:
(Computer- aided detection,   CAD)   .
:   (Senographe 2000D, GE Medical Systems, Buc, France)
CAD   (Image Checker v3.1, R2 Technology, Los Altos, Calif.)
70   (37- 69   51)
.   (,   ,   )
CAD   .
: CAD   70   67 (95.7%)   . CAD
30   29   (96.7%)
18   (100%) 22   20 (90.9%)
. CAD   22   (100%), 13
(100%), 1   (100%)   34
31   (91.8%).   0.21
0.16   0.37   .
:   CAD
. CAD
.

(Full- field digital mammography)   .   CAD
(computer- aided detection,   CAD)   (5, 6).

.   CAD
,   .
,   (signal to noise ratio, SNR)
. CAD

70
(1- 4).   .   2003
CAD   11   2005   2
,
CAD   .
_____

70 (Seno-
graphe 2000D, GE Medical Systems, Buc, France)

70 .

280 .

2.5± 1.5
cm (0.6- 6.7 cm) .

. 70

18

22 , 30

. 40 , 48

(18

22 , 30).

(25%

) .

(34/70, 48.6%)
(22/70, 31.4%), (13/70,
18.6%), (1/70, 1.4%) . 34

32 , 1 ,

1 .

CAD image checker (v3.1, R2
Technology, Los Altos, Calif.) GE
(Senographe 2000D, GE Medical Systems, Buc, France)
. CAD

.

. CAD

CAD .

.

CAD CAD

. ,

, .

CAD 70 67 (95.7%)

. CAD

- 1 . CAD 30 29

(96.7%)

18 18 (100%) 22

20 (90.9%) (Fig. 1A, 1B).

CAD

18 9

3 , 6

(Fig. 2A, 2B). CAD 48

44 CAD

93.6% . , 40 32

CAD 78.0% .

CAD - 2

. CAD 22 (100%), 13

(100%), 1

Table 1. Sensitivity of CAD System According to Radiologic Primary Features in Screening Mammography Detected Cancers

Primary Features	Number of Cases (n = 70)	Sensitivity
Microcalcifications	30 (42.9)	29/30 (96.7)
Mass	22 (31.4)	20/22 (90.9)
Mass with Microcalcifications	18 (25.7)	18/18 (100)

Note. Data are the number of findings. Numbers in parentheses are percentages.

Table 2. Sensitivity of CAD System According to Histopathologic findings of Screening Mammography Detected Cancers

Histopathologic Findings	Number of Cases (n = 70)	Sensitivity
Invasive Ductal Carcinoma	34 (48.6)	31/34 (91.8)
DCIS*	22 (31.4)	22/22 (100)
Invasive Ductal Carcinoma with DCIS*	13 (18.6)	13/13 (100)
Invasive Lobular Carcinoma	1 (1.4)	1/1 (100)

Note. Data are the number of findings. Numbers in parentheses are percentages.
* Ductal carcinoma in situ.

Table 3. Characteristics of False-Negative Lesions

Patient No./ Age (y)	Radiologic Primary Features	Lesion Size (mm) on Mammogram	Histpathologic Findings
1/46	Microcalcifications	11	Invasive Ductal Carcinoma
2/40	Mass	8	Invasive Ductal Carcinoma
3/61	Mass	10	Invasive Ductal Carcinoma

(100%)   34
        31   (91.8%).   X-
      116   185
                                                                                              0.21   ,
  ,   0.16   (9).
        0.37   .   .
    CAD   3   - 3   (digital detecter)
      .   1.0± 0.2 cm(0.8- 1.1 cm)   .
    . 2   1   (better dynamic
      (Fig. 3A, 3B).   .   range)   .

                                                                                              (10, 11).
                                                                        CAD
                                                    .   . CAD
      ,   20%
      (7).   (12). Warren   (2)   CAD
                                                    (8).   77%
                                    ,   ,   . Freer   (4)   CAD
      ,   .   12,860   CAD

A   **B**
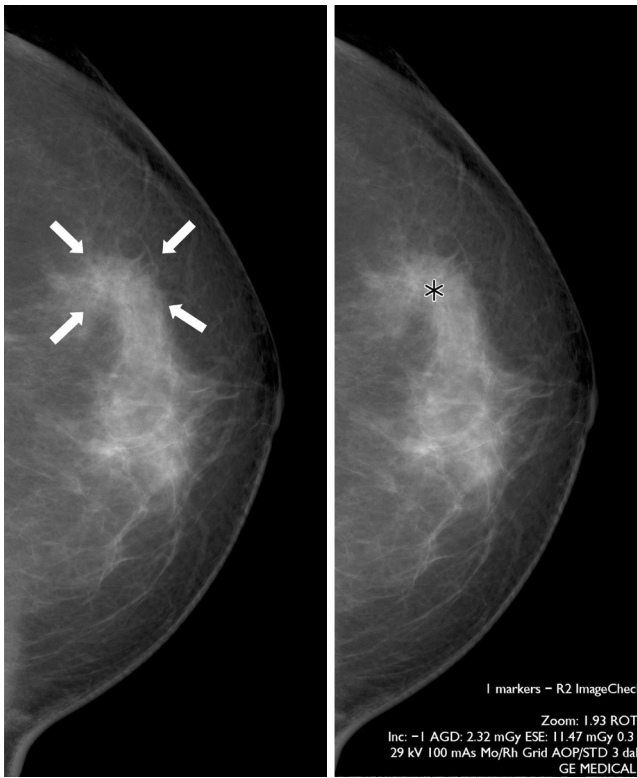
Fig. 1. A 47-year-old woman with invasive ductal carinoma.
A. Craniocaudal digital mammogram show an ill-defined mass (arrows) at screening mammography.
B. Screen-capture image of computer monitor display of CAD system output in craniocaudal view is correctly marked the mass by asterisk.
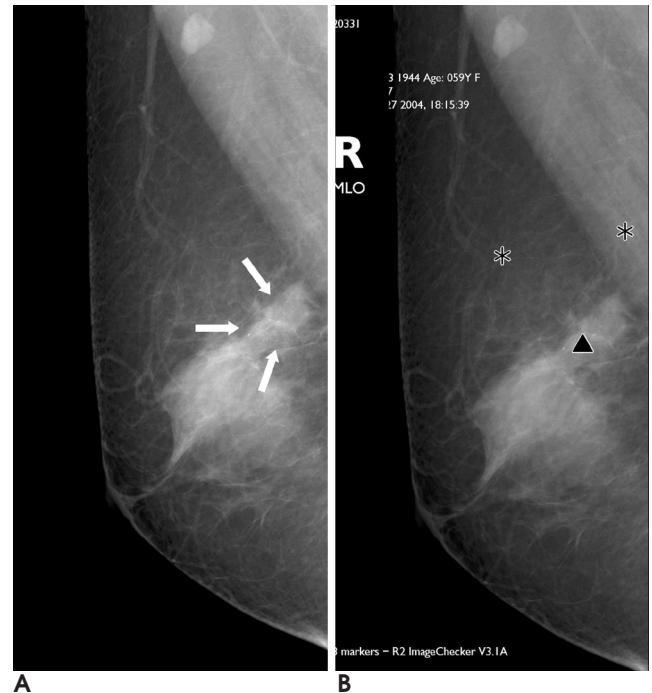

A   **B**

Fig. 2. A 59-year-old woman with invasive ductal carcinoma.
A. Mediolateral oblique digital mammogram show a poorly marginated mass with microcalcification (arrows) at screening mammography.
B. Screen-capture image of computer monitor display of CAD system output in mediolateral oblique view is correctly marked only the microcalcificaton by triangle. Two false-positive mass marks (astrerisk) are visible.

Fig. 3. A 61-year-old woman with invasive ductal carcinoma.
A. Mediolateral oblique digital mammogram show an irregular shaped mass at screening mammography.
B. Screen-capture image of computer monitor display of CAD system output in mediolateral oblique view is not correctly marked the mass. False-positive mass mark (asterisk) is only visible.

19.5%
73%   78%   .
                    CAD
          CAD   .
                    ,

                    CAD
      .   ,
                    ,

          CAD

                              .
                         CAD
              . Nawano   (5)   267
            4,148   CAD
                    89.9%,
          92.8%   ,
                    1.35   ,
      0.40   . Baum   (6)   63
                         CAD
CAD   89%,   81%   ,
                              0.35   ,

                    :
          0.26   .   CAD
                    70
67   (95.7%). CAD
              93.6%   78.0%

              (2, 4, 12).   0.37
      .
              CAD   3
                    (1.0± 0.2 cm)   67
      (2.6± 1.5 cm)
CAD
. Malich   (13)   10- 30 mm
    CAD
Brem   (14)   1- 5 mm
    6- 10 mm, 16- 20 mm, 20 mm
              .   CAD

      .

                    CAD

                    CAD
                    CAD
      .

          .   ,
CAD

                    .
          CAD
                    .

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Screening Mammography-Detected Cancers:
The Sensitivity of the Computer-aided Detection System as Applied to Full-field Digital Mammography[1]

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Purpose: We wanted to evaluate the sensitivity of the computer-aided detection (CAD) system for performing full-field digital mammography (FFDM) on the breast cancers that were originally detected by screening mammography.

Materials and Methods: The CAD system (Image Checker v3.1, R2 Technology, Los Altos, Calif.) together with a full-field digital mammography system (Senographe 2000D, GE Medical Systems, Buc, France) was prospectively applied to the mammograms of 70 mammographically detected breast cancer patients (age range, 37-69; median age, 51 years) who had negative findings on their clinical examinations. The sensitivity of the CAD system, according to histopathologic findings and radiologic primary features (i.e., mass, microcalcifications or mass with microcalcifications) and also the false-positive marking rate were then determined.

Results: The CAD system correctly depicted 67 of 70 breast cancer lesions (95.7%). The CAD system marked 29 of 30 breast cancers that presented with microcalcifications only (sensitivity 96.7%) and all 18 breast cancers that presented with mass together with microcalcifications (sensitivity 100%). Twenty of the 22 lesions that appeared as a mass only were marked correctly by the CAD system (sensitivity 90.9%). The CAD system correctly depicted all 22 lesions of ductal carcinoma in situ (sensitivity: 100%), all 13 lesions of invasive ductal carcinoma with ductal carcinoma in situ (sensitivity: 100%) and the 1 lesion of invasive lobular carcinoma (sensitivity: 100%). Thirty one of the 34 lesions of invasive ductal carcinoma were marked correctly by the CAD system (sensitivity: 91.8%). The rate of false-positive marks was 0.21 mass marks per image and 0.16 microcalcification marks per image. The overall rate of false-positive marks was 0.37 per image.

Conclusion: The CAD system using FFDM is useful for the detection of asymptomatic breast cancers, and it has a high overall tumor detection rate. The false negative cases were found in relatively small invasive ductal carcinoma.

Index words : Breast neoplasms
Computers
Diagnostic Aid
Digital radiography

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