

15:10-15:30

선별 유방초음파가 필요한가?

연세의대

문 희 정

Basic Principle For Cancer Screening

- Earlier detection of disease will reduce mortality
- Healthy individuals who are screened will not be harmed
- Screening test must be widely available and well tolerated - should be cost effective

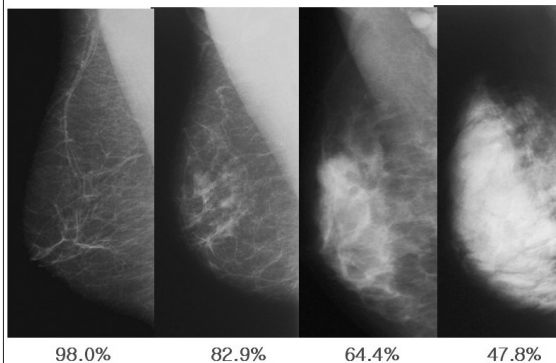
Screening for Breast Cancer

- The only screening test - Mammography!!
- Significant reduction (32%) in breast cancer mortality
- Better prognosis than clinically detected breast cancer

	Prognosis	
	Good	Bad
Screen-detected	50%	18%
Clinically-detected	19%	47%

Tabar L et al. Radiolo Clin North Am 2000;38:625-651

Breast composition



Dense breasts

- Dense breasts itself – risk factor, 4 - 6 folds
Radiology. 2004;230(1):29-41
- Breast density less than 10% of the mammogram, compared with the 75% or more – increase risk of breast cancer (OR, 4.7)
N Engl J Med 2007;356(3):227-236

Screening with Breast US?

• Ultrasound

:help distinguish between

- 1) cyst and solid masses
- 2) benign and malignant masses

:diagnostic populations>> screening studies

Thomas M. Kolb, MD
Jacob Lichy, MD
Jeffrey H. Newhouse, MD

Index terms:
Breast, US, 00.129, 00.12989
Breast neoplasms, diagnosis, 00.30
Breast radiography, 00.11
Cancer screening, 00.11, 00.129,
00.12989

Published online before print
10.1148/radiol.2251011667
Radiology 2002; 225:165-175

Abbreviations:
BI-RADS = Breast Imaging Reporting and System

Comparison of the Performance of Screening Mammography, Physical Examination, and Breast US and Evaluation of Factors that Influence Them: An Analysis of 27,825 Patient Evaluations¹

- 11,130 asymptomatic women
(High risk - 30% of all women)
- Dense breast - BI-RADS category 2, 3, 4
- Screening US by radiologists
 - 14,278 breast US in 5,712 women
 - 4-5 minutes

	Sensitivity	Specificity	NPV	PPV	Accuracy
Mammo	77.6	98.8	99.8	35.8	98.6
PE	27.6	99.4	99.4	28.9	98.8
US	75.3	96.8	99.7	20.5	96.6

Mammography sensitivity – 48% for dense breast

Sensitivity: Mammo + US – 97%

Mammo + PE – 74%

Tumor size: Mammo, US <<< PE

• Detection rate in screening US

	Average risk	High risk
Over all	0.23%	0.42%
Category 2	0.11%	0.15%
Category 3	0.27%	0.44%
Category 4	0.25%	0.52%

- 15% (37/264) of all cancers detected only in US
 - 70%- subcentimeter
 - 89%- node negative
 - Similar in size and stage with mammogram-detected
- Positive biopsy rate of US– 10.3% (37 of 358)
- Positive biopsy rate of mammogram – 32.1% (191 of 595)
- Cost of subsequent diagnostic procedure!!

Stuart S. Kaplan, MD

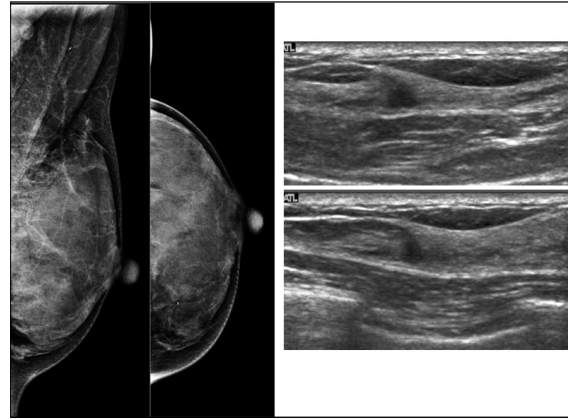
Index terms:
Breast, parenchymal pattern
Breast, US, 00.129, 00.12989
Breast neoplasms, diagnosis, 00.32
Breast neoplasms, US, 00.129,
00.12989

Clinical Utility of Bilateral Whole-Breast US in the Evaluation of Women with Dense Breast Tissue¹

- 1,862 patients, BI-RADS category 3, 4 density
 - screening US by sonographer or technician
 - 10 minutes
- 6 (0.3%) breast cancers detected: stage 0 or 1
- Positive biopsy rate of US: 11.8%
- Positive biopsy rate of mammography detected lesions: 28-30%

Screening US Results

Study	# in Study	# Bx (%)	# Cancers (% of Bx, PPV ₃)	Cancer detection rate	Cancer histology		Mean tumor size (mm)
					# invasive	#DCIS	
Gordon et al, 1995	12,706	279 (2.2)	44 (16)	0.35	44 (100)	0 (0)	11.0
Buchberger et al, 2000	8103	362 (4.5)	32 (8.8)	0.39	35 (88)	5 (13)	9.1
	867	43 (5.0)	8 (19)	0.92			NR
Kaplan, 2001	1862	102 (5.5)	6 (6.6)	0.32	5 (83)	1 (17)	9.0
Kolb et al, 2002	13,547	358 (2.6)	37 (10)	0.27	36 (97)	1 (3)	9.9
Crystal et al, 2003	1517	38 (2.5)	7 (18)	0.46	7 (100)	0 (0)	9.6
Leconte et al, 2003	4236	NR	16	0.38	14 (87.5)	2 (12.5)	10.9
Corsetti et al, 2006	7615	NR	36	0.47			NR
Fallice et al, 2007	1754	46 (2.6)	9 (19.5)	0.68	7 (78)	2 (22)	10
Overall	52207	1228 (3.0)	195 (11.6)	0.48	148 (93)	11 (7)	9.9
Shin et al, 2005	576	73 (12.7)	2 (2.7)	0.35	1 (50)	1 (50)	7.5
Kwak et al, 2005	3998	433 (10.8)	4 (0.9)	0.05	3 (75)	1 (25)	NR
Overall	4574	506 (11)	6 (1.2)	0.13	4 (67)	2 (33)	



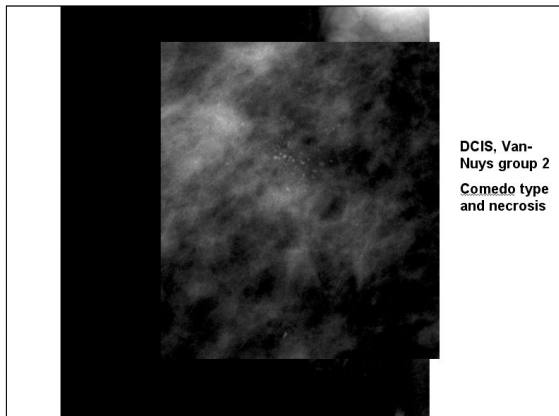
Controversy of US screening

- Operator dependent
- Time consuming
- Not cost effectiveness
- Non-significant cancer detection rate
 - Poor detection of microcalcifications
 - Detection of microcalcification: 0-62%, identification of calcifications on mammogram

US as a sole screening Technique

- Significant false negative outcome
- Delayed diagnosis and treatment
- High false positive rate
 - Unnecessary further investigation.
 - Causing significant morbidity in normal women

Teh et al. Eur J Cancer 1998;34:449-450



Opinion

Sonography Should Not Be Used for Breast Cancer Screening Until Its Efficacy Has Been Proven Scientifically

Daniel B. Kopans^{1,2}

- Mammographic screening
 - Not perfect
 - Not find all cancers
 - Not all find cancers early enough to cure
 - Strong support is needed to additional screen

제목을 입력하십시오

- Lead time bias
- Surrogate endpoint
- Detection vs identification
- The randomized controlled trial
 - Screened group vs Not screened group
 - Large population of women
 - Allocation is truly random
 - Statistically significant decrease in death rate
 - Not truly blind sonography screening

ACRIN 6666

- Whether whole breast bilateral screening US can identify cancers occult to MG
- Whether such results are generalizable across multiple centers
- Cost-effectiveness, quality of-life



Combined Screening With Ultrasound and Mammography vs Mammography Alone in Women at Elevated Risk of Breast Cancer

Wendie A. Berg; Jeffrey D. Blume; Jean B. Cormack; et al.

JAMA. 2008;299(18):2151-2163 (doi:10.1001/jama.299.18.2151)

- Screening mammogram and US at randomized order
- 21 multicenter, 2725 women with high risk
- F/U at 12 month and 24 months
- US by radiologists
- 19 minutes

제목을 입력하십시오

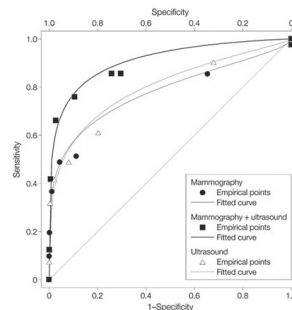
• 40 of 2637 (1.5%)

- 8 – both mammogram and US
- 12 – only mammogram
- 12 – only US
- 8 – interval cancer

	Mammogram (n=20)	US only (n=12)	Both (n=32)
Diagnostic yield	7.6/1000	4.2/1000	11.8/1000
DCIS	5	1	6
Invasive cancer	15	11	26
Size (mm)	12	10	
LN negative	70%	89%	
Positive biopsy rate	22.6%	8.9%	11.2%

제목을 입력하십시오

- Diagnostic accuracy
- Mammogram alone – 0.78
- Mammogram plus US - 0.91
- US alone – 0.8



- Whether whole breast bilateral screening US can identify cancers occult to MG - Yes!!!
- Whether such results are generalizable across multiple centers - Yes!!!
- Cost-effectiveness, quality of-life - ???

Pros vs Cons

- | | |
|---|---|
| <p>1. Scientific validation for mortality reduction</p> | <p>1. Surrogate aims and end points, such as the diagnostic performance for the screening modality or the size and stage of breast cancers depicted, have been correlated with mortality outcomes, and can be used to project the mortality reduction if the screening modality were implemented.</p> |
|---|---|

Pros vs Cons

- | | |
|---|--|
| <p>2. The person interpreting the sonogram cannot help but be influenced by the findings on the mammogram</p> <ul style="list-style-type: none"> - Detection - identification | <p>2. Detection rate – comparable to that of mammography</p> |
| <p>3. Unnecessary biopsy and anxiety</p> | <p>3. Complicated cysts</p> <ul style="list-style-type: none"> - Suspicious on US |
| <p>4. Physician, technician, AUS</p> | <p>4. ???</p> |
| <p>5. Cost-effectiveness</p> | <p>5. ???</p> |

Summary

- Screening US for breast cancer
 - High risk group
 - Dense breast tissue

Unsolved Problem

- Reduce Mortality
- Physician, technician, or AUS
- Time consuming
- Cost effectiveness
- Reduce unnecessary biopsy and anxiety