

## XII. Head MRI Measurements

MRI was performed on a 1.5T Toshiba instrument (VISART). The scanning protocol included a series of axial T1-(TR500, TE15) and T2-weighted(TR4000, TE120) scans angled parallel to the anterior-posterior commissure line.

### 1) Periventricular hyperintensity

Divide into 4 classes according to Appendix 1.

### 2) Ventricular dilatation

Divided into 4 classes according to Appendix 3.

### 3) Brain atrophy

Divided into 4 classes according to Appendix 2.

### 4) Cerebrovascular disease

Cerebral infarction

Border zone

Include cerebral cortex

White matter

Basal ganglia, thalamus, internal capsule, midbrain, pons, medulla oblongata

Cerebellar white matter, cerebellar cortex

Decided as following.

Lacuna infarction: The lesions of white matter, basal ganglia, thalamus, internal capsule, midbrain, pons, medulla oblongata and whose size are larger than or equal to 3mm and smaller than or equal to 15mm.

Cerebral embolism: Include cerebral or cerebellar cortex, and which is not border zone infarction.

Cerebral thrombosis: Other than above.

Cerebral infarction was defined as all of lacuna infarction, cerebral embolism and thrombosis.

Cerebral hemorrhage

On T2 weighted image(WI), hyperintensity inside the lesion and no signal around the lesion. Or on T2WI no signal slit lesion.

Cerebrovascular diseases

Cerebrovascular diseases were defined as all of cerebral infarction and cerebral hemorrhage.

---

### References

Stroke 1994 vol25, p318-327

Naika 1997 vol79 (4)

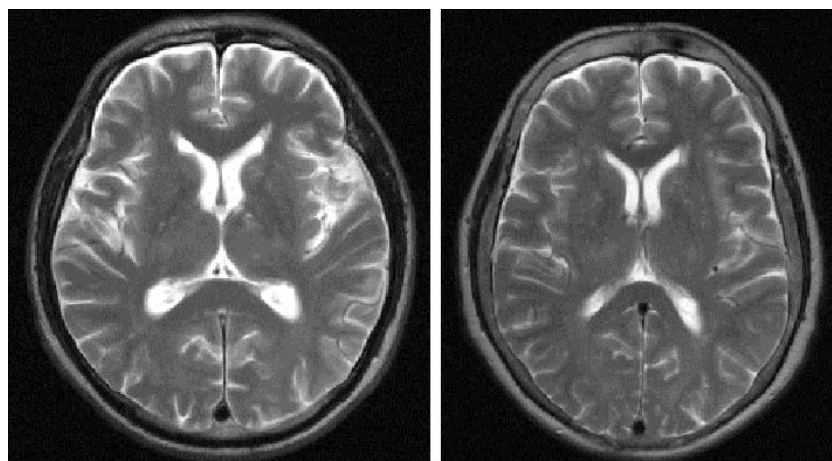
Nihon naika gakkaiishi 1997 vol86

Medicina 1994 vol31 (8)

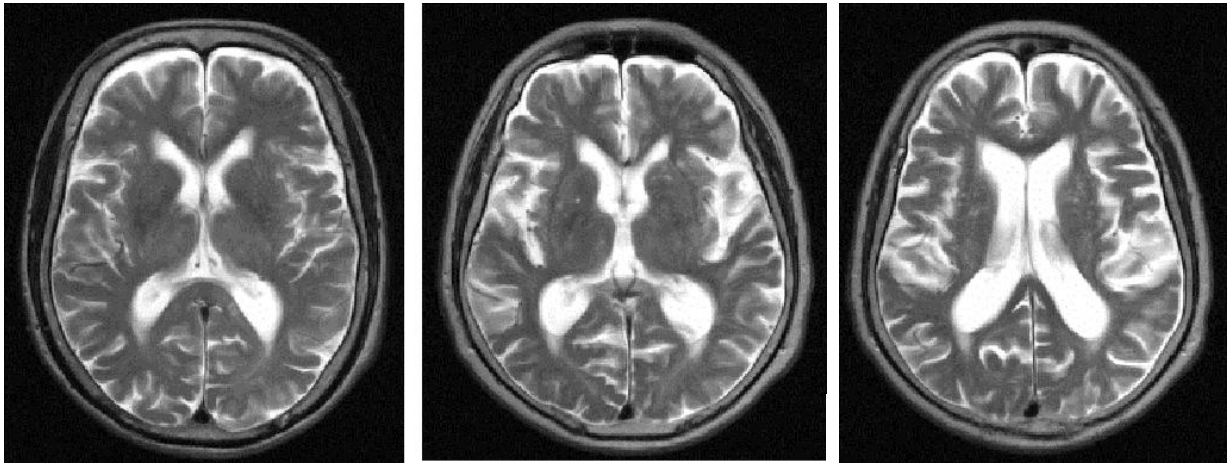
---

### Appendix 1: Periventricular hyperintensity

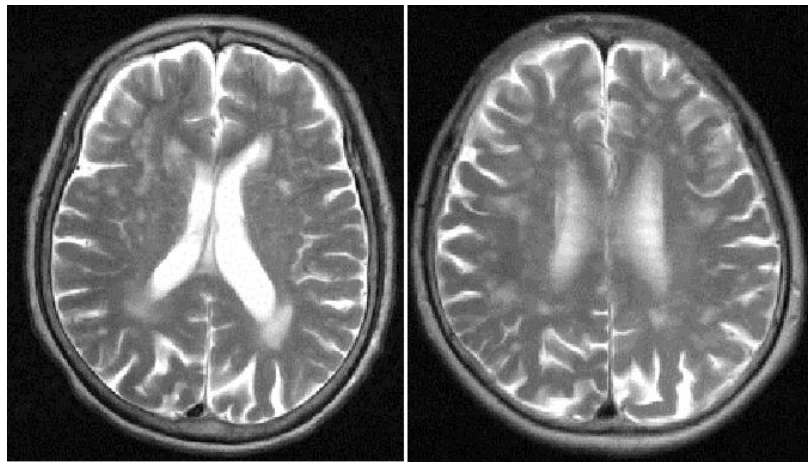
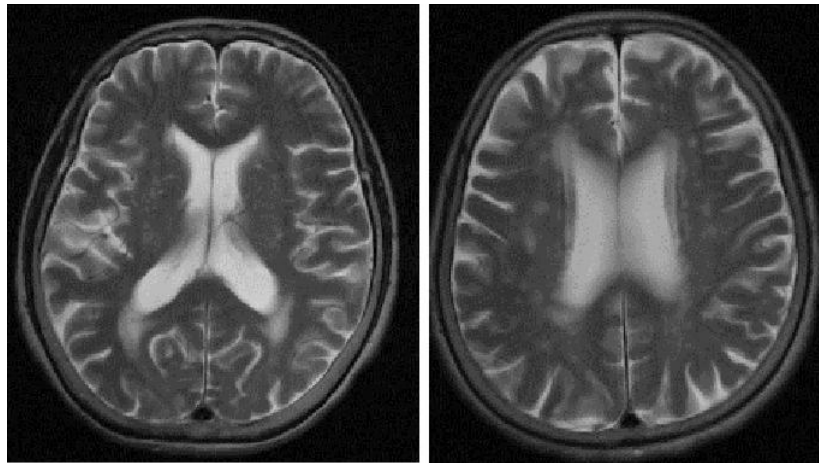
I. None: None or minimal periventricular signal hyperintensities in the form of caps only in the anterior horn of lateral ventricles.



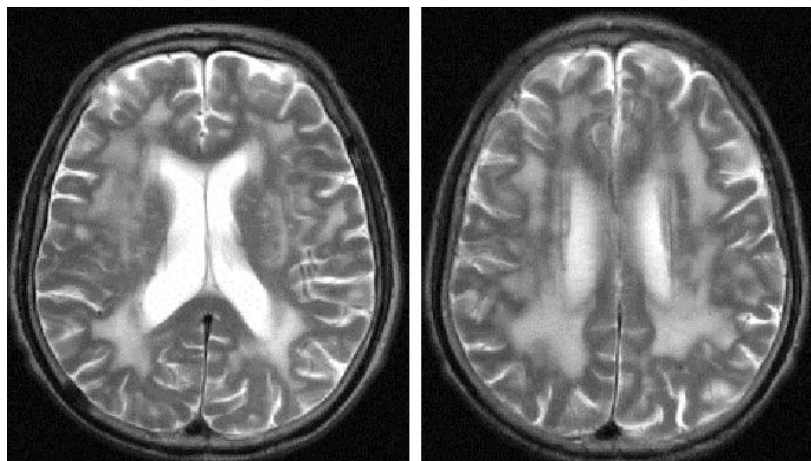
II. Mild: Caps in both anterior and posterior horns of lateral ventricles.



Moderate: Multifocal periventricular hyperintense punctuate lesions.

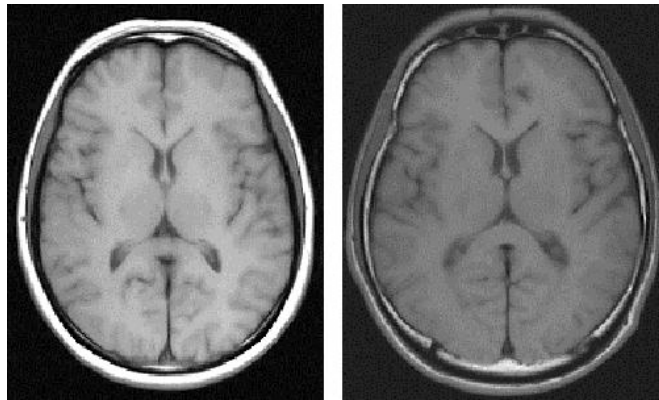


IV. Severe: Multiple high signal intensity area that reached confluency in the periventricular region and white matter.



## Appendix 2: Ventricular dilatation

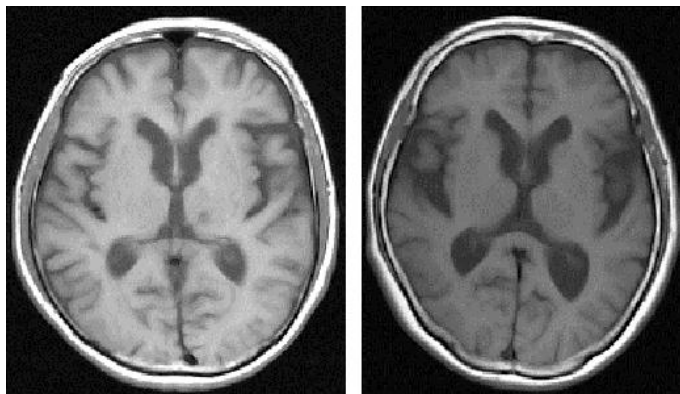
I. None



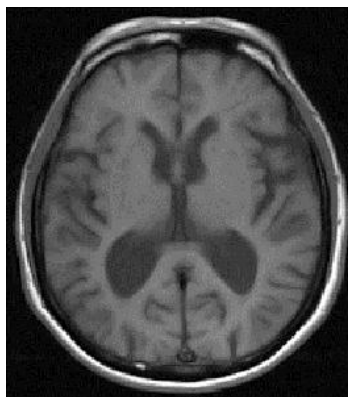
II. Mild



III. Moderate

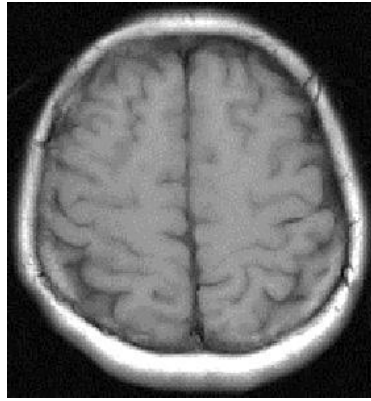


IV. Severe

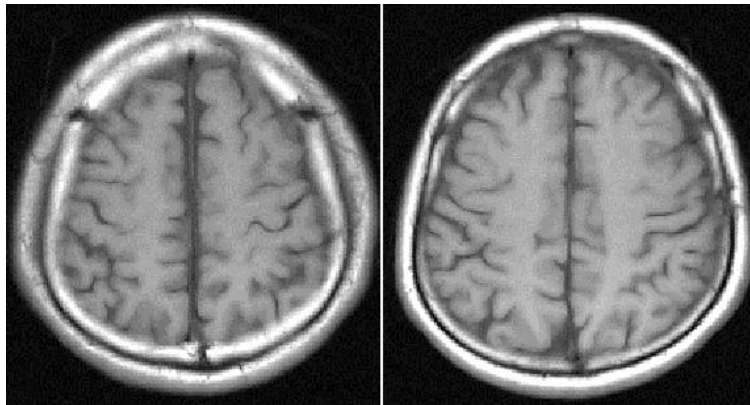


## Appendix 3: Brain atrophy

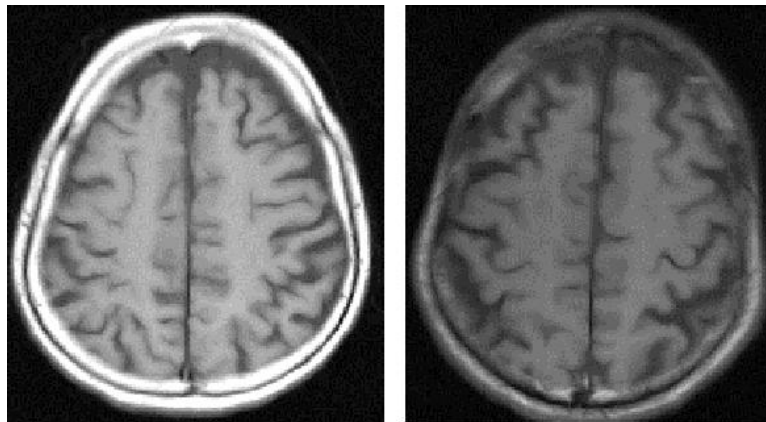
I. None



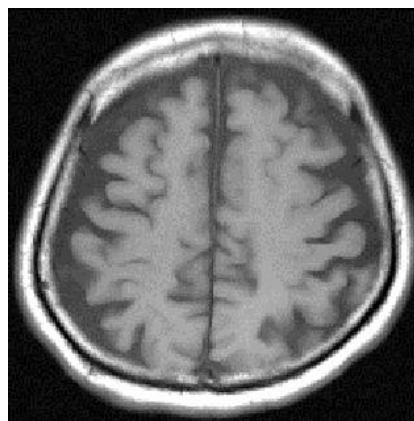
II. Mild



III. Moderate



IV. Severe



1) Periventricular hyperintensity (PVH)  
Periventricular hyperintensity (PVH)

---

40-49yr	50-59yr	60-69yr	70-79yr	80yr -	Total
---------	---------	---------	---------	--------	-------

		N	%	N	%	N	%	N	%	N	%	N	%
Not recorded	Male	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Female	0	0.0	1	0.4	0	0.0	1	0.4	0	0.0	2	0.2
	Total	0	0.0	1	0.2	0	0.0	2	0.4	0	0.0	3	0.1
None	Male	269	97.1	263	92.0	153	59.3	54	20.5	4	5.6	743	64.3
	Female	286	98.6	248	90.2	182	65.2	94	34.7	8	9.5	818	68.2
	Total	555	97.9	511	91.1	335	62.4	148	27.7	12	7.7	1561	66.3
Mild	Male	8	2.9	22	7.7	94	36.4	151	57.4	32	45.1	307	26.6
	Female	4	1.4	23	8.4	88	31.5	125	46.1	41	48.8	281	23.4
	Total	12	2.1	45	8.0	182	33.9	276	51.7	73	47.1	588	25.0
Moderate	Male	0	0.0	1	0.3	11	4.3	54	20.5	34	47.9	100	8.7
	Female	0	0.0	3	1.1	9	3.2	47	17.3	32	38.1	91	7.6
	Total	0	0.0	4	0.7	20	3.7	101	18.9	66	42.6	191	8.1
Severe	Male	0	0.0	0	0.0	0	0.0	3	1.1	1	1.4	4	0.3
	Female	0	0.0	0	0.0	0	0.0	4	1.5	3	3.6	7	0.6
	Total	0	0.0	0	0.0	0	0.0	7	1.3	4	2.6	11	0.5

## 2) Ventricular dilatation

### Ventricular dilatation

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
None	Male	256	92.4	218	76.2	122	47.3	42	16.0	4	5.6	642	55.6
	Female	279	96.2	259	94.2	206	73.8	101	37.3	7	8.3	852	71.1
	Total	535	94.4	477	85.0	328	61.1	143	26.8	11	7.1	1494	63.5
Mild	Male	18	6.5	68	23.8	126	48.8	157	59.7	32	45.1	401	34.7
	Female	10	3.4	16	5.8	70	25.1	141	52.0	55	65.5	292	24.4
	Total	28	4.9	84	15.0	196	36.5	298	55.8	87	56.1	693	29.4
Moderate	Male	3	1.1	0	0.0	10	3.9	61	23.2	33	46.5	107	9.3
	Female	1	0.3	0	0.0	3	1.1	28	10.3	22	26.2	54	4.5
	Total	4	0.7	0	0.0	13	2.4	89	16.7	55	35.5	161	6.8
Severe	Male	0	0.0	0	0.0	0	0.0	3	1.1	2	2.8	5	0.4
	Female	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Total	0	0.0	0	0.0	0	0.0	4	0.7	2	1.3	6	0.3

## 3) Brain atrophy

### Brain atrophy

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
None	Male	270	97.5	256	89.5	191	74.0	91	34.6	8	11.3	816	70.6
	Female	289	99.7	271	98.5	256	91.8	195	72.0	39	46.4	1050	87.6
	Total	559	98.6	527	93.9	447	83.2	286	53.6	47	30.3	1866	79.3
Mild	Male	7	2.5	29	10.1	67	26.0	149	56.7	43	60.6	295	25.5
	Female	1	0.3	4	1.5	23	8.2	71	26.2	41	48.8	140	11.7
	Total	8	1.4	33	5.9	90	16.8	220	41.2	84	54.2	435	18.5
Moderate	Male	0	0.0	1	0.3	0	0.0	22	8.4	20	28.2	43	3.7
	Female	0	0.0	0	0.0	0	0.0	5	1.8	4	4.8	9	0.8
	Total	0	0.0	1	0.2	0	0.0	27	5.1	24	15.5	52	2.2
Severe	Male	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	1	0.1
	Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0	1	0.0

## 4) Cerebrovascular disease (CVD)

## Lacuna infarction

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Not recorded	Male	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Female	0	0.0	1	0.4	0	0.0	1	0.4	0	0.0	2	0.2
	Total	0	0.0	1	0.2	0	0.0	1	0.2	0	0.0	2	0.1
None	Male	272	98.2	263	92.0	188	72.9	122	46.4	24	33.8	869	75.2
	Female	288	99.3	261	94.9	222	79.6	164	60.5	27	32.1	962	80.2
	Total	560	98.8	524	93.4	410	76.4	286	53.6	51	32.9	1831	77.8
Single lacuna	Male	4	1.4	13	4.5	40	15.5	45	17.1	7	9.9	109	9.4
	Female	1	0.3	11	4.0	35	12.5	37	13.7	17	20.2	101	8.4
	Total	5	0.9	24	4.3	75	14.0	82	15.4	24	15.5	210	8.9
Multiple lacuna	Male	1	0.4	10	3.5	30	11.6	96	36.5	40	56.3	177	15.3
	Female	1	0.3	2	0.7	22	7.9	69	25.5	40	47.6	134	11.2
	Total	2	0.4	12	2.1	52	9.7	165	30.9	80	51.6	311	13.2

## Cerebral embolism

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Not recorded	Male	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Female	0	0.0	1	0.4	0	0.0	1	0.4	0	0.0	2	0.2
	Total	0	0.0	1	0.2	0	0.0	1	0.2	0	0.0	2	0.1
Embolic (-)	Male	277	100.0	286	100.0	254	98.4	252	95.8	64	90.1	1133	98.1
	Female	289	99.7	274	99.6	277	99.3	264	97.4	80	95.2	1184	98.7
	Total	566	99.8	560	99.8	531	98.9	516	96.6	144	92.9	2317	98.4
Embolic (+)	Male	0	0.0	0	0.0	4	1.6	11	4.2	7	9.9	22	1.9
	Female	1	0.3	0	0.0	2	0.7	6	2.2	4	4.8	13	1.1
	Total	1	0.2	0	0.0	6	1.1	17	3.2	11	7.1	35	1.5

## Cerebral thrombosis

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Not recorded	Male	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Female	0	0.0	1	0.4	0	0.0	1	0.4	0	0.0	2	0.2
	Total	0	0.0	1	0.2	0	0.0	1	0.2	0	0.0	2	0.1
Thrombosis (-)	Male	274	98.9	284	99.3	255	98.8	252	95.8	65	91.5	1130	97.8
	Female	290	100.0	273	99.3	271	97.1	264	97.4	82	97.6	1180	98.4
	Total	564	99.5	557	99.3	526	98.0	516	96.6	147	94.8	2310	98.1
Thrombosis (+)	Male	3	1.1	2	0.7	3	1.2	11	4.2	6	8.5	25	2.2
	Female	0	0.0	1	0.4	8	2.9	6	2.2	2	2.4	17	1.4
	Total	3	0.5	3	0.5	11	2.0	17	3.2	8	5.2	42	1.8

## Cerebral infarction

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Not recorded	Male	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	1	0.1
	Female	0	0.0	1	0.4	0	0.0	1	0.4	0	0.0	2	0.2

	Total	0	0.0	1	0.2	1	0.2	1	0.2	0	0.0	3	0.1
Infarction (-)	Male	269	97.1	261	91.3	183	70.9	116	44.1	24	33.8	853	73.9
	Female	287	99.0	260	94.5	217	77.8	160	59.0	25	29.8	949	79.1
	Total	556	98.1	521	92.9	400	74.5	276	51.7	49	31.6	1802	76.6
Infarction (+)	Male	8	2.9	25	8.7	74	28.7	147	55.9	47	66.2	301	26.1
	Female	3	1.0	14	5.1	62	22.2	110	40.6	59	70.2	248	20.7
	Total	11	1.9	39	7.0	136	25.3	257	48.1	106	68.4	549	23.3

#### Cerebral hemorrhage

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Not recorded	Male	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Female	0	0.0	1	0.4	0	0.0	1	0.4	0	0.0	2	0.2
	Total	0	0.0	1	0.2	0	0.0	1	0.2	0	0.0	2	0.1
Hemorrhage (-)	Male	276	99.6	286	100.0	257	99.6	263	100.0	71	100.0	1153	99.8
	Female	290	100.0	274	99.6	279	100.0	270	99.6	84	100.0	1197	99.8
	Total	566	99.8	560	99.8	536	99.8	533	99.8	155	100.0	2350	99.8
Hemorrhage (+)	Male	1	0.4	0	0.0	1	0.4	0	0.0	0	0.0	2	0.2
	Female	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	1	0.2	0	0.0	1	0.2	0	0.0	0	0.0	2	0.1