

STIR

1

2

: (Magnetic Resonance Imaging, MRI) short tau inversion
 recovery(STIR)
 : MRI 36 44 (13 , 31
) T1, T2 , STIR,
 가가 T1, T2
 STIR STIR,
 T1 T2 ,
 (multifocality) , 가
 : 44 33 (75%) STIR T1, T2
 , (14/14, $p<0.05$). STIR
 가 . STIR (50%),
 (46%) 가 T1 T2 가 . STIR
 18 (41%)
 : STIR T1, T2
 . STIR 가 ,
 , 가 T1 T2 .

MRI 가 , (6)
 가 , 가가 , MRI STIR 가
 , 가, 가 STIR가
 가 (1, 2).
 MRI T1, T2
 T1, T2
 가 ,
 2003 1 2003 6
 가 가 (32),
 (4) MRI
 MRI 가 STIR 36 , 44
 STIR 26
 (3) , 67 43.7 . 44
 (4, 5) , 13 (3 , 3 ,
 2 , 2 , 1 , 1 ,
 1) , 31 (24 , 5 ,
 2) . 24 .

¹
² 2003 8 20 2003 9 29 . 427

•

•

1

STIR
MRI

T1, T2

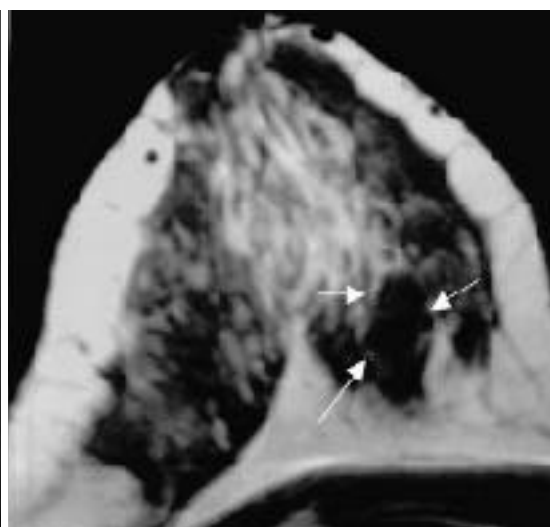
가

(dense),
(fibrofatty), (fatty)

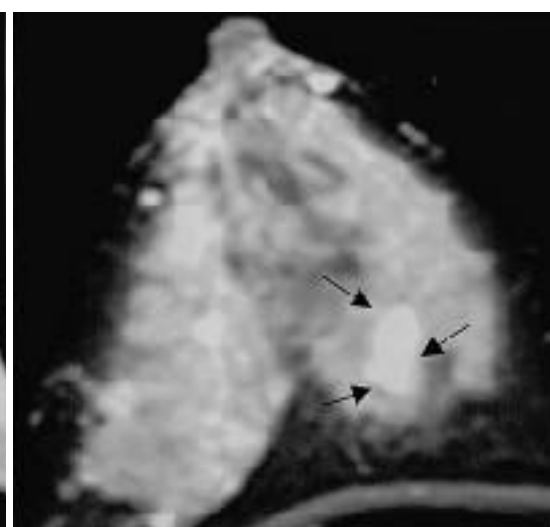
가 T1, T2

STIR

가



B



1

428

가 .

STIR

가

가 3

STIR T1 T2 가

가

STIR 가 가

가

가

가

가

가 Chi - square test ,

가 Fisher's exact test .

44

8 , 22 , 10 4

STIR

가 가 T1 T2 가

가 44 33 (75%)

30 19 (63%) ,

14 (100%) STIR T1, T2 (Fig. 1). STIR

T1 T2 가

11 (25%)

STIR 가

가

가 .

가 STIR T1, T2
가 20 (45%) , (22 , 50%)
(2 , 5%) 가 24 (55%)
(Fig. 2).

24
가 STIR T1 T2
가 13 (54%) , 11 (46%)
가 (Fig. 3).
STIR 18 (41%)
8 (3 , 5)
10
(Fig. 4). STIR
26 (59%) 3
.
T2
p<0.05). , 가,
가 가 .
가
가
가 MRI

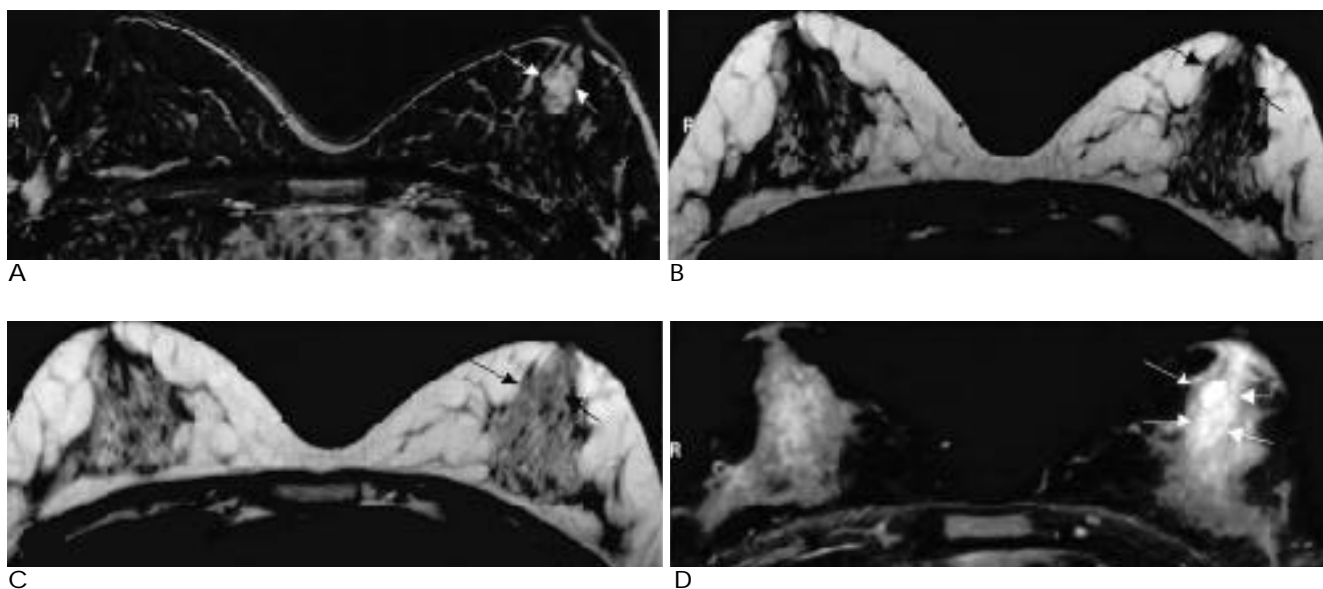


Fig. 2. Invasive ductal carcinoma in a 39-year-old woman with overestimation of extent of the lesion on STIR image. Dynamic enhanced axial image obtained three minutes after contrast injection (A) shows a lobular shaped and moderately enhancing lesion (arrows) in the left breast, but the lesion (arrows) is not defined well on T1W (B) and T2W (C) images. STIR image (D) shows larger and highly intense mass (arrows) comparing with corresponding T1W, T2WI, and dynamic enhanced one.

STIR

MRI 가 (1, 2). 가

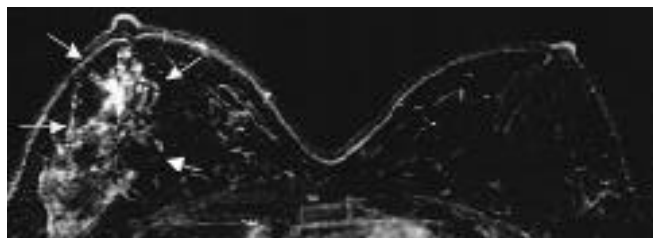
MRI 가가 T1 T2

T1 T2

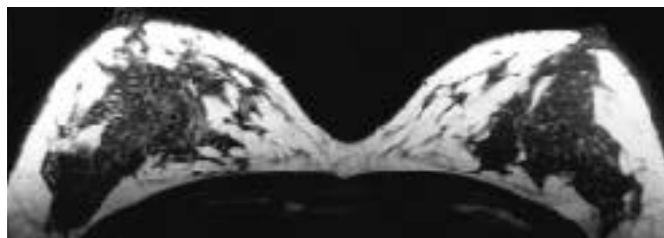
T1 T2

T1 T2

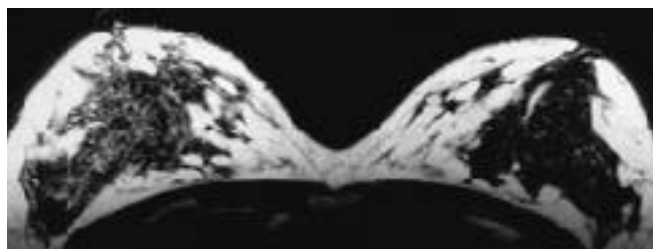
T1 T2



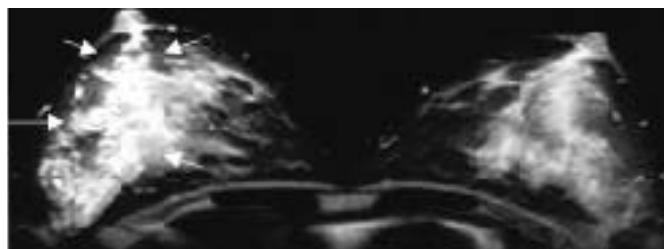
A



B



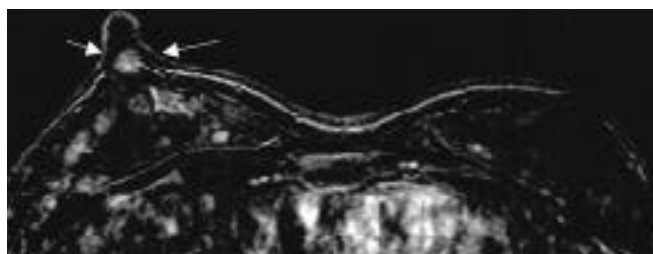
C



D

Fig. 3. Invasive ductal carcinoma with multifocal ductal carcinoma in situ in a 35-year-old woman with multifocality of the lesion on STIR image.

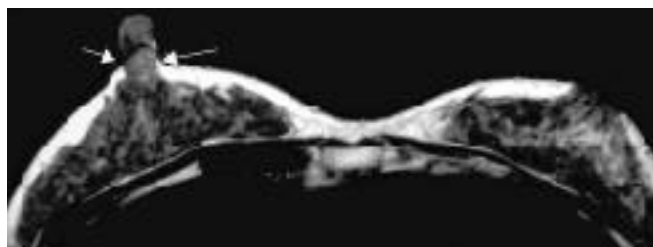
Diffusely scattered multifocal lesions (arrows) are noted in dynamic enhanced axial image (A). STIR (D) is superior to T1W (B), and T2W (C) images for the lesion detection, but the lesions (arrows) are exaggerated.



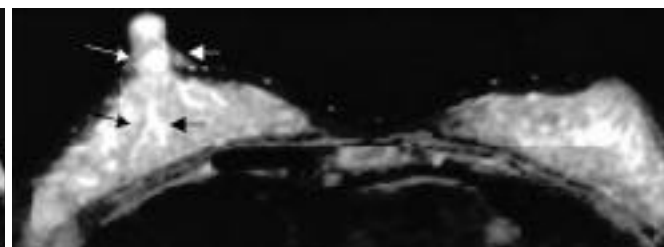
A



B



C



D

Fig. 4. Fibroadenoma with atypical ductal hyperplasia in a 29-year-old woman with visualization of ductal structures on STIR image.

Dynamic enhanced axial image obtained three minutes after contrast injection (A) shows a round well-defined enhancing lesion (white arrows) just below the right nipple. The same lesion is not identified on T1WI (B) and is defined as mild hyperintense mass on T2WI (C). But the lesion (white arrows) is more prominently visualized and dilated ducts (black arrows) are also depicted on STIR image (D).

- T1 T2 가
- (2).
- 가 , 가 ,
- 가 가 T1, T2
- STIR 90
- 180 가
- (inversion time, TI)
- TI 150 - 175 msec . STIR
- 가 , T1 T2
- 9). Nakatsu (9)
- STIR가
- 가
- 가
- 가 STIR
- STIR
- 가 가
- 가 (6).
- 가
- STIR
- STIR
- (3)
- 가 (4, 5).
- (RF thermal ablation)
- 가 T2 , T1
- STIR
- T2
- 가 STIR
- 가
- STIR T2 MRI STIR
- (10).
- (11).
- 가 STIR T1, T2
- 가
- STIR
- STIR T2
- STIR
- mapping
- 18 8
- 가 가
- 가
- 가
- STIR
- T1, T2
- STIR
- 가 T1 T2
- STIR T1 T2
- 가
- 가
1. , , , , Gd-DTPA 1995;32: 173-180
2. , , , , 가 1997;37: 757-762
3. Walker R, Kessar P, Blanchard R, et al. Turbo STIR magnetic resonance imaging as a whole-body screening tool for metastases in patients with breast carcinoma: preliminary clinical experience. *J Magn Reson Imaging* 2000;11:343-350
4. Mazumdar A, Siegel MJ, Narra V, Luchtmann-Jones L. Whole-body fast inversion recovery MR imaging of small cell neoplasms in pediatric patients: a pilot study. *AJR Am J Roentgenol* 2002;179:1261-1266
5. Hargaden G, O'Connell M, Kavanagh E, Powell T, Ward R, Eustace S. Current concepts in whole-body imaging using turbo short tau inversion recovery MR imaging. *AJR Am J Roentgenol* 2003;180:247-252
6. Forrai G, Polgar C, Zana K, et al. The role of STIR MRI sequence in the evaluation of the breast following conservative surgery and radiotherapy. *Neoplasma* 2001;48(1):7-11
7. Constrable RT, Smith RC, Gore JC. Signal-to-noise and contrast in fast spine echo (FSE) and inversion recovery FSE imaging. *J Comput Assist Tomogr* 1992;16:41-47
8. Fleckenstein JL, Archer BT, Barker BA, Vaughan JT, Parkey RW, Peshock RM. Fast short-tau inversion-recovery MR imaging. *Radiology* 1991;179:499-504
9. Nakatsu M, Hatabu H, Itoh H, et al. Comparison of short inversion time inversion recovery (STIR) and fat-saturated (chemsat) techniques for background fat intensity suppression in cervical and thoracic MR imaging. *J Magn Reson Imaging* 2000;11:56-60
10. Aschoff A, Rafie N, Jesberger JA, Duerk JL, Lewin JS. Thermal lesion conspicuity following interstitial radiofrequency thermal tu-

mor ablation in humans: a comparison of STIR, turbo spine-echo T2-weighted, and contrast-enhanced T1-weighted MR images at 0.2 T. *J Magn Reson Imaging* 2000;12:584-589

STIR
SPIR-FLAIR

: SPIR
2001;45:539-545

11. , , , .

J Korean Radiol Soc 2003;49:427 - 432

The Usefulness of STIR Image in Breast MRI¹

Hyon Joo Kwag, M.D., Shin-Ho Kook, M.D., Young Rae Lee, M.D., Min Hee Lee, M.D.²
Hae Won Park, M.D., Won Jin Moon, M.D., Seung Kwon Kim, M.D., Eun Chul Chung, M.D.

¹Department of Radiology, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine

²Department of Diagnostic Radiology, Samsung Medical Center, Sungkyunkwan University School of Medicine

Purpose: To assess the usefulness of STIR (short tau inversion recovery) imaging in breast MRI (magnetic resonance imaging).

Materials and Methods: We retrospectively reviewed T1- and T2-weighted (T1WI, T2WI), STIR, and dynamically enhanced images of 44 pathologically confirmed breast lesions (benign, 13; malignant, 31) in 36 patients. We selected the dynamically image which best depicted a particular lesion, and then made hard copy of the corresponding T1WI, T2WI, and STIR images. Using the dynamically enhanced image as a standard, we analysed these in terms of parenchymal pattern, lesion detectability, differentiation between benign and malignant lesions, extent, multifocality, and the ductal system. The results were statistically analyzed.

Results: In 33 of 44 cases (75%), detectability was greater at STIR imaging than at T1- and T2WI, especially in fibrofatty or fatty breast (14/14 cases, $p < 0.05$). STIR images did not always differentiate between benign and malignant lesions, and extent (50%) and multifocality (46%) were commonly exaggerated compared with T1- and T2WI. In 18 of 44 cases (41%), STIR images suggested the presence of ductal structures.

Conclusion: For the detection of lesions, STIR imaging was more useful than T1- and T2WI, though STIR did not differentiate between benign and malignant lesions. The extent and multifocality of a lesion were exaggerated on STIR images, compared with T1- and T2WI.

Index words : Breast, magnetic resonance (MR)

Magnetic resonance (MR), pulse sequences

Magnetic resonance (MR), comparative studies

Address reprint requests to : Shin-Ho Kook, M.D., Department of Radiology, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine, 108 Pyung-dong, Jongro-gu, Seoul 110-746, Korea.
Tel. 82-2-2001-2335 Fax. 82-2-2001-1030 E-mail: kook3@samsung.co.kr