研究成果の刊行に関する一覧表

	著者名	題名	書名	巻：頁（西暦年号）
1	Mineharu Y, Inoue K, Inoue S, Kikuchi K, Ohishi H, Nozaki K, Hashimoto N, Koizumi A	Association analyses confirming a susceptibility locus for intracranial aneurysm at chromosome 14q23	J Hum Genet	2008 Feb 8; [Epub ahead of print]
2	Hayashi H, Morizane A, Koyanagi M, Ono Y, Sasai Y, Hashimoto N, Takahashi J	Meningeal cells induce dopaminergic neurons from embryonic stem cells	Eur J Neurosci,	Jan;27(2):261-268, 2008
3	Nozaki K, Okubo C, Yokoyama Y, Morita A, Akamatsu R, Nakayama T, Fukuhara S, Hashimoto N	Examination of the effectiveness of DVD decision support tools for patients with unruptured cerebral aneurysms	Neurol Med Chir (Tokyo)	2007 Dec;47(12):531-6
4	Nakazawa K, Ohta T, Fujimoto M, Imamura H, Hashimoto N, Asato R, Tanaka S	[A case report of arteriovenous malformation of the tongue: vascular anatomy and note for transarterial embolization]	No Shinkei Geka	35:1103-1108, 2007
5	Aoki T, Kataoka H, Shimamura M, Nakagami H, Wakayama K, Moriwaki T, Ishibashi R, Nozaki K, Morishita R, Hashimoto N	NF-{kappa}B Is a Key Mediator of Cerebral Aneurysm Formation	Circulation	2007 Nov 19; [Epub ahead of print
6	Yamada S, Takagi Y, Nozaki K, Kikuta K, Hashimoto N	Risk factors for subsequent hemorrhage in patients with cerebral arteriovenous malformations	J Neurosurg	107:965-972, 2007.
7	Nakazawa K, Motoaki F, Ando M, Hashimoto N	[A case report of severe cerebral sinus thrombosis treated by mechanical disruption using rheolytic catheter with balloon]	No Shinkei Geka	35:907-912, 2007.
8	Nakazawa K, Ohta T, Fujimoto M, Imamura H, Hashimoto N	[Case report of cholesterol crystal embolism 1 month after carotid stenting]	No Shinkei Geka	35:807-811, 2007
9	Aoki T, Kataoka H, Moriwaki T, Nozaki K, Hashimoto N	Role of TIMP-1 and TIMP-2 in the progression of cerebral aneurysms	Stroke	38:2337-2345, 2007
10	Fukuda S, Naritomi H, Hashimoto N, Takaichi S, Nishimura H, Nagata I, Kikuchi H:	Difference in vulnerability of cerebral arterial bifurcation and straight portion for development of endothelial damage	J Stroke Cerebrovasc Dis	7:275-280, 2007
11	Mikuni N, Okada T, Enatsu R, Miki Y, Hanakawa T, Urayama S, Kikuta K, Takahashi JA, Nozaki K, Fukuyama H, Hashimoto N	Clinical impact of integrated functional neuronavigation and subcortical electrical stimulation to preserve motor function during resection of brain tumors	J Neurosurg	106(4):593-598, 2007

12	Kita A, Imayoshi I, Hojo M, Kitagawa M, Kokubu H, Ohsawa R, Ohtsuka T, Kageyama R, Hashimoto N	Hes1 and Hes5 control the progenitor pool, intermediate lobe specification, and posterior lobe formation in the pituitary development	Mol Endocrinol	21:1458-1466, 2007
13	Sadamasa N, Nozaki K, Takagi Y, Moriwaki T, Kawanabe Y, Ishikawa M, Hashimoto N	Cerebral aneurysm progression suppressed by blockage of endothelin B receptor	J Neurosurg	106:330-336, 2007
14	Mikuni N, Okada T, Enatsu R, Miki Y, Urayama S, Takahashi JA, Nozaki K, Fukuyama H, Hashimoto N	Clinical significance of preoperative fibre-tracking to preserve the affected pyramidal tracts during resection of brain tumours in patients with preoperative motor weakness	J Neurol Neurosurg Psychiatry	78:716-721, 2007
15	Arakawa Y, Nakazawa K, Kataoka H, Kikuta K, Hashimoto N	Microfiberscope coaxial technique in neuroendoscopic surgery	Minim Invasive Neurosurg	49:380-383, 2007
16	Mineharu Y, Inoue K, Inoue S, Yamada S, Nozaki K, Hashimoto N, Koizumi A	Model-based linkage analyses confirm chromosome 19q13.3 as a susceptibility locus for intracranial aneurysm	Stroke	38:1174-1148, 2007
17	Miki Y, Kanagaki M, Takahashi JA, Ishizu K, Nakagawa M, Yamamoto A, Fushimi Y, Okada T, Mikuni N, Kikuta K, Hashimoto N, Togashi K	Evaluation of pituitary macroadenomas with multidetector-row CT (MDCT): comparison with MR imaging	Neuroradiology	49:327-333, 2007
18	Takagi Y, Hashimoto N	[Fundamental surgical techniques for cerebral arteriovenous malformations]	No Shinkei Geka	34:1207-1214, 2007
19	Aoki T, Kataoka H, Morimoto M, Nozaki K, Hashimoto N	Macrophage-derived matrix metalloproteinase-2 and -9 promote the progression of cerebral aneurysms in rats	Stroke	38:162-169, 2007
20	Mikuni N, Okada T, Taki J, Matsumoto R, Nishida N, Enatsu R, Hanakawa T, Ikeda A, Miki Y, Urayama S, Fukuyama H, Hashimoto N	Fibers from the dorsal premotor cortex elicit motor-evoked potential in a cortical dysplasia	Neuroimage	34:12-18, 2007
21	Baba T, Houkin K, Kuroda S	Novel epidemiological features of moyamoya disease.	J Neurol Neurosurg Psychiatry	2007 Dec 12;[Epub ahead of print]
22	Ukai R, Honmou O, Harada K, Houkin K, Hamada H, Kocsis J	Mesenchymal stem cells derived from peripheral blood protects against ischemia	. J Neurotrauma	24: 508-520, 2007

23	Onda T · Honmou O · Harada K · Houkin K · Hamada H · Kocsis JD	Therapeutic benefits by human mesenchymal stem cells (hMSCs) and Ang-1 gene-modified hMSCs after cerebral ischemia.	J Cereb Blood Flow Metab	28(2):329-40, 2007
24	Nonaka T, Haraguchi K, Baba T, Koyanagi I, Houkin K	Clinical manifestations and surgical results for paraclinoid cerebral aneurysms presenting with visual symptoms	Surg Neurol	67:612-619, 2007.
25	Minamida Y, Houkin K	[Surgical site infections in neurosurgery: perioperative management]	Nippon Rinsho	28;65 Suppl 3:573-578, 2007
26	Honmou O, Houkin K	[A cell therapy for stroke]	Nippon Rinsho	28;64 Suppl 7:664-666, 2006
27	Yamashita T, Mikami T, Baba T, Minamida Y, Sugino T, Koyanagi I, Nonaka T, Houkin K	Transorbital intracranial penetrating injury from impaling on an earpick	J Neuroophthalmol	27:48-49, 2007
28	Ukai R, Honmou O, Harada K, Houkin K, Hamada H, Kocsis JD	Mesenchymal stem cells derived from peripheral blood protects against ischemia	J Neurotrauma	24:508-520, 2007.
29	Haraguchi K, Houkin K, Nonaka T, Baba T	Delayed thromboembolic infarction associated with reconfiguration of Guglielmi detachable coils--case report	Neurol Med Chir (Tokyo)	47:79-82, 2007.
30	Mikami T, Minamida Y, Koyanagi I, Houkin K	Novel bipolar forceps with protein repellence using gold-polytetrafluoroethylene composite film	Neurosurgery	60(2 Suppl 1):ONS157-160, 2007
31	Mikami T, Minamida Y, Sugino T, Koyanagi I, Yotsuyanagi T, Houkin K	Free flap transfer for the treatment of intractable postcraniotomy subdural empyemas and epidural abscesses	Neurosurgery	60(2 Suppl 1):ONS83-87, 2007
32	Mikami T, Minamida Y, Koyanagi I, Baba T, Houkin K	Anatomical variations in pneumatization of the anterior clinoid process	J Neurosurg	106(1):170-174, 2007.
33	Harada K, Honmou O, Liu H, Bando M, Houkin K, Kocsis JD	Magnetic resonance lactate and lipid signals in rat brain after middle cerebral artery occlusion model	Brain Res	1134:206-213, 2007

34	Osanai T, Kuroda S, Nakayama N, Yamauchi T, Houkin K, Iwasaki Y	Moyamoya disease presenting with subarachnoid hemorrhage localized over the frontal cortex: case report	Surg Neurol	2008 Feb;69(2):197-200
35	宝金清博	「新世紀の医学に向けて」脳梗塞に対する細胞療法	北大医学部同窓会新聞	第126号 P3-4, 2007年1月25日付
36	宝金清博	モヤモヤ病	大田　健, 奈良信雄編集, 今日の診断基準	南江堂, 東京, pp520, 2007
37	Seo Y, Ito T, Sasaki T, Nakagawara J, Nakamura H	Assessment of the anatomical relationship between the arcuate eminence and superior semicircular canal by computed tomography	Neurol Med Chir (Tokyo)	47:335-339, 2007.
38	Ueno H, Kurokawa MS, Kayama M, Homma R, Kumagai Y, Masuda C, Takada E, Tsubota K, Ueno S, Suzuki N	Experimental Transplantation of Corneal Epithelium-like Cells Induced by Pax6 Gene Transfection of Mouse Embryonic Stem Cells	Cornea	26:1220-1227, 2007.
39	Iizuka T, Sakai F, Ide T, Monzen T, Yoshii S, Iigaya M, Suzuki K, Lynch DR, Suzuki N, Hata T, Dalmau J.	Anti-NMDA receptor encephalitis in Japan. Long-term outcome without tumor removal	Neurology.	2007 Sep 26; [Epub ahead of print]
40	Hattori H, Nagata E, Oya Y, Takahashi T, Aoki M, Ito D, Suzuki N	A novel compound heterozygous dysferlin mutation in Miyoshi myopathy siblings responding to dantrolene	Eur J Neurol	14:1288-1291, 2007.
41	Shimizu T, Toriumi H, Sato H, Shibata M, Nagata E, Gotoh K, Suzuki N	Distribution and origin of TRPV1 receptor-containing nerve fibers in the dura mater of rat	Brain Res	1173:84-91, 2007.
42	Suzuki S, Utsugisawa K, Nagane Y, Satoh T, Terayama Y, Suzuki N, Kuwana M	Classification of myasthenia gravis based on autoantibody status	rch Neurol	64:1121-1124, 2007.
43	Okano H, Sakaguchi M, Ohki K, Suzuki N, Sawamoto K	Regeneration of the central nervous system using endogenous repair mechanisms	J Neurochem	102:1459-1465, 2007
44	Ito D, Suzuki N	[Seipin/BSCL2-related motor neuron disease: Seipinopathy is a novel conformational disease associated with endoplasmic reticulum stress]	Rinsho Shinkeigaku	47:329-335, 2007

45	Oki K, Nagata E, Ishiko A, Shimizu A, Tanaka K, Takahashi K, Tabira T, Katayama T, Suzuki N	Novel mutation of the Notch3 gene in a Japanese patient with CADASIL	Eur J Neurol	4:464-466, 2007.
46	Ito D, Suzuki N	Molecular pathogenesis of seipin/BSCL2-related motor neuron diseases	Ann Neurol	61:237-250, 2007
47	Abe T, Nogawa S, Tanahashi N, Shiraishi J, Ikeda E, Suzuki N	Cerebral pachyleptomeningitis associated with MPO-ANCA induced by PTU therapy	Intern Med	46:247-250, 2007
48	Takahashi S, Suzuki N, Asazuma T, Kono K, Ono T, Toyama Y	Factors of thoracic cage deformity that affect pulmonary function in adolescent idiopathic thoracic scoliosis	Spine	32:106-112, 2007.
49	野川　茂	Willis動脈輪閉塞症（もやもや病）	講義録神経学. 鈴木則宏，荒木信夫・編. メディカルレビュー社，大阪	2007, p.p. 200-203.
50	Huang L, Toyoshima M, Asakawa A, Inoue K, Harada K, Kinoshita T, Koizumi A	Roles of neuropeptides in O,O,S-trimethylphosphorothioate (OOS-TMP)-induced anorexia in mice.	Biochem Biophys Res Commun	362:177-182, 2007.
51	Matsubara E, Nakahari T, Yoshida H, Kuroiwa T, Harada KH, Inoue K, Koizumi A	Effects of perfluorooctane sulfonate on tracheal ciliary beating frequency in mice	Toxicology	236:190-198, 2007
52	Mizobuchi N, Hoseki J, Kubota H, Toyokuni S, Nozaki J, Naitoh M, Koizumi A, Nagata K	ARMET is a soluble ER protein induced by the unfolded protein response via ERSE-II element	Cell Struct Funct	32:41-50, 2007
53	Asakawa A, Toyoshima M, Fujimiya M, Harada K, Ataka K, Inoue K, Koizumi A	Perfluorooctane sulfonate influences feeding behavior and gut motility via the hypothalamus	Int J Mol Med	9:733-739, 2007.
54	Asakawa A, Toyoshima M, Inoue K, Koizumi A	Ins2Akita mice exhibit hyperphagia and anxiety behavior via the melanocortin system	Int J Mol Med	19:649-652, 2007.
55	Inoue S, Liu W, Inoue K, Mineharu Y, Takenaka K, Yamakawa H, Abe M, Jafar JJ, Herzig R, Koizumi A	Combination of linkage and association studies for brain arteriovenous malformation	Stroke	38:1368-1370, 2007

56	Mineharu Y, Inoue K, Inoue S, Yamada S, Nozaki K, Hashimoto N, Koizumi A	Model-based linkage analyses confirm chromosome 19q13.3 as a susceptibility locus for intracranial aneurysm	Stroke	38:1174-1178, 2007
57	Sakata H, Fujimura M, Watanabe M, Tominaga T:	Association of cavernous malformation within vestibular schwannoma immunohistochemical analysis of matrix metalloproteinase-2 and -9	Neurol Med Chir (Tokyo)	47:509-512, 2007.
58	Endo T, Spenger C, Westman E, Tominaga T, Olson L	Reorganization of sensory processing below the level of spinal cord injury as revealed by fMRI	Exp Neuro	2007 Sep 26; [Epub ahead of print]
59	Sato Y, Nakagawa A, Hirano T, Ohki T, Uenohara H, Takayama K, Tominaga T	Pulsed laser-induced liquid jet microcatheter system for rapid and reliable fibrinolysis in acute cerebral embolisms: experiments on safety and preliminary application in porcine cranial	Minim Invasive Neurosurg	50:212-218, 2007.
60	Kumabe T, Fujimura M, Jokura H, Tominaga T	Surgical treatment for choroid plexus tumors in the fourth ventricle: brain stem infiltration hinders total extirpation	Neurosurg Rev	2007 Oct 3; [Epub ahead of print]
61	Saito A, Takahashi T, Ezura M, Tominaga T	Intercostal arteriovenous fistula associated with neurofibromatosis manifesting as congestive myelopathy: case report	Neurosurgery	2007 Sep;61(3):E656-7; discussion E657
62	Jin K, Nakasato N, Shamoto H, Kanno A, Itoyama Y, Tominaga T	Neuromagnetic localization of spike sources in perilesional, contralateral mirror, and ipsilateral remote areas in patients with cavernoma	Epilepsia	48:2160-2166, 2007
63	Kanamori M, Kumabe T, Watanabe M, Tominaga T	Anaplastic astrocytoma and anaplastic oligodendroglioma occurring 6 years after subtotal resection of a central neurocytoma. Case report	J Neurosurg	107:185-189, 2007
64	Kanamori M, Kumabe T, Watanabe M, Tominaga T	Anaplastic astrocytoma and anaplastic oligodendroglioma occurring 6 years after subtotal resection of a central neurocytoma. Case report	J Neurosurg	107:185-189, 2007
65	Oka F, Yamashita Y, Kumabe T, Tominaga T	Total resection of a hemorrhagic tectal pilocytic astrocytoma--case report	Neurol Med Chir (Tokyo)	47:219-221, 2007.
66	Narisawa A, Fujimura M, Shimizu H, Tominaga T	[Seizure following superficial temporal-middle cerebral artery anastomosis in patients with moyamoya disease: possible contribution of postoperative cerebral hyperperfusion]	No Shinkei Geka	35:467-474, 2007

67	Fujimura M, Kaneta T, Shimizu H, Tominaga T	Symptomatic hyperperfusion after superficial temporal artery-middle cerebral artery anastomosis in a child with moyamoya disease	Childs Nerv Syst	23:1195-1198, 2007
68	Kato K, Fujimura M, Nakagawa A, Saito A, Ohki T, Takayama K, Tominaga T	Pressure-dependent effect of shock waves on rat brain: induction of neuronal apoptosis mediated by a caspase-dependent pathway	J Neurosurg	106:667-676, 2007.
69	Kumabe T, Higano S, Takahashi S, Tominaga T	Ischemic complications associated with resection of opercular glioma	J Neurosurg	106:263-269, 2007
70	Fujimura M, Kaneta T, Mugikura S, Shimizu H, Tominaga T	Temporary neurologic deterioration due to cerebral hyperperfusion after superficial temporal artery-middle cerebral artery anastomosis in patients with adult-onset moyamoya	Surg Neurol	67:273-282, 2007
71	Niizuma K, Fujimura M, Kumabe T, Tominaga T	:Malignant transformation of high-grade astrocytoma associated with neurocysticercosis in a patient with Turcot syndrome	J Clin Neurosci	14:53-55, 2007
72	Inoue T, Kumabe T, Takahashi T, Nakajima T, Watanabe M, Tominaga T	Spinal intramedullary metastasis of medulloblastoma at initial diagnosis	Childs Nerv Syst	113-116, 2007
73	Fujimura M, Watanabe M, Shimizu H, Tominaga T	Expression of matrix metalloproteinases (MMPs) and tissue inhibitor of metalloproteinase (TIMP) in cerebral cavernous malformations:	Acta Neurochir (Wien)	149:179-183, 2007
74	Sugiyama S, Yamashita Y, Kikuchi T, Saito R, Kumabe T, Tominaga T	Safety and efficacy of convection-enhanced delivery of ACNU, a hydrophilic nitrosourea, in intracranial brain tumor models	J Neurooncol	82:41-47, 2007
75	Sugiura S, Yagita Y, Sasaki T, Todo K, Terasaki Y, Ohyama N, Hori M, Kitagawa K	Postischemic administration of HMG CoA reductase inhibitor inhibits infarct expansion after transient middle cerebral artery occlusion	Brain Res	1181:125-29, 2007
76	Kitagawa K	[Management of dyslipidemia with cerebrovascular disease]	Nippon Rinsho	65 Suppl 7:543-547, 2007
77	Hattori N, Nakayama Y, Kitagawa K, Ishihara T, Saiki Y, Inagaki C	Anti-prolactin (PRL) autoantibodies suppress PRL bioactivity in patients with macroprolactinaemia	Clin Endocrinol (Oxf)	2007 Aug 6; [Epub ahead of print]

78	Yagita Y, Kitagawa K, Matsushita K, Furukado S, Kajimoto K, Sakaguchi M, Hori M, Sakoda S	Cerebral embolism caused by a left cardiac ventricle metastatic tumor	Neurology	69:407-408, 2007
79	Hoshi T, Kitagawa K, Yamagami H, Furukado S, Hougaku H, Hori M	Relation between interleukin-6 level and subclinical intracranial large-artery atherosclerosis	Atherosclerosis	2007 Jun 28; [Epub ahead of print]
80	Kitagawa K	CREB and cAMP response element-mediated gene expression in the ischemic brain	FEBS J	274:3210-3217, 2007
81	Yagita Y, Kitagawa K, Sasaki T, Terasaki Y, Todo K, Omura-Matsuoka E, Kaibuchi K, Hori M	Rho-kinase activation in endothelial cells contributes to expansion of infarction after focal cerebral ischemia	J Neurosci Res	85:2460-2469, 2007.
82	Kitagawa K, Hougaku H, Yamagami H, Hashimoto H, Itoh T, Shimizu Y, Takahashi D, Murata S, Seike Y, Kondo K, Hoshi T, Furukado S, Abe Y, Yagita Y, Sakaguchi M, Tagaya	OSACA2 Study Group: Carotid intima-media thickness and risk of cardiovascular events in high-risk patients. Results of the Osaka Follow-Up Study for Carotid Atherosclerosis 2	Cerebrovasc Dis	24:35-42, 2007.
83	Xiong ZM, Kitagawa K, Nishiuchi Y, Kimura T, Inagaki C	Protective effects of Abeta-derived tripeptide, Abeta(32-34), on Abeta(1-42)-induced phosphatidylinositol 4-kinase inhibition and neurotoxicity	Neurosci Lett	419:247-252, 2007.
84	Kitagawa K	[Future aspect of regenerative medicine for cerebral infarction]	Nippon Rinsho	64 Suppl 7:643-648, 2006
85	Kajimoto K, Oku N, Kimura Y, Kato H, Tanaka MR, Kanai Y, Kitagawa K, Maruno M, Yoshimine T, Hori M, Hatazawa J	Crossed cerebellar diaschisis: a positron emission tomography study with L-[methyl-11C]methionine and 2-deoxy-2-[18F]fluoro-D-glucose	Ann Nucl Med	109-113, 2007
86	Zhang NY, Kitagawa K, Hattori N, Nakayama Y, Xiong ZM, Wu B, Liu B, Inagaki C	Soybean-derived phosphatidylinositol inhibits in vivo low concentrations of amyloid beta protein-induced degeneration of hippocampal neurons in V337M human tau-	Life Sci	80:1971-1976, 2007.
87	Sasaki T, Kitagawa K, Omura-Matsuoka E, Todo K, Terasaki Y, Sugiura S, Hatazawa J, Yagita Y, Hori M	The phosphodiesterase inhibitor rolipram promotes survival of newborn hippocampal neurons after ischemia	Stroke	38:1597-1605, 2007
88	Hattori N, Nakayama Y, Kitagawa K, Li T, Inagaki C	Development of anti-PRL (prolactin) autoantibodies by homologous PRL in rats: a model for macroprolactinemia	Endocrinology	148:2465-2470, 2007.

89	Li T, Nakayama Y, Kitagawa K, Hattori N, Xiong ZM, Inagaki C:	Down-regulation of Cl- pump ClP55 subunit induced enhancement of glutamate neurotoxicity in cultured rat hippocampal neurons	Brain Res	1130:235-238, 2007.
90	Suyama K, Yoshida K, Takahata H, Toda K, Baba H, Ishikawa Y, Hirose M, Nagata I	Pediatric moyamoya disease presenting with intracerebral hemorrhage-Report of three cases and review of the literature	Clin Neurol Neurosurg.	2007 Nov 20; [Epub ahead of print]
91	Morofuji Y, Matsuo T, Toyoda K, Takeshita T, Hirose M, Hirao T, Hayashi Y, Tsutsumi K, Abe K, Nagata I	[Skull metastasis of hepatocellular carcinoma successfully treated by intraoperative photodynamic diagnosis using 5-aminolevulinic acid: case report]	No Shinkei Geka	35:913-918, 2007
92	Izumo T, Ohtsuru A, Tokunaga Y, Namba H, Kaneda Y, Nagata I, Yamashita S	Epstein-Barr virus-based vector improves the tumor cell killing effect of pituitary tumor in HVJ-liposome-mediated transcriptional targeting suicide gene therapy	Int J Oncol	31:379-387, 2007
93	Kawahara I, Morikawa M, Honda M, Kitagawa N, Tsutsumi K, Nagata I, Hayashi T, Koji T	High-resolution magnetic resonance imaging using gadolinium-based contrast agent for atherosclerotic carotid plaque	Surg Neurol	68:60-65, 2007.
94	Kawahara I, Kitagawa N, Tsutsumi K, Nagata I, Hayashi T, Koji T	The expression of vascular dendritic cells in human atherosclerotic carotid plaques	Hum Pathol	38:1378-1385, 2007
95	Horie N, Kitagawa N, Morikawa M, Tsutsumi K, Kaminogo M, Nagata I	Progressive perianeurysmal edema induced after endovascular coil embolization. Report of three cases and review of the literature	J Neurosurg	106:916-920, 2007
96	Honda M, Kawahara I, Kitagawa N, Tsutsumi K, Morikawa M, Hayashi T, Nagata I	Asymptomatic carotid artery plaques: use of magnetic resonance imaging to characterize vulnerable plaques in 6 cases	Surg Neurol	67:35-39, 2007.
97	Kawahara I, Masui K, Horie N, Matsuo T, Kitagawa N, Tsutsumi K, Nagata I, Morikawa M, Hayashi T	Radiation-induced meningioma following prophylactic radiotherapy for acute lymphoblastic leukemia in childhood	Pediatr Neurosurg	43:36-41, 2007.
98	Hokari M, Kuroda S, Shichinohe H, Yano S, Hida K, Iwasaki Y	Bone marrow stromal cells protect and repair damaged neurons through multiple mechanisms	J Neurosci Res	100. 2007 Nov 20; [Epub ahead of print]
99	Shichinohe H, Kuroda S, Yano S, Hida K, Iwasaki Y	Role of SDF-1/CXCR4 system in survival and migration of bone marrow stromal cells after transplantation into mice cerebral infarct.	Brain Res	1183:138-147, 2007.

100	Maruichi K, Kuroda S, Iwasaki Y	[Pathophysiology of cognitive impairment after diffuse brain injury: the prospects of cell transplantation therapy]	No Shinkei Geka	35:965-969, 2007
101	Kashiwazaki D, Kuroda S, Terasaka S, Iwasaki Y	Detection of hemodynamic transient ischemic attack during hemodialysis with near-infrared monitoring in a patient with internal carotid artery occlusion	Surg Neurol	68(3):292-294, 2007
102	Ito M, Kuroda S, Nakayama N, Iwasaki M, Shiiya N, Iwasaki Y	[Extracranial internal carotid artery aneurysm associated with Marfan syndrome: case report]	No Shinkei Geka	35:793-797, 2007
103	Kuroda S, Hashimoto N, Yoshimoto T, Iwasaki Y; Research Committee on Moyamoya Disease in Japan	Radiological findings, clinical course, and outcome in asymptomatic moyamoya disease: results of multicenter survey in Japan	Stroke	38:1430-1435, 2007
104	Takahashi JC, Murao K, Iihara K, Nonaka Y, Taki J, Nagata I, Miyamoto S	Successful "blind-alley" formation with bypass surgery for a partially thrombosed giant basilar artery tip aneurysm refractory to upper basilar artery obliteration. Case report	J Neurosurg	106:484-487, 2007.
105	桝田宏輔、高橋　淳、宮本　享	出血型もやもや病の再出血予防	脳と循環，メディカルレビュー社	13(1): p53-57, 2007
106	Mori N, Miki Y, Kikuta K-I, Fushimi Y, Okada T, Urayama S-I, Fukuyama H, Hashimoto N, Togashi	Microbleeds in moyamoya disease: susceptibility-weighted imaging vs. T2*-weighted imaging at 3T.	Investigative Radiology	in press
107	Fushimi Y, Miki Y, Kikuta K-I, Hashimoto N, Fukuyama H, Togashi K	Developmental venous anomaly presenting atypical findings on susceptibility weighted imaging	AJNR Am J Neuroradiol	in press
108	Mori N, Miki Y, Fushimi Y, Kikuta K-I, Urayama S-I, Okada T, Fukuyama H, Hashimoto N, Togashi K	Moyamoya Disease: Histogram-based Quantitative Analysis of Diffusion Tensor Imaging. Magn Reson Imaging,	Magn Reson Imaging	in press
109	Kikuta K	Experiences using 3-tesla magnetic resonance imaging in the treatment of Moyamoya disease	Acta Neurochir Suppl	103: 123–126, 2008
110	Kikuta K, Takagi Y, Nozaki K, Fushimi Y, Okada T, Mori N, Miki Y, Harada K, Sawamoto N, Fukuyama H, Hashimoto N	The presence of multiple microbleeds as a predictor of subsequent cerebral hemorrhage in patients with moyamoya disease	Neurosurgery	in press

111	Kikuta K, Takagi Y, Nozaki K, Okada T, Hashimoto N	Histological analysis of microbleed after surgical resection in a patient with moyamoya disease	Neurol Med Chir (Tokyo)	47:564-567, 2007
112	Hashimoto N, Nozaki K, Takagi Y, Kikuta K, Mikuni N	Surgery of cerebral arteriovenous malfoamations.	Neurosurgery: Surgery of the Human Cerebrum, Part I	61(1) Supplement: SHC-375-SHC-389, 2007
113	Yamada S, Takagi Y, Nozaki K, Kikuta K, Hashimoto N	Risk factors for subsequent hemorrhage in patients with cerebral arteriovenous malformations	J Neurosurg	107:965-972, 2007
114	Kikuta KI, Takagi Y, Nozaki K, Yamada K, Miyamoto S, Kataoka H, Arai T, Hashimoto N	Effects of intravenous anesthesia with propofol on regional cortical blood flow and intracranial pressure in surgery for moyamoya diseas	Surg Neurol	68:421-424, 2007
115	Fushimi Y, Miki Y, Okada T, Yamamoto A, Mori N, Hanakawa T, Urayama S, Aso T, Fukuyama H, Kikuta K, Togashi K	Fractional anisotropy and mean diffusivity: comparison between 3.0-T and 1.5-T diffusion tensor imaging with parallel imaging using histogram and region of interest analysis	NMR Biomed	743-748, 2007
116	Miki Y, Kanagaki M, Takahashi JA, Ishizu K, Nakagawa M, Yamamoto A, Fushimi Y, Okada T, Mikuni N, Kikuta KI, Hashimoto N, Togashi K	Evaluation of pituitary macroadenomas with multidetector-row CT (MDCT):comparison with MR imaging	Neuroradiology	49:327-333, 2007
117	Mikuni N, Okada T, Enatsu R, Miki Y, Hanakawa T, Urayama S, Kikuta K, Takahashi JA, Nozaki K, Fukuyama H, Hashimoto N	Clinical impact of integrated functional neuronavigation and subcortical electrical stimulation to preserve motor function during resection of brain tumors	J Neurosurg	106: 593-598, 2007
18	Takagi Y, Kikuta K, Nozaki K, Hashimoto N	Histological features of middle cerebral arteies from patients treated for moyamoya disease	Neurol Med Chir (Tokyo)	47: 1-4, 2007
119	Takagi Y, Kikuta K, Noaki K, Fujimoto M, Hayashi J, Hashimoto N	Neuronal expression of Fas-associated death domain protein and caspase-8 in the perinidal parehchyma of cerebral arteriovenous malformations	. J Neurosurg	106:275-382, 2007
120	Okada T, Miki Y, Kikuta K, Mikuni N, Urayama S, Fushimi Y, Yamamoto A, Mori N, Fukuyama H, Hashimoto N, Togashi K	Diffusion tensor fiber tractography for arteriovenous malformations: quantitative analyses to evaluate the corticospinal tract and optic radiation	AJNR Am J Neuroradiol	28:1107-1113, 2007
121	Takagi Y, Kikuta K, Nozaki K, Fujimoto M, Hayashi J, Imamura H, Hashimoto N	Expression of hypoxia-inducing factor-1 alpha and endoglin in intimal hyperplasia of the middle cerebral artery of patients with Moyamoya disease	Neurosurgery	60:338-345, 2007

122	菊田健一郎、橋本信夫	もやもや病に対する直接バイパス術の長期効果と統合画像を利用した治療戦略	脳卒中の外科	in press
123	菊田健一郎	「はじめてのSTA-MCA吻合」	脳神経外科速報	17(1):50-55, 2007
124	菊田健一郎	「バイオネット型マイクロハサミの操作法とその訓練法」	脳神経外科速報	17(2):184-189, 2007
125	菊田健一郎	「はじめての前頭側頭開頭～開頭の基本」	脳神経外科速報	17(3):314-321, 2007
126	菊田健一郎	「前頭側頭開頭の応用：orbitozygomatic approach」	脳神経外科速報	17(4):434-440, 2007
127	菊田健一郎	「はじめての外側後頭下開頭術」	脳神経外科速報	17(5):576-583, 2007
128	菊田健一郎	「外側後頭下開頭の応用：Far lateral approachとpos. transpetrosal approach」	脳神経外科速報	17(6):704-711, 2007
129	菊田健一郎	「はじめての正中後頭下開頭と第四脳室へのアプローチ」	脳神経外科速報	17(7):822-929, 2007
130	菊田健一郎	「はじめての深部吻合：OA-PICA吻合術とRAグラフト」	脳神経外科速報	17(8):922-931, 2007
131	菊田健一郎	「はじめてのParaclinoid aneurysm：前床突起削除法」	脳神経外科速報	17(9):1044-1052, 2007
132	菊田健一郎	「はじめてのCEAと頚動脈置換術」	脳神経外科速報	17(10): 1170-1178, 2007

133	菊田健一郎	「AVMの手術計画と基本コンセプト」	脳神経外科速報	17(11): 1288-1298, 2007
134	菊田健一郎	「AVMの白質内剥離～先人の教え：脳神経外科処世訓」	脳神経外科速報	17(12):1414-1422 ,
135	菊田健一郎、橋本信夫	後頭蓋窩脳動静脈奇形	Clin Neurosci	108. 25:1368-1370, 2007
136	Kikuta K	Application of neuroimaging to bypass surgery	The 3rd Kyoto-Seoul-Taipei meeting	Taipei, 2007
137	Kikuta K, Hashimoto N	Recent modification on cerebrovascular revascularization surgery in Kyoto University: Technical case report	The 56rd Congresso Nazionale della Societa Itarianna di Neurochirurgic	Rome, 2007

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Title

Novel epidemiological features of moyamoya disease

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Abstract

[Background]
Many clinical features specific to moyamoya disease have been reported and cited in textbooks based on previous data. The purpose of this study is to investigate the present epidemiological features of moyamoya disease based on recently obtained regional all-inclusive data.

[Methods]
The authors have performed an all-inclusive survey of moyamoya disease in Hokkaido, one of the major islands in Japan with a population of 5.63 million. The epidemiological features were analyzed based on the data from 267 newly registered patients with moyamoya disease in Hokkaido from 2002 to 2006. These analyzed data were adjusted to whole Japanese population at 2005.

[Results]
The detection rate of the disease per year was 0.94 patients per 100,000 people, and prevalence was 10.5 patients per 100,000 people. The incidence of ischemia concerned with the disease was 0.53 patients per 100,000 people-years and hemorrhage was 0.2 patients per 100,000 people-years. The ratio of female to male patients was 2.18. The ratio of patients 10 and above to under 10 years of age at onset was 6.18. Two peaks for age of onset were seen; the highest observed between 45 and 49 years, and the second between 5 and 9 years. Asymptomatic patients comprised 17.8% of the total number of patients.

[Conclusion]
The epidemiological features of moyamoya disease determined by this survey varied considerably from previous data. The detection rate and prevalence of the disease were higher than those reported previously. The highest peak of onset age was older than those reported previously. In addition, it was revealed that asymptomatic moyamoya patients are not always rare in Japan.

It is not always easy to determine the true epidemiological features of a specific disease with low incidence. Most published studies depend on patient data obtained from selected large hospitals or compiled from numerous previously reported literature. Consequently, these studies have many inherent selection biases. A nationwide all-inclusive study, which appears to be an ideal approach to exclude bias, is not always feasible since the registration of patients suffering from diseases with a low incidence takes several years; further, many omissions in registration can take place because of the weak incentives provided to doctors and patients. Indeed, the epidemiological data of many neurological diseases that appear even in textbooks may suffer from serious selection biases. Moyamoya disease is one such typical neurological disease that has a low incidence. The present epidemiological data for this disease has been mainly obtained from select community and university hospitals and may suffer from a serious selection bias.[1-4]

In addition, the development of a brain check-up system in Japan revealed many asymptomatic cerebrovascular diseases[5, 6] including cases of familial occurrence of moyamoya disease. This means that the previous epidemiological data may have been undercounting.

However, moyamoya disease has been designated as an intractable disease by the Japanese Ministry of Health, Labour and Welfare, which is fortunate from the point of view of disease tracking. Patients officially registered with moyamoya disease are qualified to receive a medical allowance from the government.[7] Therefore, nearly all patients are considered to have a strong incentive to seek registration. Hokkaido is the second largest island in Japan, and the data of patients with moyamoya disease have been well documented for the past several years, including demographic and radiological data. Therefore, the analysis of patient registry data in Hokkaido may help reveal the true features of the moyamoya disease. In this study, all-inclusive continuous data from a well-limited area in Japan are analyzed to reveal the contemporary epidemiological features of moyamoya disease.

PATIENTS AND METHODS

Geographical facts

Hokkaido is the second largest island in Japan with an area of 78 thousand square kilometers; it accounts for 22% of the area of Japan. This prefecture has a population of 5.63 million, which is 4.4% of the Japanese population. In addition, although Hokkaido is such a large island, it has one prefectural government of the 47 prefectures in Japan (fig.1). The other major islands are divided into many prefectures. Thus, Hokkaido presents us with an ideal opportunity to obtain sufficient data from a relatively isolated area that represents a single prefecture.

Patient registration

This survey was based on the certification system of registered intractable diseases of the Ministry of Health, Labour and Welfare in Japan from 1979. Each prefectural government is required to certify, register, and provide financial support to the patients with moyamoya disease since it has been officially designated as an intractable disease by the Japanese government.[7] The patients who were suspected as moyamoya disease in hospital could apply an application to prefectural government with radiological information, including magnetic resonance imaging (MRI), magnetic resonance angiography (MRA), and/or conventional cerebral angiography data, in order to confirm the particular vascular changes associated with moyamoya disease including basal moyamoya vessels. These applications with radiological data were evaluated by the commission of certification with specialists in each prefecture. The applications were sorted to definite moyamoya disease, probable moyamoya disease (unilateral moyamoya disease) or improbable cases (e.g. atherosclerosis without moyamoya vessels or quasi-moyamoya disease related with other diseases) based on the criteria prepared by the Research Committee on Spontaneous Occlusion of the Circle of Willis (moyamoya Disease) in Japan. [8]

The subjects surveyed in this study were patients with definite and probable moyamoya disease as certified by the Japanese Ministry of Health, Labor and Welfare in Hokkaido from 2002 to 2006. We analyzed newly certificated data that was onset age with symptomatic

cases and detected age with asymptomatic cases, gender, clinical presentation at onset, familial disease from 2002 to 2006 and the number of already registered patients in 2005.

Analysis

In this study, the types of clinical findings were divided into 4 subgroups: (a) ischemia, including infarction and transient ischemic attacks; (b) hemorrhage; (c) no symptoms. Asymptomatic patients were identified by the brain check-up system or by administration of screening examinations to individuals with familial history and; (d) other symptoms, including headaches, seizures, and involuntary movements. Furthermore, (1) detection rate, prevalence and incidence of ischemia and hemorrhage (2) gender differences, (3) age distribution at onset or detection, (4) type of clinical findings at onset and (5) proportion of family history were investigated. As far as the age and gender is concerned, the data in this study obtained in Hokkaido area was standardized based on data of the whole Japanese population at 2005. This figure of population was most accurate data based on nation census in the last years. The prevalence was calculated using all of registered patients at the point of 2005. The method of statistical analysis used was Chi-square test.

Protection of privacy act

In this study, all data were obtained from data of the Department of Health and Welfare of Hokkaido Prefecture Government under the agreement. All data used in this study was irretrievably unlinked to personal information.

RESULTS

Detection rate, incidence and prevalence (table 1)

A total of 283 new applications for disease certification were submitted during the 5 years from 2002 to 2006. The applications for individuals who had already been diagnosed with the disease were filed for 592 cases in 2005. The new applications comprised 233 definite cases, 34 probable cases, and 16 improbable cases that did not meet the criteria for valid diagnosis. Therefore, a total of 267 newly enrolled cases were investigated in this study. The 60 definite cases (22.5%) were applied with only MR examination without cerebral angiography. The prevalence of risk factor mentioned within these applications, hypertension 0.3%, diabetes 0.3%, hyperlipidemia 0% and systemic atherosclerotic disease 0.7%. The detection rate of the disease per year was 0.94 patients per 100,000 people (95% confidence interval, CI: 0.71 to 1.24), and prevalence was 10.5 patients per 100,000 people (95% CI: 9.44 to 11.7). These figures are higher than those previously reported (table 1). The incidence of ischemia concerned with the disease was 0.53 patients per 100,000 people-years, and the incidence of hemorrhage was 0.2 patients per 100,000 people-years.

Gender differences (table 1)

The ratio of female to male patients was 2.18. However, no significant gender differences were observed, although this figure appears to be slightly higher than that of 1.8 reported previously.[2]

Age distribution (table 1, fig 2)

The percentage of patients under 10 years of age at onset was 15.1% (table 1). This percentage was significantly lower than that of 47.8% reported previously (table 1).[2] Fig. 2 shows the age distribution of the new patients. The highest peak of detection rate was observed from 45 to 49 years and a smaller peak was observed from 5 to 9 years. In female patients, two definite peaks in age distribution were observed—a higher peak from 45 to 49 years and a smaller peak from 5 to 9 years; this was similar to the pattern of total age distribution. In male patients, this two-peak pattern of age distribution was not clear. It appears that the age distribution pattern was mainly influenced by the female patients. This two-peak pattern

was also observed in the previous report.[2] However, the main peak was shifted toward the adult age group.

Types of clinical findings (fig 3, 4)

The percentage of hemorrhage cases was 21.3% and these cases showed only 1 peak at 35 to 59 years. The percentage of cases with ischemia was 56.9%; these cases showed 2 peaks—one at 5 to 9 years and the other at 45 to 49 years. The percentage of asymptomatic cases was 17.8% and had 2 small peaks at 5 to 9 years and adult age.

In the disease pattern by gender, the ratio of ischemia, 53.0% in female was significantly smaller than 65.9% in male ($p<0.05$). Female patients showed a higher incidence of hemorrhage (22.2%) and asymptomatic patterns (20.5%) than male patients (19.5%, 12.2%). These data were not significantly ($p=0.62$ and $p=0.10$). In the disease pattern by age, 78.4% of the patients below 10 years of age showed ischemia pattern that was significantly larger than 53.5% of the patients of 10 years and upward ($p<0.01$). In hemorrhage pattern, 2.7% of younger group were significantly smaller than 24.3% of older group ($p<0.01$).

Familial occurrence (table 1)

Familial history was observed in 15.4% of patients. This figure was higher than that of 10.0% reported previously (table 1). [2] In the younger age group 37.8% patients were with familial moyamoya disease significantly higher than older age group 12.2% ($p<0.01$).