

Breast Cancer

April 4, 2025



Objectives

01

Describe the incidence of breast cancer in the U.S.

02

Discuss screening and diagnostic strategies

03

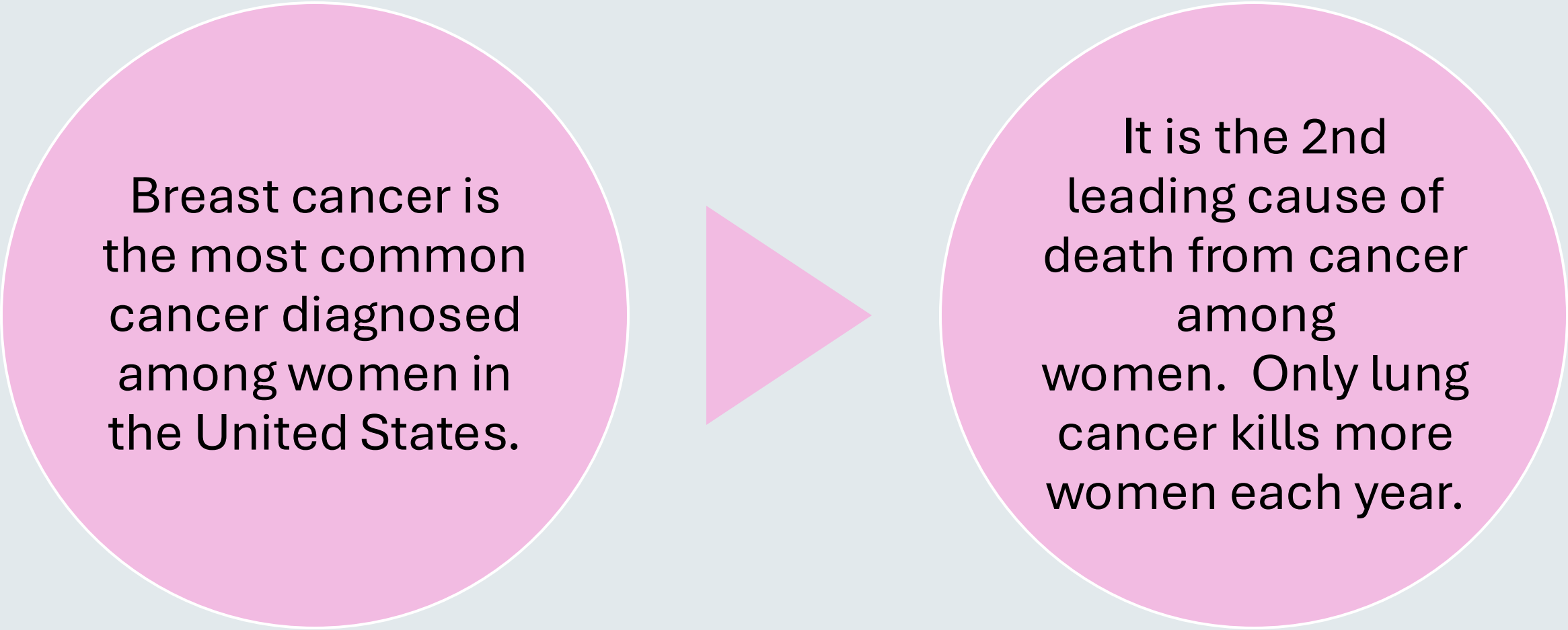
Detail the different surgical options and the indications for each surgery

04

Describe axillary management in breast cancer

05

Discuss adjuvant therapies to include radiation therapy, chemotherapy, and/or hormonal blockade







Breast cancer is the most common cancer diagnosed among women in the United States.

It is the 2nd leading cause of death from cancer among women. Only lung cancer kills more women each year.

Incidence

Figure 3. Leading Sites of New Cancer Cases and Deaths – 2025 Estimates

	Male				Female			
Estimated New Cases	Prostate	313,780	30%			Breast	316,950	32%
	Lung & bronchus	110,680	11%			Lung & bronchus	115,970	12%
	Colon & rectum	82,460	8%			Colon & rectum	71,810	7%
	Urinary bladder	65,080	6%			Uterine corpus	69,120	7%
	Melanoma of the skin	60,550	6%			Melanoma of the skin	44,410	4%
	Kidney & renal pelvis	52,410	5%			Non-Hodgkin lymphoma	35,210	4%
	Non-Hodgkin lymphoma	45,140	4%			Pancreas	32,490	3%
	Oral cavity & pharynx	42,500	4%			Thyroid	31,350	3%
	Leukemia	38,720	4%			Kidney & renal pelvis	28,570	3%
	Pancreas	34,950	3%			Leukemia	28,170	3%
	All sites	1,053,250				All sites	988,660	
Estimated Deaths	Lung & bronchus	64,190	20%			Lung & bronchus	60,540	21%
	Prostate	35,770	11%			Breast	42,170	14%
	Colon & rectum	28,900	9%			Pancreas	24,930	8%
	Pancreas	27,050	8%			Colon & rectum	24,000	8%
	Liver & intrahepatic bile duct	19,250	6%			Uterine corpus	13,860	5%
	Leukemia	13,500	4%			Ovary	12,730	4%
	Esophagus	12,940	4%			Liver & intrahepatic bile duct	10,840	4%
	Urinary bladder	12,640	4%			Leukemia	10,040	3%
	Non-Hodgkin lymphoma	11,060	3%			Non-Hodgkin lymphoma	8,330	3%
	Brain & other nervous system	10,170	3%			Brain & other nervous system	8,160	3%
	All sites	323,900				All sites	294,220	

Estimates exclude US territories and are rounded to the nearest 10; cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Ranking is based on modeled projections and may differ from observed data.

Disparities

- Young women
- Black women
- Latina & Hispanic women

Table 2. Estimated Number of Female Ductal Carcinoma In Situ and Invasive Breast Cancer Cases and Deaths by Age, US, 2024

Age	DCIS cases		Invasive cases		Deaths	
	Number	%	Number	%	Number	%
<40	1,360	2	13,180	4	990	2
40-49	8,750	15	37,650	12	2,620	6
50-59	13,760	24	67,310	22	6,800	16
60-69	17,660	31	89,540	29	10,010	24
70-79	11,890	21	69,130	22	10,140	24
80+	3,080	5	33,910	11	11,690	28
All	56,500	98	310,720	100	42,250	100

DCIS=ductal carcinoma in situ. Estimates are rounded to the nearest 10. Percentages may not add to 100 due to rounding.

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- In 2024, an estimated 310,720 new invasive breast cancers will be diagnosed among women in the US, 16% of which will be in women younger than 50 years of age.
- Approximately 56,500 cases of DCIS (stage 0 disease) will be diagnosed in 2024.
- An estimated 42,250 women will die from breast cancer in the US in 2024, more than half of whom will be ages 70 and older.

Table 1. Ten-year Probability of Breast Cancer Diagnosis (2018-2019, 2021) and Death (2020-2022)

Current age	Diagnosed with invasive breast cancer	Dying from breast cancer
20	0.1% (1 in 1,344)	<0.1% (1 in 19,247)
30	0.5% (1 in 198)	<0.1% (1 in 2,192)
40	1.6% (1 in 62)	0.1% (1 in 723)
50	2.5% (1 in 41)	0.3% (1 in 348)
60	3.6% (1 in 28)	0.5% (1 in 217)
70	4.2% (1 in 24)	0.7% (1 in 141)
80	3.1% (1 in 32)	1.0% (1 in 103)
Lifetime risk	13.1% (1 in 8)	2.3% (1 in 43)

Probability is among those who have not been previously diagnosed with cancer and reflects the likelihood of diagnosis/death within 10 years of current age. Percentages and "1 in" numbers may not be numerically equivalent due to rounding.

Source: DevCan, Version 6.7.5.

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- Approximately 1 in 8 women (13.1%) will be diagnosed with invasive breast cancer in her lifetime, and 1 in 43 (2.3%) will die from the disease. Lifetime risk is the average risk for all women after accounting for other causes of death, but does not account for individual factors that influence risk, such as race or ethnicity, family history, etc.
- The highest risk of breast cancer diagnosis is among women in their 70s (4.2% or 1 in 24 women), whereas women in their 80s have the highest risk of breast cancer death (1.0% or 1 in 103 women).

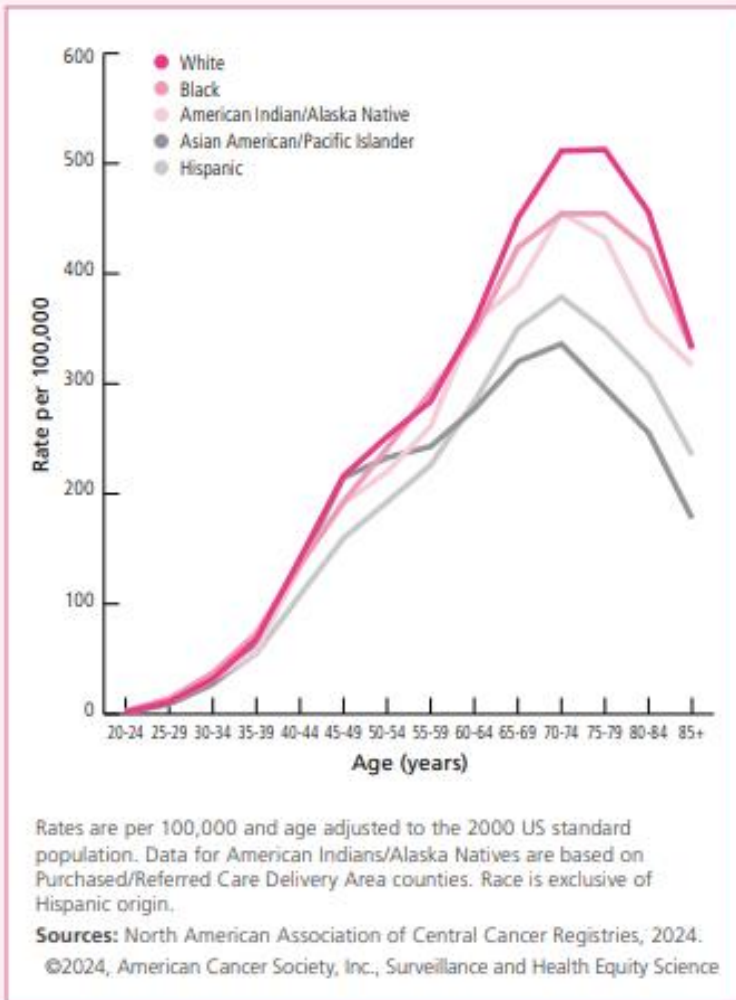


Figure 1. Age-specific Female Breast Cancer Incidence Rates by Race and Ethnicity, US, 2017-2021

- In women of all racial and ethnic groups, breast cancer incidence increases with age until the seventh decade of life and then decreases, likely due to less screening.
- Black women have the highest incidence of breast cancer until 40 years of age and White women have the highest incidence in ages 65-84 years.
- Hispanic women have the lowest incidence of breast cancer from age 30 to 59 years, and Asian American/Pacific Islander women have the lowest incidence thereafter.
- Variations by age, race, and ethnicity in part reflect differences in screening prevalence (Table 6).

Risk Factors

Increasing age &
being born female

Excess body
weight/gaining
weight during
adulthood

Using
menopausal
hormone therapy

Drinking alcohol

Being physically
inactive

Personal or family
history of breast
cancer

Certain benign
breast conditions

Reproductive &
hormonal factors

Screening

Different societies had different recommendations, which led to confusion

American Cancer Society (ACS)

United States Preventive Services Task Force (USPSTF)

American Society of Breast Surgeons (ASBrS)

National Comprehensive Cancer Network (NCCN)

Whole breast ultrasound and MRI?

Diagnosis

Early-stage breast cancer is most commonly **asymptomatic**

Palpable lesions should be worked up with mammography** and ultrasonography

BI-RADS

- 0
- 1
- 2
- 3
- 4
- 5
- 6

BI-RADS

- 0 = Incomplete (need additional imaging)
- 1
- 2
- 3
- 4
- 5
- 6

BI-RADS

- 0 = Incomplete
- 1 = Negative
- 2
- 3
- 4
- 5
- 6

BI-RADS

- 0 = Incomplete
- 1 = Negative (< 1%)
- 2
- 3
- 4
- 5
- 6

BI-RADS

- 0 = Incomplete
- 1 = Negative (< 1%)
- 2 = Benign
- 3
- 4
- 5
- 6

BI-RADS

- 0 = Incomplete
- 1 = Negative (<1%)
- 2 = Benign (< 1%)
- 3
- 4
- 5
- 6

BI-RADS

- 0 = Incomplete
- 1 = Negative (<1%)
- 2 = Benign (< 1%)
- 3
- 4
- 5
- 6 = Malignant

BI-RADS

- 0 = Incomplete
- 1 = Negative (<1%)
- 2 = Benign (< 1%)
- 3
- 4
- 5
- 6 = Malignant (100%)

BI-RADS

- 0 = Incomplete
- 1 = Negative (<1%)
- 2 = Benign (< 1%)
- 3 = Probably Benign
- 4
- 5
- 6 = Malignant (100%)

BI-RADS

- 0 = Incomplete
- 1 = Negative (<1%)
- 2 = Benign (< 1%)
- 3 = Probably Benign (< 3%)
- 4
- 5
- 6 = Malignant (100%)

BI-RADS

- 0 = Incomplete
- 1 = Negative (<1%)
- 2 = Benign (< 1%)
- 3 = Probably Benign (< 3%)
- 4
- 5 = Probably Malignant
- 6 = Malignant (100%)

BI-RADS

- 0 = Incomplete
- 1 = Negative (<1%)
- 2 = Benign (< 1%)
- 3 = Probably Benign (< 3%)
- 4
- 5 = Probably Malignant (> 85%)
- 6 = Malignant (100%)

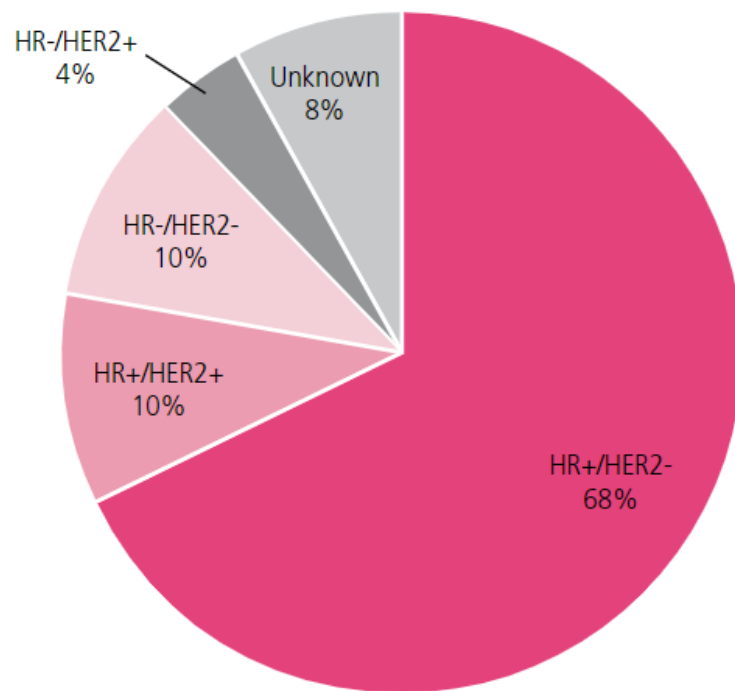
BI-RADS

- 0 = Incomplete
- 1 = Negative (<1%)
- 2 = Benign (< 1%)
- 3 = Probably Benign (< 3%)
- 4 = Suspicious
- 5 = Probably Malignant (> 85%)
- 6 = Malignant (100%)

BI-RADS

- 0 = Incomplete
- 1 = Negative (<1%)
- 2 = Benign (< 1%)
- 3 = Probably Benign (< 3%)
- 4 = Suspicious (3-85%)
- 5 = Probably Malignant (> 85%)
- 6 = Malignant (100%)

Figure 1. Distribution of Female Breast Cancer Subtypes, US, 2015-2019



HR = hormone receptor; HER2 = human epidermal growth factor receptor 2.

Source: North American Association of Central Cancer Registries (NAACCR), 2022.

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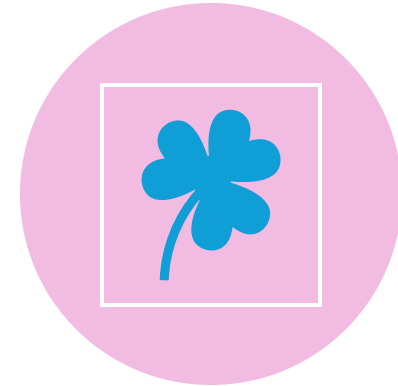
Treatment Options



LOCAL THERAPY VS.
SYSTEMIC THERAPY



SURGERY IS THE
MAINSTAY OF TREATMENT

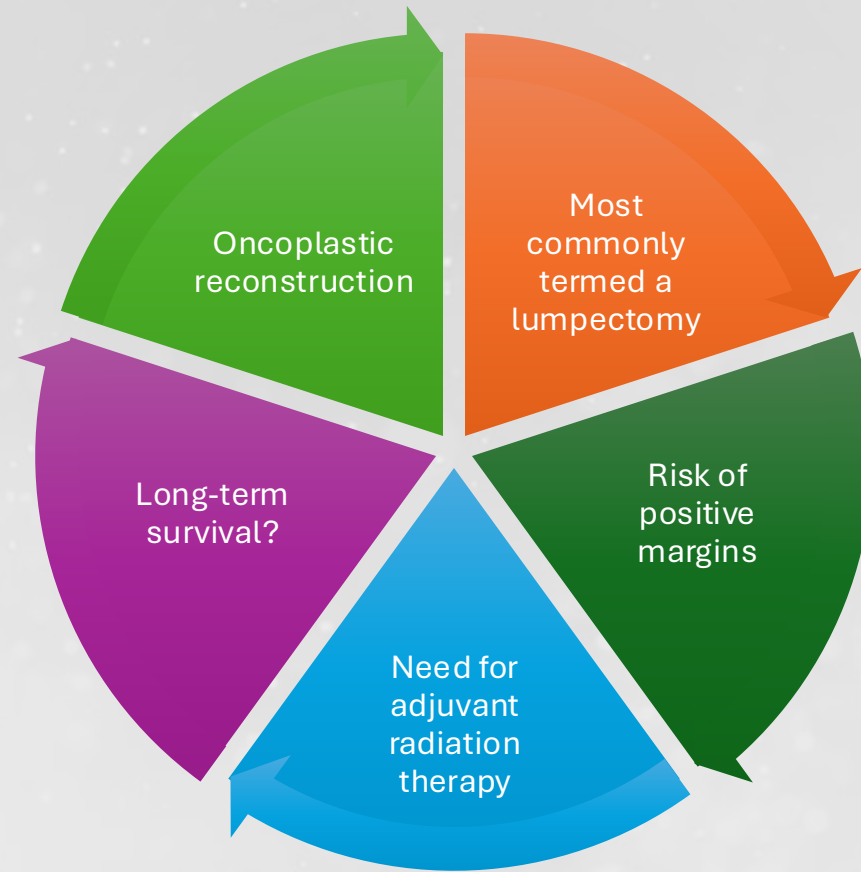


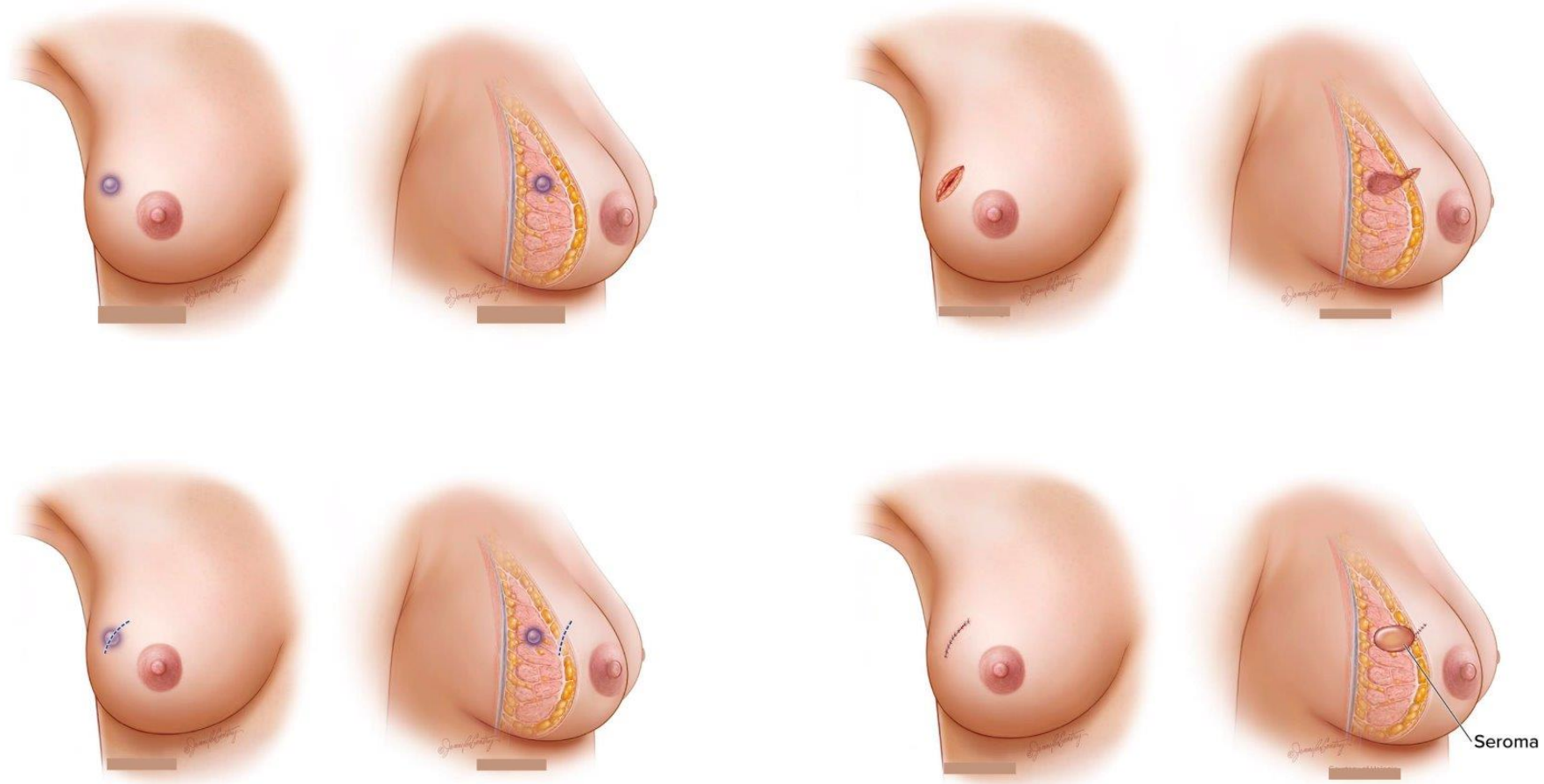
NEOADJUVANT OR
ADJUVANT?

Surgery

- Breast conservation (lumpectomy/partial mastectomy)
 - Mastopexy
 - Mammoplasty
- Mastectomy
 - Aesthetic flat closure
 - Reconstruction
 - Implant-based reconstruction
 - Autologous reconstruction

Breast Conservation

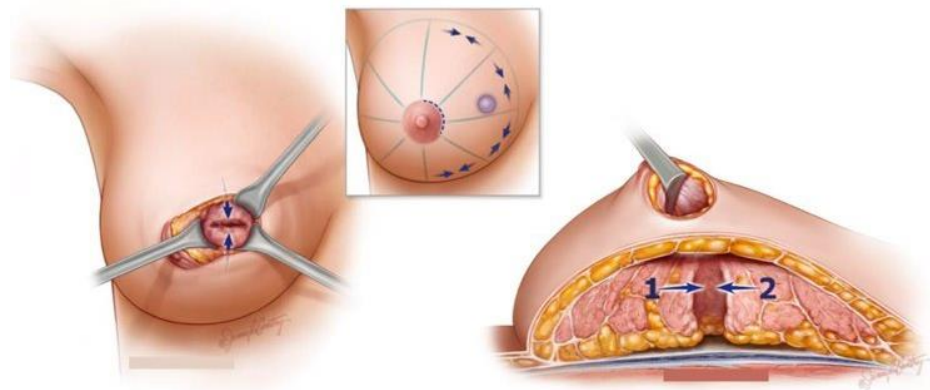
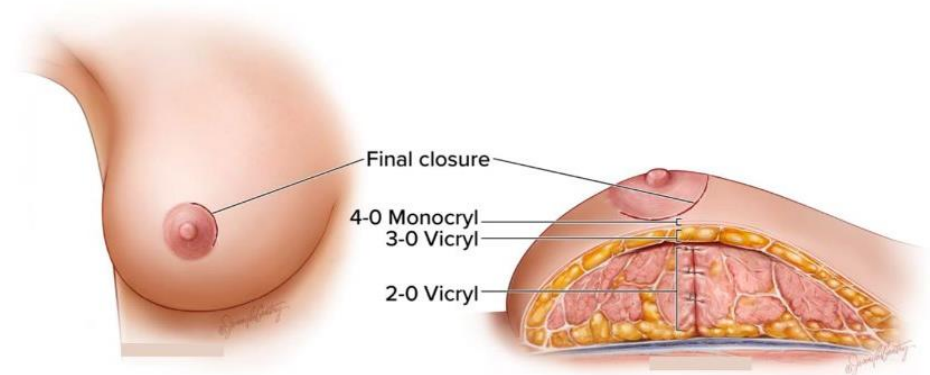
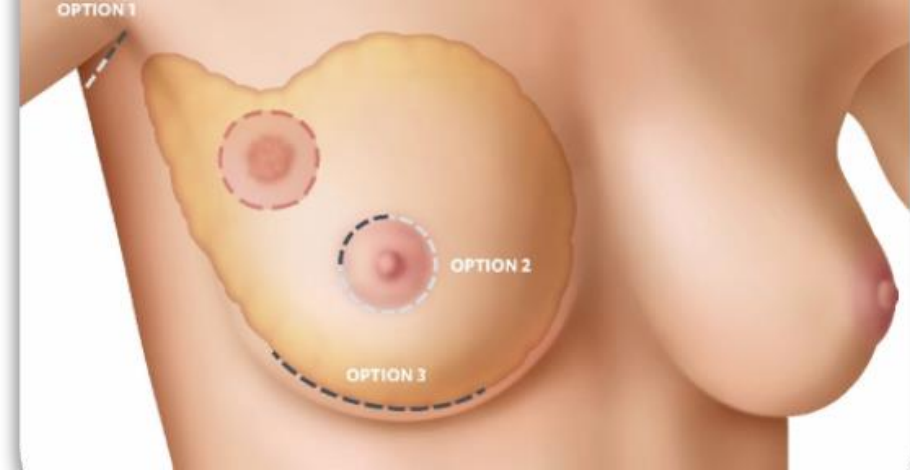




Oncoplastics



Oncoplastics





Alternatives to Surgery

Cryoablation

Radiofrequency ablation

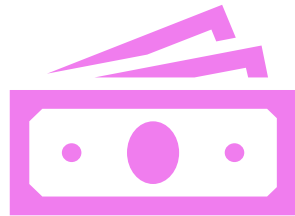
Microwave ablation

Laser ablation

High-intensity focused
ultrasound

Irreversible
electroporation/pulsed
electrical field

Benefits

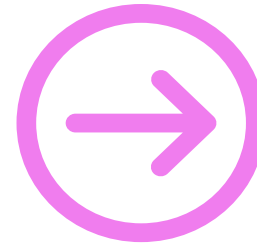


Benefits

Lower median cost (\$16,896.50 vs. \$2221.70)

Better cosmetic outcomes

Higher patient well-being scores



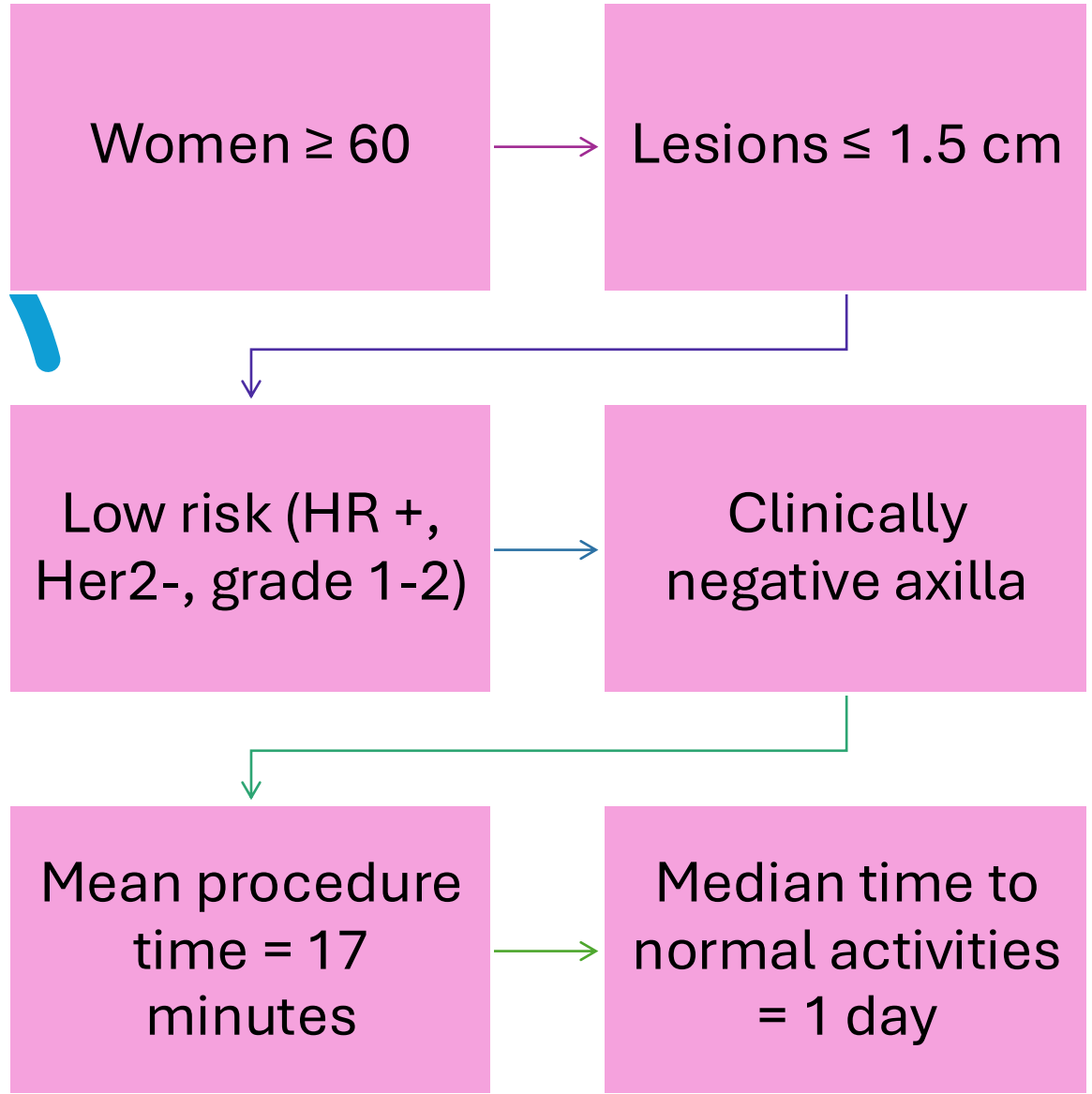
Patient selection

T1, ER/PR+, Her2-, low grade

Postmenopausal

Normal axillary ultrasound

ICE3 Trial



ICE3 Trial Outcomes

IBTR 4.3% of patients followed for 5 years (3.6% of all patients enrolled)



Breast cancer survival 96.7% (98.7%)



Overall survival 88.6%

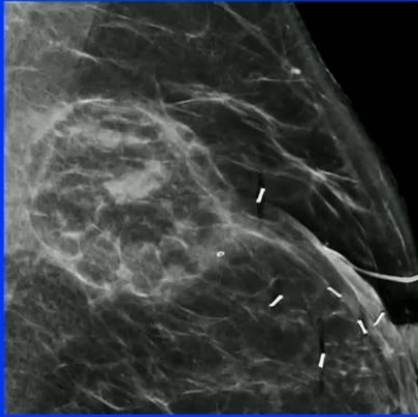


Limitations = single-armed, industry-sponsored, non-randomized, no standardization of adjuvant therapies

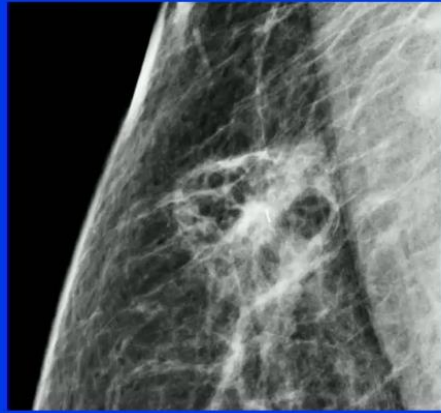


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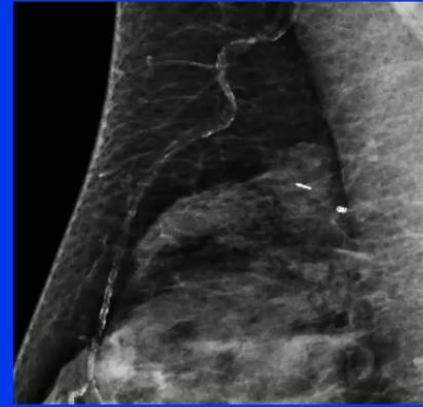
Post Cryoablation Mammogram Tumor "Ghost"



**1 year post Cryoablation
With Tumor Ghost**



**1 year post Cryoablation
With Tumor Ghost**



3 years post Cryoablation

Cryoablation

Mastectomy

Bigger surgery and often needs
Plastic Surgery involvement

Local recurrence and long-
term survival rates

Different methods (simple,
skin-sparing, nipple-sparing)

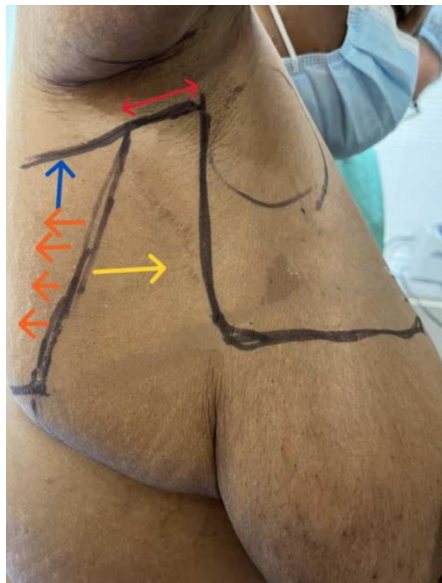
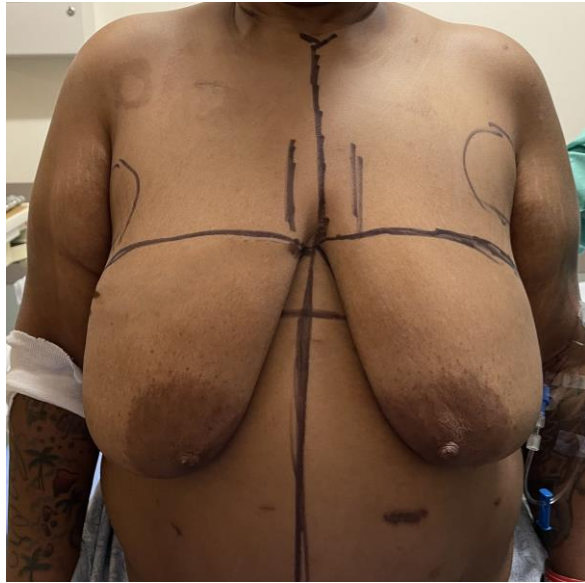
Reconstruction vs. Flat
closure

Oncoplastics





Aesthetic Flat Closure



Axillary Management

DCIS

Invasive breast cancer

Clinically positive axilla

- Axillary dissection
- Targeted axillary dissection

Axillary management is **separate** from management of the breast

De-
escalation of
Axillary
Surgery

Society of Surgical
Oncology published
Choosing Wisely
guidelines in 2016

SOUND trial

SOUND Trial

RCT at 18 European hospitals 2012-2017

Enrollment = 1405 women

CT1, cN0

Treated with BCT and XRT

Median age 60, tumor size 1.1, ER+/Her2-disease in 87.8%

In the SLN group – 13.7% positive nodes on SLN biopsy

Recommended adjuvant systemic therapy and radiotherapy similar in the 2 groups

	SLN surgery	No axillary surgery	
Locoregional relapse	12 (1.7%)	11 (1.6%)	
Distant metastases	13 (1.8%)	14 (2.0%)	
Deaths	21 (3.0%)	18 (2.6%)	
5-year DDFS	97.7%	98.0%	p=0.67
5-year DFS	94.7%	93.9%	p=0.30
5-year OR	98.2%	98.4%	p=0.72

INSEMA Trial

Prospective RCT in
Germany and
Austria 2015-2019

Enrollment = 5502
patients

cT1-T2, cN0

Treated with BCT
and XRT

Median age 62,
98.5% ER+, 3.6%
Her2 +, 3.6% grade
3

More patients in the
SLN group received
chemotherapy

Improved secondary
outcomes in the no
axillary surgery
group

Genetic Testing

- Every patient with breast cancer qualifies for and should undergo genetic testing prior to definitive therapy
- The following genes have an association with increased risk of breast cancer:
ATM, BARD1, BRCA1, BRCA2, BRIP1*, CDH1, CHEK2, MSH2, MLH1, MSH6, PMS2, EPCAM, NF1, PALB2, PTEN, RAD51C, RAD51D, STK11, TP53

Radiation Therapy



Whole breast radiation

- All breast conservation*
- Locally advanced disease
- Nodal disease
- Close margins
- Inflammatory breast cancer

Partial breast radiation

- Selected early stage

Chemotherapy

Indicated for ALL triple negative and any Her2+ tumor

- Her2 targeted therapy = Herceptin (Trastuzumab)

For T1b and above, HR+, Her2- tumors, an Oncotype Dx test is indicated

Score of 26 is the typical cut off

Hormonal Blockade

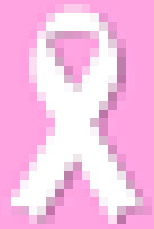
Also called endocrine therapy or anti-estrogen therapy

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graph TD; A[Also called endocrine therapy or anti-estrogen therapy] --> B[Any HR+ patient]; B --> C[Premenopausal/chemoprophylaxis = Tamoxifen]; C --> D[Postmenopausal = Aromatase inhibitors (Anastrozole, Letrozole, etc.)];
```

Any HR+ patient

Premenopausal/chemoprophylaxis = Tamoxifen

Postmenopausal = Aromatase inhibitors
(Anastrozole, Letrozole, etc.)



Survival Rates

5-year survival = 91%

10-year survival = 85%





Questions

