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Breast Cancer Screening

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Breast cancer screening

Nina Mingioni, MD FACP

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Learning Objectives

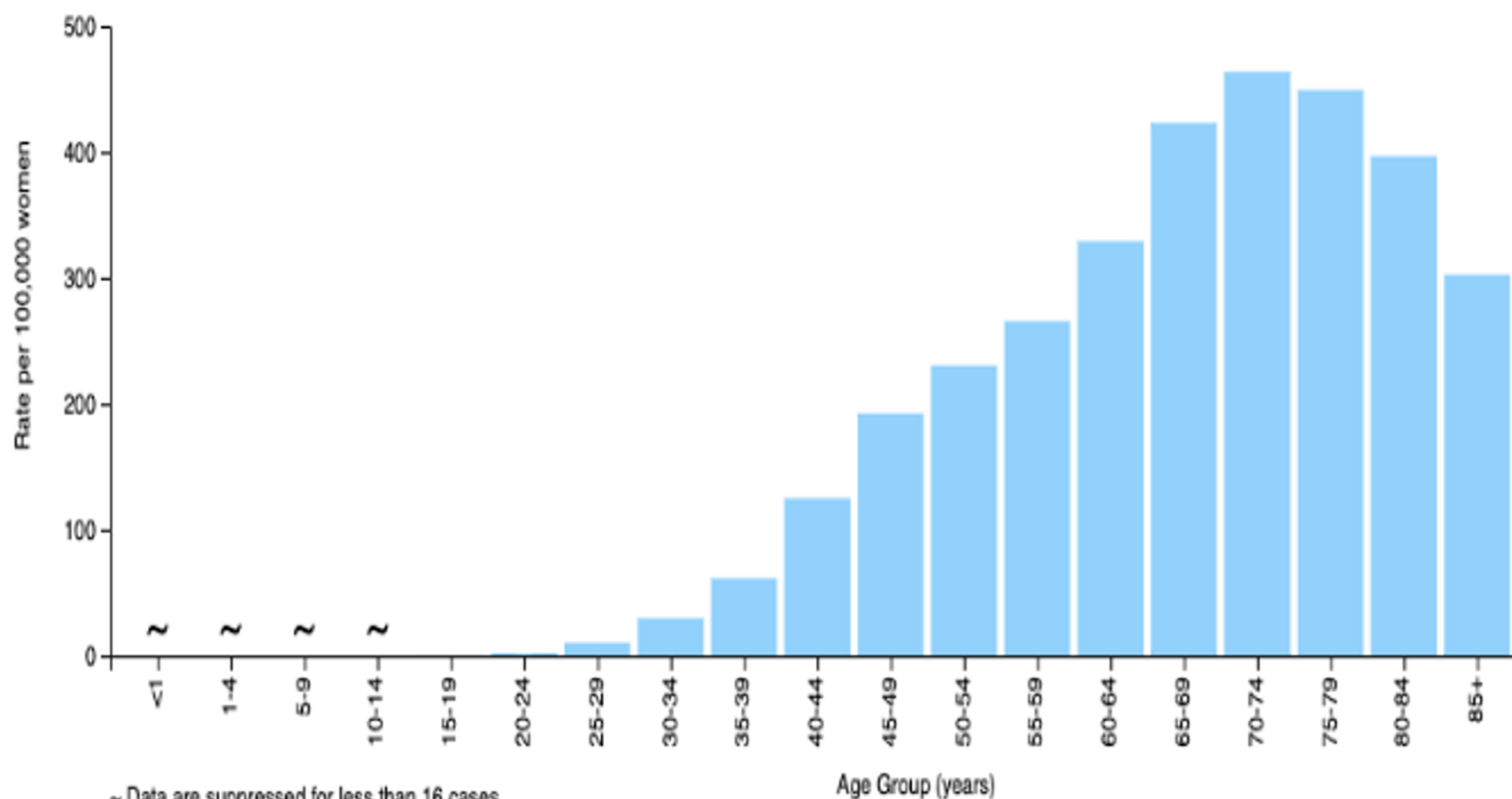
- Assess patients for risk of breast cancer
- Name common breast cancer screening modalities
- Discuss risks and benefits of breast cancer screening
- Recommend breast cancer screening for appropriate patients

What is the scope of the problem?

- Most common non-skin cancer in women
- Risk of breast cancer:
 - Cumulative lifetime risk of invasive breast cancer is 12.8%
 - 30yo: 10yr risk for developing breast cancer is 0.48% (1 in 208)
 - 40yo: 10yr risk for developing breast cancer is 1.53% (1 in 65)
 - 50yo: 10yr risk for developing breast cancer is 2.38% (1 in 42)
 - 60yo: 10yr risk for developing breast cancer is 3.54% (1 in 28)
 - 70yo: 10yr risk for developing breast cancer is 4.07% (1 in 25)
- Only 10% of breast cancers are associated with positive family history

Rate of New Cancers by Age Group (years), All Races, Female

Female Breast, United States, 2017





**Who is are
the
"screening
population"?**

average-risk women with
no current or previous
breast abnormalities

Who are not in the "average" screening pool?

- Current physical exam finding
- Previous breast cancer or other breast anomaly (DCIS, LCIS, etc.)
- BRCA mutation
- Strong family history (>15% risk)
- Other high-risk factors (chest radiation, familial cancer syndromes, etc.)

<i>Risk Factor</i>	<i>Approximate RR*</i>	<i>If the Risk Factor Is Present, Are Average-Risk Screening Guidelines Applicable?</i>
History of chest radiation	26.0	No: excluded population
History of breast cancer	Varies	No: excluded population
Extremely dense breasts compared with fatty breasts†	4.5	Yes: yet consider adjunctive screening
History of biopsy with atypical hyperplasia	3.7	No: excluded population
Two first-degree relatives with breast cancer compared with none	3.5	Yes: yet consider genetic evaluation and earlier start to screening
One first-degree relative with breast cancer compared with none	2.5	Yes: yet consider genetic evaluation if relative diagnosed at early age
Menopause after age 55 years compared with before 45 years	2.0	Yes
Nulliparity or first full-term pregnancy at age 30 years or older	2.0	Yes
History of a benign breast biopsy compared with no breast biopsy	1.7	Yes if not high-risk lesion
Menarche before age 12 years compared with after age 14 y	1.5	Yes
Postmenopausal obesity (BMI >30 kg/m ²) compared with normal weight (BMI <22 kg/m ²)	1.5	Yes
Heterogeneously dense or extremely dense breasts compared with fatty or fibroglandular breasts†	1.3	Yes: yet consider adjunctive screening
Current use of combination menopausal hormone therapy compared with never users	1.2	Yes
Moderate alcohol use compared with abstention	1.1	Yes

Models Predicting Breast Cancer Risk

Breast Cancer Risk Assessment Tool

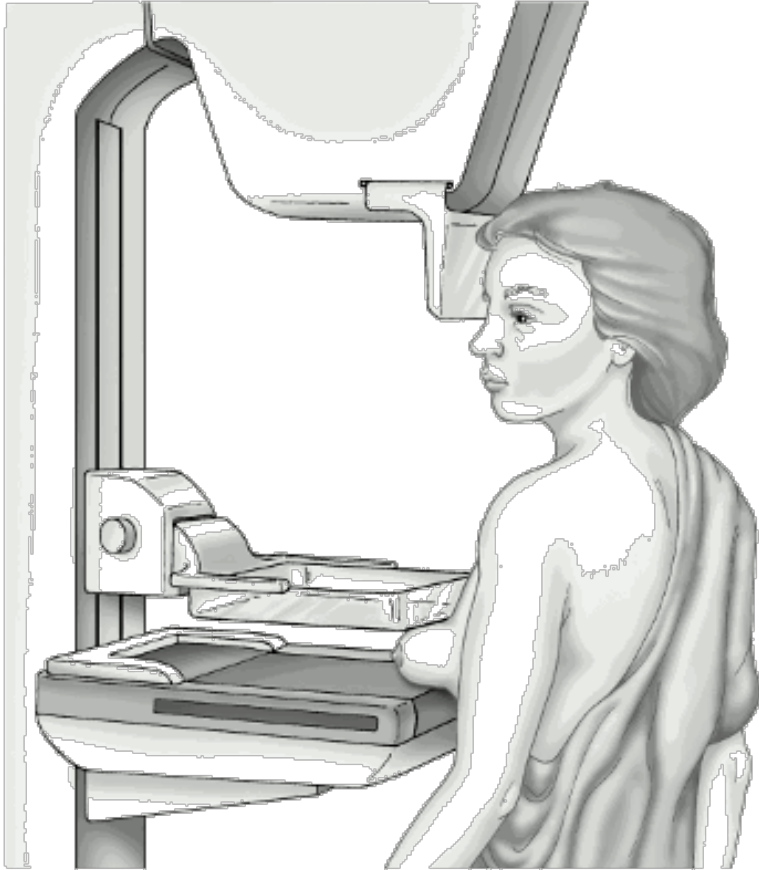
<https://www.cancer.gov/bcrisktool/>



Breast Cancer Surveillance Consortium Calculator

<https://tools.bcsc-scc.org/bc5yearrisk/calculator.htm>





What are the screening modalities?

- Clinical breast examination
- Digital mammography
 - single view breast X-ray
 - breast is significantly compressed between two plates
 - creates a 2D image
- 3D mammography (breast tomosynthesis)
 - tomosynthesis creates image of breast from multiple angles
 - 11 images over 7 seconds with computerized 3D reconstruction
 - breast is not significantly squeezed
- Breast MRI

Digital Mammo vs Digital Breast Tomosynthesis

- DBT exposes to twice as much radiation as DM
- Higher cost; longer reading time
- Observational studies only:
 - No measure of breast CA mortality, cancer stage, or quality of life
 - Increased breast CA detection as compared to DM
 - No differences in interval cancer detection rate, recall rate, or FP
- Specific recommendations NOT to use DBT by Canadian, European guidelines

Benefits of screening

- 15-20% reduction in breast cancer mortality in all age groups (metanalyses data)
 - benefit varies by age group
 - no reduction in all-cause mortality in any age group
 - mammo screening is protective against advanced breast cancer >50yo
 - no change in advanced breast cancer incidence in 39-49yo

Table 3. Effectiveness of Mammography Screening on Breast Cancer Mortality by Age, Based on Results of Randomized, Controlled Trials

<i>Age Group, y</i>	<i>Trials Included, n</i>	<i>Breast Cancer Mortality RR (95% CI)</i>	<i>Deaths Prevented Over 10 Years*</i>
40-49	9	0.92 (0.75-1.02)	3 (0-9)
50-59	7	0.86 (0.68-0.97)	8 (2-17)
60-69	5	0.67 (0.54-0.83)	21 (11-32)
70-74	3	0.80 (0.51-1.28)	13 (0-32)

Screen
10,000
women for 10
years


RR = relative risk.

** Number of breast cancer deaths prevented per 10 000 women screened for 10 years (5, 19).*

Number needed to screen to prevent 1 breast cancer death

Age group	40-49	50-59	60-69	70-79	80-84
NNS (annual)	746	351	233	377	1316
NNS (biannual)	1034	455	303	1339	1339

Hendrick RE, Helvie MA. Mammography screening: a new estimate of number needed to screen to prevent one breast cancer death. *AJR Am J Roentgenol*. 2012;198(3):723-728.



Harms of Screening: False Positives

- Anxiety/psychologic distress for up to 2 years!
- Need for more imaging and biopsy
- After 10 years of annual screening, chance for needing more imaging is 50-60%, and 40% with biannual screening
- After 10 years of annual screening chance of unnecessary biopsy 7-10%.



Harms of Screening: Overdiagnosis

- Overdiagnosis = early diagnosis of cancer that would never have progressed to clinical importance in absence of screening (mostly DCIS, but probably even some more aggressive cancers)
 - Probably 10-20% of all cancers diagnosed
 - Harms of treatment w/o benefit
 - Once diagnosed, no way to determine if this case is “overdiagnosis”



Harms of Screening: Radiation Exposure

- 0.4-1.2 deaths per 10,000 women screened over lifetime

Harms of One-Time Mammography Screening per 10,000 Women Screened: Breast Cancer Surveillance Consortium Registry Data

Outcome	Ages 40-49 y	Ages 50-59 y	Ages 60-69 y	Ages 70-74 y
False-positive mammograms, <i>n</i>	1,212	932	808	696
Breast biopsies recommended, <i>n</i>	164	159	165	175
False-negative mammograms, <i>n</i>	10	11	12	15

Guideline, Year	Clinical Breast Exam	Age to Start Screening Mammography or Discuss/Shared Decision Making	Age to Stop Screening	Screening Interval
ACOG, 2017	Recommend doing CBE	40 y (discuss; offer if chosen by SDM) 50 y (start screening if not previously started)	≥75 y	Annual or biennial
ACR, 2017	No recommendation	40 y (start screening)	None	Annual
ACS, 2015	Recommend against CBE	40–44 y (discuss; offer if chosen by SDM) 45 y (start screening)	Life expectancy <10 y	Annual for age 45–54 y Biennial for age ≥55 y
CTFPHC, 2018	Recommend against CBE	50 y (start screening)	No recommendation*	Every 2–3 y
ECIBC, 2020	(not addressed)	45 y (start screening)	75yo	Every 2–3 y for 45-49 y Biennial for age 50-69 y Every 3 y for 70-74 y
USPSTF, 2016	No recommendation†	40–49 y (discuss; offer if chosen by SDM) 50 y (start screening)	75 y	Biennial
WHO, 2014	Recommend doing CBE (low-resource settings only)	50 y (start screening)	75 y	Biennial

Bottom Line(s)

- Frequency (annual vs biannual) and starting age (40 vs 50) is based on shared decision making
- Start screening average risk women at 50yo
- Screen annually for higher risk women
 - Extremely dense breasts
 - Family history in 1° or 2° relative
- Screen with MRI only for very high-risk women

Breast Screening Decisions

A mammogram decision aid for women ages 40-49

For women in their 40's, mammogram decisions are not as simple as they used to be

National guidelines recommend that every woman in her 40's make an individual decision about when to start and how often to have mammograms. Not all **medical groups** agree with this, adding to the confusion many women feel about the mammogram decision.

What will you do?

You may want to start mammograms in your 40's or wait until you are 50.
You may want mammograms every year or you may want them every other year.
None of these choices is wrong. One of them will be right for you.

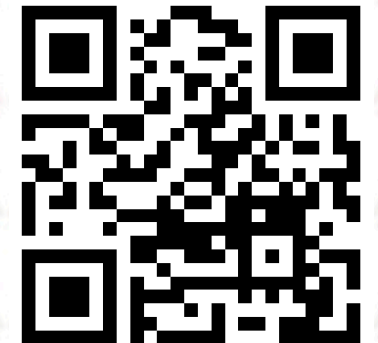
Breast Screening Decisions is a website for women ages 40-49. It is designed to give you unbiased information that can help you and your doctor decide when you should start and how often you should have screening mammograms.

In the pages of this website you will:

- Assess your personal risk of breast cancer
- See the benefits and harms of screening mammograms for women like you
- Explore your personal values about breast cancer screening
- Create a summary to share with your doctor

Information you enter here is anonymous, and we never ask your name or email address.

Enter »



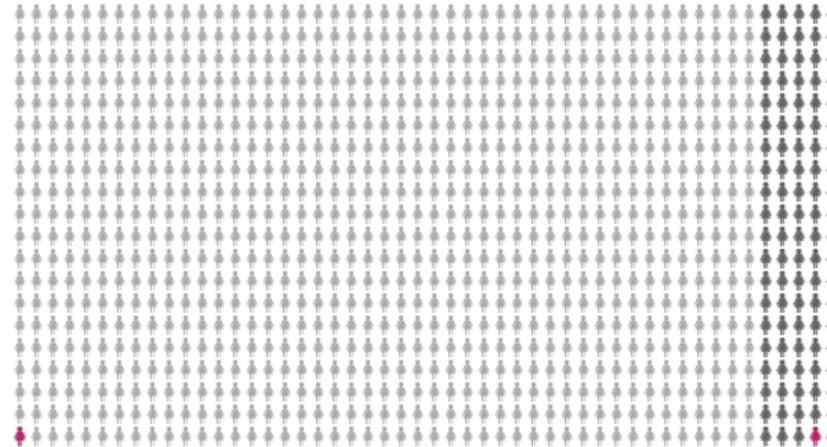
<https://bsd.weill.cornell.edu/#/>

How well do mammograms perform in women like me?

Save My Progress

No one can predict exactly what your individual mammogram results will be. Here is how mammograms perform in women ages 40-49 who are at low to average risk of breast cancer.

If 1,000 women have a screening mammogram:



[How did we
calculate this?](#)

900 will have a normal mammogram

899 do not have breast cancer

1 has breast cancer missed by screening
(false negative)

100 will have an abnormal
mammogram

98 do not have breast cancer
(false positive)

2 have breast cancer caught
by screening

So What Does This Mean?

- **Almost all women your age will have a normal mammogram.**
- **Almost all abnormal mammograms are not cancer.** These are **false-positive** results. The more often you get screened, the greater your chance of ever having a false-positive result. Over 10 years, women who have mammograms every year have a 60% chance of a false-positive result. Women who have mammograms every other year have a 40% chance of a false-positive result.
- **Some breast cancers may be missed.** These are **false-negative** results. When a cancer is missed by a screening mammogram, it is usually found after a woman has **symptoms** or at a future screening mammogram visit.

By catching some cancers early, before a woman has symptoms, mammograms can reduce the chance of dying from breast cancer. Let's see how.

**Don't forget to
talk to your
patients about
mammograms!**

