

: T2 1

(amygdala) 가 (hippocampus)  
T2  
(fluid-attenuated inversion recovery, FLAIR)  
T2 : 10 FLAIR 17 20  
coronal) . MR (oblique  
가

가  
: 10 FLAIR T2  
20  
FLAIR 93%, T2 43% . FLAIR  
T2  
FLAIR 90%, T2 80%  
80%  
85%  
FLAIR  
T2  
FLAIR T2  
MR

가 (mamillary body) (3, 4, 6).  
(hippocampal sclerosis) MR  
(mesial temporal sclerosis, MTS) (1-3), version recovery, FLAIR) 180  
(hippocampal formation) (cornu ammo-  
nis) (pyramidal cell layers) (dentate FLAIR  
gyrus) (gliosis) (neuronal loss) Jack (1) Meiners (7) FLAIR  
(1, 4).  
MR  
T2  
가 (1, 3-5),  
(temporal horn) (fornix) 가  
FLAIR  
T2

:  
 T2 FLAIR  
 24  
 19  
 FLAIR T2  
 2  
 10 , 7 , 17 (10-  
 42 , 19 )  
 10  
 (lateralization)  
 가  
 (temporo-parietal lobe)  
 가  
 14  
 3  
 1  
 1  
 1.5T (Philips Gyroscan ACS-NT,  
 Amsterdam, Netherlands)  
 (TR/TE = 3200-3500 msec/100msec, matrix size = 255/256, s-  
 lice thickness/gap = 5.0mm/0.5mm, FOV = 230mm) FLAIR  
 (TR/TE/TI = 6000 msec/130 msec/1900msec, matrix size =  
 191/256, slice thickness/ gap = 5.0mm/0.5mm, FOV = 230mm)  
 coronal) (oblique

T2 FLAIR  
 10 (100%) FLAIR  
 T2 (Fig. 1).  
 14  
 FLAIR  
 A 13 (93%), B 14 (100%)  
 T2 A 6 (43%), B  
 5 (36%) , 3 6  
 FLAIR A 5 (83%), B 5  
 (83%) , T2 A B  
 가 3 (50%) . 20 FLAIR  
 A 18 (90%) B  
 19 (95%) 9 (45%) 8 (40%)  
 T2  
 (Table 1). FLAIR  
 T2  
 FLAIR 18  
 (90%) , T2 16 (80%)  
 가  
 가

Table 1. Detection Rates of High Signal Intensity in Hippocampus or Amygdala on Mesial Temporal Sclerosis  
 (n= 20)

	FLAIR	T2WI (TSE)
Radiologist 1	18(90%)	9(45%)
Radiologist 2	19(95%)	8(40%)
Mean	93%	43%

FLAIR : fluid attenuated inversion recovery  
 TSE : turbo spin echo

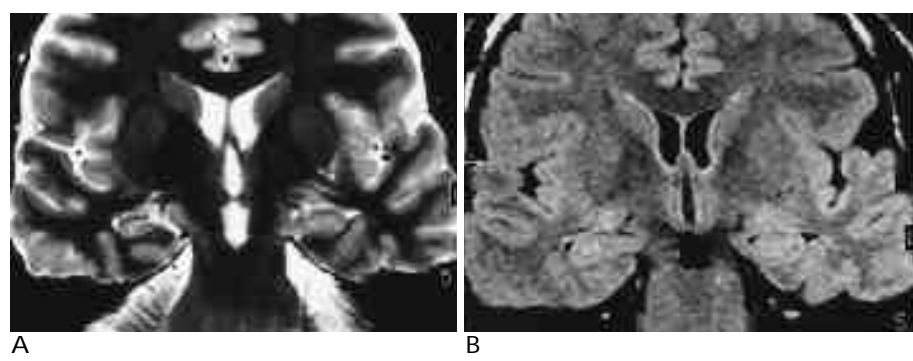


Fig. 1. Normal control.  
 A. T2-weighted oblique coronal image shows normal signal intensity in both hippocampi.  
 B. FLAIR oblique coronal image also shows normal signal intensity in both hippocampi identical or slightly higher in signal intensity as compared with adjacent temporal cortex.

FLAIR  
A 16 (80%), B 17 (85%)  
(Fig. 2, 3).  
가 A 4 (20%), B  
3 (15%) (Fig. 4).  
T2 FLAIR

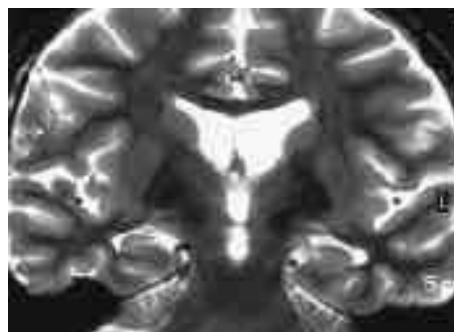
(Table 2).

FLAIR

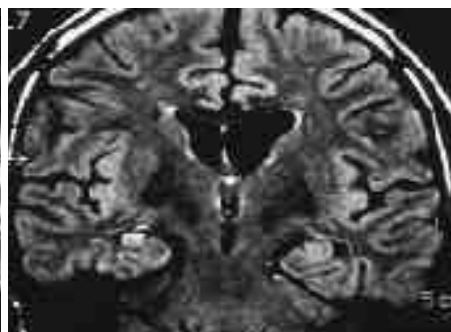
Table 2. Radiologist Preference for Detecting High Signal Intensity in Hippocampus or Amygdala

	FLAIR> TSE	FLAIR= TSE	FLAIR< TSE
Radiologist 1	16(80%)	4(20%)	0
Radiologist 2	17(85%)	3(15%)	0

FLAIR> TSE : FLAIR is better in diagnosis of mesial temporal sclerosis than TSE(turbo spin echo).

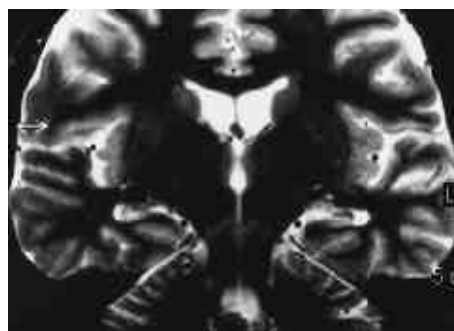


A

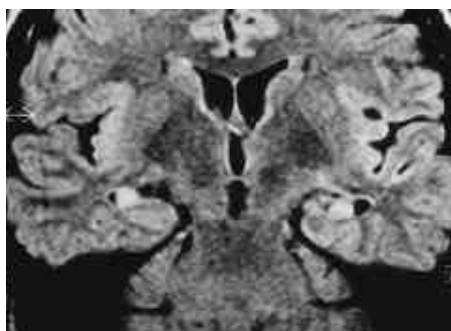


B

Fig. 2. Right mesial temporal sclerosis.  
A. T2-weighted oblique coronal image shows normal signal intensity in both hippocampi.  
B. FLAIR oblique coronal image shows high signal intensity in the right hippocampus which is more distinct in signal intensity than adjacent temporal cortex.



A

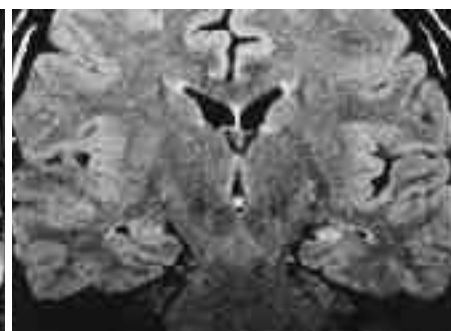


B

Fig. 3. Both mesial temporal sclerosis.  
A. T2-weighted oblique coronal image reveals high signal intensity in both hippocampi.  
B. FLAIR oblique coronal image reveals more distinct high signal intensity in both hippocampi than does T2-weighted image.



A



B

Fig. 4. Left mesial temporal sclerosis.  
A. T2-weighted oblique coronal image shows high signal intensity in the left hippocampus.  
B. FLAIR oblique coronal image also shows the same degree of high signal intensity as T2-weighted image.

2  
1 (Fig. 5).

가

1950

(1,2)

(selective amygdalohippocam-  
pectomy)  
(epileptogenic focus)

(mesiotemporal region)

(8). 1880 Sommer (3)

(mesial temporal sclerosis, MTS)

가

(1-8)

50-70%

(9,10).

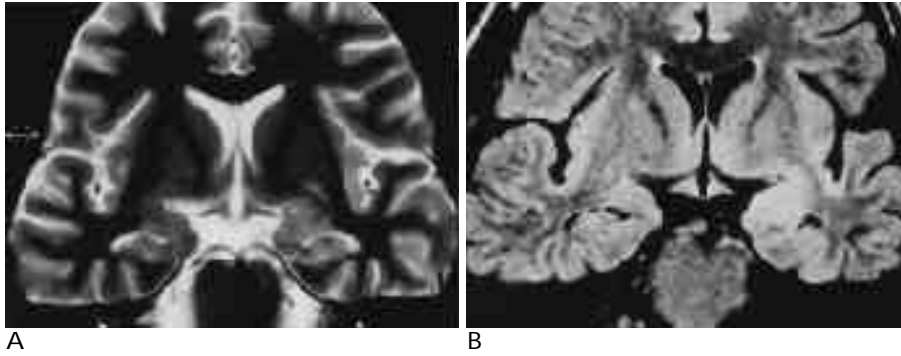


Fig. 5. Left mesial temporal sclerosis with abnormal signal intensity in the amygdala.

A. T2-weighted oblique coronal image reveals normal signal intensity in the left amygdala.

B. FLAIR oblique coronal image reveals high signal intensity in the left amygdala.

CA1 (Sommer ) (6), MR  
(11).  
Serrano (12) (13)  
(3),  
MR hippocampal relaxometry, MR hippocampal  
volumetrics  
T2 MR  
hippocampal relaxometry Kuzniecky (19) MTS  
79% 가  
T2 가  
가  
(amygdala, entorhinal cortex, (3). Jack (3) MR hippocampal volumetrics  
parahippocampal gyrus) 87% 100% 가  
(1, 10, 14).  
10% 가  
50% 가  
가 (10,15). 90 180  
50-75% 가  
(10,16). FLAIR  
MR (1,3,22-28). Jack (1)  
(6), (single photon e- T2 T2  
mission computed tomography, SPECT) T2  
(positron emission tomography, PET) (3,4). FLAIR  
MR (17), 가 28). Jack (1) T2  
(8). SPECT 가 tive) (true negative) 가  
66% T2 91%, FLAIR  
(18), 18F fluorodeoxyglucose(18FDG) PET 97% Meiners (7) T2  
84% 86% 57-97%, FLAIR 83-100%  
(seizure focus) FLAIR 가  
(3). T2 Jack (1)  
MR T2

가

FLAIR T2 (1)

T2 FLAIR

T2 (1).

T2 가

FLAIR

(contrast to noise ratio, CNR)가

FLAIR (1).

(basal cistern) (choroid fissure)

(1,29,30).

T2

, FLAIR

가

(1).

FLAIR

T2

FLAIR

(ependymal surface)

(heterotopia)

가

(1,27).

가

가

FLAIR T2

가 T2

가

FLAIR T2

가

FLAIR

T2

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## Usefulness of Fluid Attenuated Inversion Recovery(FLAIR) Image in Mesial Temporal Sclerosis : Comparison with Turbo Spin-Echo T2-Weighted Image<sup>1</sup>

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**Purpose :** To determine the usefulness of fluid attenuated inversion recovery(FLAIR) imaging for the in detection of high signal intensity of hippocampus or amygdala in mesial temporal sclerosis (MTS), compared with that of turbo spin-echo T2-weighted imaging.

**Materials and Methods :** Two neuroradiologists independently analyzed randomly mixed MR images of 20 lesions of 17 patients in whom MTS had been diagnosed, and ten normal controls. All subjects underwent both who performed both FLAIR and turbo spin-echo T2-weighted imaging, in a blind fashion. In order to determine hippocampal morphology, oblique coronal images perpendicular to the long axis of the hippocampus were obtained. The detection rate of high signal intensity in hippocampus or amygdala, the radiologists' preferred imaging sequence, and intersubject consistency of detection were evaluated. Signal intensity in hippocampus or amygdala was considered high if substantially higher than signal intensity in the cortex of adjacent temporo-parietal lobe.

**Results :** In all normal controls, FLAIR and spin-echo T2-weighted images showed normal signal intensity in hippocampus or amygdala. In MTS, the mean detection rate of high signal intensity in hippocampus or amygdala, as seen on FLAIR images was 93%, compared with 43% on spin-echo T2-weighted images. In all cases in which signal intensity on FLAIR images was normal, signal intensity on spin-echo T2-weighted images was also normal. The radiologists preferred the contrast properties of FLAIR to those of spin-echo T2-weighted images.

**Conclusion :** In the diagnosis of MTS using MRI, FLAIR images are more useful for the detection of high signal intensity of hippocampus or amygdala than are spin-echo T2-weighted images. In the diagnosis of MTS, FLAIR imaging is therefore a suitable alternative to spin-echo T2-weighted imaging.

**Index words :** Brain, diseases

Brain, MR

Magnetic resonance (MR), pulse sequences

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