



Multidisciplinary Approaches to Cancer Symposium

What Clinicians Need to Know about Breast Imaging

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Disclosures

- I do not have any relevant financial relationships.

This presentation and/or comments will provide a balanced, non-promotional, and evidence-based approach to all diagnostic, therapeutic and/or research related content.

Cultural Linguistic Competency (CLC) & Implicit Bias (IB)

STATE LAW:

The California legislature has passed Assembly Bill (AB) 1195, which states that as of July 1, 2006, all Category 1 CME activities that relate to patient care must include a cultural diversity/linguistics component. It has also passed AB 241, which states that as of January 1, 2022, all continuing education courses for a physician and surgeon **must** contain curriculum that includes specified instruction in the understanding of implicit bias in medical treatment.

The cultural and linguistic competency (CLC) and implicit bias (IB) definitions reiterate how patients' diverse backgrounds may impact their access to care.

EXEMPTION:

Business and Professions Code 2190.1 exempts activities which are dedicated solely to research or other issues that do not contain a direct patient care component.

The following CLC & IB components will be addressed in this presentation:

- *Guidelines for different population of patients will be discussed*
- *Special consideration for minorities breast cancer screening will be discussed*

Resources for guidelines

- ACR: American College of Radiology. Provides appropriateness criteria for screening and diagnostic workups of all diseases including breast cancer.
 - <https://acsearch.acr.org/list>
- SBI: Society of Breast Imaging. Focuses on all breast related imaging guidelines.
 - <https://www.sbi-online.org/sbi-recommendations-position-statements>
- ACS: American Cancer Society
 - <https://www.cancer.org/cancer/types/breast-cancer.html>
- USPSTF: United States Preventive Services Taskforce. Define the **minimum required** screening guidelines
 - <https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/breast-cancer-screening#bcei-recommendation-title-area>
- NCCN: National Comprehensive Cancer Network. Guidelines for surveillance and for high-risk patients
 - <https://www.nccn.org/guidelines/guidelines-detail?category=2&id=1421>

Breast Imaging

- **Screening**

- Asymptomatic patients. Needs to be widely available, low cost, simple, sensitive to pick up abnormalities, may have false positives

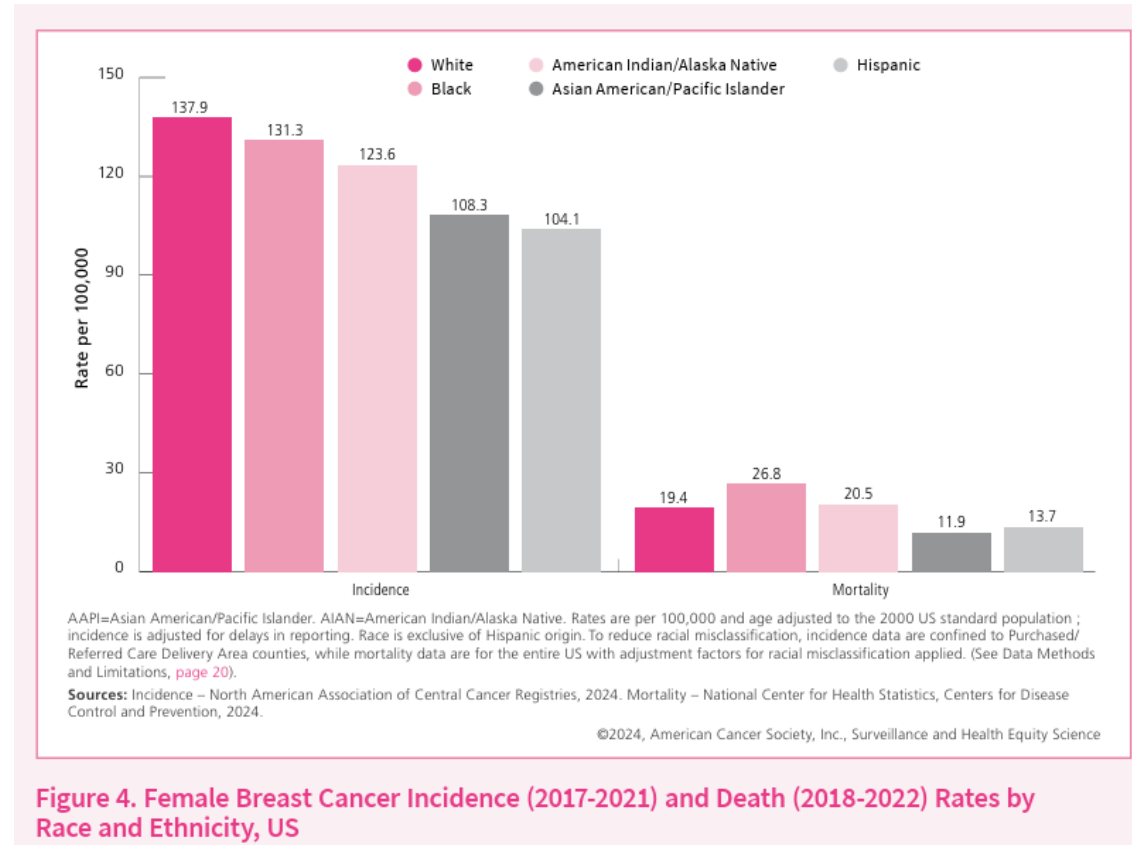
- **Diagnostic**

- Call back from screening
- Clinical problem including known cancer for staging or assess response to treatment, etc.
- Should result in a more specific diagnosis than screening

- **Modalities: Mammography, Ultrasound, MRI, abbreviated MRI, Contrast-enhanced mammography, BSGI, PEM, thermography, etc.**

Breast Cancer Risk Factors

- One in eight women in the USA will experience breast cancer during her lifetime → Average risk is 12%
- Risk will be higher with family history of breast or ovarian cancer, early menarche, late menopause, nulliparity, HRT, post-menopausal obesity, certain genetic mutations, certain races, etc.
- Black women are least likely to be diagnosed with localized-stage breast cancer and more likely with advanced breast cancer along with American Indian and Alaska Native women. Black women have the lowest survival in all stages of breast cancer (at least partially because of more common triple negative breast cancer).
- **Most breast cancer risk factors are not modifiable**



Screening Mammography

- Overall Sensitivity is 79%, less with dense breast tissue and in younger women
- False positive rate around 10% for callbacks
- 1000 mammograms → 100 diagnostic studies → 20 biopsies → 5 cancers → one interval cancer (not detected by mammography)
- Mammography is very controversial in terms of the benefit/harm ratio: It is difficult to determine the benefits of screening mammography in reducing mortality due to several potential biases

Will screening mammography save lives?

- Large-scale mammography started in 1960s
- The medical community found that early detection is beneficial to reducing mortality
- The challenge was to determine who needs regular screening mammography
- Eight large randomized controlled trials were performed in USA, Europe, and Canada
- The cumulative results show the benefits of mammography in reducing mortality, although Canadian trials did not show any benefit (some concerns exist regarding the design of those trials)
- Such a data is not available for other modalities such as ultrasound or breast MRI

False-positives of mammography

- Includes findings that are not cancers but require additional imaging, short-term follow-up, or biopsies.
- Some breast cancers found on screening may not become clinically evident (for instance, they remain as DCIS or they grow so slowly until the patient dies of another reason)
- It is known that the cumulative risk of false positives is higher with annual screening as compared to biennial
- While harms of mammography are immediate, benefit of mammography in preventing deaths occur more than 10 years after they are diagnosed → it is harder to see the benefits

What is the optimum starting age and the interval for screening mammography

- **Very hard to answer.** May need to be personalized
- High-grade tumors grow fast → even annual screening is not frequent-enough to find them early
- Slow-growing tumors grow slowly → biennial screening may be adequate to find them (for instance, post menopause)
 - Most guidelines suggest annual mammography
 - ACS suggests increasing intervals from annual to biennial mammography starting age 55 (post-menopause, low hormones, slower growth of cancer in average)
 - USPSTF : minimum biennial
- Starting age: Younger age → the harm is more, and the benefit is less than that of older age

Controversy of continuing screening past age 74

- Women 75 or older were not enrolled in the RCT → we don't know if finding breast cancer will elongate their life
- It is possible that the screening mammogram finds some breast cancers at this age that may not become clinically evident
- ACR and SBI recommend continuing annual screening past the age 74 years, without an upper age limit unless severe comorbidities limit life expectancy.

Breast Density

- Categorized into four classes:
 - predominantly fatty or scattered → considered non-dense (57%)
 - Heterogeneous or extremely dense → considered dense (43%)
- Breast density is a strong risk factor for breast cancer; up to 4-6 times higher risk when comparing extremely dense breast tissue with a fatty breast
- It is known that the sensitivity of mammograms decreases by increasing the breast density because small cancers may be hidden within the dense breast tissue
- NCCN and ACR suggest breast MRI.
- USPSTF and ACS : no recommendation because of lack of evidence to reduce mortality

Whole Breast Ultrasound

- It finds an additional 3-4 cancers per 1000 scans if performed in addition to mammography
- Can be done manually (very time consuming and not operator dependent), or by automatic machines
- The biggest problem is the number of additional biopsies needed to find additional cancers.
- Not a good option in the USA for screening because most breast cancers are already found by mammography

Digital Breast Tomosynthesis

- DBT generates a quasi-three-dimensional radiographic image of the breast by applying mathematical algorithms on a series of 2D images that were captured by rotating the x-ray tube around a compressed breast.
- FDA approved the first commercially-available DBT machine in 2011
- The radiation dose from DBT is very similar to the dose of a conventional digital 2D mammogram
- DBT lowers the callback rate (not in extremely dense or almost entirely fatty breasts)
- The cancer detection rate of DBT is very similar to conventional 2D mammography
- It is a better mammogram than 2D but it is not fundamentally different

Contrast-Enhanced Mammography (CEM)

- It is a 2D mammography that is augmented by intravenous injection of iodine contrast agent.
- Has better sensitivity than 2D mammography or DBT
- The radiation dose from CEM is almost double that of 2D and DBT because two images (low and high energy) are taken for each view.
- Great for dense breast tissue. It still has some of the limitations of mammography
- If MRI is not an option, CEM is better than 2D or DBT

High risk Screening

- MRI and mammogram (no role for supplemental ultrasound if patients are getting MRI)
- Supplemental screening is not covered by some insurances
- Male with BRCA → **consider** annual mammograms

ACR and SBI

- Risk assessment at age 25
- Annual mammograms starting at age 40 for average risk women. Continue unless significant morbidity limits life expectancy
- Calculated lifetime risk more than 20% → mammography and breast MRI (may be sooner than age 40)
- Women diagnosed with breast cancer prior to age 50 or with personal history of breast cancer and dense breasts should have annual supplemental breast MRI.
- High-risk women who desire supplemental screening — but cannot undergo MRI screening — should consider contrast-enhanced mammography (CEM).

American Cancer Society Recommendations for Breast Cancer Screening

Women at Average-risk³⁰

The American Cancer Society recommends that women at average risk of breast cancer (i.e., no personal history of breast cancer, suspected or confirmed genetic variant known to increase risk, strong family history, or history of previous radiotherapy to the chest) be screened with mammography at the following ages:

- Ages 40 to 44 years, have the opportunity to begin annual screening
- Ages 45 to 54 years, undergo annual screening
- Ages 55 years and older, transition to biennial screening or have the opportunity to continue annual screening, and continue screening as long as life expectancy is 10 years or more

Women at High-risk³¹

The American Cancer Society recommends women at high risk of breast cancer (i.e., having a lifetime risk of breast cancer of about 20% to 25% or greater according to risk assessment tools based mainly on family history, a known genetic variation that increases risk or a first-degree relative with a known variation, a strong family history of breast cancer and/or ovarian cancer, or prior chest radiation therapy) begin annual screening with magnetic resonance imaging (MRI) and mammography at age 30 years.

ACR Appropriateness Criteria[®]

Transgender Breast Cancer Screening

- Transfeminine, 40 years of age or older with past or current hormone use equal to or greater than 5 years. Average-risk patient → Annual mammography starting at age 40
- Transfeminine, >25, high risk (genetic, radiation to chest, etc.), equal or greater than 5 years of hormone treatment → annual mammograms
- Transfeminine, no hormonal treatment → no particular screening is recommended
- Transmasculine without mastectomy → follow cisgender female guidelines
- Transmasculine with mastectomy → no particular screening is recommended

Diagnostic Workup (requires mammogram+US)

- Clinical symptoms: Lump > Pain > nipple discharge
- BI-RADS 3 follow up
- Cancer Staging
- Response to treatment
- Post operative evaluation
- Implants
- Symptomatic Male Breast

Breast Lump, Nipple discharge

- Unilateral discharge from single duct → abnormal (papilloma?)
- Bilateral or from multiple duct → usually benign (advance cancer → bloody discharge from multiple ducts)
- More than 30 y/o → mammogram and ultrasound
- Under 30 y/o → start with ultrasound, mammogram only if US is suspicious
- Benign masses are usually mobile, rubbery or soft, and well-circumscribed
- The negative predictive value of mammograms + ultrasound for the evaluation of a palpable finding is reported in the range of 97 to 100%

Breast pain

- Is the 2nd most common symptom after lump for which a diagnostic workup is requested
- Multifactorial: hormonal, inflammatory, trauma, psychologic factors, etc.
- Diffuse versus focal (based on 25% of breast)
- No significant difference in the rate of cancer in patients with breast pain (0.5%) as compared to asymptomatic patients undergoing screening (0.7%)
- Mixed literature on the relation between caffeine intake and breast pain
- Non-Cyclic and Focal → Mammograms and ultrasound (start with ultrasound if under 30)
- **Diagnostic study is mostly for assurance**
- No role for MRI, BSGI, PEM

Breast Implant

- Saline implant → will be absorbed by body when leaks → deflates → no diagnostic test is needed to evaluate its integrity
- Silicone implant → Needs breast MRI without contrast (silicone protocol)
- Breast Implant-Associated Anaplastic Large Cell Lymphoma is rare, linked to textured breast implants, needs at least 7-10 years to develop, presents with mass of seroma around implant → needs breast MRI with contrast