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Selected Abstracts

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A Free Radical Scavenger Protects Cerebral Microvascular Integrity after Tissue Plasminogen Activator Administration in a Rat Stroke Model

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Objective: After stroke, the thrombolytic effect of tissue plasminogen activator (tPA) is beneficial if given within a short time. However, delayed reperfusion with tPA sometimes causes hemorrhagic transformation (HT). An understanding of the mechanism underlying the HT and new therapeutic methods are both needed. **Methods:** We used a spontaneously hypertensive rat model of middle cerebral artery occlusion (MCAO). Rats were treated with vehicle (n = 6), tPA (n = 16), or tPA plus edaravone, a free radical scavenger (n = 11). Edaravone (i.v., 3 mg/kg) was administered every 1.5 hours during the 4.5 hours of MCAO, followed by tPA treatment (i.v., 10 mg/kg) at reperfusion. At 24 hours after MCAO, the survived rats were sacrificed. **Results:** Administration of tPA significantly ($p < 0.05$) worsened the survival rate compared with vehicle. However, treatment with edaravone plus tPA significantly ($p < 0.05$) increased the survival rate, improved motor function, and decreased HT. Immunostaining revealed that edaravone suppressed the tPA-induced lipid peroxidation and matrix metalloproteinase-9 (MMP-9) activation at and around cerebral microvessels. Moreover, electron microscopic analysis demonstrated that the basement membrane disintegrated and became detached from the astrocyte endfeet in rats treated with tPA alone, whereas treatment with edaravone plus tPA prevented the microvessels from dissociating. **Conclusions:** Edaravone can protect the cerebral microvascular integrity, presumably by safeguarding the basement membrane from excess free radicals and MMP-9, leading to a decrease in HT, and an improved survival rate and neurological outcome.

Serum Lipids in Patients with Stroke – A Cross Sectional Case-Control Study

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Objective: Vascular disease remains the prime contributor to the pathogenesis of stroke but dyslipidemia has not been clearly established as a risk factor for stroke the same way it has been for coronary artery disease. There is no case-controlled study on the

contribution of serum lipids to stroke in Nigerians. This study aimed at assessing the possibility of serum lipids as risk factor for stroke in Nigerian patients. **Method:** The demography, blood pressure, fasting plasma glucose, and fasting serum lipids of 87 consecutive patients with first ever stroke managed at the University of Benin teaching hospital between January and December 2005 were analyzed and compared with those of age and sex-matched controls. **Results:** Eighty-seven stroke patients (55 males and 32 females; mean age 61.25 ± 14.77 years) were compared with age and sex-matched controls. Ischemic stroke constituted 64.37% while the rest had hemorrhagic stroke. There were no significant differences in the serum cholesterol, HDL-C and LDL-C levels of stroke patients and controls ($p > 0.05$) but the serum triglyceride level was higher among the stroke patients ($p < 0.001$) with a significant relative risk (RR 1.77; $p < 0.01$). **Conclusion:** In this cross-sectional case-control study, there is no significant difference in serum lipids of Nigerians patients with stroke with the exception of serum triglyceride which seems to confer significant stroke risk.

Prevention of Neuronal Damage by Calcium Channel Blockers with Antioxidative Effects after Transient Focal Ischemia in Rats

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Objective: In the present study, we investigated antioxidative and neuroprotective properties of two CCBs, azelnidipine and amlodipine. **Methods:** Male Wistar Kyoto rats were subjected to 90 minutes of transient middle cerebral artery occlusion (MCAO) by a nylon thread. Animals were divided into 3 groups, vehicle, azelnidipine and amlodipine group. In azelnidipine and amlodipine groups, rats were treated with azelnidipine (1mg/kg) and amlodipine (1mg/kg) by gastric gavage for two weeks before MCAO. Vehicle group was treated by solution of methyl cellulose for two weeks. Rats were killed 24 hs after MCAO. Clinical parameters (mean arterial pressure, heart rate, body weight), infarct volume, brain edema index, cerebral blood flow (CBF), oxidative stress markers which are HEL, 4-HNE, AGE and 8-OHdG, and evidence of apoptosis by TUNEL, were investigated. **Results:** Treatment with azelnidipine and amlodipine reduced infarct volume and brain edema. Azelnidipine treated group showed more marked reduction of infarct volume and cerebral edema than amlodipine group. There was no attenuation of CBF in CCB groups. The numbers of HEL, 4-HNE, AGE and 8-OHdG positive cells were significantly decreased in CCB treated groups. These molecules were again fewer in azelnidipine group than in amlodipine group. In TUNEL staining, the number of positive cells was

smaller in the CCB treated groups, especially in amlodipine group. **Conclusions:** Pretreatment of amlodipine and amlodipine had a neuroprotective effect in ischemic brain. Antioxidative property is one of the important profiles of CCBs that is implicated in brain protection.

Neuroprotective Effects of Intranasal Ginsenoside Rb1 after Middle Cerebral Artery Occlusion in Rats

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Background and Purpose: Intranasal administration has been proven to be an effective way for central nervous system (CNS) targeting drug delivery. Ginsenoside Rb1 (GRb1), a major component of ginseng extract, has shown neuroprotective effects both in vitro and in vivo. But as a drug with large molecular weight, it's difficult for the drug to reach the CNS effectively. Here we investigated whether intranasal administered GRb1 could enter CNS and reveal neuroprotective effects after middle cerebral artery occlusion in rats. **Methods:** HPLC-MS was used to detect the drug in serum and different regions of brain after administered intranasally (i.n.) or intravenously (i.v.) in rats. The value of $AUC_{\text{brain}}/AUC_{\text{plasma}}$ was used to evaluate brain targeting effect. Then GRb1 was given right after the onset of focal ischemia in a middle cerebral artery occlusion model in rats. The infarction volume, blood brain barrier (BBB) damage was evaluated by MRI scan at 24h after the ischemic insult. **Results:** There was no significant difference for GRb1 in different regions of rat brain between i.n. administration and i.v. injection except in olfactory tract and olfactory bulb. But the $AUC_{\text{brain}}/AUC_{\text{plasma}}$ value for i.n. was greater than i.v., which indicated clearly brain targeting effect. MRI scan showed that GRb1 could reduce infarct volume and the BBB damage. **Conclusions:** Our results demonstrate significant brain targeting effect of i.n. GRb1 which could be used for management of acute ischemic stroke. As a noninvasive delivery method, it's of great value in clinical practice for its convenience.

Predictors of In-Hospital Mortality following Intracerebral Hemorrhage in East Coast of Malaysia

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Background: Stroke is the third most common cause of death in Malaysia. Intracerebral hemorrhage accounts for 9 to 31 percent of a first ever stroke with a high mortality rate especially in the first few days. The predictors of mortality of stroke in Malaysia are poorly understood. Objective of this study was to evaluate the influence of various factors on the mortality of patients with intracerebral hemorrhage (ICH).

Methods: This prospective study was carried out at Hospital Tengku Ampuan Afzan Kuantan Malaysia between December 2007 and November 2008. All the patients with ICH admitted to medical wards/ICU were evaluated clinically and CT scans were performed to confirm the diagnosis. **Results:** A total of 94 (61 male and 33 female) patients were included. Mean age was 56 (± 12) years. Hypertension was the commonest risk factor (65.0%) followed by diabetes mellitus (19.1%) and hyperlipidaemia (40.4%). Fifty percent of subjects were between 40 to 60 years of age. Other risk factors were history of hypertension (67.0%), ischemic heart disease (17.0%), diabetes mellitus (19.1%), and cigarette smoking (41.5%). The overall mortality rate was 35.1%. About three-fourth (75%) of the deaths occurred within the first week of hospitalization after ICH. Factors independently associated with in-hospital mortality were Glasgow Coma Scale (GCS) score (≤ 8), volume of hematoma and intraventricular extension. **Conclusion:** Higher rate of mortality were observed during the first week of hospitalization following ICH. Significant predictors of mortality were the admission GCS, the volume of the hematoma, and intraventricular extension.

Plasmin for Enhance Improvement in Acute Ischaemic Stroke

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Background: The purpose of this study was to evaluate Plasmin in acute ischaemic stroke patients in a randomized, double-blind, placebo-controlled trial. **Methods:** An 84-day randomized double-blind placebo-controlled study was conducted. Participants were recruited from six academic hospitals from 6 different cities (Jakarta, Solo, Semarang, Bandung, Makassar, and Manado) that had been diagnosed as ischaemic stroke for the first time after 2 hours and before 2 weeks of onset. Patients were randomly assigned to 1 of 2 conditions: Plasmin or placebo control (1:1 ratio). **Results:** Sixty patients of ischemic stroke who fulfilled inclusion criteria were enrolled in the study over 84 days period, with 44 participants completing the study (21 Plasmin and 23 placebo). The increasing of BI score at 84th day compare to 14th day was significantly more in Plasmin group than in placebo. Eighteen participants (85.7%) of Plasmin showed improvement in MRS score at 84th day compare to score at 14th day, while in placebo group only 12 participants (52.2%) showed improvement ($p = 0.018$). Motor strength of upper extremity was seen improving significantly in Plasmin after 14 days of treatment compare to placebo, while lower extremity was significantly improved after 28 days of treatment. **Conclusion:** Administration of Plasmin in the acute ischaemic stroke patient between 2 hours and 2 weeks of onset showed significant improvement in motor strength, Barthel Index score, and MRS score. Further study with larger number of participants is recommended to confirm the benefit of Plasmin in management of acute ischaemic stroke.

Neuroprotection against Cerebral Ischemia through Inhibition of Calpain Using Tetracycline Derivatives

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Background and Aims: In the present study, we tested the protective effects of two tetracycline derivatives against glutamate-mediated excitotoxicity and cerebral ischemia-induced brain damage. The potential molecular mechanisms of such neuroprotection were also investigated. **Methods:** All procedures for cerebral ischemia produced by middle cerebral artery occlusion (MCAO) using C57/black mice were approved by the local Animal Care Committee. Under temporary isoflurane anesthesia, mice were subjected to MCAO using an intraluminal filament as previously described. After 1 h of MCAO, the filament was withdrawn, blood flow restored to normal by laser Doppler flowmetry and wounds sutured. Animals were sacrificed after 24 h of reperfusion. Brain infarction was measured and brain tissues were subjected to RNA and protein extraction for PCR, Western blotting, and immunostaining analyses. **Results:** We examined the protective properties of chlortetracycline (CTC) and demeclocycline (DMC) and showed that these two tetracyclines were also potent neuroprotective against glutamate-induced neuronal death *in vitro* and cerebral ischemia *in vivo*. CTC and DMC only weakly antagonized NMDA receptor activities causing 16% and 14%, respectively, inhibition of NMDA-induced whole cell currents and partially blocked NMDA-induced Ca^{2+} influx, commonly regarded as the major trigger of neuronal death. *In vitro* and *in vivo* experiments demonstrated that the two compounds selectively inhibited the activities of calpain I and II activated following glutamate treatment and cerebral ischemia. Minocycline did not significantly inhibit calpain activity. **Conclusions:** These results demonstrated that CTC and DMC provide neuroprotection through suppression of a rise in intracellular Ca^{2+} and inhibition of calpains.

Guanidinoacetate N-Methyltransferase Deficient Mouse as a Model for Neuroprotective Role of Creatine following Neonatal Hypoxic-Ischemic Encephalopathy

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Background: The aim of this study is to investigate the effects of creatine supplementation in GAMT mouse models following hypoxic and ischemic (HI) events. **Methods:** Knockout female GAMT and their wild type littermates were used in this study which has short term and long term phases. At postnatal day 7, pups underwent right carotid artery ligation followed by hypoxia (8% O_2) for 20 min. Following weaning, mice were separated in various groups on the basis of their genotype and diet supplementation for 10 weeks.

Various neurological tests like Morris water maze, rota rod, and open field, biochemical analysis of blood plasma and urine and whole brain histology were performed to observe the effect of diet following HI events. Separate group of mouse with out hypoxic ischemic insult, for all treatments, were used as control for short and long term experiments. **Results:** During short term experiments, GAMT wild type pups performed significantly better than knockouts to perform various behavioral reflexes. The performance of knockouts was even worst following hypoxic ischemic insult. During long term phase, we observed that creatine supplementation improves the performance of both wild type and knockout mice in all HI as well as in no HI treatments. Knockout mouse even performed better than wild type littermates in some experiments. Performance of wild type as well as knockout GAMT mouse was significantly affected in experimental groups fed on creatine free diet. **Conclusion:** Creatine supplementation improves the over all performance of GAMT knockout as well as wild type mouse.

Carotid Intima Media Thickness Does Not Correlate with Coronary Artery Atherosclerosis in Pakistani Population

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Objective: To determine the frequency of carotid artery disease in patients with coronary artery disease (CAD) and to determine the relationship of carotid intima media thickness (IMT) and severity of CAD in our population. **Methods:** A cross-sectional study was done in Shifa International Hospital from January 2008 to January 2009. All patients 18 years and above undergoing coronary angiography were recruited serially after informed consent. All patients had carotid Doppler study within 2 weeks of angiography. $\text{IMT} \leq 1\text{mm}$ was considered normal and $\geq 1.1\text{mm}$ as diseased. More than 50% stenosis was considered significant in carotid and coronary vessels. **Results:** There were total of 297 patients; 213 (72%) were male. Mean age was 56 ± 10 years (range 34-88). Hypertension was present in 58%; diabetes in 42%; dyslipidemia in 46% and stroke in 4%. 20% patients were current smokers. 69% patients underwent elective angiography. Indications for angiography included: unstable angina 37%; stable angina 22%; ACS 15%; STEMI 15%; NSTEMI 8%. The frequency of significant carotid disease was 12/291 (4%). The mean IMT on right was 1.34 mm and on left was 1.39 mm. In univariate analysis, IMT of $\geq 1.1\text{mm}$ was significantly associated with coronary artery disease ($p=0.04$); however, on multivariate analysis this significance was lost and male gender ($p=0.001$), history of diabetes ($p=0.003$) and smoking ($p=0.004$) remained independent predictors of coronary artery disease. There was also a significant correlation between $\text{IMT} \geq 1.1\text{mm}$ and $>50\%$ carotid disease ($p=0.001$ for right and $p=0.0001$ for left). Increase in IMT was seen with increasing age ($p=0.01$). **Conclusion:** The frequency of significant carotid disease in patients with coronary artery disease was very low.

Cerebral Ischemia Manifested as Recurrent Loss of Consciousness

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Objective: To demonstrate the clinical characteristics of cerebral ischemia manifested as recurrent loss of consciousness and to explore the pathogenesis of these incidents. **Methods:** 12 patients with cerebral ischemia manifested mainly as recurrent loss of consciousness were retrospectively studied. Their risk factors, clinical characteristics, cranial MRIs, angiograms, perfusion images and follow-ups were recorded. **Results:** The patients had at least one risk factor of cerebrovascular disease and presented as syncope or syncope-like episodes that lasted for minutes to hours and less than 24 hours. These patients were divided into three types according to the angiograms: A severe stenosis in anterior circulation (mostly on both sides); B severe stenosis in posterior circulation; and C multiple severe stenosis (in both anterior and posterior circulation). Angiogram and cerebral perfusion studies strongly suggested that stenotic cerebral arteries restricted cerebral blood flow, causing diffused cerebral hypoperfusion or brainstem ischemia. All the 12 patients received medical therapy. 4 of the 12 patients received stent angioplasty and there were no attacks during the follow-up. 6 of the remaining 8 patients with drug therapy encountered ischemic strokes within 90 days, including 2 with disabling strokes. **Conclusions:** Recurrent loss of consciousness was a rare manifestation of large cerebral artery stenosis. The probable mechanism might be diffuse hypoperfusion in cerebrum or brainstem. These patients were in high risk of stroke. Interventional therapy to revascularization might be a rational treatment.

Clinical and Imaging Characteristics of 21 Cases with Moyamoya Disease

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Objective: To analyze the clinical features of moyamoya disease (MMD) and the diagnostic value of brain CT, MRI, MRA and DSA to MMD. **Methods:** Totally 21 MMD patients were enrolled in this study. The initial clinical manifestations and results of the imaging examinations were analyzed retrospectively. **Results:** This study was composed of 21 patients (9 male, 12 female). The most common first symptom in adults was cerebral hemorrhage (CH), with a total of 13 cases (68.4%). In 13 cases with CT scan: 6 cases had subarachnoid hemorrhage, 4 cases had intraventricular hemorrhage, and 3 cases had lobar hemorrhage. In 8 cases with MRI/MRA: 6 cases had CI (75%), 6 cases had bilateral stenosis of the distal internal carotid artery (ICA) and proximal of their first branches accompanied with the prominent collateralization. All patients were examined by DSA, the bilateral stenosis or occlusion of distal ICA and proximal MCA/ACA was found in 21 patients (100%), moyamoya vessels were found in 17 patients (80.9%), the prominent collateralization

was found in 20 patients (95.2%). **Conclusions:** Ischemic stroke is the major clinical manifestation in adult MMD patients. When a patient has recurrent stroke without stroke risk factors, MMD should be considered and DSA should be performed as soon as possible.

The Complications and the Therapeutic Methods of Carotid Angioplasty and Stenting

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Objective: To summarize the complications and the therapeutic methods of carotid angioplasty and stenting (CAS) based on 38 cases. **Methods:** The complications and the therapeutic methods of CAS procedures on 38 patients were analyzed retrospectively. During the peri-operative period, the anticoagulant therapy was used in all of the cases, so was the cerebral vascular angiography and cervical Doppler sonography. 24 patients used cerebral protection of filter devices. Among the 14 patients without cerebral protection 10 patients underwent predilation, 3 patients underwent postdilation; and 1 patient underwent neither. **Results:** Among all the 38 cases, 1 suffered puncture site hematoma; 17 reported intra-operative carotid sinus reactions; 5 reported post-operative cerebral hyperperfusion; 4 reported intra-operative cerebral ischemia, 3 of them improved after treatment, the other got dyskinesia of one side; thrombosis following stent placement in 1 case, 1 patient died of intracerebral hemorrhage after the surgery. 37 patients' symptoms disappear or get better. **Conclusion:** These results suggest that careful preoperative preparation, orderly procedure, and correct postoperative treatment might significantly decrease the incidence of perioperative and long-term complications. Percutaneous transluminal stenting for stenosis of internal carotid artery is safe. Enough attention should be paid to the occurrence of ICH resulting from over-flow after operation.

Protection Mechanism of Remote Ischemic Preconditioning on Cerebral Ischemic in Humans

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Objective: To investigate the possible protection mechanism of remote ischemic Preconditioning (RIPC) on cerebral ischemic in human. **Methods:** To collect 63 patients with the stenosis or occlusion of internal carotid artery (ICA) or middle cerebral artery (MCA) in Xuanwu Hospital. These patients were divided into two groups, the patient with cerebral infarction in group A, the other in group B. RIPC was induced by five min cycles of upper limb ischemia and reperfusion using a blood pressure cuff. The levels of adenosine, VEGF, HIF-1 α and HGF in serum were determined by enzyme linked immunosorbent assay (ELISA). Comparative analysis of these level, clinical

cal manifestations and imaging before experiencing RIPC and after six months were performed. **Results:** All the level of adenosine, VEGF, HIF-1 α and HGF in patient with cerebral infarction is higher than the patient without cerebral infarction. The mean of adenosine is 111.3pg/ml in group A and >92.8 pg/ml in group B; the mean of VEGF is 553.3 pg/ml in group A, and >478.3 pg/ml group in group B; the mean of HIF-1 α is 309.3 pg/ml in group A and 263.5 pg/ml in group B; the mean of HGF is 20.0 pg/ml group A and >18.77 pg/ml in group B. Differences between A and B groups were not significant. There is one patient who experience RIPC in follow-up after six month. The mean of adenosine is from 46.36 to 84.54 pg/ml; VEGF from 199.20 to 592.95 pg/ml; HIF-1 α from 191.59 to 346.06 pg/ml. Differences VEGF before experiencing RIPC and after six months were significant ($P<0.05$). The clinical manifestation and flow of perfusion on ischemic zone were obviously improved. **Conclusion:** RIPC may protect cerebral ischemic through evaluating the level of adenosine, VEGF, HIF-1 α .

Short-Term Outcomes of Stenting for Cerebral Artery Stenosis

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Objective: Introduce exactly the procedure of stent-assistant angioplasty of cerebral artery stenosis and summary the experience of stenting in 80 patients with cerebral artery stenosis. **Methods:** The patients with severe cerebral artery stenosis were treated by stent implantation and 98 stents were implanted, of which 52 were in carotid, 41 in vertebrobasilar artery, 3 in subclavian artery, 2 in middle cerebral artery. Forty-five patients were operated under cerebral protection. **Results:** Stent were successfully implanted in all patients, the degree of stenosis reduced more than 80% in 76 patients and 70% in 4 patients. Forty-five filter devices for cerebral protection were used successfully. Of the 12 TIA patients, 11 ceased to recurrent after stent implantation. During periprocedure, 3 patients had consciousness disturbance and/or acroparalysis because of lower blood pressure, and recovered after salvage. Two patients older than 80 suffered from pulmonary infection and acute cardiac insufficiency. One patient dead, and one had acute cerebral infarct. **Conclusion:** Endovascular stenting is effective technique in treating cerebral artery stenosis. The operation will be safer under cerebral protection device.

The Relationship of Mesenchymal Stem Cell Paracrine Action and Cell Apoptosis after Cerebral Ischemia

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Background: The mechanism of inhibitory effect on apoptosis after cerebral ischemia because of MSCs' paracrine action had not been elucidated. **Objective:** To obtain the paracrine action of MSCs and investigate the in vivo mechanism of its inhibitory effect on apoptosis after cerebral ischemia. **Methods:** Rat cerebral ischemia model was established by the middle cerebral artery occlusion (MCAO). Twenty-four rats were divided into two groups: cell implanted group (group A, n=12) and no cell implanted group (group B, n=12). The rats of group A (n=12) were implanted MSCs, and the rats of group B (n=12) were admitted the same does of PBS as control. Half rats of each group (n=6) were injected U0126 intravenously through the tail vein. The level of VEGF and p-ERK1/2 protein expression was measured by Western blot 7 days later. Apoptosis cells in the area of ischemic penumbra were examined by TUNEL. **Results:** The VEGF protein content in the brain tissue in the group A was significantly higher compared to that in the group B ($P<0.05$). The number of the apoptosis cells in the group A was significantly decreased compared to that in the group B while the expression of p-ERK1/2 was increased. The expression of p-ERK1/2 was down-regulated in rats which were administrated U0126 before the treatment of cerebral ischemia while the number of the apoptosis cells was increased ($P<0.05$). There was no statistical difference of VEGF protein expression between groups whether had been injected U0126 or not. **Conclusion:** MSCs can paracrine VEGF in the striatum of rat's brain and VEGF can play the inhibitory effect on apoptosis in the ischemia area via activation of ERK1/2.

Bis(7)-Tacrine Retrieves Hypoperfusion-Induced Spatial Memory Impairment by Promoting Neurogenesis in 2VO Rats

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Background and Purpose: We evaluate effects of dimer bis(7)-tacrine in reversing hypoperfusion-induced spatial memory impairment in rats. **Methods:** Twenty male Sprague-Dawley rats were used in this study. Thirteen rats were performed bilateral common carotid arteries ligation surgery. The other 7 rats received the same surgical operation but without vessels occlusion as sham. Three months after the surgery, rats were administrated with either bis(7)-tacrine (10mg/kg, i.g.) or saline (1.0ml/d, i.p.) for 7 days. Spatial learning performance was assessed 3 weeks later by Morris water maze. Hippocampal neurogenesis was estimated by immunohistochemical method. **Results:** 2VO rats displayed longer escape latency than the sham-operated rats ($P<0.01$). Administration of bis(7)-tacrine effectively reduced the time to find the platform compared to

the saline-treated rats ($P<0.01$). In the probe trial, rats received 2VO surgery spent less time in the target quadrant than the sham group ($P<0.01$). Administration of bis(7)-tarcine significantly improved the performance in probe trial than the saline-treated rats ($P<0.01$). Number of crosses on the platform area of ischemia rats was less than sham ($P<0.01$). Rats received bis(7)-tarcine performed better than saline-treated ischemia rats ($P<0.01$). We further investigated neurogenesis in hippocampal dentate gyrus, results revealed that administration of bis(7)-tarcine promote newborn cells coexpression of BrdU and nestin in ischemia rats compared to the saline treated rats ($P<0.01$). **Conclusions:** Administration of bis(7)-tarcine could attenuate the memory impairment by enhance neurogenesis in chronic ischemic rats.

Early Management of Ruptured Intracranial Vertebral Dissecting Aneurysms

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Objective: To evaluate the early management of intracranial vertebral dissecting aneurysms. **Methods:** The ruptured intracranial vertebral dissecting aneurysms have been treated early since August 2005 according to their specific configuration by three endovascular techniques. Six aneurysms were treated by stent-assisted coiling; 4 aneurysms were treated by double stents technique; 4 aneurysms were treated by aneurysm and parent artery coiling. Bloody cerebrospinal fluid was drained as early as possible after endovascular treatment, together with calcium channel blockers to prevent cerebral vasospasm. **Results:** There was no embolic or bleeding complication during the operation. 13 patients recovered good, except that one patient who harbored Hnt&Hess V was died due to initiated severe brain damage. Follow-up 16 months, there is no rebleeding. Angiographic follow-up, 6 aneurysms treated by stent-assisted coiling except one which had partial recanalization did not recur. In 4 aneurysms treated by double-stent technique, the fusiform ectasia portion of two aneurysms was disappeared and was remarkably diminished in another two aneurysms. 3 aneurysms treated by aneurysm and parent artery coiling have no recanalization. **Conclusions:** Early endovascular treatment of ruptured vertebral dissecting aneurysms is safe and effective. According to morphologic characteristics of aneurysm, it is better to choose a suitable technique such as stent-assisted coiling.

Evaluation of Quality of Life and Factors in Patients after Stroke

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Objective: To study the quality of life and factors in patients after stroke. **Methods:** This study was based on the China QUEST

project. One hundred and eighty-four cases of stroke were registered prospectively and continuously from July 1, 2006 to November 30, 2006 in the first affiliated hospital of Baotou medical college. The contents of registry include: social demographic characteristics, incident condition. HRQoL and factors were determined in 3 and 12-month survivors after stroke using a 35-item quality of questionnaire (QOL-35) designed specifically for Chinese people. **Results:** The scores of HRQoL at 12 months after stroke was 58.08 ± 20.02 , is less than 3 months. There is a significant difference between 3 and 12 months score ($P<0.05$). HRQOL is better in young (<65 years), having occupation, no history of stroke, ischemic cerebral infarction, mild disability, high level income and patient's salary being the source of family income, than the opposite aspects ($P<0.05$). HRQOL is no relationship with gender, marriage, insurance, and hospitalization and nursing care costs. **Conclusion:** In China, HRQOL in patients at 12 months after stroke is less than 3 months. HRQOL after stroke is related to age, occupation, past history of stroke, pathological type, disability, level of income, and resource of family income.

Experimental Study on Treatment of Intracerebral Hemorrhage Rats with Intraventricular Transplantation of Human Amniotic Epithelial Cells

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Objectives: To study the biologic features and the effect of hAECs transplantation on rat models of Intracerebral Hemorrhage. **Methods:** Human amnion membrane made from the chorion of a health placenta, and digested by collagens and trypsin respectively. In 24 hours after the rat models of intracerebral hemorrhage were made with collagens-induced, hAECs labeled with Hoechst33258 were transplanted into the lateral ventricle. Neurological functions were tested by Menzies test and beam-walking test, and then the brain water content was measured. The brain sections were made for fluorescence microscopy, morphological and immunohistochemical analyses. **Results:** Four weeks after transplantation, HAEC-EGFP grew well along the lateral wall and showed green fluorescent, some of which were stained with antibody to vimentin. The behavior test score were improved in treatment group than those of control group on the 3rd day after transplantation. Water content in rat brain of transplant group decreased significantly on the 2nd, 3rd, and 4th day after transplantation and the counted numbers of activated microglia were reduced. All the differences have statistical significance between the two groups. **Conclusion:** HAECs can survive in the lateral ventricle of ICH rats up to 4 weeks after transplantation, express antigen-vimentin, improve the motor deficits of ICH rats and reduced both the activation of microglia and brain edema in rat brain after ICH.

Recanalization of the Occluded Middle Cerebral Artery in MRI-Based Hyperacute Stroke Thrombolysis

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Purposes: To investigate the value of 3 dimension-time of flight magnetic resonance angiography (3D TOF-MRA) in determining recanalization of the occluded middle cerebral artery in multimodal MRI-based hyperacute stroke thrombolysis. **Methods:** One-hundred and thirty-nine patients (96 male and 43 female, aged from 29-79 years, mean age 61 years) with acute ischemic stroke with 12-hour window were examined by multimodal MRI. Among them 52 patients with hyperacute cerebral arterial thrombosis were treated by recombinant tissue plasminogen activator (rt-PA, 0.9 mg/kg) and followed up periodically by MRI. **Results:** The 52 cases hyperacute cerebral infarction identified and selected by multimodal MRI, 24 cases (46.2%) of proximal occlusions in middle cerebral artery (MCA), 22 cases (91.7%) were recanalised after thrombolysis. Among which 18 cases with middle cerebral artery occlusion all got partial to complete recanalization (100%), 6 cases with combined obstructions of the internal carotid artery (ICA) and middle cerebral artery (MCA), 4 cases (4/6) got partial recanalization cross circle of Willis. The 52 patients selected by multimodal MRI to receive thrombolytic treatment demonstrated clinical improvement, with 90 days mRS ≤ 2 and BI of 80-100. The 6 patients developed asymptomatic intracranial hemorrhage (11.5%) 1-7 day after receiving thrombolytics. The mortality and symptomatic intracranial hemorrhage from this study was zero. **Discussion:** Early recanalization is key to achieving good outcome after ischemic stroke. The management of benefit from such therapies is directly to the speed that recanalization is achieved.

Intra-Arterial Thrombolysis and Stenting for Acute Basilar Artery Occlusion

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Objective: To explore and evaluate the predictors of acute basilar artery occlusion (BAO) and the clinical curative effect of intra-arterial thrombolysis (IAT) and endovascular stenting for BAO. **Methods:** 52 patients with BAO were analyzed retrospectively, who were given emergently by IAT therapy with recombinant tissue plasminogen activator (rt-PA) or Urokinase (UK) within 3~48h. 16 patients were given the therapy of stenting because of the partial vascular recanalization and remnant stenosis of basilar artery >50% after IAT. NIHSS scores were estimated before the endovascular treatment and mRS after 3 months. **Results:** After IAT, total recanalization was observed in 24 cases (46.2%), and partial recanalization in 16 cases (30.7%), and no or minimal recanalization in 12 cases (23.1%). Recanalization ratio was 76.9%. 16 patients were treated by stenting with final remnant stenosis <10%. 22 cases (42.3%) were with favorable prognosis, and 20 cases (38.5%) with mortality. Survival

rate was 61.5%. Patient outcomes were correlated to NIHSS score (<0.01), treatment time window (<0.05) and recanalization level (<0.01) significantly. Recanalization were correlated to NIHSS scores (<0.01) and treatment time window (<0.05) significantly. Multivariate analysis showed NIHSS scores <14 and good recanalization as independent variables could predict favorable prognosis of the patients with BAO. **Conclusion:** NIHSS scores <14 on admission and good recanalization were predictors for good outcome of the patients with BAO. It showed that IAT and stenting interventionally were of safety and efficacy for BAO.

Serum Levels of MMP-2 and the Number of Leukocytes in Peripheral Blood of the Acute Cerebral Infarction Patients

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Objective: To study the relationship among the serum levels of matrix metalloproteinase-2 (MMP-2), the number of leukocytes in peripheral blood, the volume of infarction, degree of neurofunction impairment and prognosis in patients with acute cerebral infarction, and investigate the effect of MMP-2, WBC in cerebral infarction. **Methods:** We measured the MMP-2 level of 48 cases acute cerebral infarction patients brought into by enzyme linked immunosorbent assay within 48 hours, the 7th days, the 14th days after onset, and measured the number of leukocytes in peripheral blood in the same time, and compared with the control group. **Results:** The serum level of MMP-2 and number of leukocytes in peripheral blood of cerebral infarction group was obviously higher than control group. MMP-2 is highest in the 7th days ($P < 0.05$), WBC is highest within 48 hours after onset ($P < 0.05$). They have obviously positive correlation between the volume of infarction and the degree of neurofunction impairment and negative correlation with prognosis. Both of them are positive linear correlation ($r=0.628$, $P < 0.05$). **Conclusions:** Inflammatory reaction associated with the acute cerebral infarction, took place in the process of ischemic brain damage. MMP-2 and Leukocyte take on important role in the process, and both of them were positive correlated.

Misdiagnosis of Posterior Circulation Ischemia during Initial Presentation in the Emergency Room

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Background: Posterior circulation ischemia (PCI) is generally considered a condition with a poor prognosis because of high rates of mortality and severe disability. The symptoms of PCI are more complicated than those of anterior circulation TIA or Stroke. We hypothesized that emergency room physicians may be less famil-

iar with PCI and the chance for misdiagnosis of this disease may be high among these patients **Methods:** Subjects are 116 PCI patients registered in the Nanjing Stroke Registry Program between January 2007 and December 2008. Information concerning of patient demographic features, cardiovascular risk factors, past medical history, subsequent diagnostic testing results, and stroke characteristics were collected. **Results:** Of the 116 PCI patients were enrolled in our study. 31 (26.7%) patients who presented to the emergency room were misdiagnosed and given corresponding therapies. There are 18 male and 13 female, median age 64.3, range: 18–78 yrs. Most of them were misdiagnosis as vertigo; some of them diagnosed syncope, gastritis, seizures, alcoholic and drug poisoning, head trauma. **Conclusions:** PCI symptoms have a higher chance of being misdiagnosed during the initial visit to the emergency room. The patients presenting with symptoms such as vertigo, nausea, and drop attack, ataxia and conscious disturbance, especially in the middle-aged and old patients who have cardiovascular risk factors, should be assessed very carefully by looking for associated cranial nerves, brain stem, cerebellum and occipital lobe symptoms/signs. Our study indicates that the physicians in the emergency room need the training to enhance the ability to identify PCI.

The Effect of Carotid Artery Stenting on Cognitive Performance in Patients with High-Grade Carotid Artery Stenosis: Temporary or Persistent?

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Background: This study is aimed to investigate the change in cognitive performance before and after carotid angioplasty and stenting (CAS) with brain protection devices among patients with high-grade carotid artery stenosis. **Methods:** Thirty-two patients suffering from high-grade symptomatic carotid stenosis and received CAS were enrolled in this prospective study. The degree of the stenosis was measured on angiograms before and after stent placement. A battery of 5 selected neuropsychological tests was performed before, 2 days, 1 month, and 6 months after stent placement. Ultrasonography was repeated 1 month after stent placement, and CT angiograms were performed 6 months later. The following neuropsychological tests were selected: The Mini Mental State Examination (MMSE), an extended mental status examination, Wechsler memory scale (WMS), a psychomotor performance test for speed, and the language fluency test (LF). Differences of the scores before and after stent placement were calculated and tested for significance with a Student t test. **Results:** Stenosis of carotid artery averaged 78% before treatment and 16% after CAS. Compared with the scores prior to CAS, when 2 days and 1 month after procedures, the scores from the extended mental status examination improved ($P<0.05$). The scores from the language fluency test also improved significantly ($P<0.05$). Six months after procedure, all the scores only ameliorated slightly ($P>0.05$). No significant change was noted in the scores from the Mini-Mental State Examination and Wechsler memory scale or in the speed of psychomotor performance. **Conclusion:** CAS with brain protection

devices in patients with a high-grade stenosis of the carotid artery might result in significant improvement in cognitive performance, but the improvement seemed not to be persistent. Further studies are needed.

Vertebral Cerebrospinal Fluid Poor Circulation Syndrome

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Objective: To study and evaluate the causes, mechanisms, clinical symptoms and signs and MRI manifestations of vertebral cerebrospinal fluid poor circulation syndrome. **Methods:** The clinical and MRI data of 1392 patients for Spinal lesions were collected and analyzed. The features of different kinds of spinal lesions were analyzed. **Results:** Various degrees of spinal stenosis, poor circulation of cerebrospinal fluid and the corresponding clinical symptoms and signs were found in all cases. Common symptoms by turns were dizziness, general fatigue, memory digression, lower limb weakness, insomnia, chest distress, upper limb weakness neck and back muscles stiffness. The clinical manifestations were markedly increased after 37 years old. The common clinical manifestations were various in different age groups lumbosacral and cervical segments were of a higher attack rate. The Common abnormalities of MRI manifestations by turns were vertebral hyperosteoecy of posterior margin, subarachnoid space narrowing, disc herniation, facet joint imbalance, lateral recess stenosis, the ligamentum flavum hypertrophy, posterior longitudinal ligament hypertrophy, spinal degeneration, spinal muscles tension imbalance and so on. **Conclusion:** The clinical symptoms and signs of vertebral cerebrospinal fluid poor circulation syndrome are diverse. MRI could show sufficiently the causes of vertebral cerebrospinal fluid poor circulation evaluate their conditions and assist clinical diagnosis.

The Diagnosis and Treatment of Cervical Dural Arteriovenous Fistulae Presenting with Intracranial Subarachnoid Hemorrhage

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Objective: The cDAVF is a rare cause of intracranial subarachnoid hemorrhage (SAH), with 25 patient's reports in literature. We discuss our experience on the diagnosis and treatment of cDAVF. **Methods:** A male (56-year-old) and a female (35-year-old) all presented with headache. Computed tomography scan revealed intracranial SAH in the basal cisterns, the 4th ventricle and hydrocephalus. The initial cerebral angiography showed a cDAVF at the C1 level. After hydrocephalus was managed, repeat cerebral and spinal angiographies were performed 1 week later to exclude other vascular lesions. **Results:** The repeat left vertebral artery arteriogram confirmed that

a cDAVF was in the left C1 level. The fistula was fed by meningeal branches of the left distal VA, which shunted into an enlarged medullary vein on the ventral surface of the brain stem and cervical cord. This abnormal vein drained toward the posterior cranial fossa. Two patients subsequently underwent foramen magnum craniectomy and upper cervical laminectomy, and then cDAVF was coagulated. The operative course was uneventful without complications. Follow-up angiogram showed no residual cDAVF. **Conclusion:** The cDAVF have a wide variation of presentation associated with pattern of venous drainage, differing from DAVF in the thoracolumbar region. Intracranial SAH may be caused by increased venous hypertension when drainage ascended toward intracranial veins.

Temporary Venous Cardiac Pacing in Carotid Stenting: Prevention of Angioplasty-Induced Bradycardia and Hypotension

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Objective: Due to the progressive aging of the population, severe carotid stenosis has not become a uncommon condition. Angioplasty of carotid stenosis at the sinus is usually concerned with hemodynamic impairment from stimulation of the carotid sinus baroreceptor (severe bradycardia, hypotension). **Material and Methods:** We retrospectively analyzed a consecutive series of 45 aged patients underwent the carotid angioplasty and stent placement (CAS) between January 2005 and December 2008. Prophylactic temporary venous pacemakers were used to prevent possible angioplasty-induced bradycardia and subsequent hypotension. Pacemakers were set to capture a heart rate decrease below 60 beats per minute. **Results:** The 45 patients with a mean age of 71.9 ± 7 years, and consisted of 41 men, 4 women. The pacemakers maintained a cardiac rhythm in all patients and in no case did the pacemaker fail to respond when activated. 86.67 percent (39 of 45) of patients with calcified lesions and 13.33 percent (6 of 45) of patients without calcified lesions, which was statistically significant ($P < 0.05$). No patient experienced an operative morbidity or mortality as a consequence of the temporary pacing devices. **Conclusions:** Angioplasty induced bradycardia in CAS is a common condition and it is more prevalent in carotid bifurcation with calcified lesions. Temporary venous demand pacing is a safe procedure and may prevent life-threatening, baroreceptor-induced bradycardia and/or hypotension especially in bilateral CAS.

MRI-Based Emergency Assessment of Hyperacute Stroke Thrombolysis in 12-Hour Window: Preliminary Experience from a Single Centre in China

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Objective: The evolution of acute stroke is highly variable from patient to patient, and it is clear that a time-based thrombolysis strategy has limitation. Our objective is to investigate the value of fast multimodal magnetic resonance imaging (MRI)-based emergency assessment hyperacute stroke thrombolysis in 12-hour window. **Methods:** One-hundred-thirty-nine patients with 12-hour window acute ischemic stroke were examined by fast multimode magnetic resonance imaging and among them, 52 patients with hyperacute cerebral infarction confirmed by MRI were treated by recombinant tissue plasminogen activator (rt-PA) and followed up periodically by MRI. Ten percent of the total dosage (0.9 mg/kg) rt-PA was injected as an intravenous bolus after 1 minute, while the rest was given by continuous intravenous infusion at 60 minutes. **Results:** The 52 patients selected by fast multimode MRI to receive thrombolytics demonstrated clinical improvement, with 90 days modified Rankin scale scores ≤ 2 and life quality Barthel index of 80-100. The 6 patients developed asymptomatic intracranial hemorrhage (11.5%) 1-7 day after receiving thrombolytics. **Conclusions:** Fast multimodal MRI-based selection of hyperacute stroke model is superior compared with the traditional DWI/PWI mismatch model for the emergency assessment of hyperacute stroke thrombolysis.

Study on the Relationship between Helicobacter pylori Infection and High-Sensitivity C-Reactive Protein in Patients with Ischemic Stroke

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Objective: To investigate Helicobacter pylori (Hp) infection status in patients with ischemic stroke, and to further explore the relationship between Hp and high-sensitivity C-reactive protein (hs-CRP). **Methods:** Serological antibodies of Hp-CIM and Hp-IgG were determined in 77 cases of hospitalized patients with ischemic stroke and 34 healthy controls by Assure H pylori Rapid Test with current infection marker (CIM Hp RT), hs-CRP was simultaneously determined, and the relationship between them was analyzed. **Results:** The prevalence of Hp current infection and past infection in patients with ischemic stroke of CIM Hp RT were significantly higher than the healthy control group (66.2% vs 41.2%, 59.7% vs 35.3%, $P < 0.05$). The levels of hs-CRP in ischemic stroke patients with Hp current infection was significantly higher than the patients with past infection group (7.83 ± 4.28 mmol/l vs 5.41 ± 5.76 mmol/l, $P < 0.05$), and both were higher than the healthy control group ($P < 0.05$). **Conclusion:** There was a higher prevalence of Hp infection in

patients with ischemic stroke and Hp infection may increase risk of atherosclerosis and stroke by altering serum hs-CRP.

The Relationship between Serum Uric Acid and Carotid Stenosis in Patients with Ischemic Stroke

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Objective: To study the relationship between serum uric acid (SUA) level and carotid stenosis in patients with ischemic stroke.

Methods: Patients with ischemic stroke were examined with subtraction and diagnosed as with (112 cases) and without carotid stenosis (50 cases). Patients with stenosis were further grouped as slight (45 cases), moderate 39 cases) and severe stenosis (28 cases). There were 62 patients with unilateral and 50 patients with bilateral carotid

stenosis. **Results:** The level of SUA was significantly higher in patients with carotid stenosis than in patients without ($P<0.001$). SUA was significantly higher in patients with severe stenosis than in patients with moderate stenosis ($P=0.29$), significantly higher in patients with moderate stenosis than in patients with mild stenosis ($P=0.14$), significantly higher in patients with bilateral stenosis group than in unilateral stenosis ($P=0.003$). Logistic regression analysis showed that SUA level is not an independent risk factor of carotid stenosis. Spearman rank correlation analysis showed that SUA level and the degree of carotid stenosis was positively correlated ($R=0.401$, $P<0.001$). **Conclusions:** SUA level may be an important but not independent risk factor for carotid stenosis. There was a correlation between SUA level and the severity of the carotid stenosis.