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

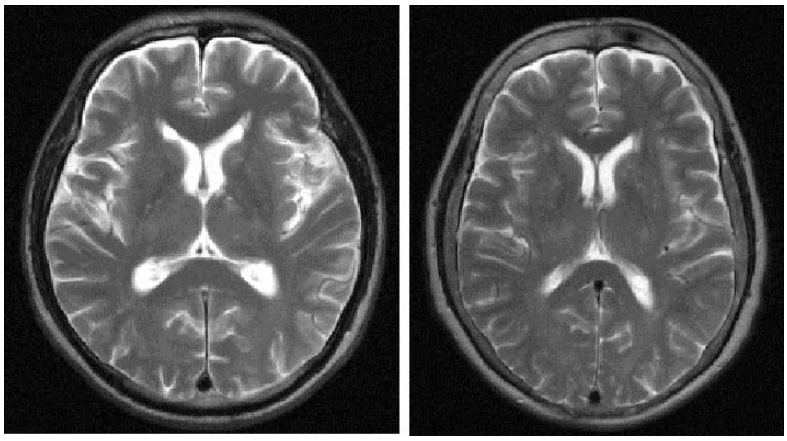
Cerebrovascular diseases were defined as all of cerebral infarction and cerebral hemorrhage.

References

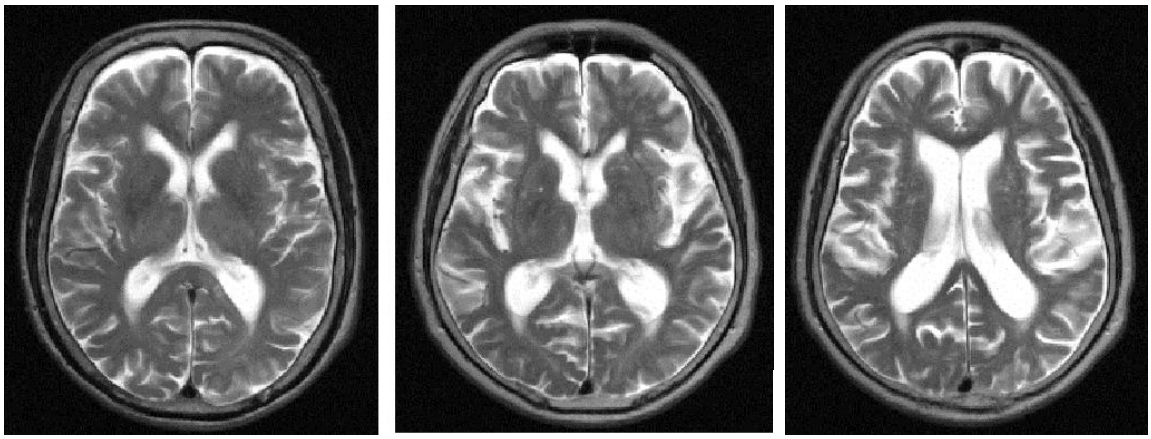
Stroke 1994 vol25, p318-327
Naika 1997 vol79 (4)
Nihon naika gakkaishi 1997 vol86
Medicina 1994 vol31 (8)

Appendix 1: Periventricular hyperintensity

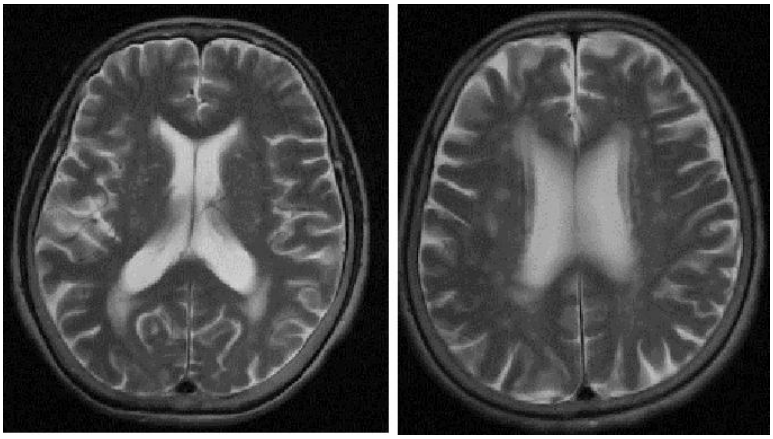
I. None: None or minimal periventricular signal hyperintensities in the form of caps only in the anterior horn of lateral ventricles.

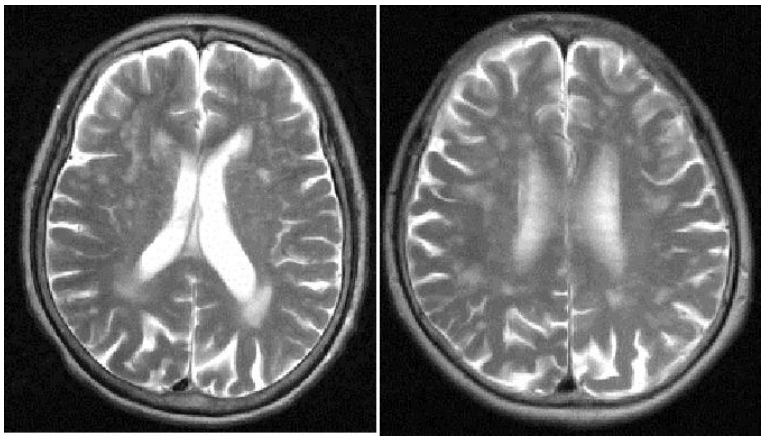


II. Mild: Caps in both anterior and posterior horns of lateral ventricles.

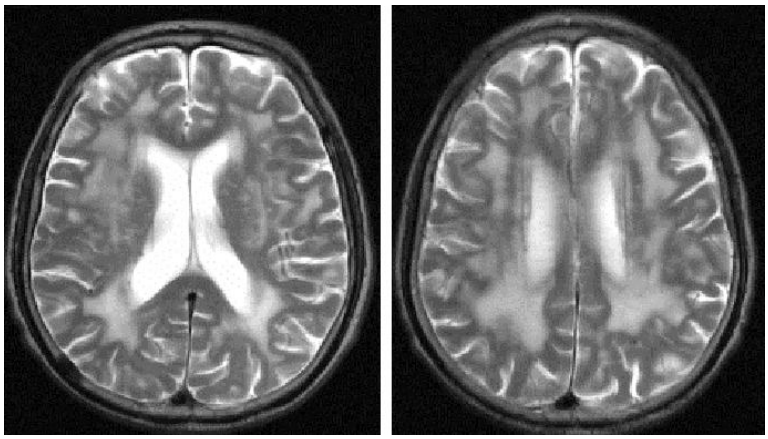


III. Moderate: Multifocal periventricular hyperintense punctuate lesions.



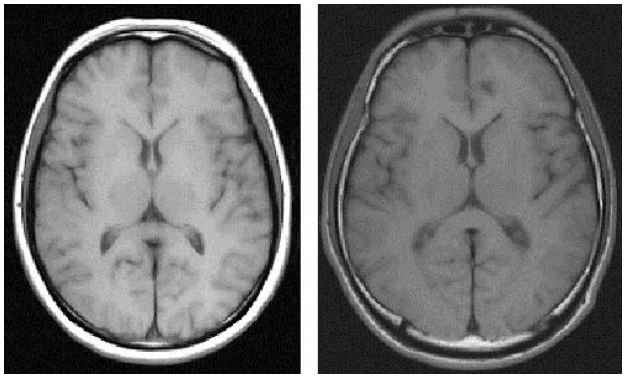


IV. Severe: Multiple high signal intensity area that reached confluency in the periventricular region and white matter.



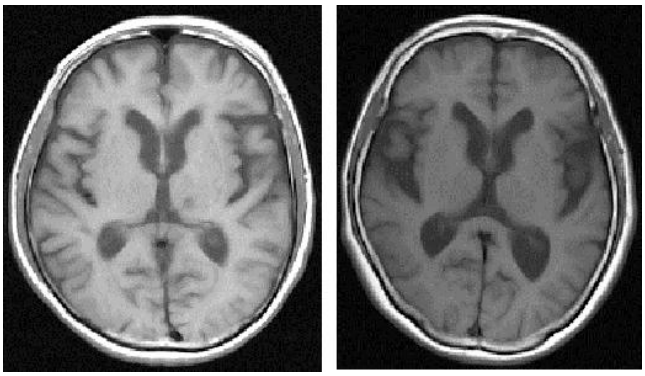
Appendix 2: Ventricular dilatation

I. None

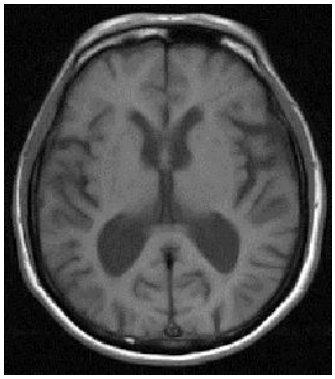


II. Mild

III. Moderate

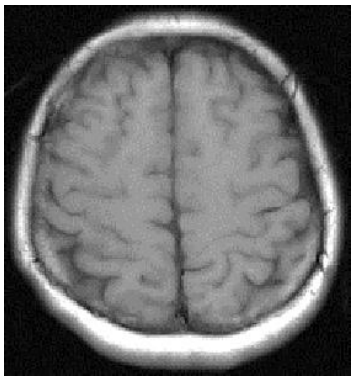


IV. Severe

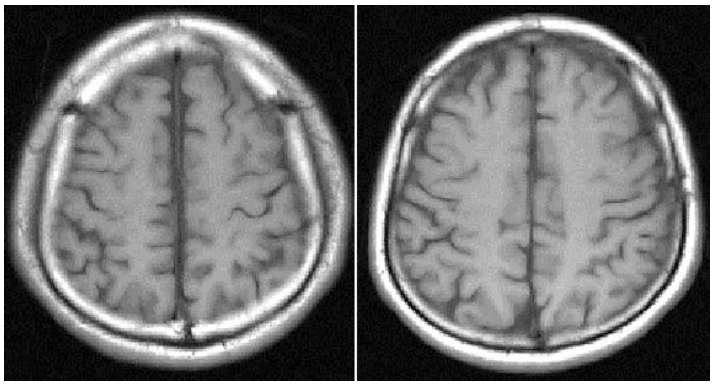


Appendix 3: Brain atrophy

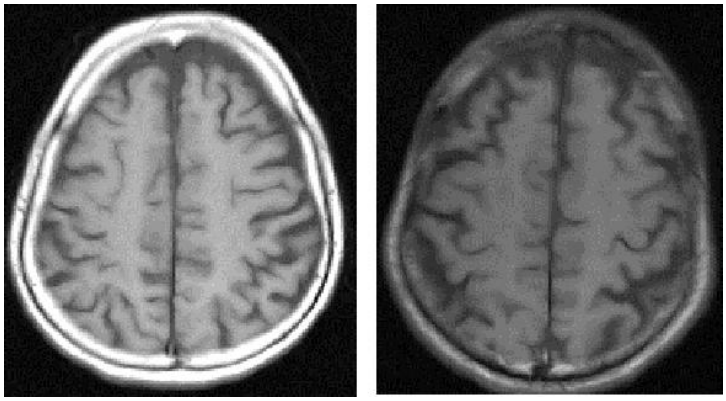
I. None



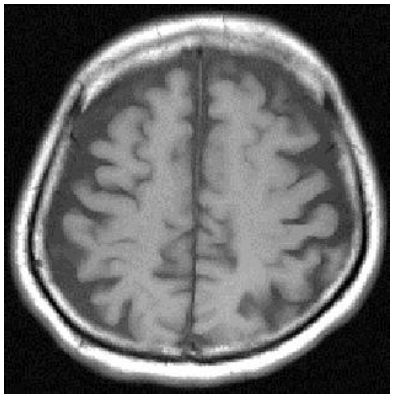
II. Mild



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	0	0.0	0	0.0	0	0.0	0	0.0
	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	1	0.2	0	0.0	1	0.0
None	Male	258	98.9	302	93.2	200	70.4	99	39.3	11	26.2	870	74.8

	Female	287	98.6	257	91.8	201	71.5	96	36.6	13	38.2	854	74.4
	Total	545	98.7	559	92.5	401	71.0	195	37.9	24	31.6	1724	74.6
Mild	Male	3	1.1	19	5.9	58	20.4	67	26.6	14	33.3	161	13.8
	Female	1	0.3	20	7.1	55	19.6	72	27.5	11	32.4	159	13.9
	Total	4	0.7	39	6.5	113	20.0	139	27.0	25	32.9	320	13.8
Moderate	Male	0	0.0	2	0.6	22	7.7	80	31.7	16	38.1	120	10.3
	Female	3	1.0	3	1.1	24	8.5	86	32.8	9	26.5	125	10.9
	Total	3	0.5	5	0.8	46	8.1	166	32.3	25	32.9	245	10.6
Severe	Male	0	0.0	1	0.3	4	1.4	6	2.4	1	2.4	12	1.0
	Female	0	0.0	0	0.0	1	0.4	7	2.7	1	2.9	9	0.8
	Total	0	0.0	1	0.2	5	0.9	13	2.5	2	2.6	21	0.9

2) Ventricular dilatation

Ventricular dilatation

		40-49yr		50-59yr		60-69yr		70-79yr		80yr-		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
None	Male	207	79.3	210	64.8	100	35.2	30	11.9	2	4.8	549	47.2
	Female	265	91.1	233	83.2	186	66.2	78	29.8	5	14.7	767	66.8
	Total	472	85.5	443	73.3	286	50.6	108	21.0	7	9.2	1316	56.9
Mild	Male	54	20.7	109	33.6	166	58.5	131	52.0	23	54.8	483	41.5
	Female	25	8.6	46	16.4	90	32.0	144	55.0	22	64.7	327	28.5
	Total	79	14.3	155	25.7	256	45.3	275	53.5	45	59.2	810	35.0
Moderate	Male	0	0.0	5	1.5	17	6.0	72	28.6	14	33.3	108	9.3
	Female	1	0.3	1	0.4	4	1.4	36	13.7	7	20.6	49	4.3
	Total	1	0.2	6	1.0	21	3.7	108	21.0	21	27.6	157	6.8
Severe	Male	0	0.0	0	0.0	1	0.4	19	7.5	3	7.1	23	2.0
	Female	0	0.0	0	0.0	1	0.4	4	1.5	0	0.0	5	0.4
	Total	0	0.0	0	0.0	2	0.4	23	4.5	3	3.9	28	1.2

3) Brain atrophy

Brain atrophy

		40-49yr		50-59yr		60-69yr		70-79yr		80yr -		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
None	Male	235	90.0	260	80.2	184	64.8	75	29.8	8	19.0	762	65.5
	Female	289	99.3	271	96.8	239	85.1	164	62.6	14	41.2	977	85.1
	Total	524	94.9	531	87.9	423	74.9	239	46.5	22	28.9	1739	75.2
Mild	Male	26	10.0	63	19.4	94	33.1	147	58.3	24	57.1	354	30.4
	Female	2	0.7	9	3.2	41	14.6	95	36.3	18	52.9	165	14.4
	Total	28	5.1	72	11.9	135	23.9	242	47.1	42	55.3	519	22.5
Moderate	Male	0	0.0	1	0.3	6	2.1	29	11.5	9	21.4	45	3.9
	Female	0	0.0	0	0.0	1	0.4	3	1.1	2	5.9	6	0.5
	Total	0	0.0	1	0.2	7	1.2	32	6.2	11	14.5	51	2.2
Severe	Male	0	0.0	0	0.0	0	0.0	1	0.4	1	2.4	2	0.2
	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	1	1.3	2	0.1

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	0	0.0	0	0.0	2	0.8	0	0.0	2	0.2
	Total	0	0.0	0	0.0	0	0.0	2	0.4	0	0.0	2	0.1
None	Male	260	99.6	309	95.4	245	86.3	173	68.7	24	57.1	1011	86.9

	Female	289	99.3	271	96.8	264	94.0	217	82.8	26	76.5	1067	92.9
	Total	549	99.5	580	96.0	509	90.1	390	75.9	50	65.8	2078	89.9
Single lacuna	Male	1	0.4	10	3.1	20	7.0	39	15.5	9	21.4	79	6.8
	Female	2	0.7	8	2.9	11	3.9	32	12.2	6	17.6	59	5.1
	Total	3	0.5	18	3.0	31	5.5	71	13.8	15	19.7	138	6.0
Multiple lacuna	Male	0	0.0	5	1.5	19	6.7	40	15.9	9	21.4	73	6.3
	Female	0	0.0	1	0.4	6	2.1	11	4.2	2	5.9	20	1.7
	Total	0	0.0	6	1.0	25	4.4	51	9.9	11	14.5	93	4.0

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	0	0.0	0	0.0	2	0.8	0	0.0	2	0.2
	Total	0	0.0	0	0.0	0	0.0	2	0.4	0	0.0	2	0.1
Embolism (-)	Male	259	99.2	322	99.4	278	97.9	233	92.5	39	92.9	1131	97.2
	Female	291	100.0	280	100.0	278	98.9	253	96.6	33	97.1	1135	98.9
	Total	550	99.6	602	99.7	556	98.4	486	94.6	72	94.7	2266	98.1
Embolism (+)	Male	2	0.8	2	0.6	6	2.1	19	7.5	3	7.1	32	2.8
	Female	0	0.0	0	0.0	3	1.1	7	2.7	1	2.9	11	1.0
	Total	2	0.4	2	0.3	9	1.6	26	5.1	4	5.3	43	1.9

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	0	0.0	0	0.0	2	0.8	0	0.0	2	0.2
	Total	0	0.0	0	0.0	0	0.0	2	0.4	0	0.0	2	0.1
Thrombosis (-)	Male	261	100.0	323	99.7	282	99.3	242	96.0	35	83.3	1143	98.3
	Female	289	99.3	280	100.0	276	98.2	250	95.4	32	94.1	1127	98.2
	Total	550	99.6	603	99.8	558	98.8	492	95.7	67	88.2	2270	98.2
Thrombosis (+)	Male	0	0.0	1	0.3	2	0.7	10	4.0	7	16.7	20	1.7
	Female	2	0.7	0	0.0	5	1.8	10	3.8	2	5.9	19	1.7
	Total	2	0.4	1	0.2	7	1.2	20	3.9	9	11.8	39	1.7

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	0	0.0	0	0.0	0	0.0	0	0.0
	Female	0	0.0	0	0.0	0	0.0	3	1.1	0	0.0	3	0.3
	Total	0	0.0	0	0.0	0	0.0	3	0.6	0	0.0	3	0.1
CVD (-)	Male	258	98.9	305	94.1	240	84.5	161	63.9	19	45.2	983	84.5
	Female	287	98.6	271	96.8	257	91.5	202	77.1	23	67.6	1040	90.6
	Total	545	98.7	576	95.4	497	88.0	363	70.6	42	55.3	2023	87.5
CVD (+)	Male	3	1.1	19	5.9	44	15.5	91	36.1	23	54.8	180	15.5
	Female	4	1.4	9	3.2	24	8.5	57	21.8	11	32.4	105	9.1
	Total	7	1.3	28	4.6	68	12.0	148	28.8	34	44.7	285	12.3