



:
 : 29
 11 (8 , 3)
 1.5T echo planar imaging(EPI)
 EPI 1
 4 60
 : 11 가
 11 3 가
 11 10
 (p<0.05) (r=0.81)가
 :
 ,
 , 가 PWI PWI
 (magnetic resonance , PWI 가 ,
 image, MRI) 가
 (diffusion - weighted image, DWI)
 가
 , 가 . DWI
 가 (perfu -
 sion - weighted image, PWI) 11
 DWI PWI
 8 , 3 58 (25 - 80
 가 (1 - 5).) 29
 , (7 - 50) (Table 1).
 가 PWI (6 - 7), 1.5T MRI (Signa Horizon, GE
 Medical Systems, Milwaukee, WI, U.S.A.) bird cage
 . DWI echo planar imag -
 ing(EPI) x, y, z

1

2

2001 11 30 2002 1 22

가 . DWI Milwaukee, WI, U.S.A.) 가 1

TR/TE 10000/96 msec, 128 × 128, 21 - 28 cm, b 1000 sec/mm², 5 mm

DWI 가

4 , PWI (relative cerebral blood volume ratio, rCBV ratio)

. PWI EPI , (relative cerebral blood volume map, rCBV map)

TR/TE 2000/60 msec, 90 °

128 × 128, 24 cm, 5 mm

. 1 kg 0.02 mmol gadolinium(Gd - DTPA)

가 (power - injector) (2 ml/sec)

60 , 240 120

PWI Advantage Windows Workstation(AW 2.0; GE Medical Systems, Milwaukee, WI, U.S.A.)

FuncTool (GE Medical Sys - tems, $S_t = S_0 e^{-TE/T2^*}$ [1]

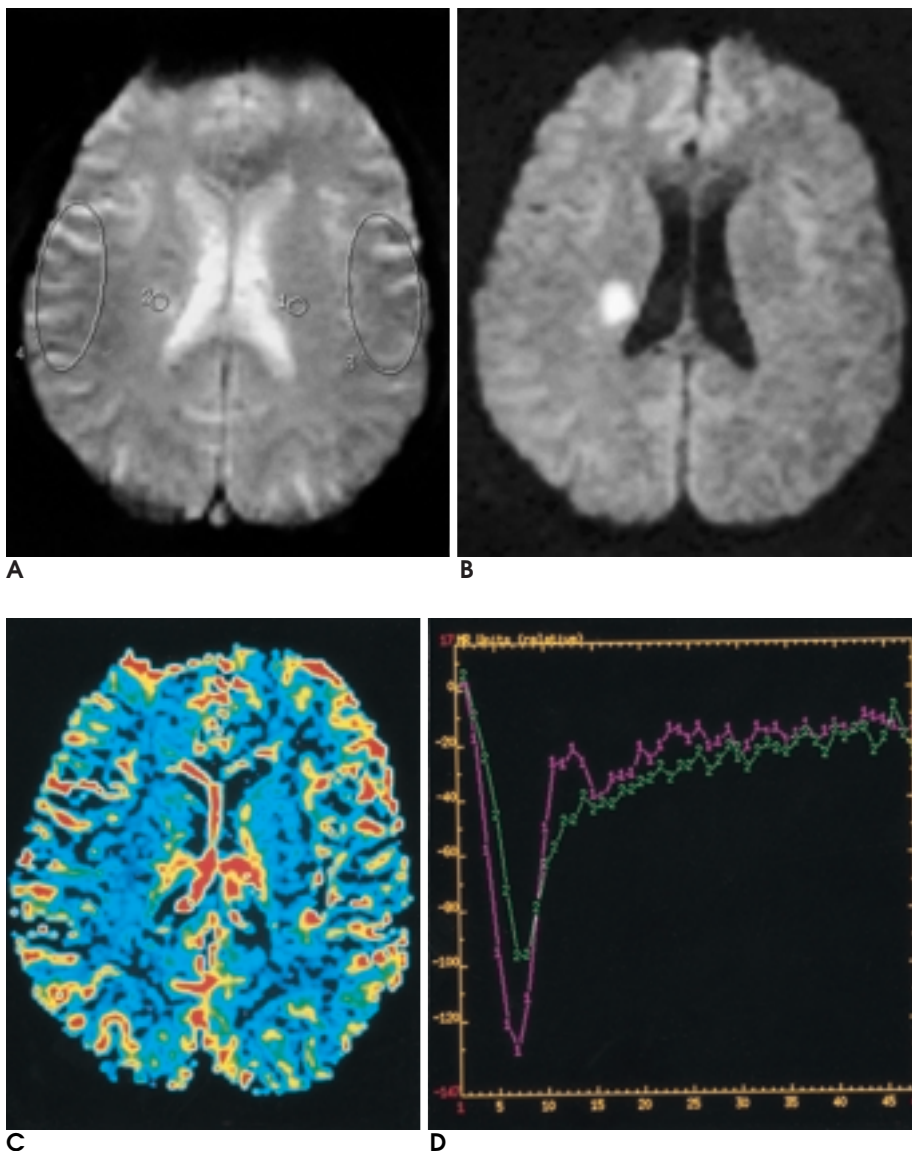


Fig. 1. 49-year-old man with dysarthria (case 1). T2*-weighted image(A) and DWI(B) shows infarcted lesion in right basal ganglia. rCBV map(C) shows decreased perfusion area in right basal ganglia, and time-intensity curve(D) reveals decreased perfusion on lesion(number 2), as comparison to that on contralateral region(number 1). Calculated rCBV ratio of lesion is 0.73.

$$R2^* = 1/T2^* = -\ln(S_t/S_0)$$

[2]

rCBV ratio

가

[3]

National Institute of Health Stroke Scale(NIHSS)

가

$$rCBV = R2^*dt$$

[3]

NIHSS

rCBV ratio

(6).

2

가
가

DWI rCBV map

, 2

DWI

11

3 cm

, rCBV map

DWI

. DWI rCBV map

가

3 (27%)

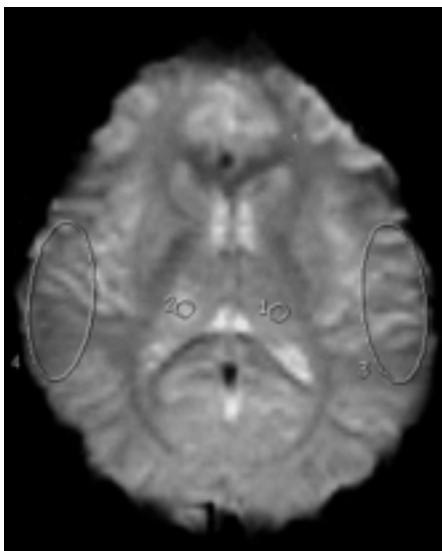
(Fig. 1).

8 rCBV map

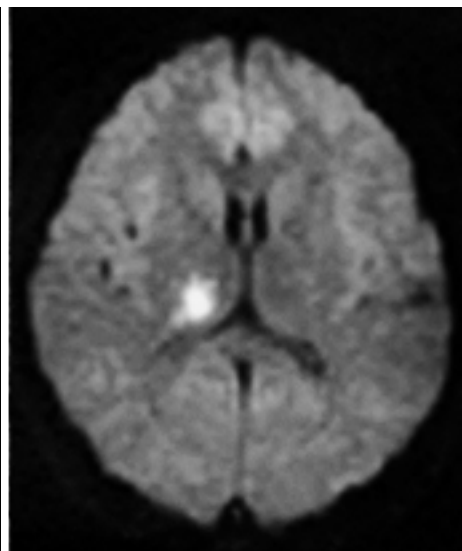
, DWI

DWI

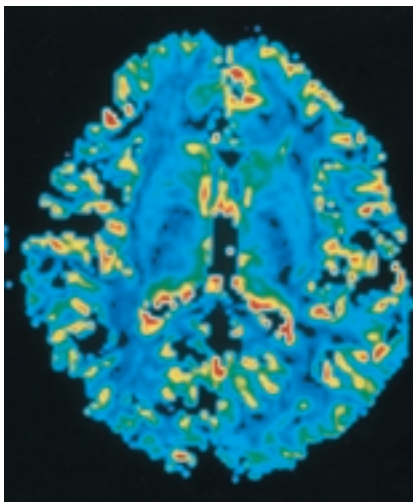
DWI



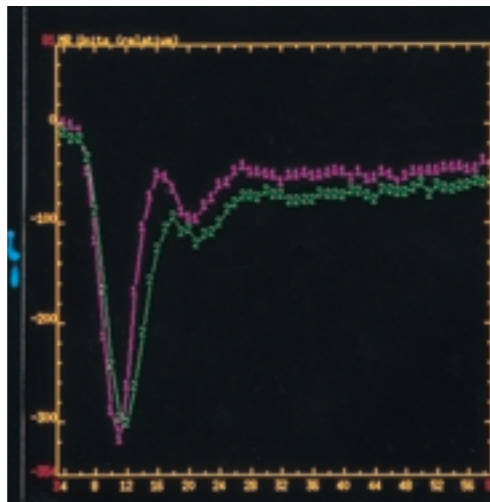
A



B



C



D

Fig. 2. 25-year-old woman with left hypoesthesia (case 8).

T2*-weighted image(A) and DWI(B) shows infarcted lesion in right thalamus. rCBV map(C) fails to show decreased perfusion area, but time-intensity curve(D) reveals decreased perfusion on lesion (number 2), as comparison to that on contralateral region (number 1). Calculated rCBV ratio of lesion is 0.94.

DWI rCBV map 가 8
10
(Fig. 2), 1 (Case 11)
rCBV ratio가 1.05 가
가 .
Table 1 11 PWI
rCBV ratio
T2*
가
NIHSS
NIHSS
NIHSS 가 가
(6).
T2 T2*
NIHSS NIHSS (95% T2*
NIHSS) rCBV ratio (y=0.0577x+0.7762)
1 (r) 0.81
가 (Fig. 3).

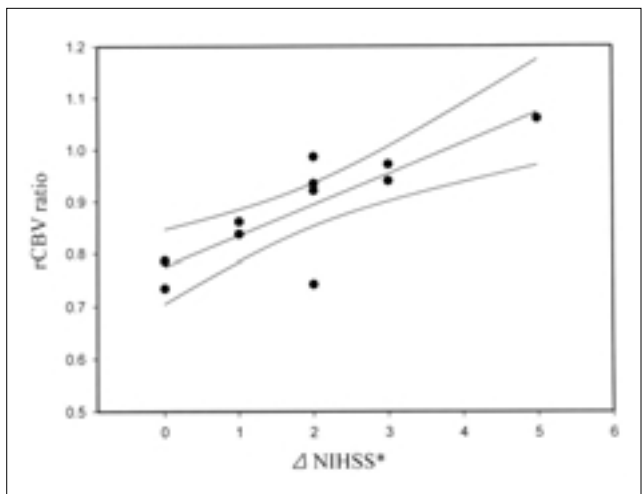


Fig. 3. Scatter diagram shows a regression line with 95% confidence band, demonstrating the linear relationship($r=0.81$) between the rCBV ratio of lesion and NIHSS score.

* NIHSS=Initial NIHSS score at arrival-NIHSS score at discharge

Table 1. Summary of Patients with Lacunar Infarction

Case No.	Age/Sex	Symptom	Delay time to PWI(hours)	rCBV ratio (lesion/normal)	Initial NIHSS Score at Arrival	NIHSS Score at Discharge
1	49/M	Dysarthria	33	0.73	1	1
2	54/M	Right hemiparesis	18	0.74	5	3
3	69/F	Dysarthria	9	0.79	1	1
4	38/M	Dysarthria	40	0.84	2	1
5	74/M	Left hemiparesis	48	0.86	3	2
6	62/M	Left hemiparesis	41	0.92	4	2
7	80/M	Left hemiparesis	45	0.93	4	2
8	25/F	Left hypoesthesia	50	0.94	4	1
9	65/M	Left hemiparesis	7	0.97	8	5
10	59/M	Right hemiparesis	16	0.98	6	4
11	58/F	Left hemiparesis	27	1.05	5	0

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Diagnosis and Prediction of Clinical Outcomes in Patients with Acute Lacunar Infarction: Usefulness of Perfusion MR Imaging¹

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Purpose: To correlate the findings of perfusion-weighted imaging (PWI) with clinical outcomes in patients with acute lacunar infarction.

Materials and Methods: Eleven patients (7 males and 4 females) with acute lacunar infarction who were examined within 50 (mean, 29) hours of the onset of symptoms underwent conventional MRI, diffusion-weighted imaging (DWI) and PWI. Gadolinium (0.2 mmol/kg) was injected at a rate of 2 ml/sec, and PWI was performed using a gradient-echo EPI pulse sequence and the following parameters: TR/TE, 2000/60; flip angle, 90 °; matrix size, 128 × 128. Relative cerebral blood volume (rCBV) maps were derived from gadolinium bolus perfusion-weighted images where rCBV ratios between infarcted areas were detected by DWI, and contralateral control areas were obtained. In each case, the resulting rCBV ratio at a lesion site was compared with the clinical outcome determined on the basis of the difference between National Institute Health Stroke Scale (NIHSS) scores at admission and discharge.

Results: With the aid of the time-intensity curve obtained at PWI, the rCBV maps revealed a hypoperfused area in 10 of 11 patients, and there was positive correlation ($r = 0.81$) with clinical outcome.

Conclusion: Although PWI has a lower detection rate than DWI, it may be a useful modality for helping determine prognosis in cases of acute lacunar infarction.

Index words : Brain, infarction

Brain, blood flow

Brain, MR

Magnetic resonance (MR), perfusion study

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