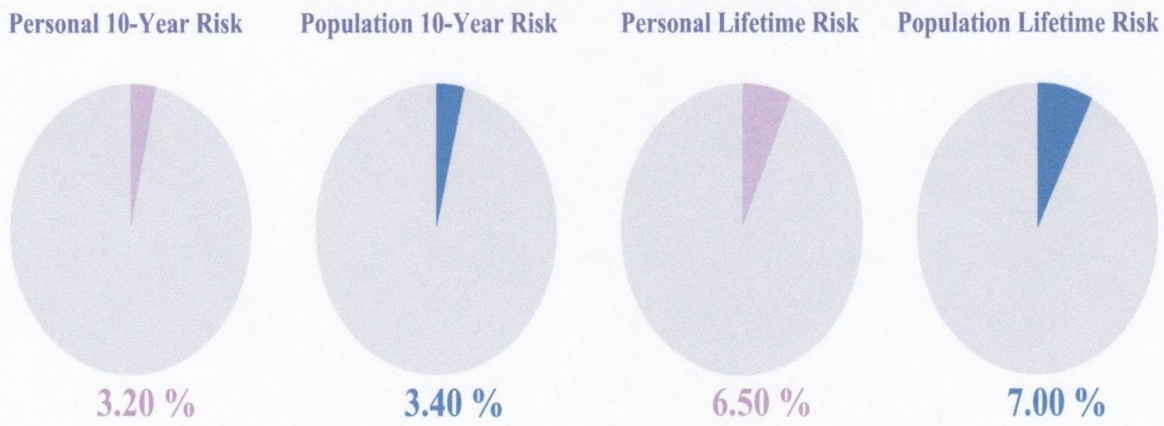
A comparison study of breast cancer risk models concluded that the Tyrer–Cuzick model is the most consistently accurate, whereas the Gail, Claus, and Ford models all significantly underestimate risk. [54] However, a study by Boughey et al found that the Tyrer-Cuzick model significantly overestimated the risk of breast cancer in women with atypical hyperplasia. [55]

Tyrer-Cuzick Risk Assessment Calculator

The results below are based on the IBIS risk assessment model. These results display your 10-year risk and your lifetime risk compared to the U.S. population average. Please consult with your physician should you have any questions about your risk for breast cancer or for guidance on options for breast cancer screening or genetic counseling.

IBIS Breast Cancer Risk Assessment Score

Patient Id:Patient1623266037



Based on the information provided, the patient's estimated risk for developing invasive breast cancer over the next 10 years is 3.2%. The U.S. population's average 10-year risk is 3.4% for women of the same age and race/ethnicity. Based on the information provided, the patient's estimated risk for developing invasive breast cancer in her lifetime 6.5%. The U.S. population's average lifetime risk is 7% for women of the same age and race/ethnicity.

AMERICAN CANCER SOCIETY RECOMMENDS MRI SCREENING

a) Have a known *BRCA1* or *BRCA2* gene mutation
b) Have a first-degree relative with a *BRCA1* or *BRCA2* gene mutation and have not had any testing them- selves

RECOMMENDATIONS (CONT.)

c) A lifetime risk of breast cancer of 20% or greater, according to risk assessment tools that are based mainly on family history

d) A history of radiation therapy to the chest between the ages of 10 years and 30 years

RECOMMENDATIONS (CONT.)

e) Other genetic syndromes, including Li–Fraumeni syndrome, Cowden syndrome, or Bannayan–Riley– Ruvalcaba syndrome or one of these syndromes in a first-degree relative

ULTRASOUND

Take-Home Message

- Lifestyle Habits
- BMI
- Limiting Exposure to Hormone
- Mammogram
- High Risk Screening

Population	Women with a personal or family history of breast, ovarian, tubal, or peritoneal cancer or who have an ancestry associated with *BRCA1/2* gene mutations	Women whose personal or family history or ancestry is not associated with potentially harmful *BRCA1/2* gene mutations
Recommendation	Assess with an appropriate brief familial risk assessment tool. Grade: B	Do not perform routine risk assessment, genetic counseling, or genetic testing. Grade: D

Risk Assessment	Patients with family or personal histories of breast, ovarian, tubal, or peritoneal cancer or ancestry associated with harmful *BRCA1/2* mutations should be assessed using a familial risk assessment tool. The USPSTF found adequate evidence that these tools are accurate in identifying women with increased likelihood of *BRCA1/2* mutations. Tools evaluated by the USPSTF include the Ontario Family History Assessment Tool, Manchester Scoring System, Referral Screening Tool, Pedigree Assessment Tool, 7-Question Family History Screening Tool, International Breast Cancer Intervention Study instrument (Tyrer-Cuzick), and brief versions of BRCAPRO. These tools should be used to guide referrals to genetic counseling.
Genetic Counseling	Genetic counseling about *BRCA1/2* mutation testing should be performed by trained health professionals, including suitably trained primary care providers. The process of genetic counseling includes detailed kindred analysis and risk assessment for potentially harmful *BRCA1/2* mutations. It also includes identification of candidates for testing, patient education, discussion of the benefits and harms of genetic testing, interpretation of results after testing, and discussion of management options.
Genetic Testing	Tests for *BRCA1/2* mutations are highly sensitive and specific for known mutations. Testing for *BRCA1/2* mutations should be performed when an individual has personal or family history that suggests an inherited cancer susceptibility, when an individual is willing to see a health professional who is suitably trained to provide genetic counseling and interpret test results, and when test results will aid in decision making.
Treatment and Interventions	In general, the care of women with harmful *BRCA1/2* mutations is managed with a variety of interventions to lower future cancer risk. This includes intensive screening, risk-reducing medications, and risk-reducing mastectomy and salpingo-oophorectomy.
Relevant USPSTF Recommendations	The USPSTF recommends that clinicians offer to prescribe risk-reducing medications such as tamoxifen, raloxifene, or aromatase inhibitors to women at increased risk for breast cancer and at low risk for adverse medication effects. It recommends against the routine use of medications for risk reduction of primary breast cancer in women not at increased risk for breast cancer. The USPSTF recommends against screening for ovarian cancer in women. This recommendation does not apply to women with known genetic mutations that increase their risk for ovarian cancer (eg, *BRCA1/2* mutations). The USPSTF found insufficient evidence to assess the balance of benefits and harms of performing screening pelvic examinations in asymptomatic women for the early detection and treatment of a range of gynecologic conditions.

For a summary of the evidence systematically reviewed in making this recommendation, the full recommendation statement, and supporting documents, please go to https://www.uspreventiveservicestaskforce.org.

WOMEN WITH DENSE BREASTS

- The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of adjunctive screening for breast cancer using breast ultrasound, magnetic resonance imaging (MRI), tomosynthesis, or other modalities in women identified to have dense breasts on an otherwise negative screening mammogram