

# **BREAST CANCER**

## **EPIDEMIOLOGY, RISK FACTORS AND SCREENING**

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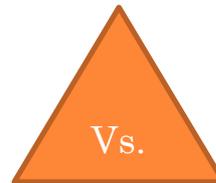
# OUTLINE

- Definition
- Epidemiology and Classification
- Presentation of Breast Cancer
- Risk factors
- Screening protocol
- Diagnosis
- Outline of treatment
- Recommendations



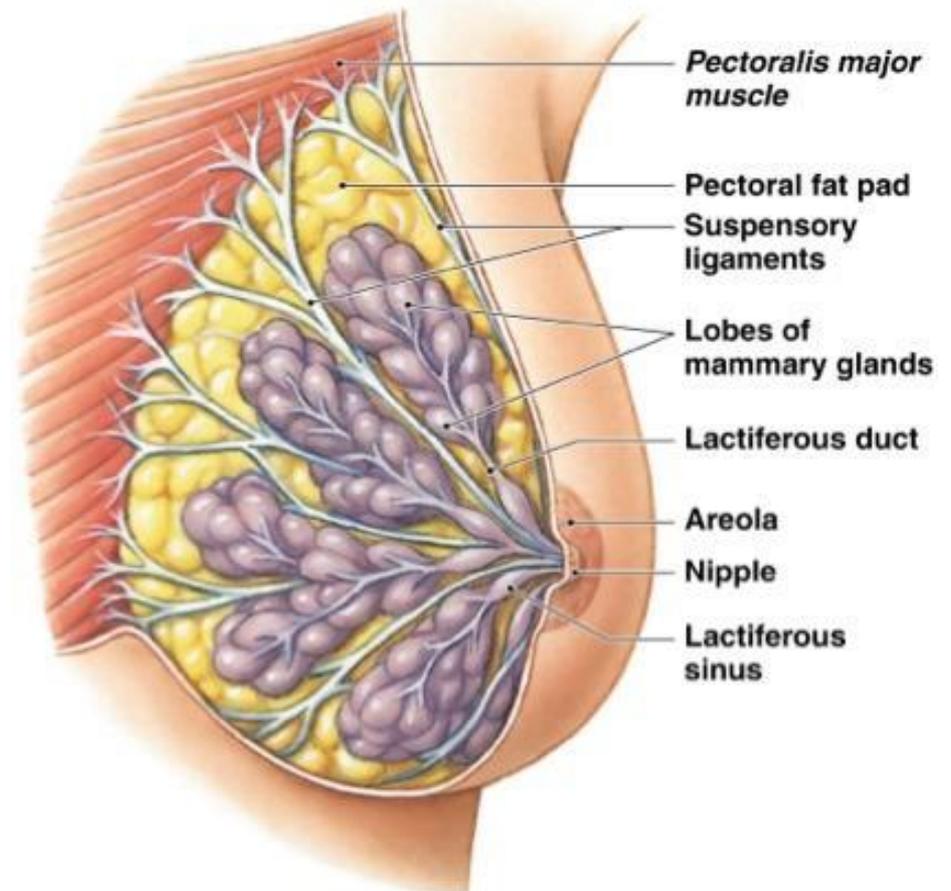
# DEFINITION

- Heterogeneous group of diseases that cause cells in the body to change and grow out of control.



## ○ Breast Structure

- Gland → Ductal and Lobular structures
- Fat
- Connective tissue
- lymphatic tissue



# BREAST CANCER RISK?

- Most common non-skin cancer in women in U.S.
- 2<sup>nd</sup> leading cancer killer among **women** (lung is number 1).
- Over 232,000 cases were reported in 2013, > 99% in women.
- 1 in 8 women will be diagnosed with breast cancer in her life



- *Worldwide* Breast Cancer ranks first among cancers affecting women and is ranked 5<sup>th</sup> as cancer related deaths with more than 2.3 million new cases were reported in 2020 and 685,000 deaths.
- Breast cancer survival rates are improving, according to the WHO reports, there were 7.8 million women alive who were diagnosed with breast cancer in the past 5 years, making it the world's most prevalent cancer.



1 in 8

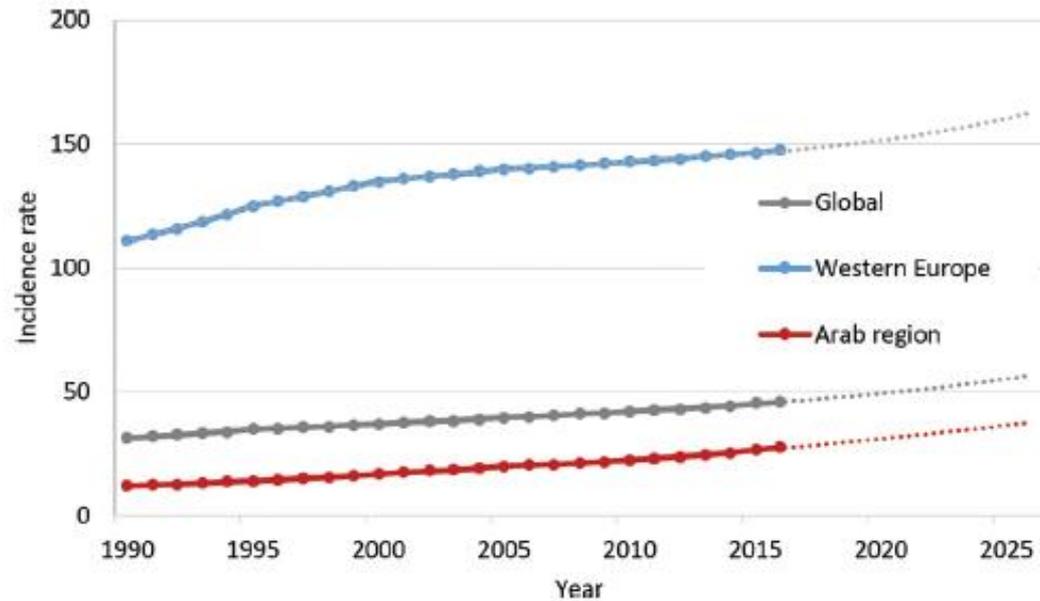
Approximately one in eight women will develop invasive breast cancer in her lifetime



Original Article

## Burden of Breast Cancer in the Arab World: Findings from Global Burden of Disease, 2016

M. Jawad Hashim<sup>1</sup>, Fatima A. Al-Shamsi<sup>1</sup>, Noura A. Al-Marzooqi<sup>1</sup>, Sarah S. Al-Qasemi<sup>1</sup>, Ali H. Mokdad<sup>2</sup>, Gulfaraz Khan<sup>3</sup>



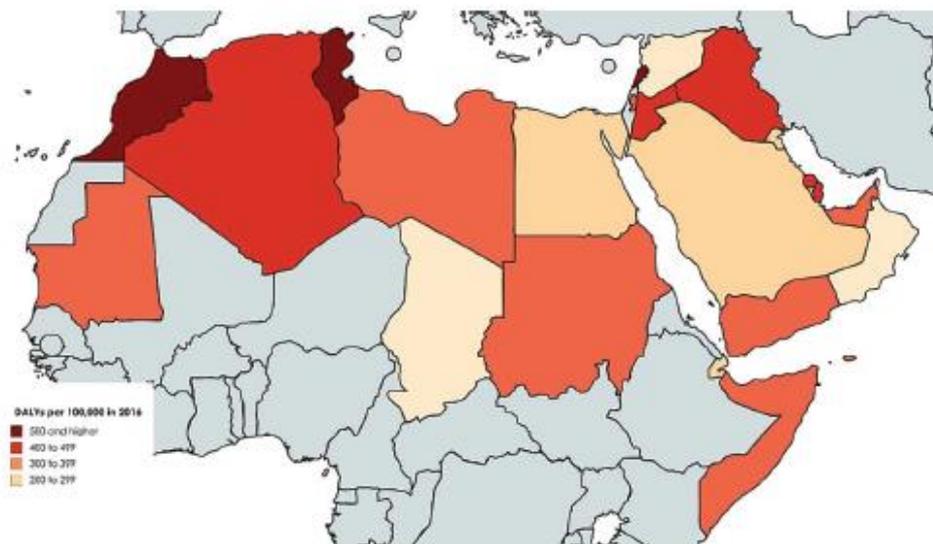
**Figure 1** Trends in breast cancer in the Arab world, 1990–2016, and projections to 2025. *Notes:* Incidence rates of breast cancer among women (all ages) per 100,000 persons. Projection estimates up to 2025 are in dotted lines.



**Table 2** | Country-specific data on breast cancer, 2016

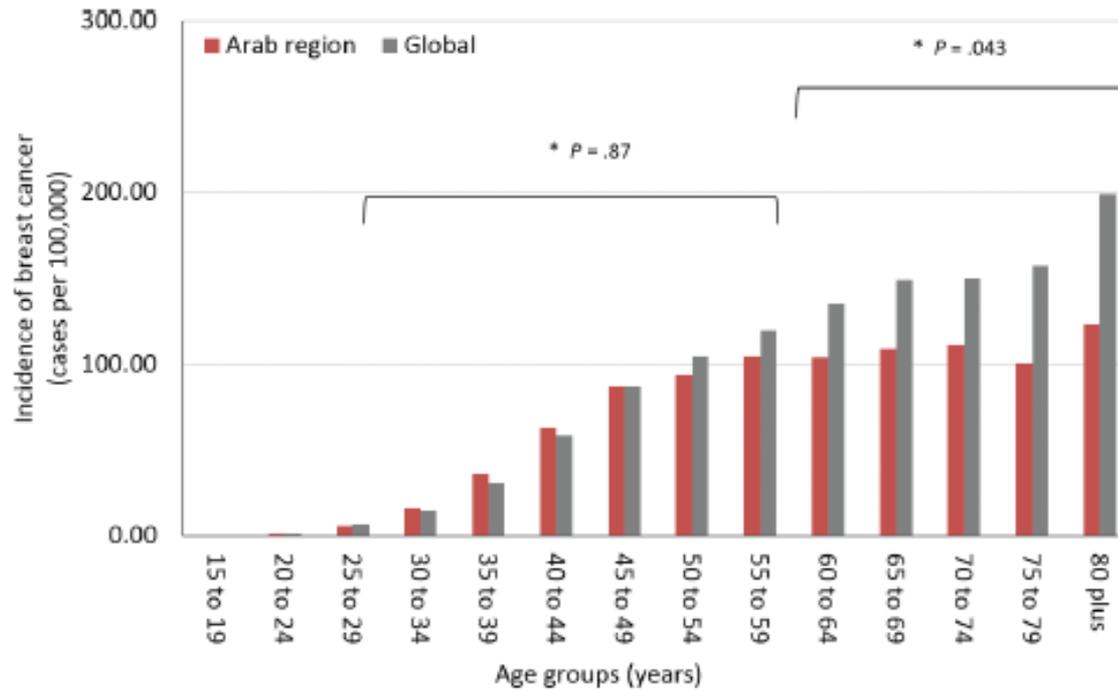
Country	Incidence rate	DALY rate	Death rate	Total deaths
Global	46	405	15	535,341
Algeria	27	411	12	2392
Arab region	28	363	11	20,063
Bahrain	44	458	13	71
Comoros	12	317	10	37
Djibouti	10	259	8	40
Egypt	19	237	7	3231
Iraq	19	468	14	2623
Jordan	32	427	13	474
Kuwait	36	276	8	145
Lebanon	84	561	21	622
Libya	37	360	10	320
Mauritania	12	317	10	205
Morocco	44	642	18	3094
Oman	17	194	6	89
Palestine	14	320	10	250
Qatar	39	403	10	64
Saudi Arabia	25	201	6	878
Somalia	12	370	11	586
Sudan	18	338	10	1916
Syria	12	165	5	465
Tunisia	44	553	18	1014
UAE	36	389	10	257
Western Europe	148	801	39	85,042
Yemen	13	323	9	1290

All figures are for the year 2016. All the rates are per 100,000. Notes: DALY, disability adjusted life years.



**Figure 2** | Geographical distribution of breast cancer burden in the Arab world, 2016. Notes: DALY rates per 100,000 persons in 2016. Darker red hues indicate higher rates.





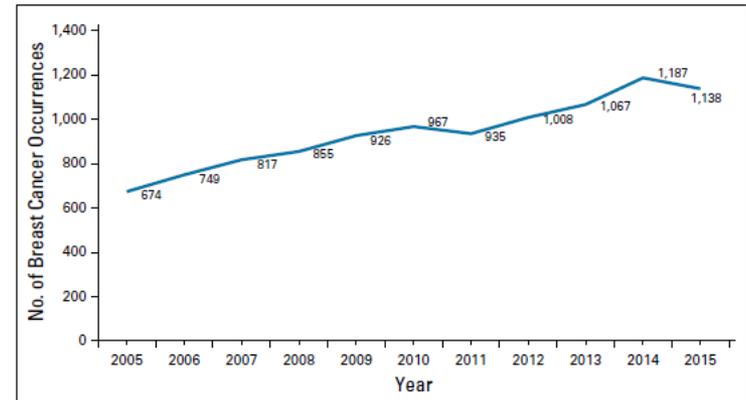
**Figure 3** | Age distribution of breast cancer incidence in the Arab world, 2016. Incidence figures in the age bracket 30–59 years are not significantly different in Arab women compared with women globally ( $p = 0.87$ , related-samples Wilcoxon signed rank test), whereas in the age bracket 60–80+, are higher for women globally ( $p = 0.043$ ).



# BREAST CANCER IN JORDAN

- Breast cancer is the most common malignancy in Jordan and the third leading cause of cancer death after lung and colorectal cancers.
- Accounts for 20.6% of cancers in Jordanians of both sexes and 39.4% of cancers among Jordanian women.
- The number of new cases has been significantly increasing, and women present with breast cancer at a younger age and with more advanced disease than women in Western countries

FIG 1. Number of breast cancer occurrences (2005-2015).



## Breast Cancer Care in Jordan

Hikmat Abdel-Razeq, MD<sup>1,2</sup>; Asem Mansour, MD<sup>3</sup>; and Dima Jaddan, MD, MPH<sup>1</sup>

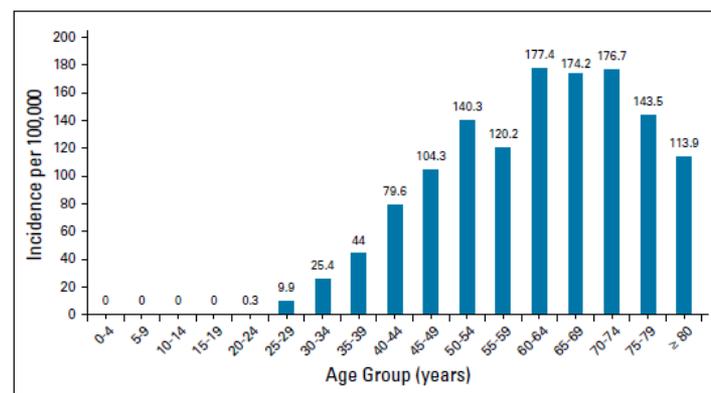
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# BREAST CANCER IN JORDAN

- ❑ Approximately 15.6% new patients with breast cancer were younger than age 40 years; 29.1% were between 40 and 49 years; 25.6%, between 50 and 59 years; and 29.7%, older than age 60 years.
- ❑ Age-specific rates for breast cancer in women for 2015 show the highest incidence of 177.4 per 100,000 in the age group 60 to 64 years, followed by 176.7 per 100,000 in women between age 70 and 74 years.
- ❑ The median age at diagnosis among women was 51 years, which is approximately 10 years younger than the median age at diagnosis of breast cancer for women in Western countries

FIG 3. Age-specific incidence rates per 100,000 (2015).



## Breast Cancer Care in Jordan

Hikmat Abdel-Razeq, MD<sup>1,2</sup>; Asem Mansour, MD<sup>3</sup>; and Dima Jaddan, MD, MPH<sup>1</sup>

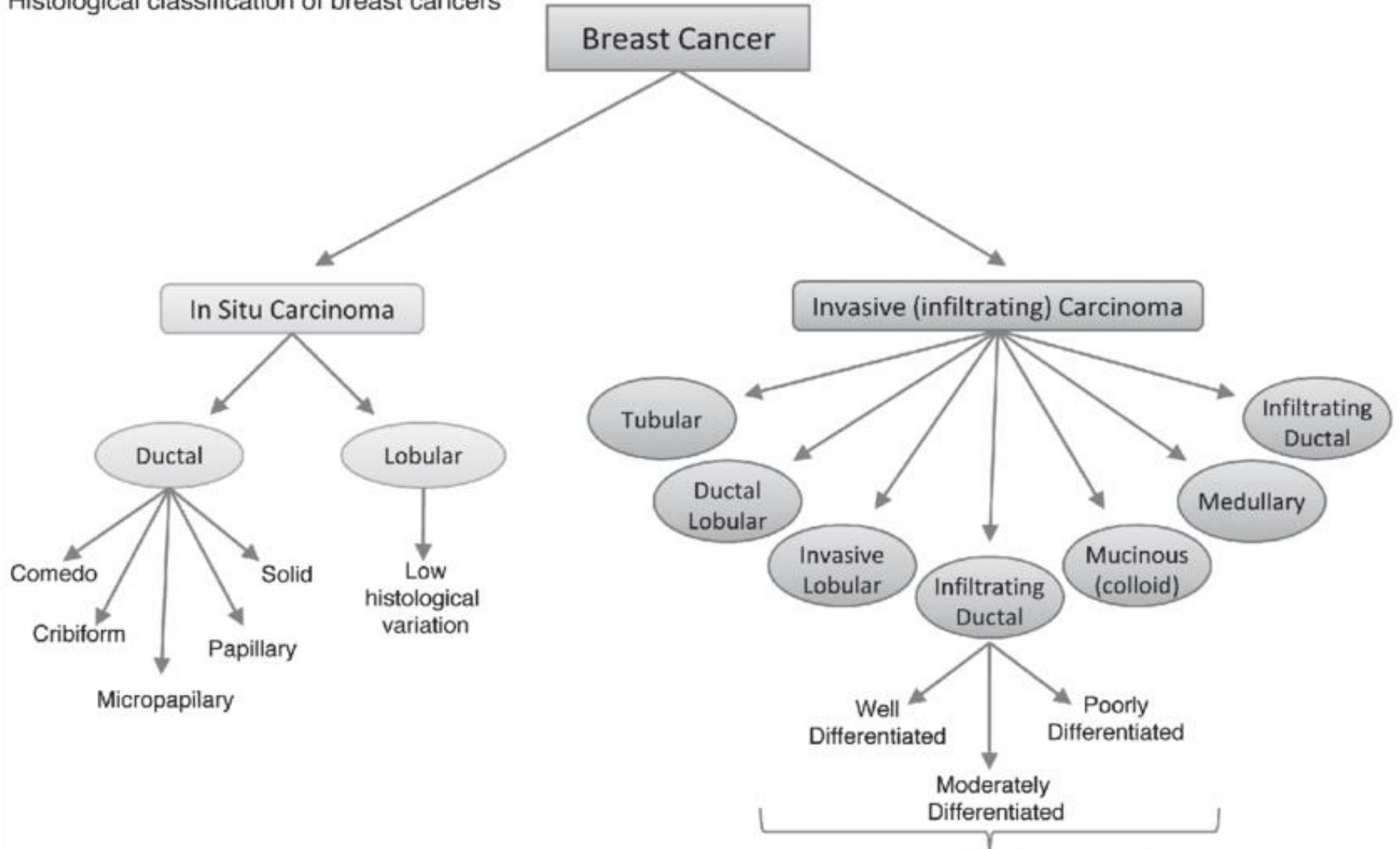
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# BREAST CANCER CLASSIFICATION



# Histological classification of breast cancers



This classification is based on  
1. Nuclear Pleomorphism  
2. Glandular/Tubule Formation  
3. Mitotic Rate (per 10 HPF)

# Breast Cancer

## Non Invasive Carcinoma

DCIS

LCIS

## Invasive Carcinoma

Invasive ductal  
carcinoma

Invasive lobular  
carcinoma



**Table 1. Estimated New Female Breast Cancer Cases and Deaths by Age, US, 2015\***

<b>Age</b>	<b>In Situ Cases</b>	<b>Invasive Cases</b>	<b>Deaths</b>
<40	1,650	10,500	1,010
40-49	12,310	35,850	3,690
50-59	16,970	54,060	7,600
60-69	15,850	59,990	9,090
70-79	9,650	42,480	8,040
80+	3,860	28,960	10,860
<b>All ages</b>	<b>60,290</b>	<b>231,840</b>	<b>40,290</b>

\*Rounded to the nearest 10.

American Cancer Society, Inc., Surveillance Research, 2015



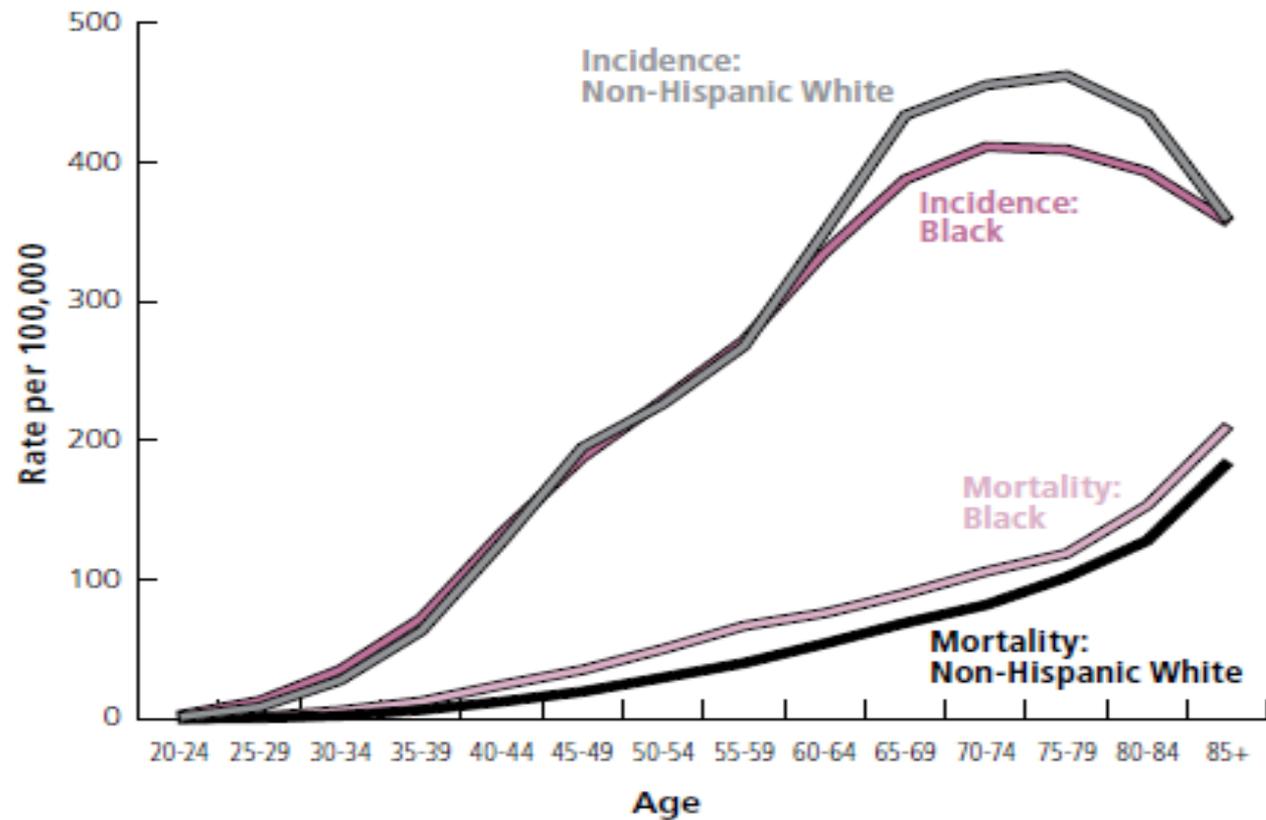
# Breast Cancer Occurrence

## How many cases and deaths are estimated to occur in 2015?

- In 2015, an estimated 231,840 new cases of invasive breast cancer will be diagnosed among women, as well as an estimated 60,290 additional cases of in situ breast cancer (Table 1, page 1).
- In 2015, approximately 40,290 women are expected to die from breast cancer (Table 1, page 1). Only lung cancer accounts for more cancer deaths in women.
- In 2015, about 2,350 men will be diagnosed with breast cancer and 440 men will die from the disease.



**Figure 1. Age-specific Female Breast Cancer Incidence and Mortality Rates, US, 2008-2012**



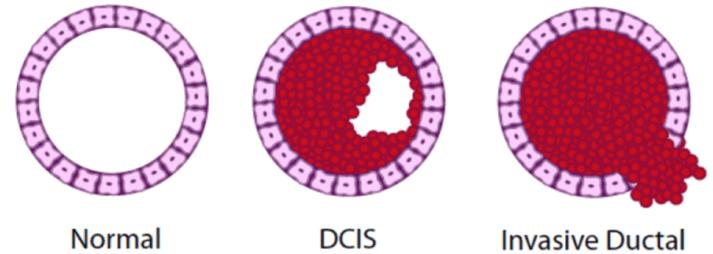
**Sources:** Incidence: North American Association of Central Cancer Registries (NAACCR), 2015. Mortality: US mortality data, National Center for Health Statistics, Centers for Disease Control and Prevention.

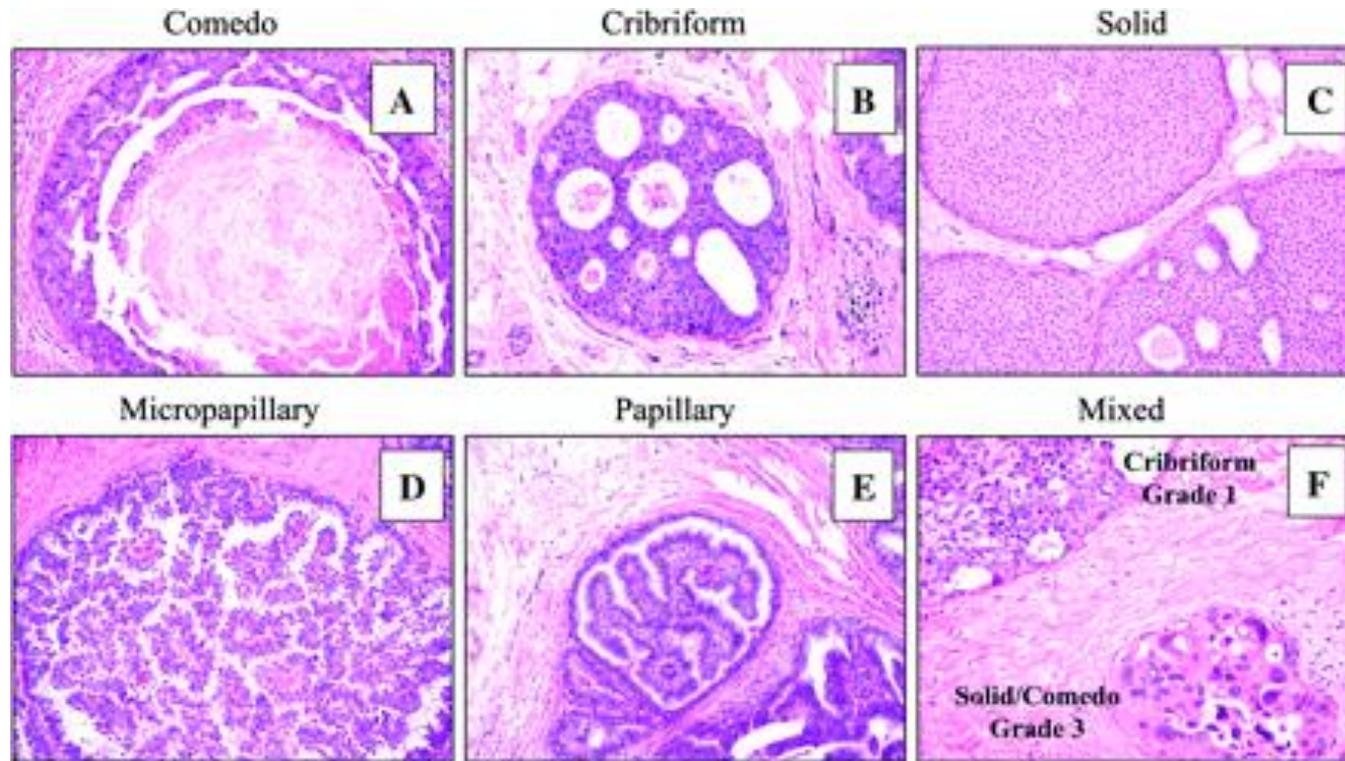
American Cancer Society, Inc., Surveillance Research, 2015



# DCIS

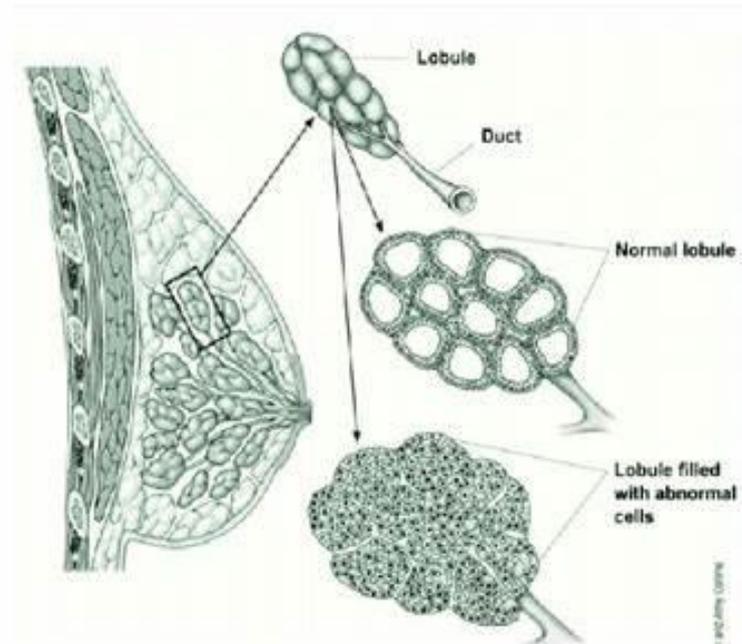
- Malignant cells are confined to ductal wall and not invading the BM
- 83% of in-situ cases diagnosed between 2008-2012
- Considered a precancerous lesions
- Incidence increases in correlation with the use of screening mammography
- 20%-53% with untreated DCIS progress to invasive cancer over 10 years or more

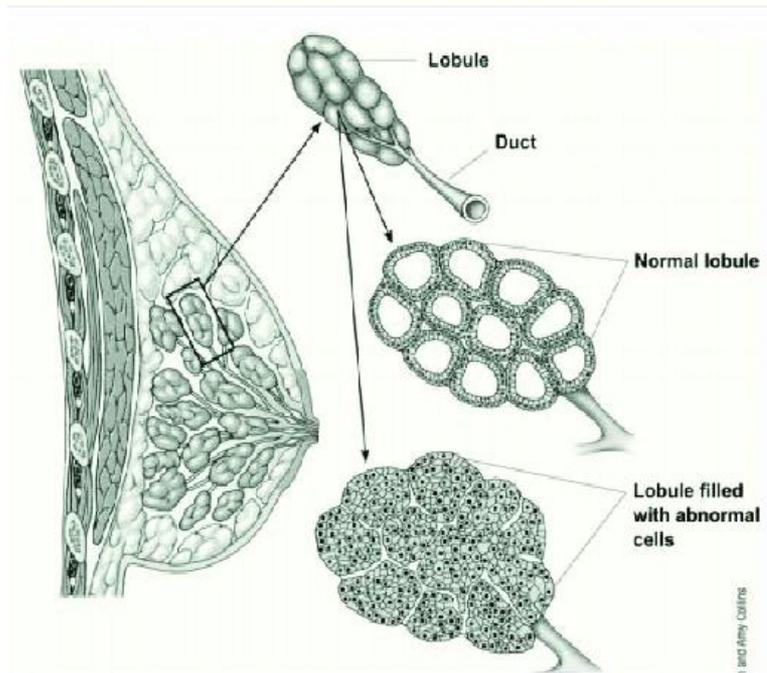




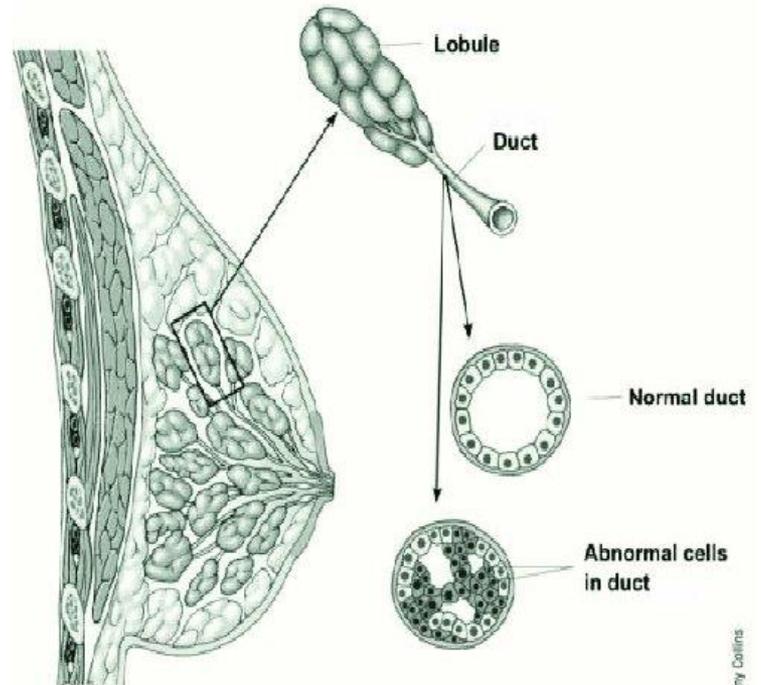
# LCIS

- Cancerous cells are confined to breast lobules
- It is no more considered a precancerous lesion
- It considered a *marker of increased risk for carcinoma*
- 13% of in-situ carcinoma diagnosed between 2008-2012





**A**

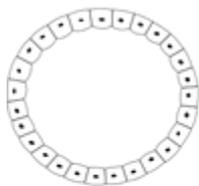


**B**

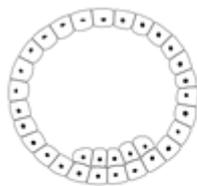


# INVASIVE CARCINOMA

- Most common type of breast carcinoma
- Cancerous cells invade walls of glands or duct into surrounding tissue
- The prognosis is strongly influenced by the extent of tumor spread (stage of the disease)



Normal duct



Intraductal hyperplasia



Intraductal hyperplasia with atypia



Intraductal carcinoma in situ



Invasive ductal carcinoma



# BREAST CANCER STAGING

## TNM Staging System

Stage 0

Stage 1

Stage 2

Stage 3

Stage 4

## **SEER Summary Stage System**

**Local Stage: Confined to breast**

Stage 1

Some stage 2

**Regional Stage: involve surrounding tissue and LN**

Stage 2

Stage 3a, 3b

**Distant stage**

Stage 3c

Stage 4

# MOLECULAR SUBTYPES OF BREAST CARCINOMA

## Luminal A HR+ / HER2 - / low Ki67

- ❑ 74% of BC
- ❑ Slow growing
- ❑ Less aggressive
- ❑ Favorable prognosis

## Luminal B HR+ / HER2 +

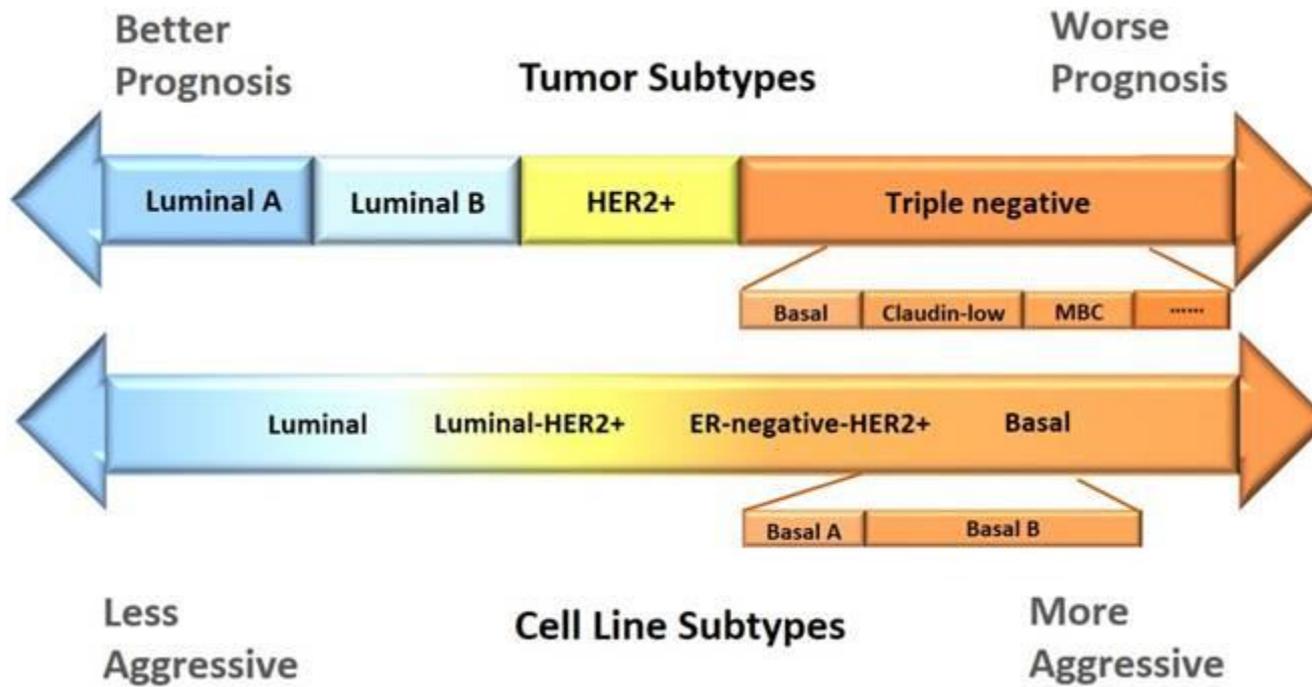
- ❑ 10% of BC
- ❑ More aggressive with higher grade than luminal A

## HER2 enriched HR- / HER2 +

- ❑ 4% of BC
- ❑ More aggressive than HR+
- ❑ Poor survival compared to HR+

## Triple Negative

- ❑ 12% of BC
- ❑ More common in black US, premenopausal, BRCA-1
- ❑ 75% are basal like
- ❑ Poor short term prognosis



# BREAST CANCER

## CLINICAL PRESENTATION



# PRESENTATION

- Typically; small tumors are asymptomatic and usually discovered during screening.
- Symptomatic or palpable tumors are generally present in advanced stage.
  - Generally, more aggressive treatment will be required



**Breast  
pain**

**Breast  
mass**

**Axillary  
lymphadenopathy**

**Inflammatory  
changes**

**Breast  
Cancer**

**Swelling / Skin  
thickening**

**Nipple changes  
retraction  
erosion  
thickening**

**Nipple  
discharge  
(bloody)**

**Skin dimpling**





<https://bugswong.smugmug.com/Medical-slides/Breast-disease/>





<http://cursoenarm.net/UPTODATE/contents/mobipreview.htm?15/24/15747>



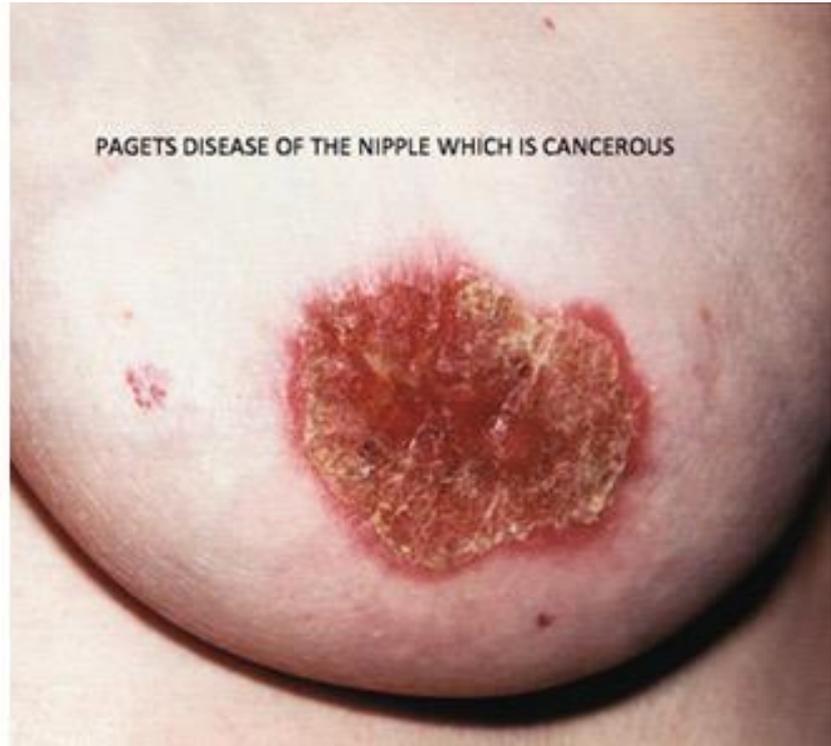
Inflammatory breast cancer illustrating the classical peau d'orange of involved skin. Courtesy of Dr Giorgio M Baratelli, Radiopaedia.org, rID 43353.





<http://www.webpathology.com/image.asp?case=290&n=10>





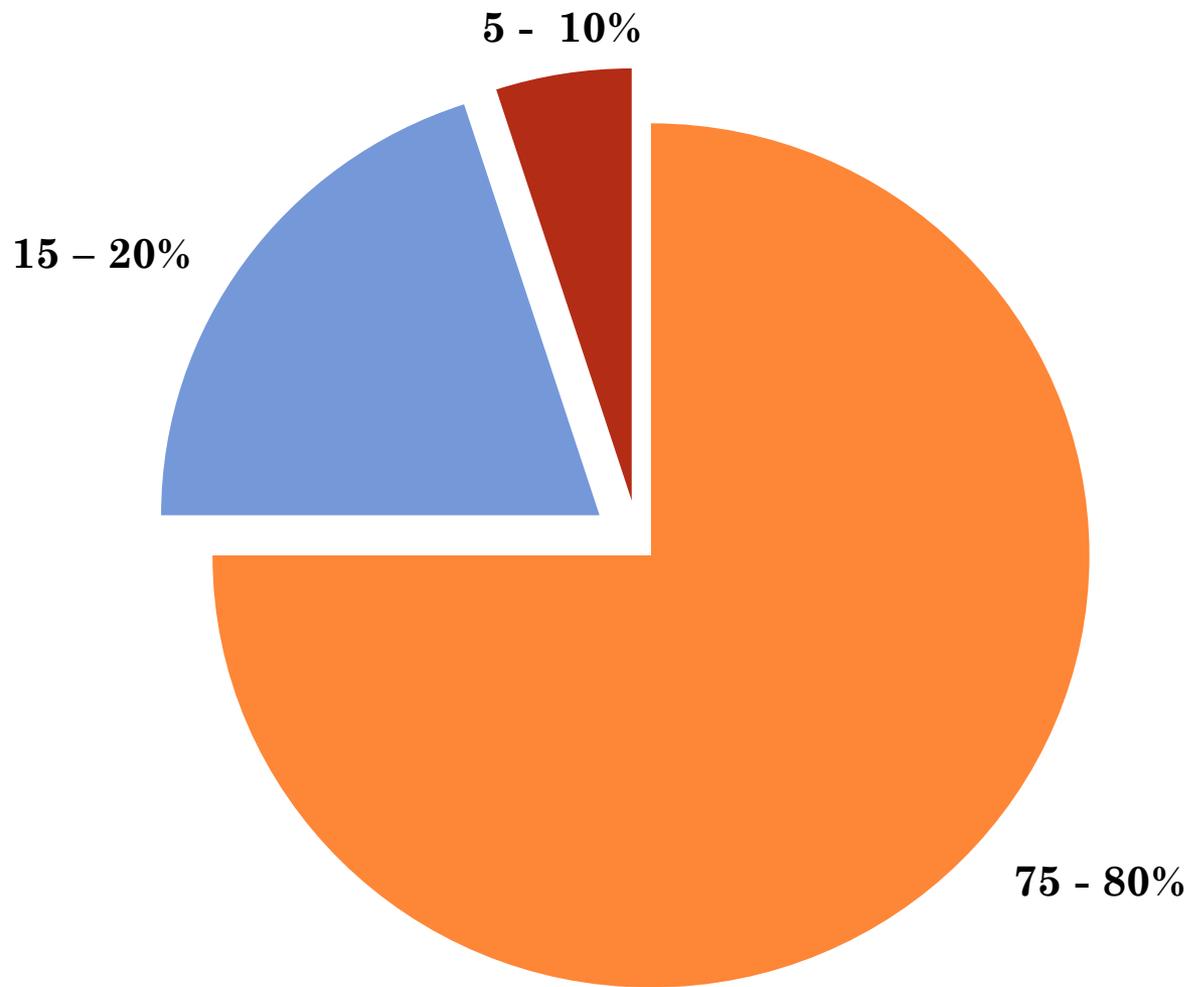
<http://milliebello.co.uk/breast-cancer-diagnosis.htm>



# Breast Cancer

## Risk Factors





**Breast Cancer**

- Sporadic
- Familial
- Hereditary



# Non modifiable risk factors

Age

Race

Personal  
history BC / OC

Genetic  
factors

Female  
Gender

Family history  
of BC / OC

Reproductive  
history

Menstrual  
history

Radiation  
exposure

Breast  
density



# Modifiable risk factors

**Exercise**

**Obesity**

**Nulliparity**

**HRT**

**Female  
Gender**

**Breast  
feeding**

**OCP ?**

**Alcohol  
consumption**

**Smoking ?**



# GENDER

- Breast cancer is the most common cancer among US women, accounting for 29% of newly diagnosed cancers.
- Life time risk for BC is 1:8 (12.5%)
- Men are generally at low risk for developing breast cancer



# AGE

- Breast cancer incidence and death rates generally increase with age.
- During 2008-2012, the median age at the time of breast cancer diagnosis was 61 years
  - 50% of women who developed BC were 61 years of age or younger at the time of diagnosis
  - The median age of diagnosis is younger for black women than white women



**Table 5. Age-specific Probabilities of Developing Invasive Female Breast Cancer\***

<b>If current age is ...</b>	<b>The probability of developing breast cancer in the next 10 years is:†</b>	<b>or 1 in:</b>
20	0.1%	1,674
30	0.4%	225
40	1.4%	69
50	2.3%	44
60	3.5%	29
70	3.9%	26
Lifetime risk	12.3%	8

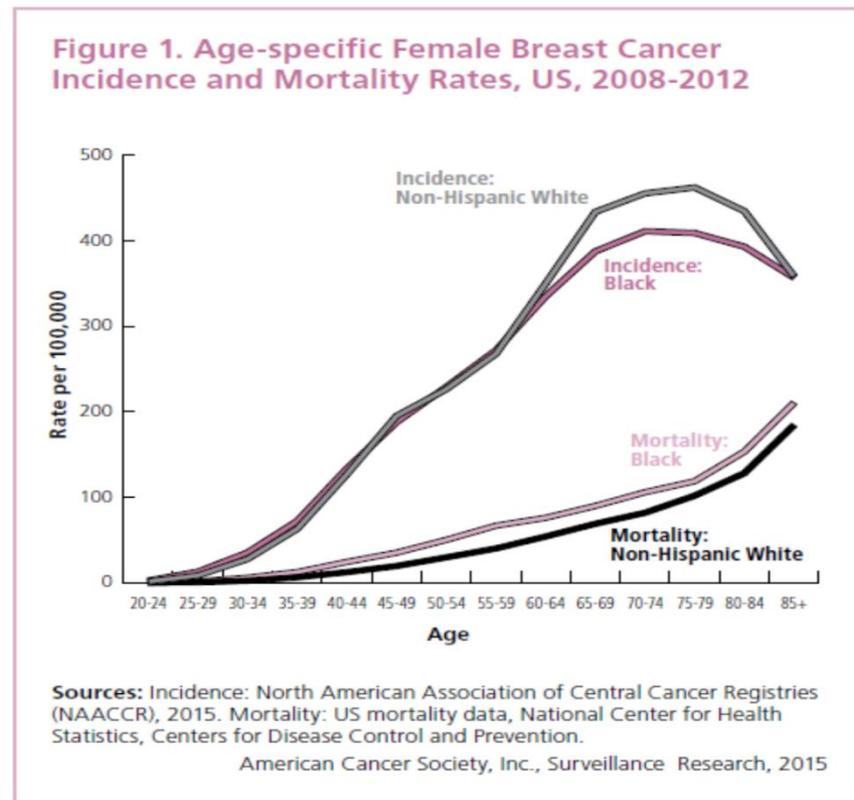
\*Among those free of cancer at beginning of age interval. Based on cases diagnosed 2010-2012. Percentages and "1 in" numbers may not be numerically equivalent due to rounding.

**Source:** 18 SEER Registries, National Cancer Institute. Probabilities derived using NCI DevCan Software, Version 6.7.3.

American Cancer Society, Inc., Surveillance Research, 2015



- The decrease in incidence rates that occurs in women 80 years of age and older may reflect lower rates of screening, the detection of cancers by mammography before 80 years of age, and/or incomplete detection

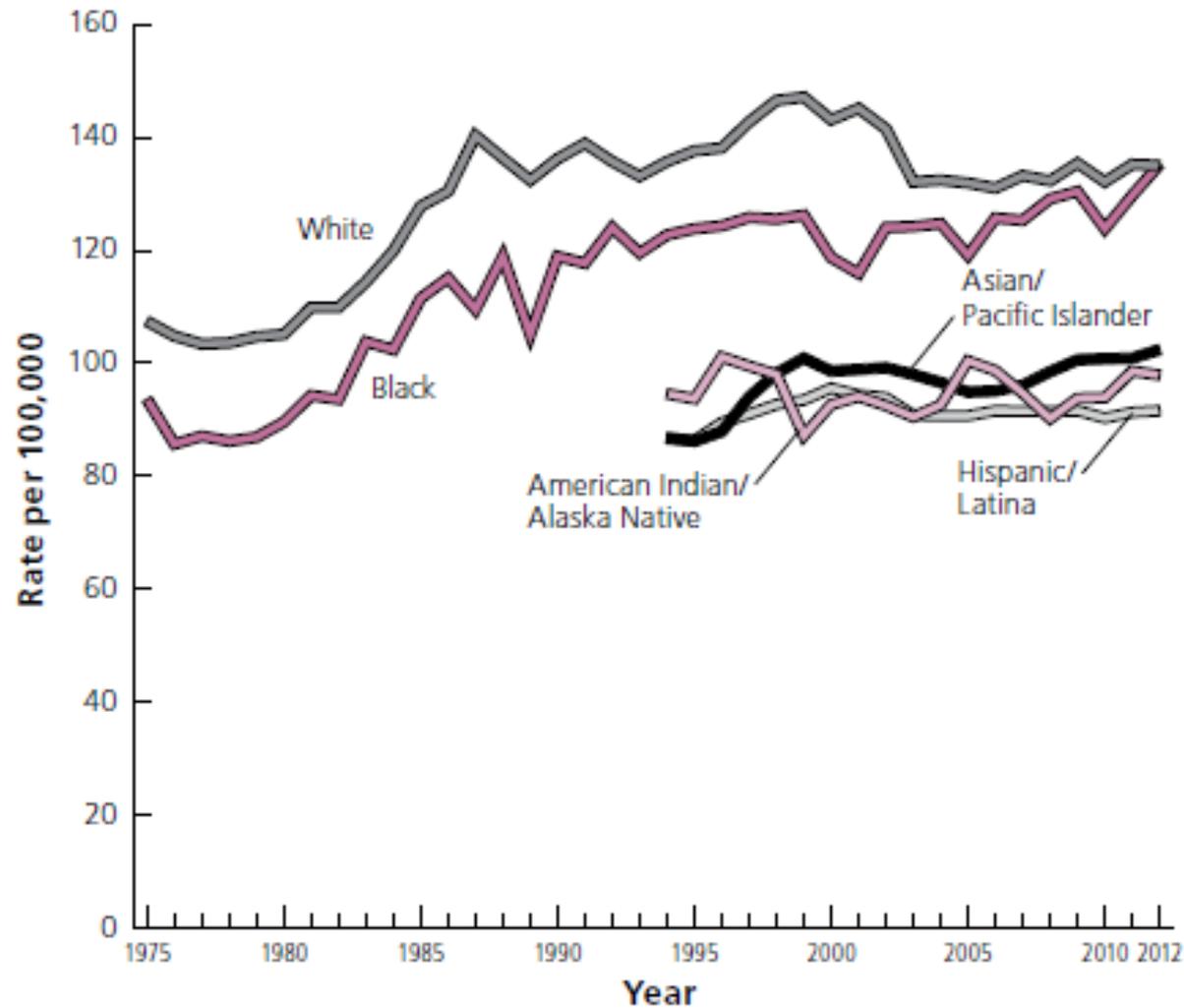


## RACE / ETHNICITY

- Between the ages of 60 and 84, breast cancer incidence rates are markedly higher in white women than black women.
- Black women have a higher incidence rate before age 45.
- Black women with BC have higher mortality rates in all age groups.



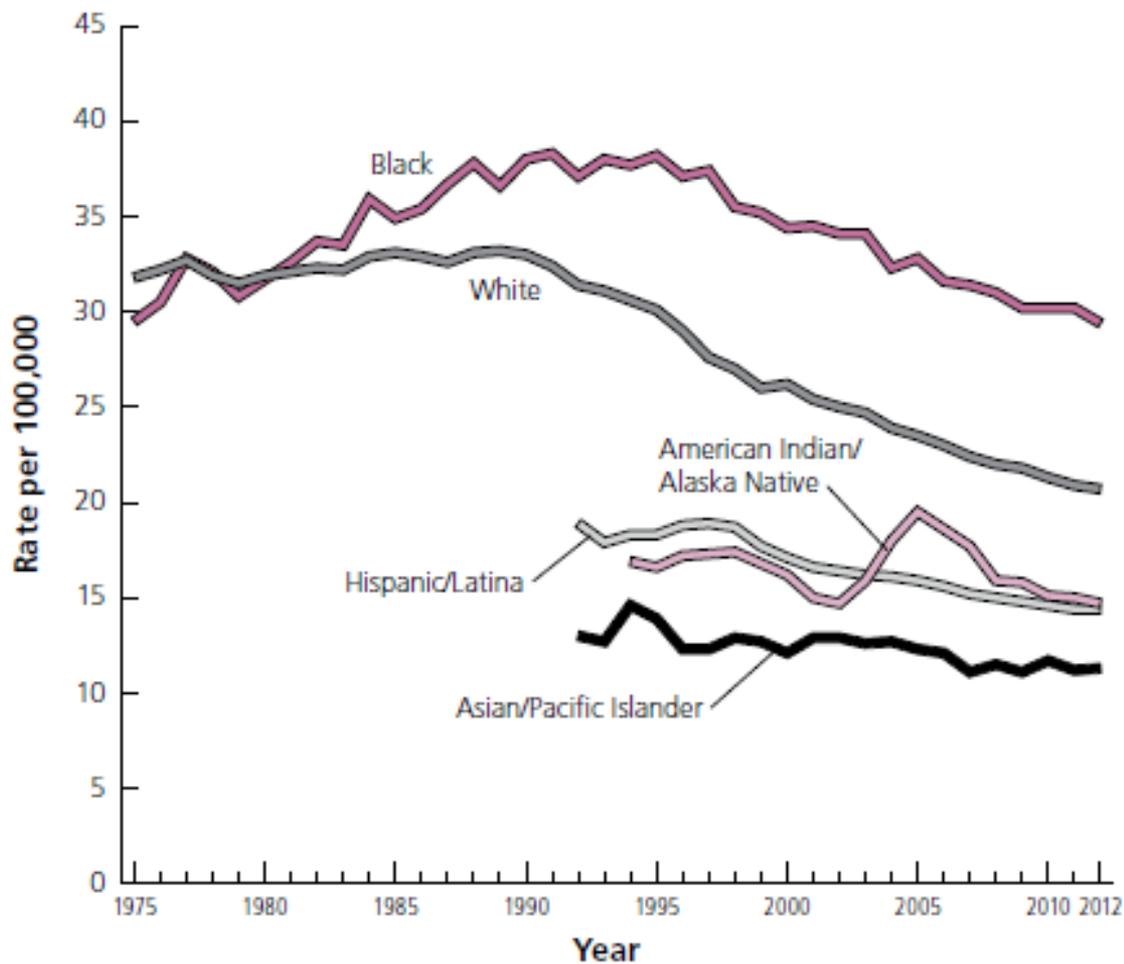
Figure 5a. Trends in Female Breast Cancer Incidence Rates\* by Race and Ethnicity, US, 1975-2012



\*Rates are age adjusted to the 2000 US standard population and adjusted for reporting delay.



Figure 5b. Trends in Female Breast Cancer Death Rates\* by Race and Ethnicity, US, 1975-2012



\*Rates are age adjusted to the 2000 US standard population.



# FAMILY HISTORY

- Women / men with a family history of breast cancer, especially in a first-degree relative (mother, sister, daughter, father, brother, or son) are at increased risk of developing breast cancer
- Risk is higher with more than one affected first-degree relative.
- Risk is further increased when the affected relative was diagnosed at a young age.
- Compared to women without a family history, risk of breast cancer
  - One 1<sup>st</sup> degree member → 2 times higher
  - 2 1<sup>st</sup> degree relative → 3 times higher
  - 3 or more 1<sup>st</sup> degree relatives → 4 times higher



*The majority of women with one or more affected first-degree relatives will never develop breast cancer and that most women who develop breast cancer do not have a family history of the disease.*



# GENETIC FACTORS

## BRCA 1 / 2 mutations

- The most well-studied breast cancer susceptibility genes
  - 5%-10% of all female breast cancers
  - 5%-20% of male breast cancer
  - 15%-20% of all familial breast cancers
- Very rare (much less than 1%) in the general population
  - Slightly more often in certain ethnic or geographically isolated groups, such as those of Ashkenazi (Eastern European) Jewish descent (about 2%).
- The average risk for *BRCA1* and *BRCA2* mutation carriers is estimated to be between 57%-65% and 45%-55%, respectively
- Mutations in *PALB2*, a different gene that works with *BRCA2*, appear to confer risk similar to *BRCA2* mutations.



<b>Risk by age of 70</b>	<b>Breast</b>	<b>Ovarian</b>	<b>Contralateral BC</b>
<b>BRCA 1</b>	<b>55-70%</b>	<b>40%</b>	<b>Up to 60%</b>
<b>BRCA 2</b>	<b>45-70%</b>	<b>15%</b>	<b>Up to 60%</b>

*BRCA 2 mutation are associated with increased risk of male breast cancer and prostate cancer*

*Other cancers → pancreatic cancer – fallopian tube cancers – primary peritoneal sarcoma*



**Other inherited conditions associated with a smaller increase in breast cancer risk include:**

- **Li-Fraumeni syndrome**
- **Cowden syndromes**



## *Genetic tests*

- Molecular tests are commercially available to identify some of the *BRCA* mutations, as well as many of the family cancer syndromes
- The interpretation of these tests and treatment decisions is complex.
- It is not yet possible to predict if or when women who carry a particular genetic abnormality will develop breast cancer.
- Tests are not available for all of the genetic variants that affect breast cancer risk



# PERSONAL HISTORY OF BC

- Women with a history of breast cancer are about 1.5 times more likely to develop a new breast cancer.
- Women diagnosed with early onset breast cancer (age <40) have almost a 4.5-fold increased risk of subsequent breast cancer.
- Genetic predisposition, such as mutations in *BRCA1* and *BRCA2* genes, contribute to some of the excess risk of subsequent breast cancers, particularly among women diagnosed at a young age



# PROLIFERATIVE DUCTAL LESIONS

A correlation between ductal proliferative lesions and risk of breast cancer

UDH	1.5-2 fold
ADH	4-5 folds
DCIS	9-10 folds



# LOBULAR NEOPLASIA

	Breast Cancer RR
ALH	4-5 folds
LCIS	8-9 folds

*LIN has been linked to increased risk for subsequent carcinoma in both breast*



# DENSE BREAST

## Factors affect breast density

**Genetics**

**Increase Age**

**Pregnancy**

**Menopause**

**Obesity**

**Tamoxifen**

**Decrease in Breast Density**

**Alcohol**

**Combined HRT**

**Increase in Breast Density**





# ENDOGENOUS HORMONE LEVELS

- Postmenopausal women with naturally high levels of certain endogenous sex hormones have about **twice** the risk of developing breast cancer compared to women with the lowest levels.
- It is harder to study the relationship of hormones in premenopausal women because levels vary across the menstrual cycle
  - a recent large review found that high levels of circulating estrogens and androgens are also associated with a small increased risk of breast cancer in premenopausal women.



# MENSTRUAL CYCLES

- Breast cancer risk increases slightly for each year earlier menstruation begins (by about 5%) and for each year later menopause begins (by about 3%).
  - Breast cancer risk is about 20% higher among girls that begin menstruating before age 11 compared to those that begin at age 13.
  - Women who experience menopause at age 55 or older have about a 12% higher risk compared to those who do so between ages 50-54.
- The increased risk may be due to longer lifetime exposure to reproductive hormones and has been more strongly linked to ER+ breast cancer than other subtypes.



# BONE MINERAL DENSITY

- High bone mineral density in postmenopausal women has been associated with increased risk for breast cancer in many, but not all, studies.
- Risk appears to be most strongly related to ER+ disease
- It is a marker for cumulative estrogen exposure.
- It may be helpful for identifying women at increased risk for breast cancer



# PREGNANCY

- Women with first child before 20 years of age have a 50% reduced lifetime risk of breast cancer compared to women who have not had children
- A transient increase in breast cancer risk (lasting about 10 years) following a full-term pregnancy, particularly among women who are older at first birth
- Women who have their first child after 35 years of age remain at higher risk of breast cancer compared to women have not had children



# FERTILITY DRUGS

- A review of 23 studies found that use of fertility drugs, including clomiphene, gonadotropins, and gonadotropin-releasing hormones, **was not** associated with breast cancer risk.
- Recently published results of a long-term follow-up study of women seen at 5 US fertility clinics also found no association with ever use of clomiphene or gonadotropins
- Risk of invasive breast cancer was increased among women who underwent **more than 12 clomiphene** treatment cycles compared to women who had never used fertility drugs.
- More research is needed on the relationship between breast cancer risk and the long-term effects of ovulation-stimulating drugs.



# BREASTFEEDING

- Most studies suggest that breastfeeding for a year or more slightly reduces a woman's overall risk of breast cancer.
  - Breastfeeding for a longer duration is associated with greater risk reduction.
  - In a review of 47 studies; the risk of breast cancer was reduced by 4% for every 12 months of breastfeeding.
- The protective effect may be stronger for or even limited to triple negative cancers.



## ○ Explanation ?

- Breastfeeding inhibits menstruation, thus reducing the lifetime number of menstrual cycles.
- Structural changes that occur in the breast following lactation and weaning



# HORMONAL BIRTH CONTROL

- Studies suggest that recent use of OCP (combined E & P pill) is associated with a small increase in BC risk, particularly among women who begin use before 20 years of age or before first pregnancy.
- Risk appears to diminish when women stop taking the pill, and after about 10 years, it is similar to those who have never taken OCPs.
- Depo-Provera and Mirena have only been in use since the 1990s, thus more studies with additional years of follow-up data are needed to confirm if use of these drugs is associated with breast cancer risk



# HRT

- Combined estrogen and progestin increases the risk of developing breast cancer, with higher risk associated with longer use.
- Risk is also greater for women who start hormone therapy soon after the onset of menopause compared to those who begin use later.
- The increased risk appears to diminish within 5 years of discontinuation of hormone use.



## Estrogen-only therapy

- The effects of on breast cancer risk is less clear
- The US Preventive Services Task Force has concluded that the use of estrogen alone is associated with reduced risk of breast cancer
  - (i.e. women who used estrogen-only therapy for an average of 6 years had a 23% lower risk of developing breast cancer)
- Some observational studies have found a slight increase in risk among estrogen therapy users
  - Lean women
  - Women begin therapy soon after menopause.

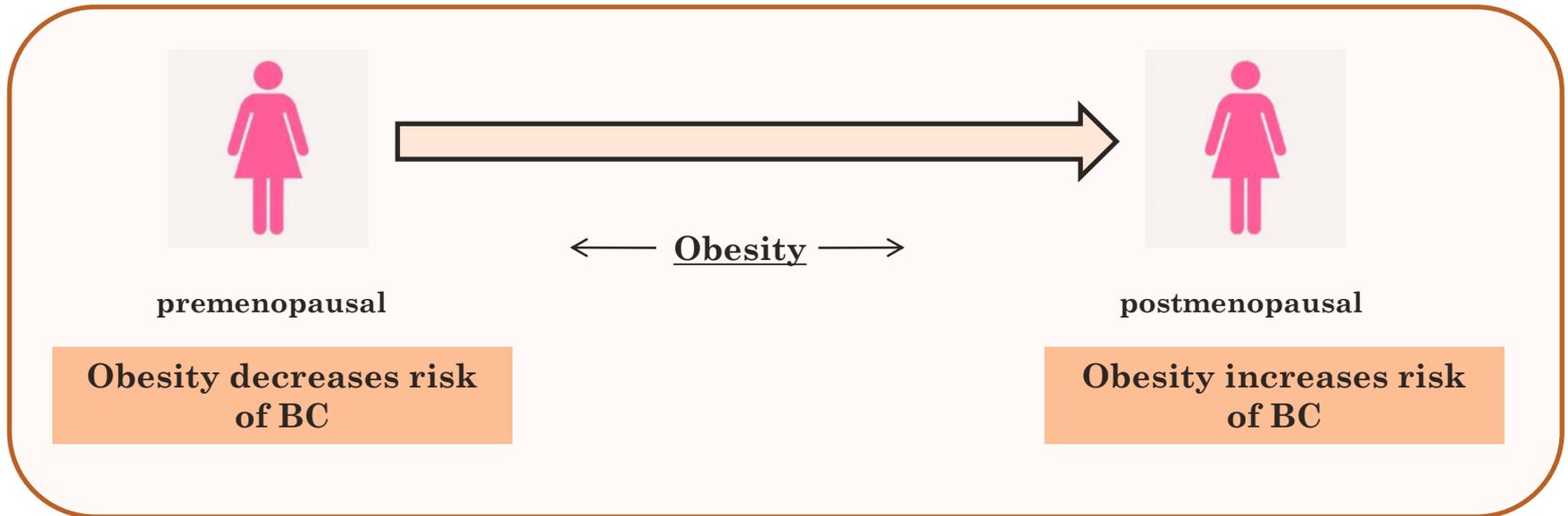


# TOBACCO

- Limited but accumulating research indicates that smoking may slightly **increase** breast cancer risk
  - Long-term, heavy smoking
  - Women who start smoking before their first pregnancy.
- A recent review by American Cancer Society researchers found that women who initiated smoking before the birth of their first child had a 21% higher risk of breast cancer than did women who never smoked.
- The 2014 US Surgeon General's report on smoking concluded that there is "suggestive but not sufficient" evidence that smoking increases the risk of breast cancer.
- Some studies suggest secondhand smoke may increase risk, particularly for premenopausal breast cancer. The association is unclear



# OBESITY



- ❑ *Risk is about 1.5 times higher in overweight women and about 2 times higher in obese women than in lean postmenopausal women*
- ❑ *A large meta-analysis recently concluded that each 5 kg (about 11 pounds) gained during adulthood increases the risk of postmenopausal breast cancer by 11%.*
- ❑ *Breast cancer risk was 16% higher in women with type II diabetes independent of obesity*



# PHYSICAL ACTIVITY

- Growing evidence suggests that women who get regular physical activity have a 10%-25% lower risk of breast cancer compared to women who are inactive
- Stronger evidence for postmenopausal than premenopausal women.
- An ACS study that included more than 73,000 postmenopausal women found that breast cancer risk was **14%** lower among women who reported walking 7 or more hours per week compared to women who walked 3 or less hours per week.



# DIET

- The effect of diet on breast cancer risk remains an active area of research.
- Numerous studies have examined the relationship between food consumption (including fat, fiber, soy, dairy, meat, and fruits and vegetables) and breast cancer with mixed results
- A recent meta-analysis showed no association between fat intake and BC
  - Nurses' Health Study showed that a high-fat diet during adolescence was associated with a moderate increase in premenopausal breast cancer risk



- A meta-analysis showed that soy intake was inversely associated with breast cancer risk in Asian but not Western populations.
- There is growing evidence that high levels of fruit and vegetable consumption may reduce the risk of hormone receptor-negative breast cancer



# ALCOHOL

- Numerous studies have confirmed that alcohol consumption increases the risk of breast cancer
  - 7%-10% for each 10g (one drink) of alcohol consumed per day on average.
  - 20% higher risk for 2-3 alcoholic drinks per day
- Alcohol use has been more strongly related with increased risk for ER+ than ER- breast cancer
- This effect is related to increasing estrogen and androgen levels.



# RADIATION

- The link between radiation exposure and breast cancer has been demonstrated in studies of atomic bomb survivors and women who have received high-dose radiation therapy to the chest
- Girls and women treated with high-dose radiation to the chest between 10 and 30 years of age, such as for Hodgkin lymphoma are at increased risk for breast cancer
- Breast cancer risk among women with such exposure starts to rise about 8 years after radiation treatment and continues to be elevated for more than 25 years



# ENVIRONMENTAL POLLUTANTS

- In general, epidemiological studies have not found clear relationships between environmental pollutants and breast cancer
- Some have suggested that rising breast cancer incidence in the latter half of the 20th century may have been caused by environmental pollutants such as organochlorine pesticides
  - Risk increased in animal studies only



# OCCUPATIONAL EXPOSURES

- A few occupations have been linked to breast cancer risk
- A recent meta-analysis concluded that evidence from high-quality studies suggests that night shift work increases breast cancer risk by 40%.
  - Shift work at night is a common exposure, involving about 15% to 20% of workers in the US and Europe
  - Exposure to light at night disrupts the production of melatonin
  - Experimental evidence suggests that melatonin may inhibit the growth of small, established tumors and prevent new tumors from developing
- The International Agency for Research on Cancer concluded in 2007 that shift work, particularly at night, was probably carcinogenic to humans



## Table 4. Factors That Increase the Relative Risk for Breast Cancer in Women

### Relative Risk

### Factor

>4.0

- Age (65+ vs. <65 years, although risk increases across all ages until age 80)
- Biopsy-confirmed atypical hyperplasia
- Certain inherited genetic mutations for breast cancer (*BRCA1* and/or *BRCA2*)
- Ductal carcinoma in situ
- Lobular carcinoma in situ
- Personal history of early-onset (<40 years) breast cancer
- Two or more first-degree relatives with breast cancer diagnosed at an early age

2.1-4.0

- High endogenous estrogen or testosterone levels (postmenopausal)
- High-dose radiation to chest
- Mammographically extremely dense (>50%) breasts compared to less dense (11%-25%)
- One first-degree relative with breast cancer



## Table 4. Factors That Increase the Relative Risk for Breast Cancer in Women

**Relative Risk**

**Factor**

1.1-2.0

- Alcohol consumption
- Ashkenazi Jewish heritage
- Diethylstilbestrol exposure
- Early menarche (<12 years)
- Height (>5 feet 3 inches)
- High socioeconomic status
- Late age at first full-term pregnancy (>30 years)
- Late menopause (>55 years)
- Mammographically dense (26%-50%) breasts compared to less dense (11%-25%)
- Non-atypical ductal hyperplasia or fibroadenoma
- Never breastfed a child
- No full-term pregnancies
- Obesity (postmenopausal)/adult weight gain
- Personal history of breast cancer (40+ years)
- Personal history of endometrium, ovary, or colon cancer
- Recent and long-term use of menopausal hormone therapy containing estrogen and progestin
- Recent oral contraceptive use



# FACTORS THAT ARE NOT ASSOCIATED WITH BREAST CANCER RISK

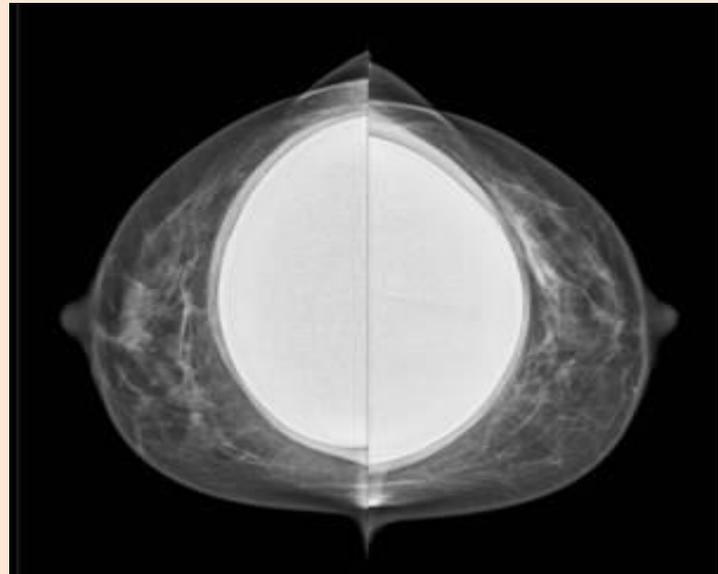
**Abortion**

**Hair dyes and antiperspirants**



# Breast implants

- ❑ Can be associated with rare type of lymphoma
- ❑ Implant displacement view



# BREAST CANCER SCREENING



# Screening Protocol

**Individualized**

- ❑ Age
- ❑ Estimated Risk
- ❑ Individual risk factors
  - ❑ Family history
  - ❑ Genetics

What ?

When?

How often?



# MAMMOGRAPHY

- The single most effective method of early detection
  - Identify cancer several years before physical symptoms develop
- Low-dose x-ray procedure that allows visualization of the internal structure of the breast
- The percentage of women 45 years of age and older who reported having had a mammogram within the past 2 years was 69% in 2013
- Among women 40 years of age and older, mammography prevalence increased from 29% in 1987 to 70% in 2000



**Screening  
Mammography**

**Vs.**

**Diagnostic  
Mammography**



**Film Mammography**

**Digital Mammography**

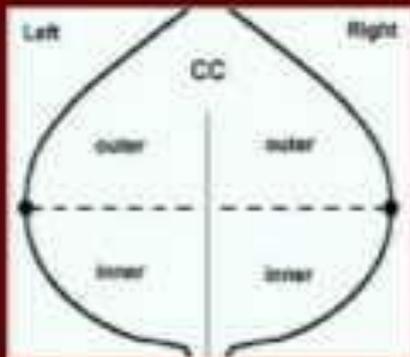
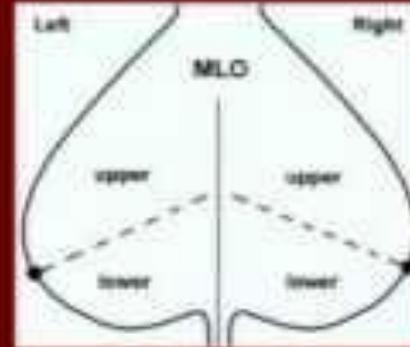
**3D Digital Mammography  
(Breast Tomosynthesis)**



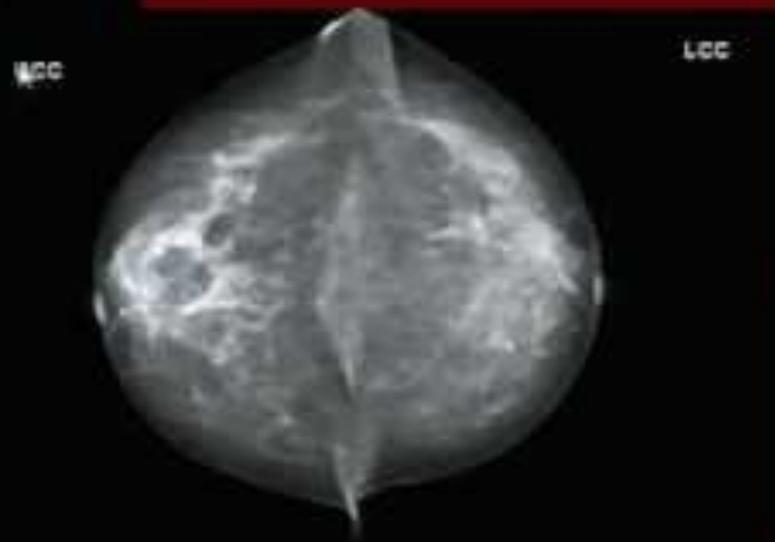
# RADIOGRAPHIC VIEWS- Breast can be divided into Four Quadrants



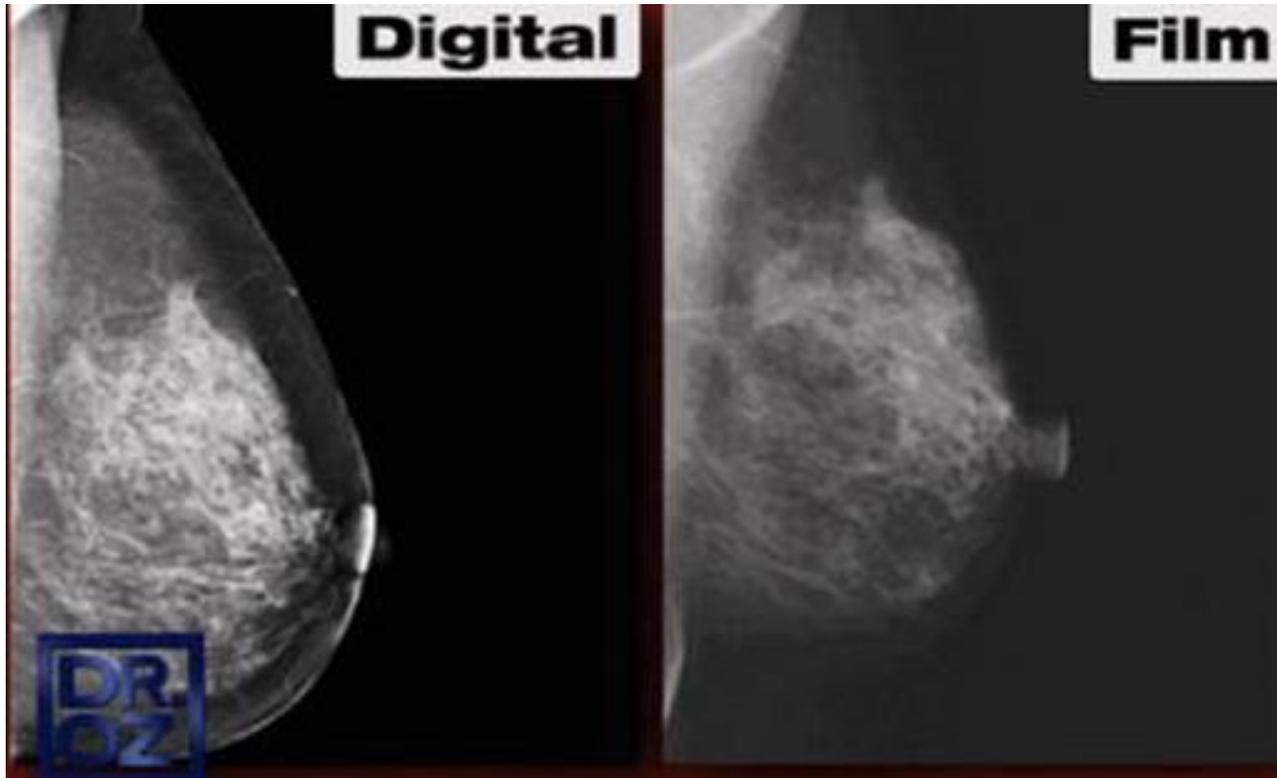
## MEDIO-LATERAL OBLIQUE (MLO) VIEW



## CRANIO-CAUDAL (CC) VIEW







# IS DIGITAL BETTER?

- ❑ Yes, for women who are:
  - ❑ < 50 years old
  - ❑ Premenopausal
  - ❑ Dense breasts
  
- ❑ Sensitivity?
  - ❑ Film mammography → 54%
  - ❑ Digital mammography → 79%



## Sensitivity

- % of people who have the disease that the test will correctly identify (e.g. 70% , 80%)

## Positive predictive value

- % of women for whom a biopsy is recommended and performed that have a cancer diagnosis



## Factors impact breast mammogram sensitivity:

- ❑ Breast density
- ❑ Postmenopausal HRT
- ❑ Breast implants



# ISSUES RELATED TO MAMMOGRAPHY SCREENING

## False-positive results

- On average, 10% of women will be recalled from each screening examination for further testing (most often additional mammographic views of areas of suspicion)
- Only 5% of these women will have cancer

## Overdiagnosis

- Detection of cancers that would not cause a woman any harm in her lifetime and that would not have progressed or otherwise been detected in the absence of screening
- Estimates of the rate of overdiagnosis are highly variable, ranging from <5% to more than 30%



## Radiation exposure

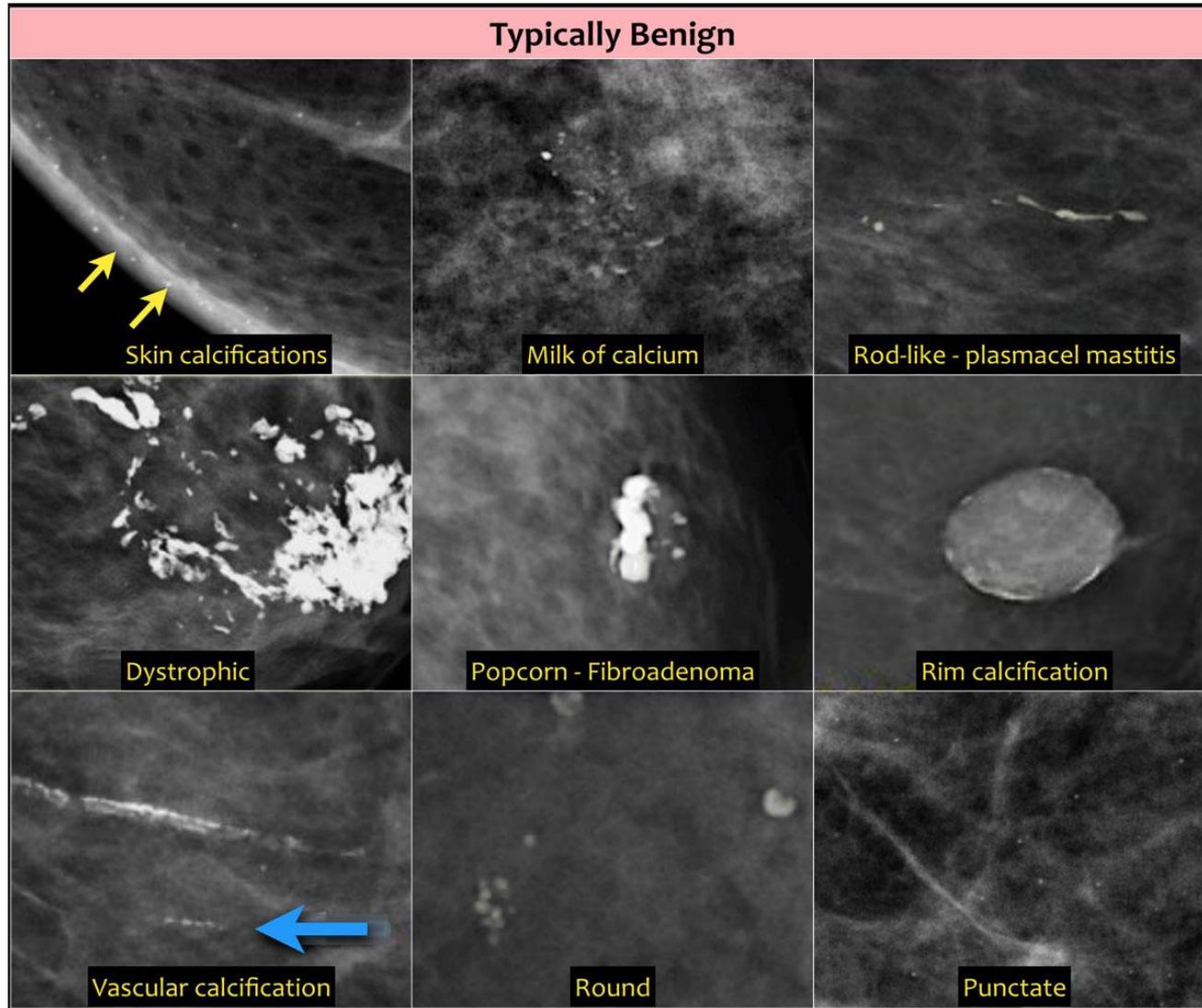
- The dose required for a mammogram is very small and the risk of harm is minimal

## Limitations

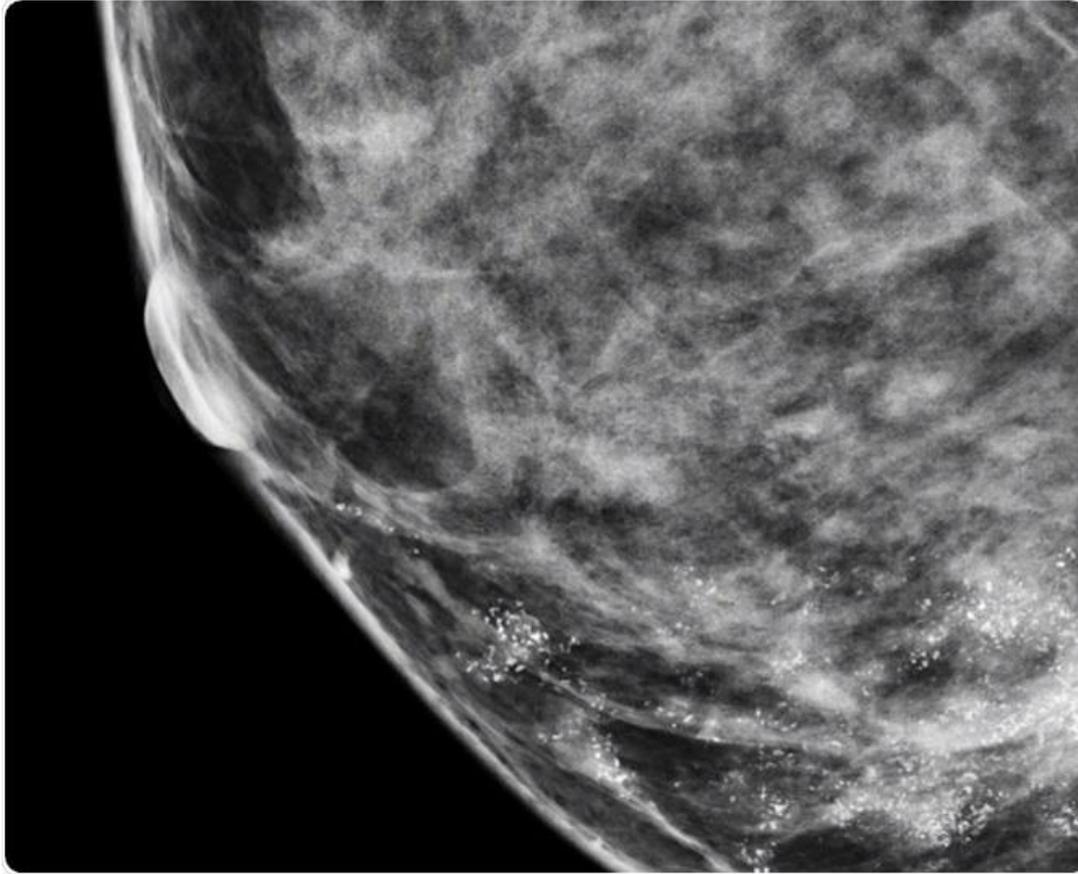
- Not all breast cancer will be detected by a mammogram
- some breast cancers that are screen-detected still have poor prognosis.
- Most women will never be diagnosed with breast cancer, but will undergo regular screening and may experience one or more “false alarms.”



# Mammogram : Calcifications (Benign)

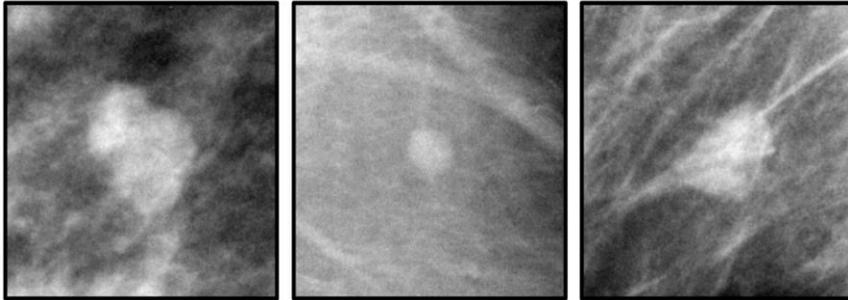


## Mammogram : Calcifications (suspicious)

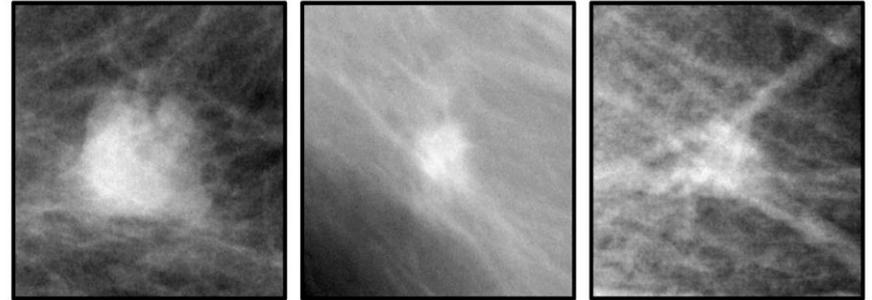


# MAMMOGRAM: MASS LIKE

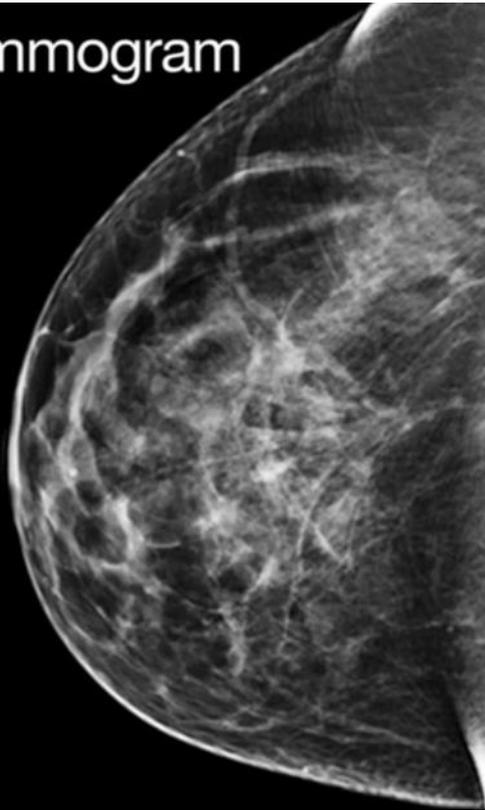
Benign masses



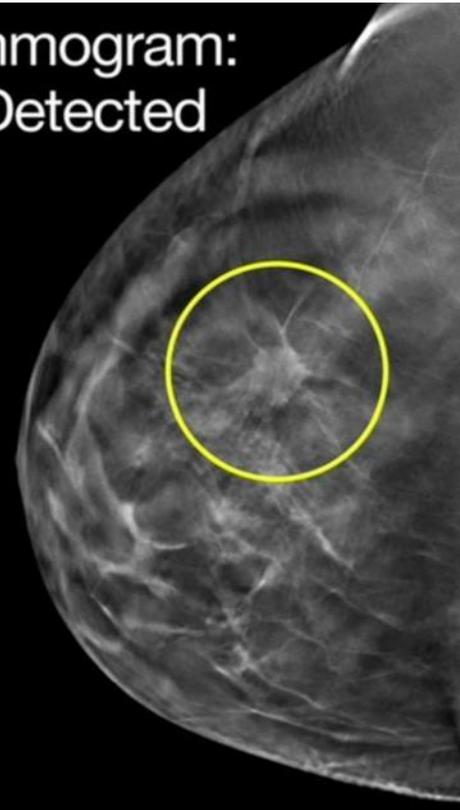
Malignant masses



2D Mammogram



3D Mammogram:  
Cancer Detected



# ULTRASONOGRAPHY

- Sometimes used to evaluate abnormal findings from a screening or diagnostic mammogram or physical exam.
- In combination with mammography, higher sensitivity is achieved when screening women with dense breast tissue (*MMx: 78%, US: 49%, MMx+US: 91%*)
- Also increases the likelihood of false-positive results
- The use of ultrasound instead of mammograms for breast cancer screening is not recommended



# BENIGN VS. MALIGNANT BREAST MASS

	Benign	Malignant
<b>Shape</b>	Oval / eclipsed	Variable
<b>Alignment</b>	Wider than deep Aligned parallel to tissue planes	Deeper than wide
<b>Margins</b>	Smooth / thin Echogenic Pseudo capsule 2-3 gentle lobulations	Irregular or spiculated Echogenic halo
<b>Echotexture</b>	Variable to intense hyper-echogenicity	Low – level Marked hypo-echogenicity

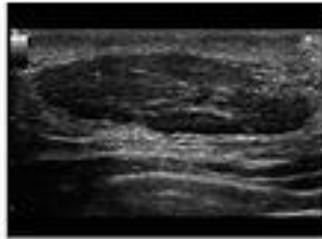


# Breast ultrasound

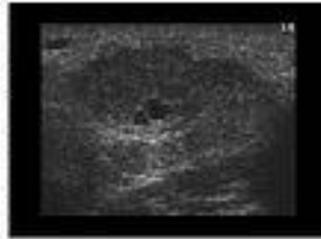
## Benign



Infected cysts



Lipomas

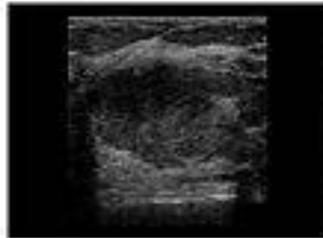


Inflammation

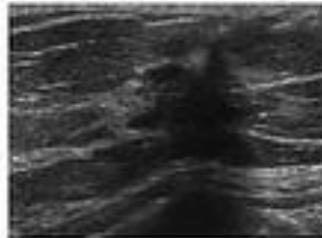


Fibro adenomas

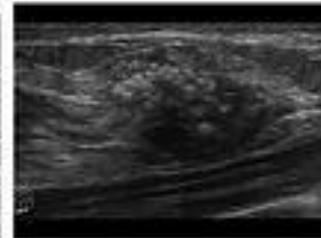
## Malignant



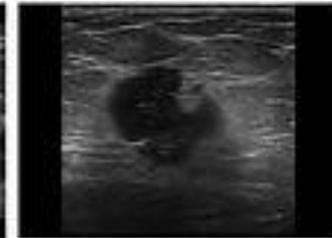
Metastases



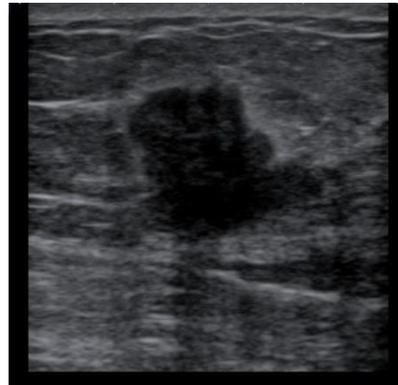
Spreading bilateral



Carcinoma in situ



Microcalcification



# MAGNETIC RESONANCE IMAGING (MRI)

- MRIs should supplement, but not replace, mammography screening
- Annual MRI screening in addition to mammography for women at high lifetime risk (20%-25% or greater) beginning at 30 years of age.
- Women at moderately increased risk (15%-20% lifetime risk) should be considered case by case.
- MRI screening is not recommended for women whose lifetime risk of breast cancer is less than 15%.
- A recent study indicates that while MRI use in community practice is increasing for high-risk women, it is often used in women who are not at high risk for breast cancer.



## American Cancer Society Risk Criteria for Breast MRI Screening as an Adjunct to Mammography<sup>218</sup>

*Women at high lifetime risk (~20%-25% or greater) of breast cancer include those who:*

- Have a known *BRCA1* or *BRCA2* gene mutation
- Have a first-degree relative (mother, father, brother, sister, or child) with a *BRCA1* or *BRCA2* gene mutation, but have not had genetic testing themselves
- Had radiation therapy to the chest when they were between 10 and 30 years of age
- Have Li-Fraumeni syndrome or Cowden syndrome, or have a first-degree relative with one of these syndromes

*Women at moderately increased (15%-20% lifetime risk) risk include those who:*

- Have a lifetime risk of breast cancer of 15% to 20%, according to risk assessment tools that are based mainly on family history
- Have a personal history of breast cancer, ductal carcinoma in situ (DCIS), lobular carcinoma in situ (LCIS), atypical ductal hyperplasia, or atypical lobular hyperplasia
- Have extremely dense breasts or unevenly dense breasts when viewed by mammograms

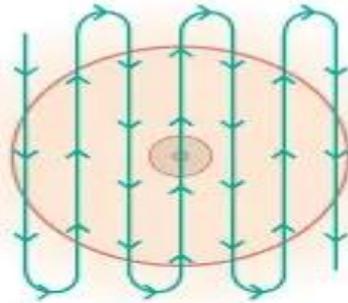


# CLINICAL BREAST EXAMINATION (CBE)

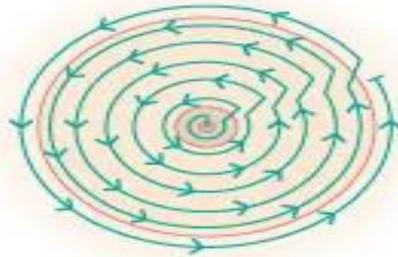
- The American Cancer Society no longer recommends CBE for average-risk asymptomatic women
- Compared to mammography alone, CBE plus mammography has been shown to detect only a small proportion of breast cancer tumors and increases the probability of false-positives
- Clinicians are encouraged to use this time to counsel women on the importance:
  - Identifying alarming breast changes
  - Discussing potential benefits, harms, and limitations of screening mammography
  - Address other important aspects of preventive services



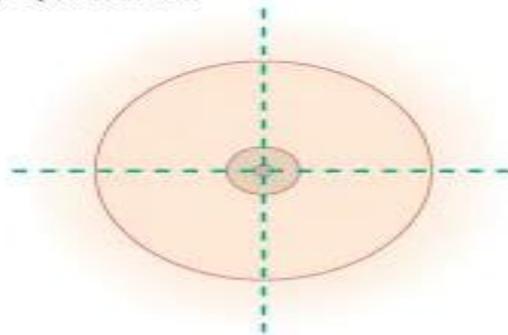
(a) Lawnmower technique



(b) Concentric rings  
Start at nipple and work your way outside



(c) Quadrants



# BREAST SELF-AWARENESS

- The American Cancer Society no longer recommends that all women perform monthly breast self-exams (BSE)
- All women should become familiar with both the appearance and feel of their breasts and report any changes promptly to their physician.
- Experts have concluded that self-awareness seems to be at least as effective for detecting breast cancer as structured BSE
- Women who detect their own breast cancer usually find it outside of a structured breast self-exam while bathing or getting dressed.



- If symptoms develop, women should contact a doctor immediately, even after a recent normal mammogram.
- Most lumps are not abnormal, and for women who are still menstruating, they can appear and disappear with the menstrual cycle.
- Most breast lumps are not cancerous



**THE END**

