

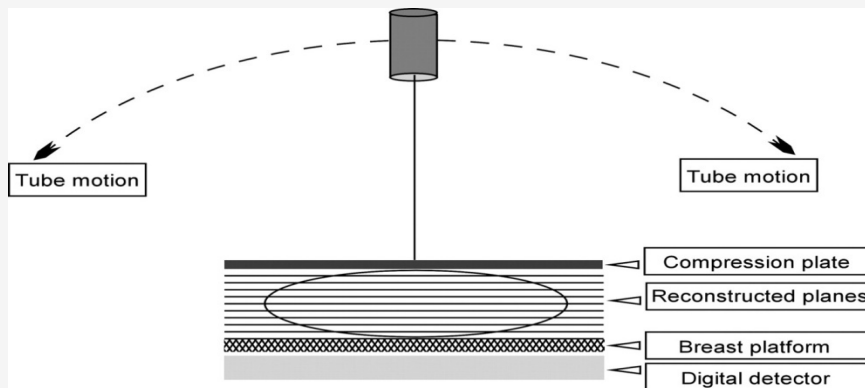
Module 2: Supplemental Screening

- Intended Learning Outcomes
 - Differentiate between supplemental screening technologies and their relative ability to increase cancer detection
 - Ultrasound
 - MRI
 - Counsel women considering testing about the benefits and risks of supplementary screening

Supplemental Screening

- Ultrasound
- MRI
- Tomosynthesis
- Molecular Breast Imaging
- **ALL** can increase cancer detection
- **NONE** proven to decrease mortality or morbidity
- None recommended by major organizations for density alone

Tomosynthesis



Digital x-ray mammogram
Multiple projections in an arc

Tomosynthesis

- **Benefits**
 - Increase cancer detection in all densities (41%)
 - Decreased recall rate (15%)
 - Removes superimposition of tissue
- **Risks**
 - Radiation dose initially 2x regular mammogram
 - can synthesize 2-D images from the 3-D images to decrease the dose
 - Increased interpretation time

Screening Ultrasound

- 5.3 additional cancers/1000 women in year 1
- 3.7/1000 in years 2 and 3



Image courtesy of R.W. Pinsky, MD
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	False +	PPV
Mammo alone	4.4	22.6 %
US alone	8.1	8.9 %
Mammo + US	10.4	11.2 %

Berg WA, et al, JAMA, 2008; 299, 2151-2163

Berg WA JAMA 2012 ; 307:1394-1404.

Connecticut Experience

	Hooley	Weigert	Parris
# of patients	935	8647	5519
# of Cat 4 or 5	5%	5%	3.3%
# of incremental cancers	3.2/1000	3.25/1000	1.8/1000
Size of cancer	0.5 - 0.9 cm	0.4 - 8 cm	0.4 - 1.5 cm
PPV	6.5%	6.7%	5.5%

> 50% dense
All risk levels
Hand held whole breast ultrasound

Hooley et al, Radiology, 2012

Weigert et al, Breast Journal 2012

Parris et al, Breast Journal 2013

Screening Ultrasound

- Computer model study of cost/benefit of supplemental screening US
 - Aged 50–74 years
 - Heterogeneously or extremely dense breasts
 - Per 1000 women:
 - 0.36 additional deaths averted
 - 1.7 QALYs (Quality Adjusted Life Years) gained
 - 354 biopsy recommendations
 - **Cost effectiveness ratio: \$325,000 per QALY gained**

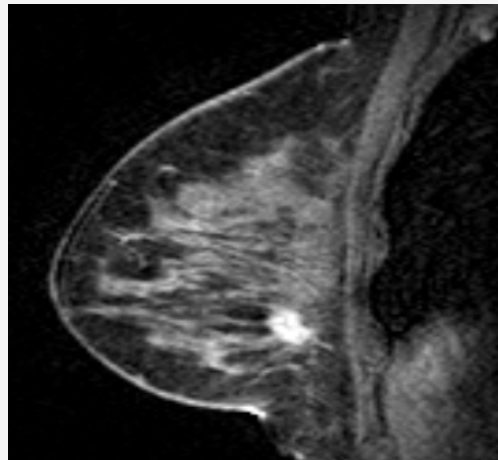
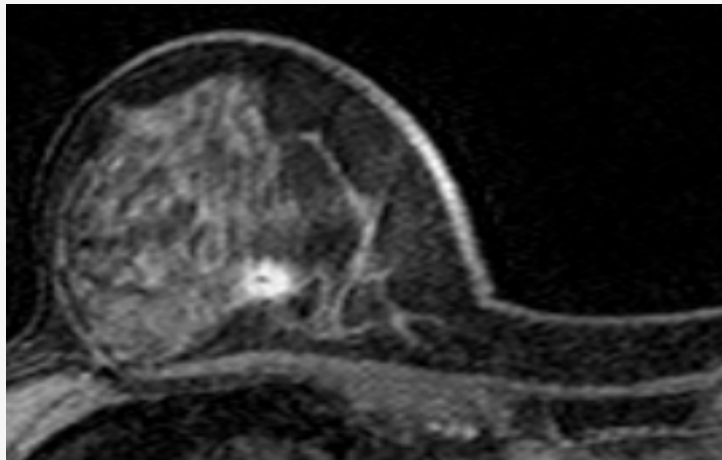
Automated Ultrasound

- Automated high frequency linear transducer
- ~1000 images acquired
- Can scroll through images
- Limited outcome studies to date
- May become more widely used with further study

MRI

- Powerful magnetic field
- No radiation
- IV gadolinium required
- Not recommended
 - Pregnancy
 - Pacemaker
 - Incompatible implanted metal
 - Impaired renal function
 - Severe claustrophobia

MRI



Dense, negative
mammogram

Diagnosis: Invasive
Ductal CA

Expanded ACRIN trial: Higher risk AND dense
Added MRI screening after 3 rounds of M/US

ACRIN +MRI

58% accepted offer of study MRI

612 women in MRI-added group

Supplemental cancer yield of MRI: 14.7/1000

	Sensitivity	Specificity	PPV	Recall Rate
Mammo alone	56%	89%	29%	11%
Mammo + US	94%	74%	11%	16%
MRI	100%	70%	19%	31%

Molecular Breast Imaging-MBI

- Technitium-99m sestamibi radio isotope- IV injection
- Dose similar to mammography
- Higher resolution than whole body imaging

- 8.8 additional cancers/1000 women vs mammography alone
- Increased recalls up to 17%
- No difference in PPV3 vs mammography alone
- NO MORTALITY REDUCTION DATA