

## 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

Divided into 4 classes according to Appendix 1.

### 2) Ventricular dilatation

Divided into 4 classes according to Appendix 2.

### 3) Brain atrophy

Divide into 4 classes according to Appendix 3.

### 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 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.

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### References

Stroke 1994 vol25, p318-327

Naika 1997 vol79 (4)

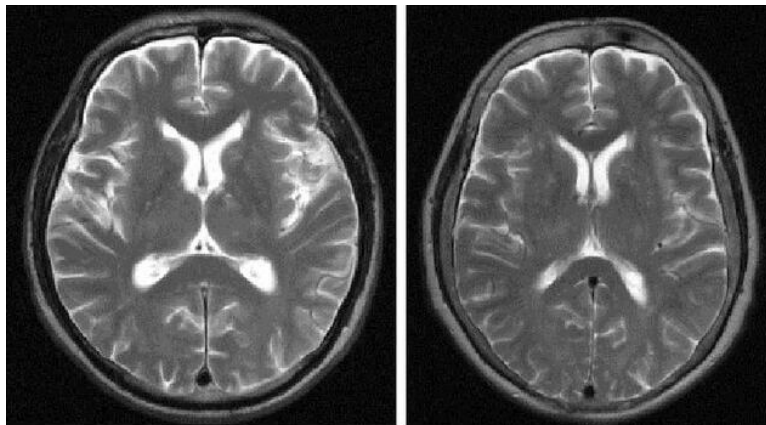
Nihon naika gakkaiishi 1997 vol86

Medicina 1994 vol31 (8)

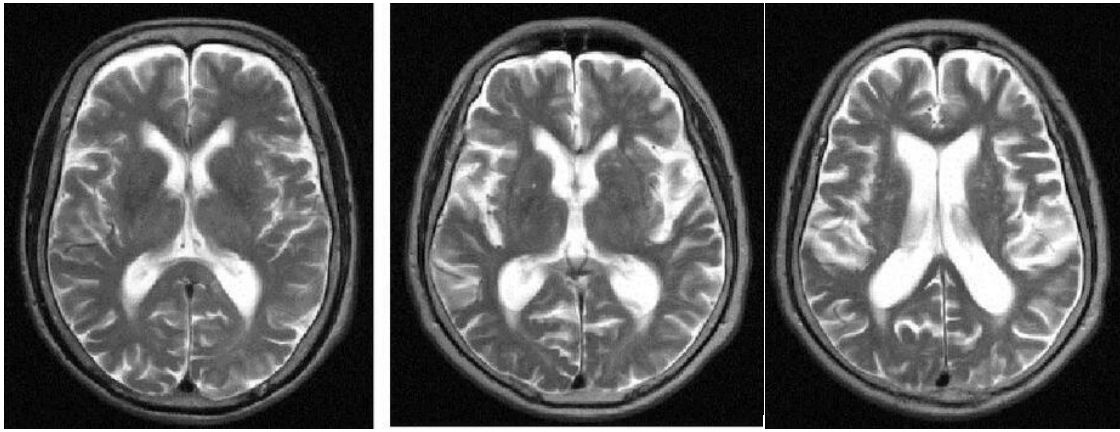
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### Appendix 1: Periventricular hyperintensity

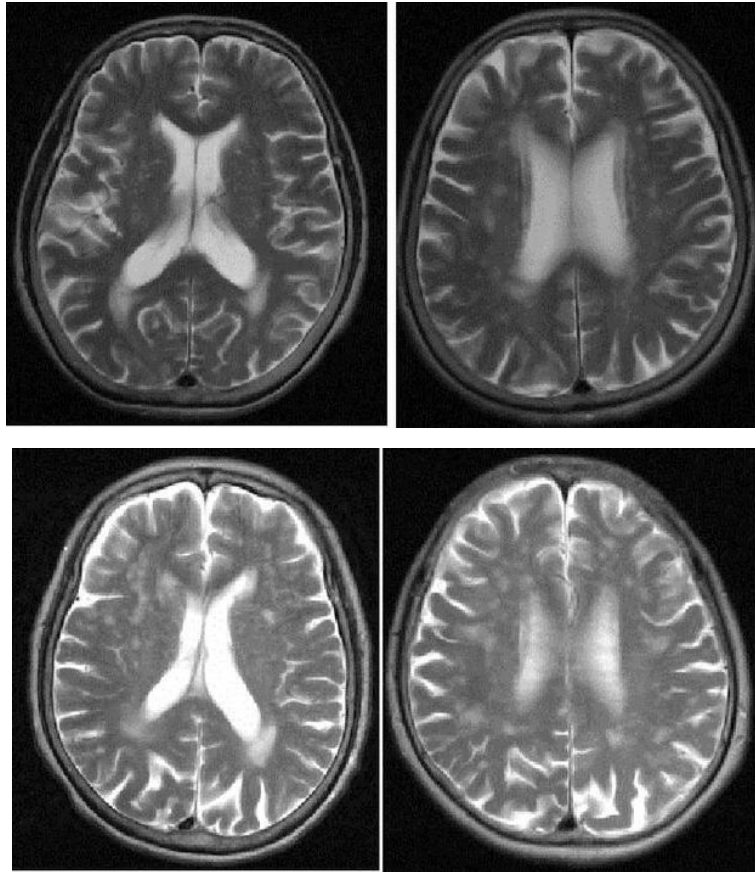
I. None: None or minimal periventricular signal hyperintensities in the form of caps only in the anterior horn of lateral ventricles.



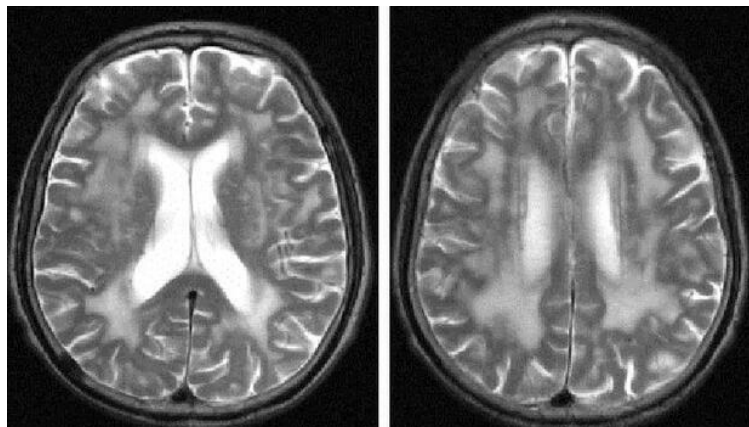
II. Mild: Caps in both anterior and posterior horns of lateral ventricles.



III. Moderate: Multifocal periventricular hyperintense punctuate lesions.

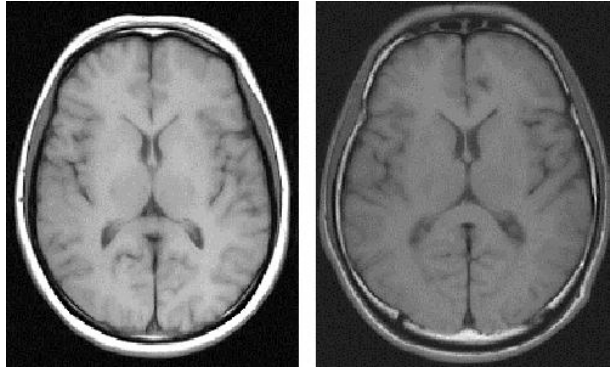


IV. Severe: Multiple high signal intensity area that reached confluency in the periventricular region and white matter.

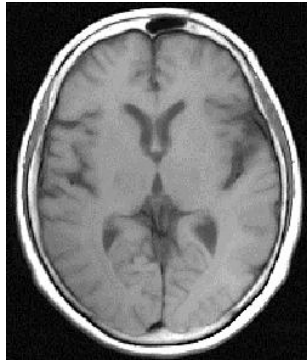


## Appendix 2: Ventricular dilatation

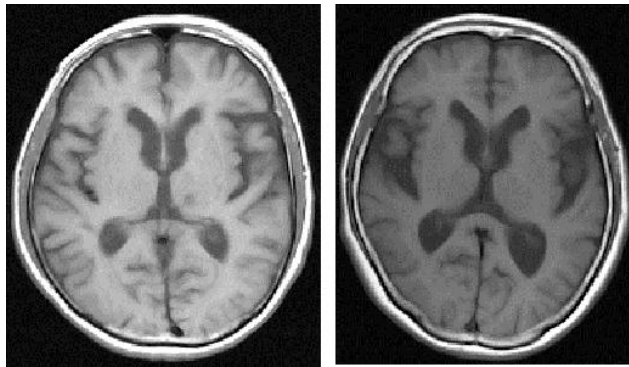
I. None



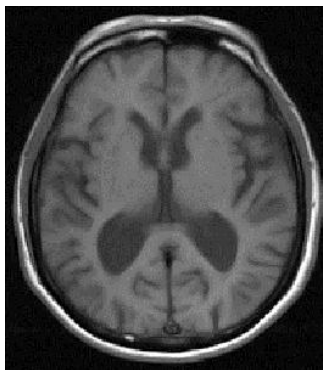
II. Mild



III. Moderate

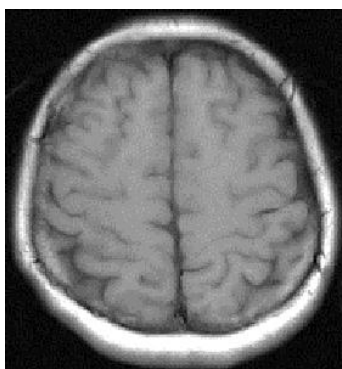


IV. Severe

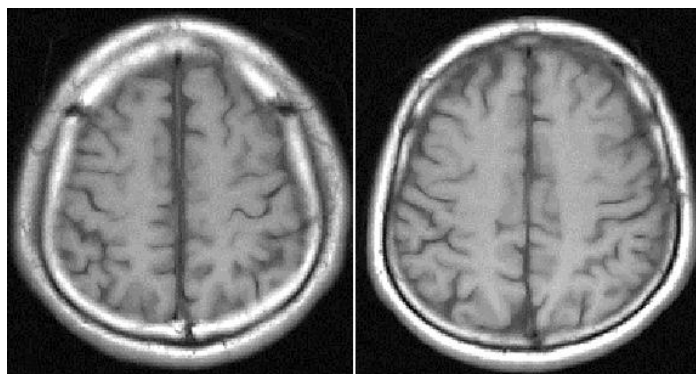


## Appendix 3: Brain atrophy

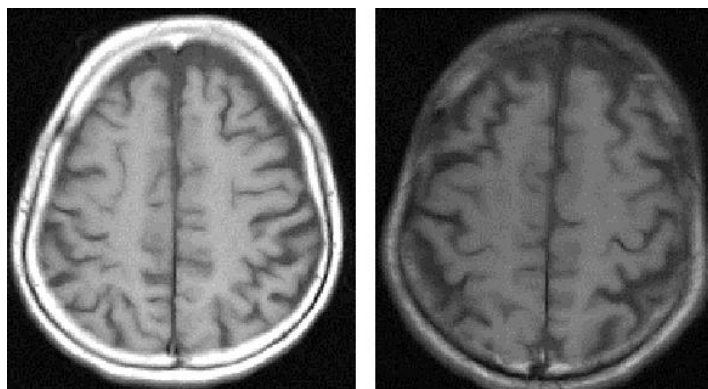
### I. None



### 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	1	0.4	0	0.0	0	0.0	1	0.1
	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	1	0.2	1	0.2	0	0.0	2	0.1
None	Male	281	99.3	273	93.8	191	67.5	67	27.7	10	19.6	822	71.5
	Female	288	99.3	261	93.5	191	71.0	107	39.2	9	15.5	856	73.2
	Total	569	99.3	534	93.7	382	69.2	174	33.8	19	17.4	1678	72.4
Mild	Male	2	0.7	16	5.5	74	26.1	117	48.3	16	31.4	225	19.6
	Female	2	0.7	15	5.4	63	23.4	107	39.2	23	39.7	210	18.0
	Total	4	0.7	31	5.4	137	24.8	224	43.5	39	35.8	435	18.8
Moderate	Male	0	0.0	2	0.7	15	5.3	50	20.7	21	41.2	88	7.7
	Female	0	0.0	3	1.1	15	5.6	53	19.4	20	34.5	91	7.8
	Total	0	0.0	5	0.9	30	5.4	103	20.0	41	37.6	179	7.7
Severe	Male	0	0.0	0	0.0	2	0.7	8	3.3	4	7.8	14	1.2
	Female	0	0.0	0	0.0	0	0.0	5	1.8	6	10.3	11	0.9
	Total	0	0.0	0	0.0	2	0.4	13	2.5	10	9.2	25	1.1

## 2) Ventricular dilatation

### Ventricular dilatation

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
None	Male	251	88.7	217	74.6	119	42.0	26	10.7	1	2.0	614	53.4
	Female	277	95.5	258	92.5	200	74.3	77	28.2	8	13.8	820	70.1
	Total	528	92.1	475	83.3	319	57.8	103	20.0	9	8.3	1434	61.8
Mild	Male	28	9.9	74	25.4	150	53.0	144	59.5	21	41.2	417	36.3
	Female	12	4.1	20	7.2	66	24.5	164	60.1	34	58.6	296	25.3
	Total	40	7.0	94	16.5	216	39.1	308	59.8	55	50.5	713	30.7
Moderate	Male	4	1.4	0	0.0	14	4.9	66	27.3	24	47.1	108	9.4
	Female	1	0.3	1	0.4	2	0.7	31	11.4	16	27.6	51	4.4
	Total	5	0.9	1	0.2	16	2.9	97	18.8	40	36.7	159	6.9
Severe	Male	0	0.0	0	0.0	0	0.0	6	2.5	5	9.8	11	1.0
	Female	0	0.0	0	0.0	1	0.4	1	0.4	0	0.0	2	0.2
	Total	0	0.0	0	0.0	1	0.2	7	1.4	5	4.6	13	0.6

## 3) Brain atrophy

### Brain atrophy

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
None	Male	267	94.3	255	87.6	207	73.1	75	31.0	8	15.7	812	70.6
	Female	288	99.3	273	97.8	241	89.6	188	68.9	25	43.1	1015	86.8
	Total	555	96.9	528	92.6	448	81.2	263	51.1	33	30.3	1827	78.8
Mild	Male	16	5.7	36	12.4	74	26.1	143	59.1	30	58.8	299	26.0
	Female	2	0.7	6	2.2	27	10.0	84	30.8	32	55.2	151	12.9
	Total	18	3.1	42	7.4	101	18.3	227	44.1	62	56.9	450	19.4
Moderate	Male	0	0.0	0	0.0	2	0.7	24	9.9	13	25.5	39	3.4
	Female	0	0.0	0	0.0	1	0.4	1	0.4	1	1.7	3	0.3
	Total	0	0.0	0	0.0	3	0.5	25	4.9	14	12.8	42	1.8
Severe	Male	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	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	0	0.0	0	0.0	0	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	1	0.4	0	0.0	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	1	0.2	0	0.0	0	0.0	1	0.0
None	Male	278	98.2	280	96.2	229	80.9	144	59.5	29	56.9	960	83.5
	Female	287	99.0	267	95.7	244	90.7	215	78.8	33	56.9	1046	89.5
	Total	565	98.6	547	96.0	473	85.7	359	69.7	62	56.9	2006	86.5
Single lacuna	Male	4	1.4	10	3.4	29	10.2	42	17.4	10	19.6	95	8.3
	Female	3	1.0	10	3.6	18	6.7	39	14.3	18	31.0	88	7.5
	Total	7	1.2	20	3.5	47	8.5	81	15.7	28	25.7	183	7.9
Multiple lacuna	Male	1	0.4	1	0.3	24	8.5	56	23.1	12	23.5	94	8.2
	Female	0	0.0	2	0.7	7	2.6	19	7.0	7	12.1	35	3.0
	Total	1	0.2	3	0.5	31	5.6	75	14.6	19	17.4	129	5.6

#### 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	1	0.4	0	0.0	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	1	0.2	0	0.0	0	0.0	1	0.0
Embolism (-)	Male	281	99.3	284	97.6	256	90.5	182	75.2	29	56.9	1032	89.7
	Female	288	99.3	275	98.6	255	94.8	235	86.1	42	72.4	1095	93.7
	Total	569	99.3	559	98.1	511	92.6	417	81.0	71	65.1	2127	91.7
Embolism (+)	Male	2	0.7	7	2.4	26	9.2	60	24.8	22	43.1	117	10.2
	Female	2	0.7	4	1.4	14	5.2	38	13.9	16	27.6	74	6.3
	Total	4	0.7	11	1.9	40	7.2	98	19.0	38	34.9	191	8.2

#### 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	1	0.4	0	0.0	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	1	0.2	0	0.0	0	0.0	1	0.0
Thrombosis (-)	Male	281	99.3	291	100.0	278	98.2	236	97.5	46	90.2	1132	98.4
	Female	288	99.3	279	100.0	267	99.3	265	97.1	55	94.8	1154	98.7
	Total	569	99.3	570	100.0	545	98.7	501	97.3	101	92.7	2286	98.6
Thrombosis (+)	Male	2	0.7	0	0.0	4	1.4	6	2.5	5	9.8	17	1.5
	Female	2	0.7	0	0.0	2	0.7	8	2.9	3	5.2	15	1.3
	Total	4	0.7	0	0.0	6	1.1	14	2.7	8	7.3	32	1.4

#### 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	1	0.4	0	0.0	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	1	0.2	0	0.0	0	0.0	1	0.0
Hemorrhage (-)	Male	283	100.0	291	100.0	281	99.3	240	99.2	51	100.0	1146	99.7
	Female	290	100.0	278	99.6	268	99.6	272	99.6	58	100.0	1166	99.7
	Total	573	100.0	569	99.8	549	99.5	512	99.4	109	100.0	2312	99.7
Hemorrhage (+)	Male	0	0.0	0	0.0	1	0.4	2	0.8	0	0.0	3	0.3
	Female	0	0.0	1	0.4	1	0.4	1	0.4	0	0.0	3	0.3
	Total	0	0.0	1	0.2	2	0.4	3	0.6	0	0.0	6	0.3

#### Cerebrovascular disease (CVD)

		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	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	0	0.0	0	0.0	1	0.2	0	0.0	0	0.0	1	0.0
CVD (-)	Male	276	97.5	274	94.2	218	77.0	129	53.3	19	37.3	916	79.7
	Female	284	97.9	265	95.0	236	87.7	194	71.1	28	48.3	1007	86.1
	Total	560	97.7	539	94.6	454	82.2	323	62.7	47	43.1	1923	82.9
CVD (+)	Male	7	2.5	17	5.8	64	22.6	113	46.7	32	62.7	233	20.3
	Female	6	2.1	14	5.0	33	12.3	79	28.9	30	51.7	162	13.9
	Total	13	2.3	31	5.4	97	17.6	192	37.3	62	56.9	395	17.0