

4 1

[illegible]

: 1995 1 1998 12 4 43,329
 (36,802 , 18 - 86 , 46)
 ACR BI - RADS 0, 4, 5
 ,
 ,
 : 가 가 (1995 64.5%, 1998 97.4%),
 30 60 가 가 BI - RADS 0, 4, 5
 가 1,879 , 가 가
 155 , 106 가 , 43
 5.1% , 1.2/1000 , 1 2.3%, 2 27.7%,
 3 40.6% 가
 (40.5%), 가
 (66.7%). 47 (4), 91.5%,
 95.0% 1 cm 48.8%,
 가 가 33.3%,
 22.0%, 0 I 가 73.2% ,
 : 가

(audit)가 ,
(1, 2).
가 (3 - 6),

1995 1 1998 12
1995 , 1996
가

가

Senographe 500 T (GE Medical System, Milwaukee, U.S.A.) Giotto Hi - Tech Mammo - graphy (IMS, Bologna, Italy) ,

1
2

(American College of Radiology Breast Imaging Report - ing and Data System) 0, 4, 5 (1)

가 (p=0.039).

가 (Table 4)
 1995 1 1999 10 (36,802 BI - RADS 0, 4, 5
 10) 가 1,879 , 가
 4, 5 가 155 .
 0 가
 (1, 2) 766 4, 5 155 가
 106 (36 ,
 70) , 43 (1 ,
 42) .
 4 47 ,
 4.2%
 Table 1 (47/1131) . (recall rate) 5.1% (1,879/36,802)
 가 가 , (cancer detection rate) 1.2/1000
 43,329 , (43/36,802) .
 36,802 1 (false positive 1: FP1)
 40 가 0, 4, 5
 (Table 2). 18 (1879 - 43=1836), 2 (FP2) (가
 86 46) 4, 5
 (155 - 43=112). 3 (FP3)
 (Table 3)
 47 , 40 가 21
 (44.7%) 가 ,
 (Table 2) 60 가
 (0.15%) . (p=0.066,
 Chi - square test) , 30 60 가
 91.5% (43/47), 95.0% (34919/36755) .
 1

Table 1. Distribution of Population of Screening Mammography by Years

Year	1995	1996	1997	1998	Total
Base population	11,478	13,534	14,149	9,863	49,024
No. of MMG	7,408	12,780	13,534	9,607	43,329
%	64.5	94.4	95.7	97.4	88.4

MMG : mammography

Table 2. Distribution of Age on Screening Mammography

Age	29	30-39	40-49	50-59	60-69	70	Total
Base population	2,923	12,866	15,926	12,214	4,557	538	49,024
No. of MMG	1,407	11,673	14,650	11,096	4,057	446	43,329
%	48.1	90.7	92.0	90.8	89.0	82.9	88.4

Table 3. Age Distribution of Breast Cancer

Age	29	30-39	40-49	50-59	60-69	70	Total
No. of cancer	0	5	21	15	6	0	47
%	0	10.6	44.7	31.9	12.8	0	100
%(No. of MMG)*	0	0.04	0.14	0.14	0.15	0	0.11

* These percentage factors show the proportion of breast cancer patients to the total number of taking mammography by age groups.

(Table 5)
 43 1
 42
 가 17 (40.5%) 가 24

22 (spiculated) (59.1%), (indistinct) 8 (36.4%), (circumscribed) 1 (4.5%) (high density)가 18 (81.8%), (equal density)가 4 (18.2%) (median tumor size) 1.65 cm, (r = 0.84, p < 0.01).

(Table 6) 45 47, 1 41 4 (Table 7, 8) (minimal cancer; 1 cm) 48.8% (20/41)

(Table 7) 가 6

Table 4. Basic Data of Mammographic Interpretation and Monitoring

Mammography	Biopsy results		Total
	Positive	Negative	
Positive	43	FP1 : 1,836 FP2 : 112 FP3 : 63	1,879 155 106
Negative	4	34,919	34,923
Total	47	36,755	36,802

FP : false positive

Table 5. Radiographic Findings of Breast Cancer on Screening Mammography

Findings	No.	%
Microcalcification	17	40.5
Mass	15	35.7
Mass + calcification	7	16.7
Architectural distortion	3	7.1
Total	42	100

Table 6. Pathologic Diagnosis of Breast Cancer

Diagnosis	No.	%	No.	%
Invasive ductal carcinoma	30	66.7	27	65.9
DCIS	13	28.9	12	29.3
Mucinous carcinoma	1	2.2	1	2.4
Invasive lobular carcinoma	1	2.2	1	2.4
Total	45	100	41*	100

DCIS : ductal carcinoma in situ

* False negative cases (n = 4) were excluded.

가 가 , 가 3 가 33.3% (9/27; 4 41 29 , 27) 22.0% (9/41) (Table 8) I 가 가 , 0 I 73.2% (30/41)

(Table 9) 1994 Agency for Healthcare Policy

Table 7. Lymph Node Status of Breast Cancer

LN involvement	No.	%	No.	%
0*	34	75.6	32	78.1
1 - 3	10	22.2	8	19.5
4 - 9	0	0	0	0
10	1	2.2	1	2.4
Total	45	100	41 [†]	100

LN : lymph node

* This category included 6 cases which did not performed axillary lymph node biopsy or dissection.

[†] False negative cases (n = 4) were excluded.

Table 8. Tumor Staging of Breast Cancer

Stage	No.	%	No.	%
0	13	28.9	12	29.3
I	19	42.2	18	43.9
IIA	8	17.8	6	14.6
IIB	4	8.9	4	9.8
IIIA	1	2.2	1	2.4
Total	45	100	41*	100

* False negative cases (n = 4) were excluded.

Table 9. Analysis of Medical Audit Data of Screening Mammography

	Desirable goals	Our data
PPV1	5 - 10%	2.3%
PPV2	25 - 40%	27.7%
Tumor found-stage 0 or I	> 50%	73.2%
Tumor found-minimal cancer*	> 30%	48.8%
Node positivity	< 25%	22.0%
Cancers found/1000cases	2 - 10	1.2
Recall rate	10%	5.1%
Sensitivity	> 85%	91.5%
Specificity	> 90%	95.0%

PPV : positive predictive value

* Minimal cancer is invasive cancer 1 cm or ductal carcinoma in situ.

:

and Research (AHCPR)

(1, 2).

(15)

가

1 2.3%

Faulk

(19)

,

가

Morimoto

(11)

, 1000

1.2

.

,

.

(20)

가

가

4

, 40

60

가

가

가

가

가

.

가

40

가

.

(7).

30

80

가

가

가

40

가

가

40

50

(8, 9).

.

4

,

가

,

가

,

가

가

,

.

(9 - 11).

30

40

가

,

(9, 12, 13).

1cm

.

(21, 22)

가

.

가

AHCPR

1994

Quality Determinants of Mammography Guidelines

(1, 2)

(1, 2).

,

,

.

1

가

가

,

가

,

가

가

(23).

.

(2).

5.1%

10%

가

가

,

(3, 24).

.

95

,

,

, 98

가

,

가

IMF

40

가

21

가

.

60

가

0.15%

0

가

,

가

.

(14 -

.

17)

,

가

가

.

,

가

,

가

,

(2, 24).

,

가

,

가

,

,

, 5

.

(18)

가

.

가

.

,

.

,

가

가

.

가

,

1. American College of Radiology. *Breast imaging reporting and data system (BI-RADS™)*. 3rd ed. Reston [VA]: American College of Radiology, 1998
2. Linver MN, Osuch JR, Brenner RJ, Smith RA. The mammography audit: a primer for the Mammography Quality Standards Act (MQSA). *AJR Am J Roentgenol* 1995;165:19-25
3. Sickles EA, Ominsky SH, Sollitto RA, Galvin HB, Monticciolo DL. Medical audit of a rapid-throughput mammography screening practice: methodology and results of 27,114 examinations. *Radiology* 1990;175:323-327
4. Baines CJ, Miller AB, Wall C, et al. Sensitivity and specificity of first screen mammography in the Canadian National Breast Screening Study: a preliminary report from five centers. *Radiology* 1986;160:295-298
5. Brown ML, Houn F, Sickles EA, Kessler LG. Screening mammography in community practice: positive predictive value of abnormal findings and yield of follow-up diagnostic procedures. *AJR Am J Roentgenol* 1995; 165 : 1373-1377
6. Thurfjell EL, Lindgren JA . Population-based mammography screening in Swedish clinical practice: prevalence and incidence screening in Uppsala County. *Radiology* 1994;193:351-357
7. . 1999 . : , 1998
8. Ahn YO, Park BJ, Yoo KY, et al. Incidence estimation of female breast cancer among Koreans. *J Korean Med Sci* 1994;9:328-334
9. Feig SA. Mammographic screening of women aged 40 to 49 years: Is it justified? *Obstet Gynecol Clin North Am* 1994;21:587-606
10. Ohuchi N, Yoshida K, Kimura M, et al. Improved detection rate of early breast cancer in mass screening combined with mammography. *Jpn J Cancer Res* 1993;84:807-812
11. Morimoto T, Sasa M, Yamaguchi T, Harada K, Sagara Y. High detection rate of breast cancer by mass screening using mammography in Japan. *Jpn J Cancer Res* 1994;85:1193-1195
12. Smart CR, Hendrick RE, Rutledge III JH, Smith RA. Benefit of mammography screening in women ages 40 to 49 years: current evidence from randomized controlled trials. *Cancer* 1995;75:1619-1626
13. Liberman L, Dershaw DD, Deutch BM, Thaler HT, Lippin BS. Screening mammography: value in women 35-39 years old. *AJR Am J Roentgenol* 1993;161:53-56
14. , , , . screening mammography . 1999;31: 499-508
15. , , , , . . 1999;41:181-186
16. Bassett LW, Liu TH, Giuliano AE, Gold RH. The prevalence of carcinoma in palpable vs. impalpable, mammographically detected lesions. *AJR Am J Roentgenol* 1991;157:21-24
17. Perdue P, Page D, Nellestein M, et al. Early detection of breast carcinoma: a comparison of palpable and nonpalpable lesions. *Surgery* 1992;111:656-659
18. , , , . 13,791 . 1997;53:176-184
19. Faulk RM, Sickles EA, Sollitto RA, Ominsky SH, Galvin HB, Frankel SD. Clinical efficacy of mammographic screening in the elderly. *Radiology* 1995;194:193-197
20. , , , , . Screening . 1995;32: 343-346
21. Bird RE, Wallace TW, Yankaskas BC. Analysis of cancers missed at screening mammography. *Radiology* 1992;184:613-617
22. Goergen SK, Evans J, Cohen GPB, MacMillan JH. Characteristics of breast carcinomas missed by screening radiologists. *Radiology* 1997;204:131-135
23. Kopans DB. The positive predictive value of mammography. *AJR Am J Roentgenol* 1992;158:521-526
24. Sickles EA. Quality assurance: how to audit your own mammography practice. *Radiol Clin North Am* 1992;30:265-275

Screening Mammography: The Results for Four Years¹

Hyo Kyeong Choi, M.D., Jeong Mi Park, M.D., Jun Hyung Lee, M.D.,
Byung Ho Son, M.D.², Sei Hyun Ahn, M.D.²

¹Department of Radiology, Asan Medical Center, University of Ulsan College of Medicine

²Department of Surgery, Asan Medical Center, University of Ulsan College of Medicine

Purpose: To perform a medical audit of screening mammography for breast cancer and to determine the benefit of this procedure for the early detection of this condition.

Materials and Methods: We reviewed the results of 43,329 instances of mammography in 36,802 women [18-86 (mean, 46) years old] who underwent the procedure at our health promotion center between January 1995 and December 1998. After reviewing the mammographic reports, we selected ACR BI-RADS assessment categories 0, 4, 5, and then reviewed the follow-up studies and the pathologic results thus obtained. By comparison with the total number of patients diagnosed with breast cancer during the same period, false negative cases were confirmed, and from these data a medical audit was performed.

Results: The percentage of women undergoing mammographic examination has increased in recent years (from 64.5% in 1995 to 97.4% in 1998), and cases of breast cancer among those aged 30 to 69 has tended to increase. A total of 1,879 cases were assessed as BI-RADS categories 0, 4, 5, and of these, 155 were recommended for biopsy or surgery. A confirmatory pathologic diagnosis was obtained in 106 cases, and in 43 of these, breast cancer was pathologically proven. The recall rate was 5.1%, and the cancer detection rate was 1.2/1000 population. Positive predictive value 1 (PPV1) was found in 2.3% of cases, PPV2 in 27.7%, and PPV3 in 40.6%. The most common mammographic finding was microcalcification (40.5%), and a pathological finding of invasive ductal carcinoma was found in 66.7% of cases. Patients diagnosed with breast cancer totalled 47 (four cases were false negative); the estimated sensitivity was 91.5%, with a specificity of 95.0%. The percentage of minimal cancers found was 48.8, while that of axillary node-positive invasive cancers was 33.3. The total rate of axillary nodal metastasis was 22.0%, and the rate of stages 0 and I was 73.2%.

Conclusion: When appropriate interpretation and follow-up monitoring of screening mammography is performed, the procedure is effective for the early detection of breast cancer.

Index words : Breast radiography
Breast neoplasms, diagnosis
Cancer screening

Address reprint requests to : Hyo Kyeong Choi, M.D., Department of Radiology, Asan Medical Center, University of Ulsan,
388-1, Poongnap-Dong, Songpa-Ku, Seoul 138-736, Korea.
Tel. 82-2-2224-4946 Fax. 82-2-476-4719
E-mail: hkchoi@www.amc.seoul.kr