



Method of Breast Cancer Screening - The World Standard

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Mammography Saves Lives !

Goals of Screening Mammography

- **Detect breast cancer when there are no symptoms, (at early stage) and when the cancer is most treatable**
- **Reduce mortality from breast cancer.**



Randomized Controlled Trials

<u>Trial</u>	<u>Year of Entry</u>	<u>Age</u>	<u>Method</u>
HIP	1963-1969	40-64	2v MM+PE
Malmo	1976-1986	45-69	1/2v MM
Swedish 2-county	1977-1985	40-74	1v MM
Stockholm	1981-1985	40-64	1v MM
Gothenburg	1982-1988	40-59	2v MM
Edinburgh	1978-1985	45-64	1/2v MM+PE
CNBSS 1	1980-1987	40-49	2v MM+PE
CNBSS 2	1980-1987	50-59	2v MM+PE



Metaanalysis of Randomized Clinical Trials:

- **Over 500,000 women had undergone screening**
- **26% reduction in mortality from breast cancer**



Further analysis of the Swedish Trial:

- **130,000 women had mammography screening for 29 years**
- **An increased benefit. A 30% reduction in mortality from breast cancer.**



Mammography

- **Good Equipment**
- **Competent Staff:
Radiographer &
Radiologist**



Mammography: 3 Concerns

- *Chinese womens' breasts are small, is mammogram a problem?*
- **Majority of Hong Kong women have “A or B” cup bra size & mammography is not a problem.**



Mammography: 3 Concerns

- *Mammograms are very painful*
- **Study at HK Sanatorium & Hospital (1999-2001), 2071 women had mammograms, 0.8% said they were painful**



Mammography: 3 Concerns

- *Will I get breast cancer because I had a mammogram?*
- **Radiation – theoretical cause of breast cancer (1.3 in 100,000), extrapolated from high dose studies but actually none have been reported**

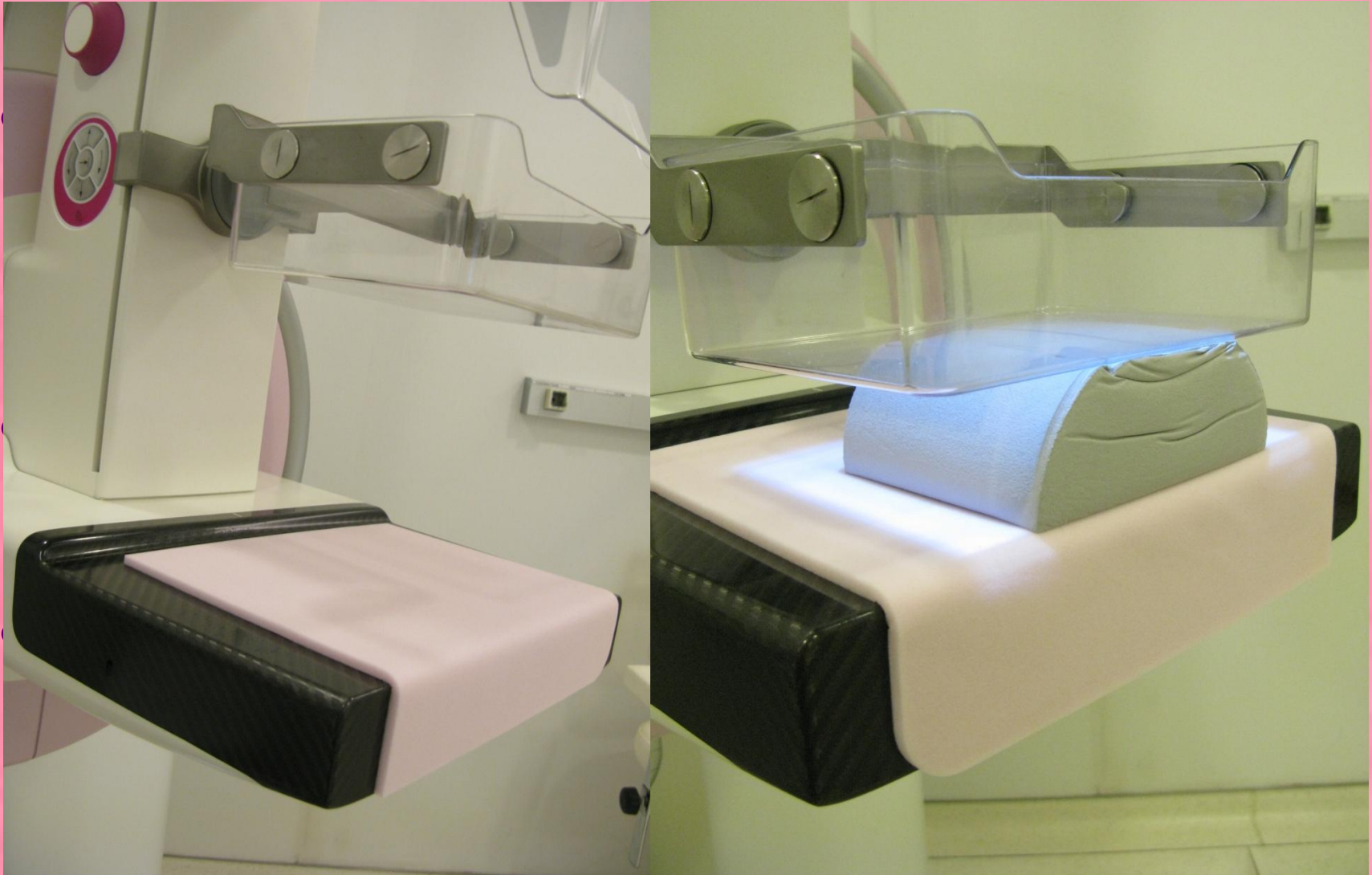


Radiation Dose From Mammography

- **Low dose: 0.3-0.4 mSv**
- **Background Radiation in HK: 2 to 3 mSv/yr**
- **Equivalent to a 4-hour air plane trip
(Hong Kong to Japan or
California to New York)**

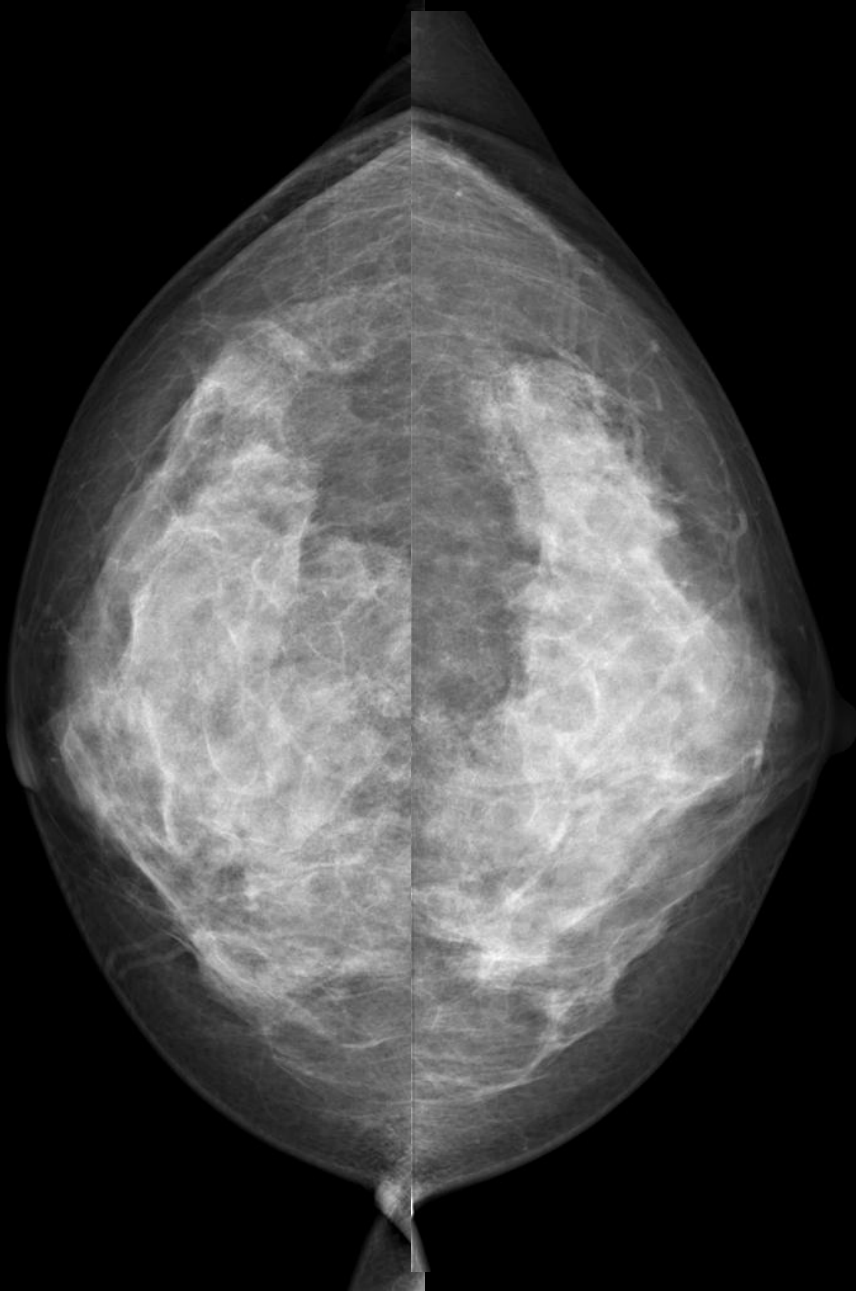


Mammopad



Radiolucent cushion (MammoPad) applied to image receptor

CC



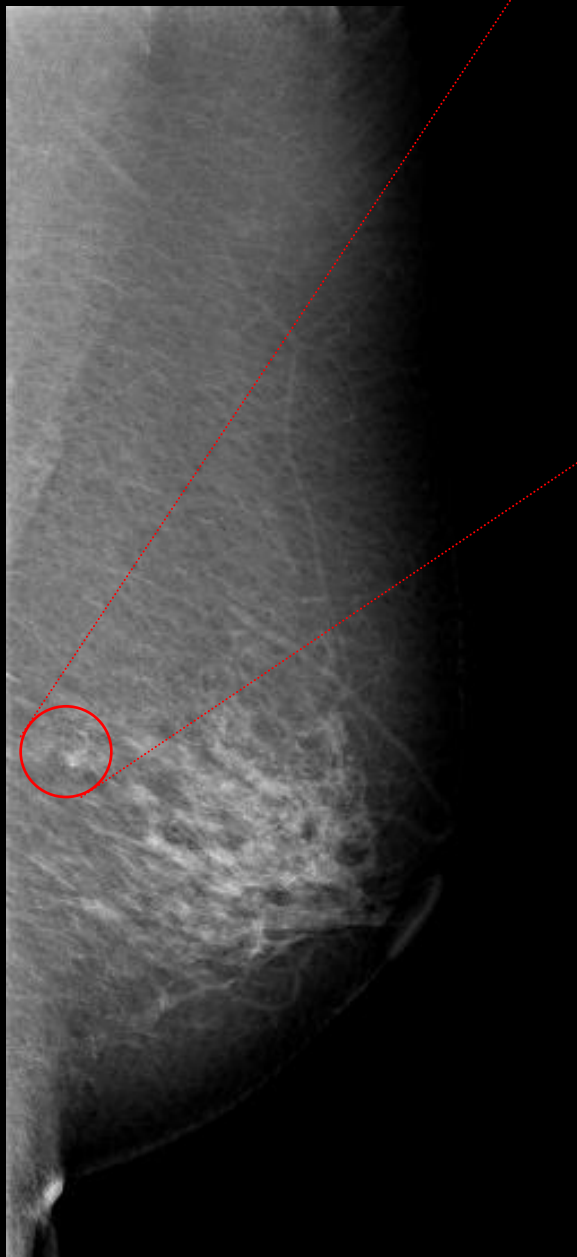
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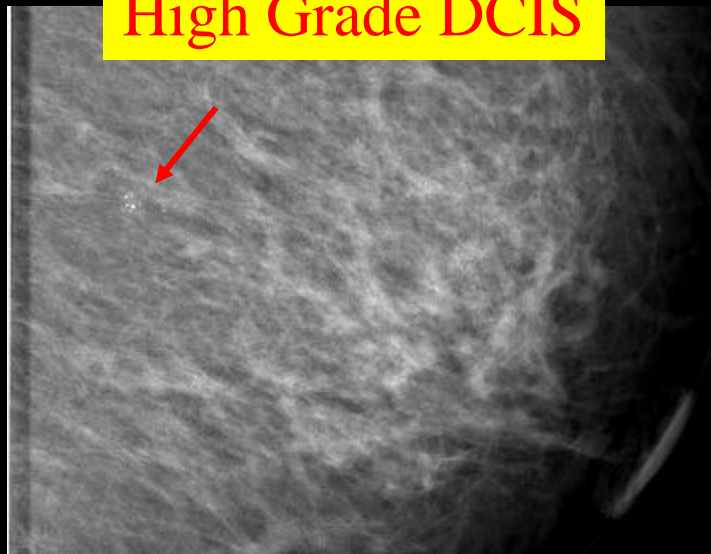
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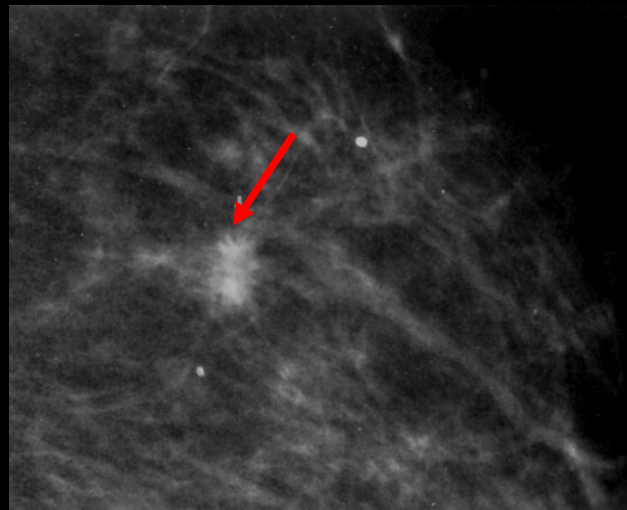
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High Grade DCIS



5mm Infiltrating Ductal Carcinoma



Limitations of Mammography

- Need to recall patient for further views if suspicious or questionable lesion is seen.**
- May not definitely tell if lesion is malignant or not. Therefore biopsy will be needed.**
- May miss a cancer in dense breasts. Therefore recommend MRI for women with increased risk of breast cancer.**

“Harms” cited by United States Preventive Services Task Force (USPSTF)

- Prolonged anxiety, worry & distress over additional test, biopsy or false positive results**
- Radiation from mammography**
- Possibility of over diagnosis & over treatment
Some cancers are innocuous (cancer that won't kill)**
- Only 10% decrease in number of women with late stage cancers.**



Mayo Clinic mammogram guidelines

“Physicians cannot distinguish between dangerous breast cancers from the non-life-threatening ones, so annual mammogram remains the best option for detecting cancer early and reducing the risk of death from breast cancer.”

Dr. S. Pruthi

Controversy

The Cochrane Review of Lancet 2000 article by Gotzsche & Olsen on Mammographic Screening concluded “there is no mortality benefit”

American College of Radiology says “this study is based on flawed data”

Professor S.W. Duffy, a mathematics professor from Lincolns’ Inn Fields, London said: “the authors had heavy reliance on arbitrary principles and were unable to perform an adequate unbiased review of material.

Who are the women that get Breast Carcinoma?

- 80% of women are defined as “average risk” ie, women with no identifiable risk factor
- 15% of women are defined as “moderately increased risk” with 15% to 20% lifetime risk of breast cancer
- 5% of women are defined as “high risk” with $> 20\%$ lifetime risk of breast cancer.



What are the mammographic guidelines?

- **Women are defined as “average risk” with no identifiable risk factor for breast CA.**
- **ACR (Am. College of Radiology) & ACS (Am. Cancer Society) Recommendations:**
 - **Annual mammography screening starting at age 40.**

What are the mammographic guidelines?

- Women are defined as “moderately increased risk” with 15% to 20% lifetime risk of breast cancer

Women with biopsy proven lobular hyperplasia, atypical ductal hyperplasia (ADH), ductal carcinoma in situ (DCIS), invasive breast or ovarian carcinoma regardless of age

- ACR (Am. College of Radiology) recommendations:
 1. Annual mammography screening at time of diagnosis
 2. Consider annual MRI
- ACS (Am. Cancer Society) recommendations:
 1. Annual mammography screening at time of diagnosis
 2. Talk to clinician about MRI

What are the mammographic guidelines?

Women are defined as “high risk” with $> 20\%$ lifetime risk of breast cancer

- BRCA 1, BRCA 2 gene mutation,**
- Positive family history for BRCA gene mutation but untested themselves**
- Positive family history for 1st degree relative with premenopausal breast Ca or ovarian Ca**
- History of mantle radiation (Hodgkin's disease between age 10 and 30**

What are the mammographic guidelines?

ACR & ACS recommendations:

- 1. Start annual mammographic screening at age 30 or 10 years earlier than when the youngest relative was diagnosed with breast cancer**
- 2. Start annual mammographic 8 years after irradiation but not earlier than 25 years of age for mantle radiation patients**
- 3. Add annual MRI starting at age 30**

Conclusion



ACR & ACS guidelines for early breast CA detection

- **Women with “average risk”**
Annual mammogram starting at age 40
- **Women with “moderately increased risk”**
Annual mammogram starting at time of diagnosis + consider annual MRI
- **Women with “high risk”**
Annual mammogram at age 30 + annual MRI

Conclusion

- **Some malignant microcalcifications can only be seen with mammography and not US or MRI.**
- **No other imaging modality can replace mammogram (US, MRI, Nuclear Medicine Sestimibi, PET, Positron Emission Mammography (PEM), Thermography or Electrical impedance).**



Conclusion

Screening Mammography is the only
proven imaging modality to
Reduce Mortality from Breast Cancer.



References

- Kerlikowski K, Grady D, Rubin SM, et al. Efficacy of Screening Mammography. A Meta Analysis JAMA 1995; 273:149-54.
- NIH Consensus Statement Vol 15 November 1, Jan 21-23, 1997. Breast Cancer Screening for the Women Ages 40 – 49.
- Kaplan SS, Clinical Utility of Bilateral Whole Breast US in Evaluation of Women, with Dense Breast Tissue, Rad 2001; 221:641-64.
- Duffy SW. Interpretation of the breast screening trials: a commentary on the recent paper by Gotzsche & Olsen, Breast 2001;10; 209-12.
- Olsen O, Gotzsche P et al. Cochrane Review on Screening for breast cancer with mammography. Lancet 2001;358:1340-42.
- American Cancer Society Prevention and Early Detection, Mammography and other Breast Imaging Procedures 21/12/2001.
- Gordon PB, Ultrasound for Breast Cancer Screening and Staging, Radiol., Clin. North America: 2002; 40:431-43.
- Duffy SW, Tabar L, Chen H, et al. The Impact of Organized Mammography Service Screening on Breast Carcinoma Mortality in seven Swedish Counties. Cancer 2002; 95:458-69.

References

- Hartman AR, Daniel BL, Kurian AW et al. Breast Magnetic Resonance Image Screening and Ductal Lavage in Women at High Genetic Risk for Breast Carcinoma, *Cancer* 2004; 100 #3.
- Health Advice on Prevention and Screening of Cancer for the Healthcare Professionals (Hong Kong) 2004.
- Hong Kong College of Radiologists Mammography Statement 9 May 2006.
- Rosenberg R, Yankaskas B, Abrahams L et al. Performance Benchmarks for Screening Mammography, Oct 2006 *Radiology*, 241:55-66.
- Lehman CD, Isaacs C, Schall et al, Cancer Yield of Mammography, MR and US in High Risk Women - Prospective Multi-Institution Breast Cancer Screening Study *Rad.* 2007; 244:381-8.
- Sashow D, Boetes C, Burke W et al. American Cancer Society Guidelines for Breast Screening with MRI as an Adjunct to Mammography, *CA Cancer J Clin* 2007; 57:75-89.
- Kwong A, Cheung P, Wong AY et al. The Acceptance and Feasibility of Breast Cancer Screening in the East. *Breast* 2008; 17(1):42-50.
- Lee C, Dershaw D, Kopans D, et al. Breast Cancer Screening with Imaging: Recommendations from the Society of Breast Imaging and the ACR on the Use of Mammography, Breast MRI, Breast US and other Technologists for Detection of Clinically Occult Breast Cancer, *Journal of the American College of Radiology*, Volume 7, Issue 1, P.18-27, Jan 2010.

References

- **Cancer Expert Working Groups on Cancer, Prevention and Screening, Recommendations on Breast Cancer Screening (Hong Kong), updated July 2010, released Sept 2010.**
- **Hendrick RE. Radiation Doses and Cancer Risks from Breast Imaging Studies. Radiology 2010; Oct 257(1): 246-53.**
- **Breast Cancer.Org.Mammography Recommendation modified Nov 9, 2012.**
- **American Cancer Society Mammography Guidelines ACS Guidelines Recommended for Early Breast Cancer Detection, last Medical Review 30/8/2012, Last Revise 2/6/2013.**
- **Mammography – Wikipedia, the free encyclopedia.**



Thank You

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Additional slides for questions

United States Preventive Services Task Force –USPSTF November 2009:

- Screening mammogram for women with average breast cancer risk should start at age 50 instead of 40.**
- Only women with very high risk should start breast cancer screening younger than 50.**
- Mammograms should be done every other years instead of every years.**
- Women older than 75 do not need mammograms.**

United States Preventive Services Task Force –USPSTF November 2009:

- **Rebuttal by**
- **American Medical Association.**
- **American College of Obstetricians and Gynecologists**
- **American College of Radiology**
- **American Cancer Society**
- **The National Cancer Institute**
- **The National Comprehensive Cancer Network**

USPSTF Mammography Acknowledgment:

- 1 5% reduction in mortality among women 40 to 49 years**
- Using mathematical models starting annual screening at age 40 instead of 50 would result in additional mortality reduction of only 3%**
- Screening at 50 rather than 40 would result in sacrifice of 33 years of life per 1,000 women**
- Preserve 81% mortality reduction of annual screening by starting screening at age 50 instead of 40**

Digital Mammography Screen Trial:

- **>49,000 women at 33 centres in the US and Canada**
- **No significant difference in sensitivity in the entire cohort**
- **Digital mammography performed better in premenopausal and perimenopausal women, those <50 years and those with dense breasts**

ACRIN study show women with dense breasts and increased risk.

- Incremental cancer detection rate of 4.2 per 1,000 screen. Dense breast is independent risk factor given 2 to 6 times that of women with less dense breasts**