

: , , ,
 : 12
 12 , ,
 : 12 9 , 6 , 3
 (corpus callosum) 3 , (thalamus) 2 , (midbrain) 2 6
 (inferior temporal gyrus) 2 , (cingulate gyrus) 1 , (precentral gyrus) 1
 , (hippocampal gyrus) 1 , (parahippocampal gyrus) 1
 3 (centrum semiovale) 2 , (periventricular white
 matter) 1 . (9), (2), (2), (2)
 T1 ,
 T2 . (1), (1) (1)
 T1 , T2
 (1) (1)
 . 2
 : (, , ,)
 , 가
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 가
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CT

(globus pallidus) (white matter) ,
 (1-3), (cor- 1990 12 1998 6
 tex), (hippocampus) (2). 12 12
 , , , 80 47.1 . 가 20
 , 가
 , COHb(carboxyhemoglobin)
 . 10

:
 1 . 3 (centrum semiovale) 2 , 1
 5 , 3 , 1 , (9), (2), (2) (2)
 2 가 (Fig. 1, 2, 4).
 1.0 T T1 T2 (Fig. 1-4).
 (Shimadzu, Kyoto, Japan) T1 T2 3 ,
 T2 , 1 (Table 1), T1 , T2
 , , , 4). 가 66
 (Fig. 3) ,
 가 80 (Fig. 4C)
 12 9 , 6 , 3
 (corpus callosum) 3 , (thalamus) 2 ,
 , (midbrain) 2 . 6 , (disorientation) (s-
 (inferior temporal gyrus) 2 , (cingulate gyrus) 1 pastic gait) . 2
 , (precentral gyrus) 1 , 1 , , ,
 (parahippocampal gyrus) 1 , (confusion) (Table 1).

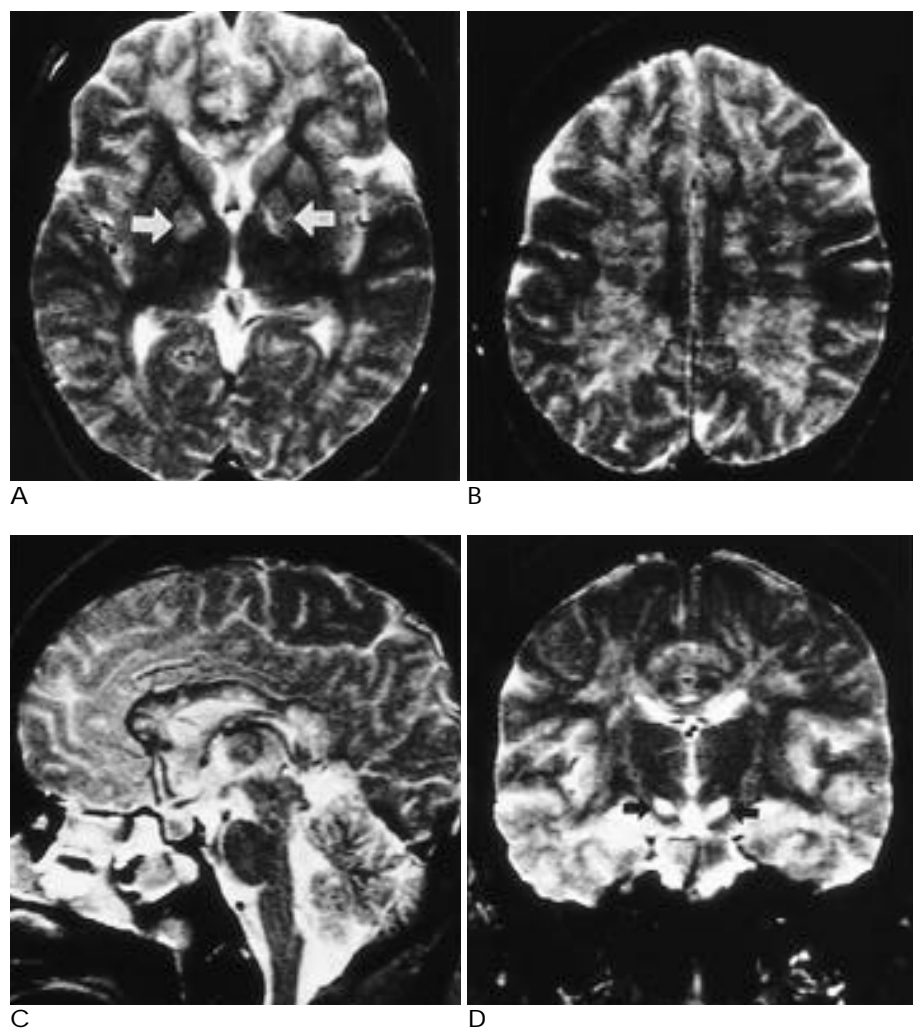


Fig. 1. 22-years-old woman with coma-
 tous mentality.
 A.B. Spin echo axial T2WIs show bilat-
 eral symmetric focal high signal lesions
 in both globus pallidi(A, white arrows),
 and diffuse high signal alteration in
 both centrum semiovales(B).
 C.D. Spin echo sagittal and coronal
 T2WIs show multifocal high signal le-
 sions in nearly entire corpus callo-
 sum(C), and bilateral symmetric focal
 high signal lesions in midbrain(D, ar-
 rows).

Table 1. Analysis of Acute Carbon Monoxide Intoxication(n= 12)

Age/Sex	P/Hx	Site	SI(T1/T2WI)	Hemorrhage	Infarction	Clinical outcome
23/M	Hepatitis	both globus pallidi	subtle low/high	-	-	good
36/M	-	both globus pallidi & both posteromedial thalami	subtle low/high	-	-	good
35/F	-	both globus pallidi & ant. body & splenium of corpus calosum	subtle low/high	-	-	good
20/F	-	both globus pallidi	low/high	-	-	good
74/F	HTN	both globus pallidi	low/high	-	-	good
54/F	HTN Seizure	both globus pallidi	low/high	-	-	delayed encephalopathy :memory disturbance, confusion & disorientation
66/M	HTN IHD	both thalami & midbrain	peripheral:low/high central:high/low	both thalami & midbrain :early subacute stage	both SCA territories	memory disturbance & gait disturbance
80/F	HTN	corpus callosum	low/high	-	right ACA territory	muscle weakness & slurred speech
71/F	CHF LC	both inferior temporal, parahippocampal & hippocampal gyri	low/high	-	-	good
23/F	-	both globus pallidi, left frontal white matter, left centrum semiovale & both inferior temporal gyri	low/high	-	-	memory disturbance & disorientation
22/F	-	both globus pallidi, midbrain, both centrum semiovale & corpus callosum	low/high	-	-	spastic gait & muscle weakness
61/M	HTN Hepatitis	both globus pallidi, left periventricular white matter, right cingulate gyrus & right precentral gyrus	peripheral:low/high central:high/low	both globus pallidi :early subacute stage	-	delayed encephalopathy :memory disturbance & gait disturbance

P/Hx:past history, SI:signal intensity, CHF:congestive heart disease, LC:liver cirrhosis, HTN:hypertension, IHD:ischemic heart disease, ACA:anterior cerebral artery, SCA:superior cerebellar artery

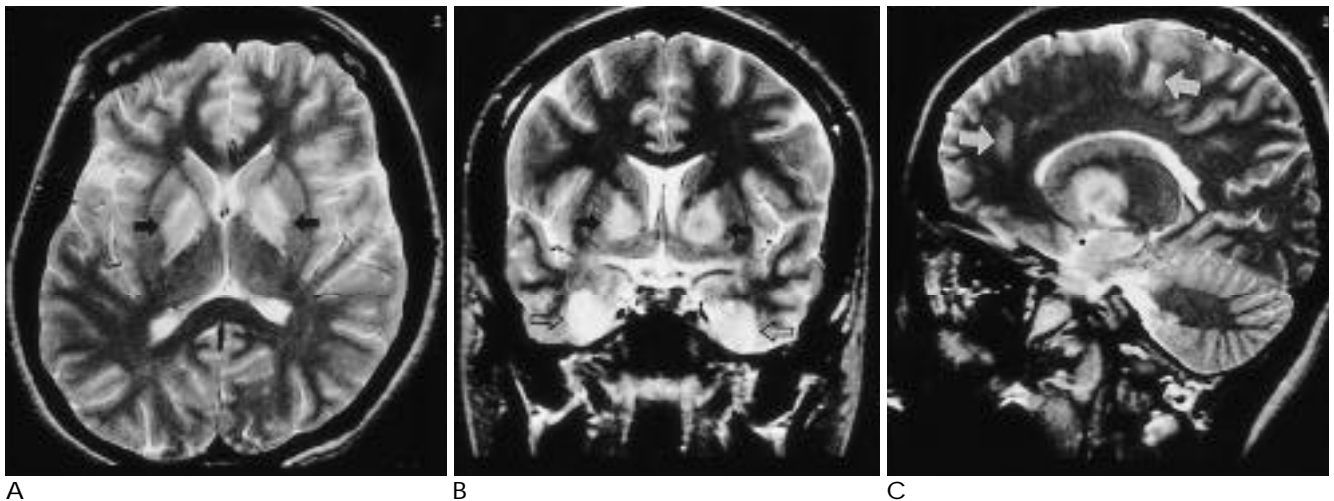


Fig. 2. 23-years-old woman with stuporous mentality.

A. B. C Spin echo axial, coronal, and sagittal T2WIs show bilateral symmetric oval shaped high signal lesions in both globus pallidi(A, B, arrows) and inferior temporal gyri(B, clear arrows), and focal high signal alteration in left frontal and parietal white matter(C, white arrows).

(spongy change), (degeneration), (neuron), (1,4-6). (putamen), (caudate nucleus), (1,2,7,8). (Fig. 1A, 2A), (Fig. 1B, 2C), { (Fig. 2B), (Fig. 1C, 3A), (Fig. 1D) (1-4). Zeiss (2) (Fig. 1A, 1D, 2A, 2B, 4A, 4B). T1WI (1), (necro- 가 T1WI PDWI T2WI (Fig. 1-4). sis), (demyelination),

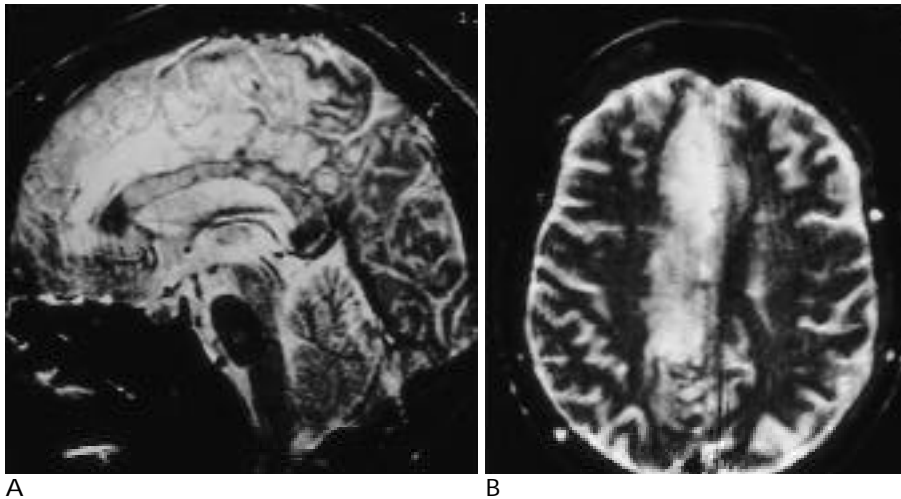


Fig. 3. 80-years-old woman with drowsy mentality and clinical history of hypertension.
A. Spin echo sagittal T2WI shows diffuse high signal lesions in right cingulate gyrus and frontoparietal lobe, and patchy high signal alteration in corpus callosal body with swelling.
B. Spin echo axial T2WI shows diffuse high signal alteration and gyral swelling of frontoparietal lobe corresponding to right anterior cerebral artery territory.

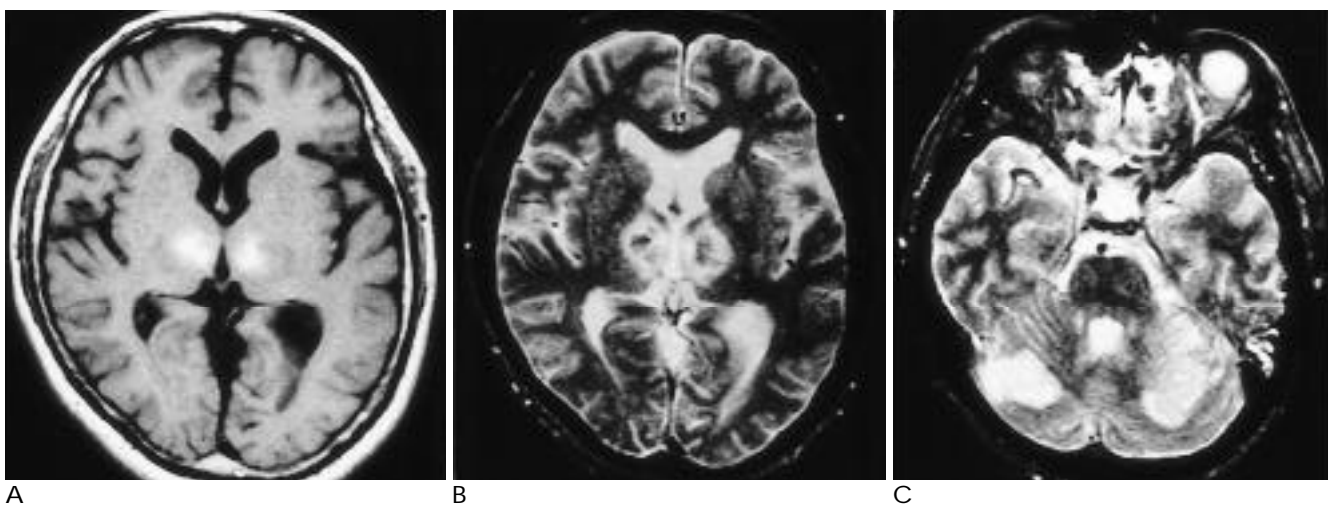


Fig. 4. 66-years-old man with drowsy mentality and clinical history of hypertension and ischemic heart disease.
A.B. Spin echo axial T1WI(A) and T2WI(B) show bilateral symmetric lesions with central high/low signal intensity portion due to hemorrhage of early subacute stage and peripheral low/high signal intensity portion on T1/T2WI in both thalami.
C. Spin echo axial T2WI show acute cerebellar infarctions with bilateral focal high signal lesions in both cerebellar hemispheres corresponding to both superior cerebellar artery territories.

가 12 가 6 가 ,
 가 ,
 가 COHb
 가
 , methanol (2,6) .
 , hydrogen sulfide , cyanide
 , barbiturate , Leigh (necrotizing encephalomyelopathy)
 , Huntington , Kearns-Sayre (3,4).
 250 (9). (4)
 3가 COHb
 (oxyhemoglobin)
 가 , 가 (1,2,12,13),
 cytochrome a3 (4,7).
 (hypoxemia)
 (hypoperfusion),
 가
 (1,3-
 5,10). 가 가 가 (가 , ,) ,
 가 - 가 가
 가 가 가
 9 가 가 (3). 12
 (1), (Fig.
 4)
 가 24 48
 (11).
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 (11).
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Acute Carbon Monoxide Intoxication: The Relation between MR Findings and Clinical Outcome¹

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Purpose: To analyse MR findings of various involving sites and the relation between such findings and clinical outcome, the authors retrospectively reviewed MR images of acute carbon monoxide intoxication.

Materials and Methods: In 12 patients, MR images obtained from several hours to 12 days after acute carbon monoxide intoxication were reviewed. The images were analysed with regard to involved sites, symmetry, signal intensity, and the presence or absence of hemorrhage, and the relationship between MR findings and clinical outcome; the presence of delayed encephalopathy was then determined.

Results: The globus pallidus(n= 9), white matter{(n= 3), [centrum semiovale(n= 2), periventricular white matter(n= 1)] and gyrus(n= 6) [inferior temporal gyrus(n= 2), cingulate gyrus(n= 1), precentral gyrus(n= 1), hippocampal gyrus(n= 1), parahippocampal gyrus(n= 1)] were typically involved, and there was also involvement of the corpus callosum(n= 3), thalamus(n= 2) and midbrain(n= 2). All lesions of the globus pallidus, thalamus, midbrain and temporal lobe were bilaterally symmetric. In all these cases, subtle or prominent low signal intensity was seen on spin-echo T1WI, and high signal intensity on PDWI and T2WI. Some lesions of the globus pallidus(n= 1), thalamus(n= 1) and midbrain(n= 1) were associated with hemorrhage, which occurred during the early subacute stage and was seen on high/low signal intensity T1/T2WI images. Acute cerebral(n= 1) and cerebellar(n= 1) infarctions were also seen. Cerebral white matter involvement correlated with poor clinical outcome, and in two cases, delayed encephalopathy developed.

Conclusion: In these cases of acute carbon monoxide intoxication, the globus pallidus, white matter, cortex and hippocampus were frequently involved, and there was also involvement of various sites such as the corpus callosum, thalamus and midbrain. Lesions of the temporal lobe, thalamus and midbrain were bilaterally symmetric. The involvement of cerebral white matter and the presence of delayed encephalopathy can influence clinical outcome.

Index words : Brain, MR
Carbon monoxide

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