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Selected Abstracts

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The Study of Association between SNP 1425G/A in *PRKCH* and Genetic Susceptibility of Cerebral Infarction

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Objective: To explore the association between 1425G/A single nucleotide polymorphism (SNP) of Protein kinase C η gene (*PRKCH*) and cerebral infarction in Jiangsu Han population. **Methods:** 255 patients with cerebral infarction and 225 controls were recruited in our case-control study. The 1425G/A in *PRKCH* gene was detected by direct sequencing of PCR products. Data were coded and entered in SPSS Windows (version 13.0). **Results:** The frequencies of the GA+AA genotypes and A allele in CI group were significantly higher than those in control group ($\chi^2=7.377$, $P=0.007$ and $\chi^2=15.104$, $P<0.001$). Further analysis indicated that the genotypes and alleles frequencies were statistically different between lacunar infarction subtype and controls ($\chi^2=11.744$, $P=0.001$ and $\chi^2=20.445$, $P<0.001$). Logistic regression analysis revealed that hypertension, diabetes mellitus, hyperlipidemia and the A allele of 1425G/A polymorphism were independent risk factors for lacunar infarction. **Conclusions:** The SNP 1425G/A in *PRKCH* was significantly associated with cerebral infarction, particularly with lacunar infarction.

The Effect of JNK Signaling Cascade Pathway on the Suppression of Lipopolysaccharide Induced COX-2 Expression by Berberine in Human Peripheral Blood Monocytes

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Objective: To investigate the inhibition of berberine (BBR) on lipopolysaccharide (LPS) induced COX-2 expression via JNK, p38MAPK signaling cascade pathways in human peripheral blood monocytes (HPMC). **Methods:** HPMC were isolated and cultured from whole blood and divided into 5 groups treated with null, LPS, LPS+BBR 25 μ mol/L, LPS+BBR 50 μ mol/L, LPS+BBR 100 μ mol/L respectively for 30minutes, 6 hours, 12 hours and 24 hours. Then monocytes were extracted for RT-PCR and westernblot analysis to examine COX-2 mRNA and activated protein expression

of JNK and p38MAPK signaling pathway. Meanwhile, JNK and p38MAPK inhibitor was incubated together with LPS stimulation to examine COX-2 mRNA and protein expression. **Results:** At the four time points after treatment, the COX-2 mRNA and protein expression decreased at a low ebb at 12 hours after BBR treatment ($P<0.05$). On the other hand, with the increasing concentration of BBR, the COX-2 expression decreased progressively ($P<0.01$). At the concentration of 25 μ mol/L and 50 μ mol/L, JNK protein expression was not inhibited significantly by BBR compared with LPS stimulation group ($P>0.05$). Whereas with the treatment of BBR at the concentration of 100 μ mol/L, JNK protein expression could be inhibited obviously compared with LPS stimulation group ($P<0.01$). Human monocytes COX-2 mRNA and protein expression was inhibited statistically significantly while incubated with JNK and p38MAPK pathway inhibitor ($P<0.05$). **Conclusions:** We conclude that BBR inhibits COX-2 mRNA and protein expression in a dose-dependent manner. JNK expression can be inhibited by BBR at a high level of dosage. BBR inhibits COX-2 expression perhaps via JNK pathway at a high level of dosage. COX-2 expression can be inhibited by p38MAPK signaling pathway inhibitor. P38MAPK may have no prominent relationship with the effect of BBR in HPMC.

Aneurysmal Ventricle Hemorrhage in Patients with Hunt and Hess Grade 4 or 5: Treatment Using the Guglielmi Detachable Coil System

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Objective: To evaluate the safety and efficacy of aneurysmal ventricle hemorrhage patients with Hunt and Hess grade 4 or 5 who were treated with Guglielmi detachable coil (GDC) embolization. **Methods:** Sixty-six aneurysmal ventricle hemorrhage patients with Hunt and Hess grade 4 or 5 who were treated with Guglielmi detachable coil (GDC) embolization via femoral arterial routes. **Results:** The embolization was successfully in all 66 patients. Eight patients died of respiratory and circulation failure, 6 patients died of lung infection, 12 patients were in coma and 34 patients were became awaken when discharge. **Conclusion:** Embolization of aneurysmal ventricle hemorrhage patients with Hunt and Hess grade 4 or 5 using Guglielmi detachable coil (GDC) is safe and effective.

The Application of MRI in Thrombolysis for Ultra-Acute Cerebral Arterial Thrombosis

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Objective: To investigate the value of MRI in thrombolytic therapy of ultra-acute cerebral arterial thrombosis. **Methods:** Ninety-six patients with acute cerebral arterial thrombosis were examined by plain CT and multiparametric protocol MRI and among them 21 patients with ultra-acute cerebral arterial thrombosis were treated by recombinant tissue plasminogen activator (rt-PA) and followed-up periodically by MRI. **Results:** The 21 patients selected by MRI to receive thrombolysis demonstrated clinical improvement, with 90d modified Rankin scale scores (mRs) ≤ 2 and life quality Barthel indexes (BI) of 80-100. The complication involved one patient (4.8%) who developed an asymptomatic parenchymal hematoma (PH1) three weeks after receiving thrombolytics; three patients (14.3%) who developed hemorrhagic infarction (HI) one to seven days after receiving thrombolytics. **Conclusions:** MRI has significant clinical value for the treatment of ultra-acute stroke patients who are candidates for receiving intravenous thrombolytic therapy. Our data suggest that patients suffering from ultra-acute stroke patients that are strong candidates for intravenous thrombolytic therapy can be identified by multiparametric protocol MRI, especially to those whose time windows were undefined or beyond 3 hours after symptom onset. MRI-based thrombolysis is safe and effective for ultra-acute ischemic stroke.

The Research on Expression of Platelet Activation Markers and CD62P in Patients with Acute Cerebral Ischemic Stroke and Influence of Using of Anti-Platelet Drugs

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Objective: To study the influence of different anti-platelet drugs (aspirin and ADP antagonists) on the expressions of platelet activation markers in patients with acute cerebral ischemic stroke and provide reliable theoretical references for the prevention and therapy of acute cerebral infarction. **Methods:** Flow cytometry was used to examine CD62P, the platelet activation markers in patients with cerebral ischemic stroke before the use of anti-platelet drugs and after six month of use, respectively. The use of turbidity of the arachidonic acid (AA), adenosine diphosphate (ADP) and epinephrine (EP)-induced platelet aggregation were measured in the patients with ischemic stroke. In the administration before and after the use of drugs in three months, Modified Rankin Scale and Barthel Index were used to evaluate the neurological function of the patients of ischemic stroke. **Results:** The expressions of platelet activation markers in one hundred and twenty-eight patients with cerebral ischemic stroke were obviously higher. The expression of platelet activation mark-

ers in cerebral ischemic stroke patients with diabetes and hypertension was not higher than that without diabetes and hypertension ($P > 0.05$). Both aspirin and ADP antagonists could inhibit the expression of platelet activation markers, but there was no remarkable difference between them ($P > 0.05$). ADP antagonists could inhibit ADP-induced platelet aggregation more than aspirin ($P < 0.01$). However, the score of neurological function after treatment with the patients of aspirin group has no significant difference between the score of the patients of the ADP antagonists ($P > 0.05$). **Conclusions:** The activation of platelet plays a main role in the pathogenesis of cerebral ischemic stroke. Whether hypertension and diabetes occurred in the ischemic stroke further promote platelet activation still needs to be further explored. Both Aspirin and ADP antagonists could inhibit the expression of platelet activation markers. Different anti-platelet drugs could inhibit platelet activation and aggregation from different channels. Monitoring indicators of platelet activation (CD62p) and the aggregation can make the use of antiplatelet drugs better.

Angiogenesis by Intranasal Administration of Acidic Fibroblast Growth Factor after Focal Cerebral Ischemia in Rats

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Background and Purpose: In the central nervous system (CNS), angiogenesis results in the maintenance of cerebral blood flow in the ischemia penumbra, which contributes to the long-term functional recovery after cerebral ischemia. Acidic fibroblast growth factor (aFGF) plays an important role in promoting cerebral angiogenesis. As a noninvasive method, intranasal administration can delivery drug into the CNS bypassing the brain blood barrier (BBB), and provide an effective method for cerebral ischemia. The study was designed to investigate the effect of aFGF on stroke-induced angiogenesis in the ischemic boundary zone after intranasal administration. **Methods:** Adult male Sprague-Dawley rats were intranasal administered with aFGF or saline ($n = 6$) starting 24 hours after middle cerebral artery occlusion (MCAO) and daily for 7 days, as well as BrdU (50 mg/kg) was intraperitoneally injected daily for 13 days. Modified Neurological Severity Scores (mNSS) tests were performed at 0, 1, 7 and 14 days after MCAO. BrdU positive cells and microvessels at the boundary of the ischemic lesion were detected by immunohistochemistry and three-dimensional image respectively. **Results:** At day 7 and day 14 after MCAO, the mNSS of aFGF group were significantly lower than that in control group. Compared with control rats ($26.50 \pm 6.87\%$), the number of BrdU positive cells in all endothelial cells of enlarged thin walled vessels significantly ($P < 0.05$) increased in aFGF treated group ($40.03 \pm 8.28\%$). As evaluated by three-dimensional laser scanning confocal microscopy, treatment with aFGF increased the density and vascular branch numbers of microvessels in the ischemic boundary zone. **Conclusions:** Our data suggests that angiogenesis induced by intranasal administration of aFGF may contribute to neurological functional recovery after stroke, and provide a novel way for the cerebral ischemic therapeutics.

Electroacupuncture Help Intranasal NGF Offer More Protection Against Stroke

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Objective: The present study was designed to investigate the potential of electroacupuncture (EA) for enhancing intranasal administration (IN) of nerve growth factor (NGF) to the brain and neuroprotective effects of combination therapy with IN of NGF and EA on adult rats following focal cerebral ischemia. **Methods:** To perform quantitative distribution of ^{125}I -NGF in rat brain regions after middle cerebral artery occlusion (MCAO), NGF radiolabeled with ^{125}I was intranasally administered alone (IN group) or with EA (IN+EA group) or placebo-EA (IN+PEA group). Baihui (DU20) and Renzhong (DU26) were performed in EA treatment, while bilateral Dicang (ST4) acupoints in placebo-EA treatment. To assess therapeutic effects of treatment on rats following cerebral ischemic damage, rats subjected to MCAO were randomly assigned to 4 groups: IN of PBS as control group, IN group, IN+PEA group and IN+EA group. Treatments were initiated 2 hours after MCAO and given for 3 consecutive days. Neurological function was evaluated with the modified Neurological Severity Scores (mNSS) before and 1, 7, 14, 21 and 28 days after MCAO. Infarct volume was evaluated using hematoxylin and eosin-stained specimens 28 days after stroke. **Results:** Quantitative measurement of ^{125}I -NGF revealed a higher concentration of ^{125}I -NGF in olfactory bulb and some rostral brain regions of IN+EA group compared with IN group ($P < 0.05$), while no difference was observed between IN+PEA and IN group. Neurological functions were significantly improved in IN+EA group compared with the control group ($P < 0.05$). IN+EA treatment also led to markedly reduction of infarction volume compared with the control treatment ($P < 0.05$). **Conclusion:** The data suggested that EA performed on DU channel could enhance delivery of NGF to the CNS via olfactory pathway and help intranasal NGF offer more neuroprotection after stroke.

Study of Digital Subtraction Angiography in Patients with Ischemic Cerebrovascular Disease

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Objective: To investigate the manifestations and clinical significance of DSA in patients with ischemic cerebrovascular disease. **Methods:** We collected and analyzed the results of in 84 patients with ischemic cerebrovascular disease by angiography, in order to find out the characteristics of distribution of the extracranial and / or intracranial arteries damage, as well as the collateral circulation establishment. **Results:** There were 69 patients (82.14%) with the extracranial and /or intracranial arteries damage and 166 vessels involved in which the frequency of damage in intracranial arteries (66.87%) was remarkably higher than that in extracranial

cal arteries (33.13%) ($P < 0.001$). The frequency of damage in internal carotid arteries (21.68%) in the extracranial was highest.

Conclusion: Lesions of internal carotid arteries in the extracranial and intracranial arteries play an important role in onset of ischemic cerebrovascular disease.

Magnetic Resonance Angiography in Evaluation of Venous Thrombolysis for Acute Cerebral Infarction

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Objective: To investigate an evaluation method for venous thrombolysis treating acute cerebral infarction. **Methods:** When the patients were delivered into hospital in 12 h following acute cerebral infarction, 1,000,000 U of urokinase were administered via intravenous. Clinical neurological repair were evaluated before or after thrombolysis. Evaluation of post-thrombolytic vessel recanalization was investigated by magnetic resonance angiography (MRA). **Results:** Thirteen patients were included. Before thrombolysis, infarction was seen at cerebral median artery M1 or M2 in all the patients. Peripheral artery imaging was absent. Vessel recanalization thoroughly happened in four patients after thrombolysis. In the other patients, more angiography imaging was observed than that before thrombolysis. But most of increased angiography imaging was thin or intermittent. European stroke scale increased most fast during 24 h to 72 h after thrombolysis. The best of European stroke scale was 100 in 14 days. After 90 days, 5 patients could live and work without any difficulty, the others were self-dependence. **Conclusions:** MRA is an exact convenient evaluation methods before or after thrombolysis, with objectivism and good cost-efficient. Therapeutic time window of thrombolysis is depended on MRA, and the age, economic condition, anamnesis, changing of illness. And it could be prolonged in a certain range. MRA could predict the effect of thrombolysis in acute cerebral infarction.

Retrospective Analysis of Risk Factors of Two Common Different Traditional Chinese Medicine Syndromes-Obstruction of Collateral Due to Wind-Phlegm and Qi-Deficiency and Blood-Stasis Syndrome in 900 Patients with Cerebral Ischemic Stroke in Wuhan District

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Objective: To analyze the risk factors of two common different Chinese medicine Syndromes-Obstruction of collateral due to wind-

phlegm and Qi-deficiency and blood-stasis syndrome of 900 patients with cerebral ischemic stroke in Wuhan District. **Methods:** Totally 900 in-patients admitted in our Department Neurology from December 2003 to February 2008 were included. They were diagnosed as cerebral infarction by CT and MRI, and grouped as Obstruction of collateral due to wind-phlegm and Qi-deficiency and blood-stasis syndrome group. Risk factors related to cerebral ischemic stroke such as gender, age, time of onset, site of infarction, tongue color, tongue fur, pulse condition, hypertension, diabetes, past stroke history, hyperlipidemia, hematocrit, drinking, smoking, genetic factor, blood type, complications were selected. Age was graded every 10 year. Logistic regression model was applied in the screening risk factors. The odd ratio (OR) and 95% confidence intervals (CI) were calculated. Statistical analysis was carried out by the software SAS 8.2. **Results:** (1) There were statistical significance differently between the two groups to different age groups ($X^2 = 8.2493$, $P = 0.0412$), hyperlipidemia ($X^2 = 4.8386$, $P = 0.0278$), tongue color ($X^2 = 7.947$, $P = 0.0048$), tongue fur ($X^2 = 4.3298$, $P = 0.0375$), pulse condition ($X^2 = 2.4747$, $P = 0.0057$). (2) Univariate non-conditional Logistic regression model analyzer showed the three factors: hyperlipidemia, tongue color and tongue fur had statistical significance to the two syndrome patterns. The OR of hyperlipidemia, tongue color and tongue fur were 0.699 ($P = 0.0282$), 0.332 ($P = 0.0071$) and 0.667 ($P = 0.0382$) respectively. (3) Multiple non-conditional Logistic regression model analyzer showed the two factors: past stroke history (OR: 3.226, $P = 0.0314$), complications (OR: 0.203, $P = 0.0705$) and anterior circulation infarction (OR: 0.214, $P = 0.0098$) had statistical significance to the two syndrome patterns. **Conclusions:** Compared to Obstruction of collateral due to wind-phlegm syndrome, constituent ratio of Qi-deficiency and blood-stasis syndrome was higher.

The Clinical Value of Quantitative Analysis of Diffusion Tensor Imaging in Acute Ischemic Stroke

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Objective: To investigate the relationship between changes quantitative parameters of diffusion tensor imaging (DTI) and clinical severity or disability, further to assess the clinical value of DTI in acute ischemic stroke with corticospinal tract (CST) impaired. **Methods:** Six patients diagnosed as acute ischemic stroke were evaluated with NIH Stroke Scale (NIHSS), all MRI scanings were examination on a 3.0 T scanner performed within 72 hours after onset. We separately measured fractional anisotropy (FA), averaged diffusivity (D_{av}), primary diffusivity (λ_1) and transverse diffusivity (λ_{23}) of infarcts, and of the distant part in ipsilateral CST to investigate whether the microstructure changes could be detected. Diffusion tensor-based tractography (DTT) demonstrates the appearances of bilateral CST and grades it to detect wheather there was a correlation between DTT grades and muscle strength. **Results:** Compared to the contralateral normal parts, all quantitative parameters of white matter in the infarcts decreased. Slight changes of quantitative parameters in ipsilateral CST remote from infarcts were observed. $(I/C)_{FA}$ rate $([I/C] \text{ rate} = [\text{ipsilateral/contralateral}] \text{ rate})$ of white matter in the

infarcts decreased with increasing onset time ($r = -0.899$, $P = 0.015$). DTT showed that the ipsilateral CSTs were thinner even interrupted than the contralateral ones. DTT grades had a high correlation with muscle strength scores of the lower limbs. **Conclusions:** Decreases of all the four quantitative parameters demonstrate that DTI is sensitive in detecting the white matter ischemia. Some parameter rate may be an indicator of course of stroke. Quantitative DTI and DTT at high field can provide valuable information for early diagnosis in acute ischemic stroke. The observed DTI abnormalities may imply the relationships between white matter ischemia and clinical symptoms. However, the present study calls for more comprehensive studies with larger sample sizes to validate the clinical value of quantitative DTI in prognosing acute ischemic stroke.

Role of Mitochondria in Ischemic Postconditioning-Induced Attenuation of Cerebral Ischemia in Diabetic Rats

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Objective: To investigate the effect of ischemic postconditioning (I-Post) on mitochondria after focal cerebral ischemia-reperfusion in streptozotocin-induced diabetic rats. **Methods:** The male SD rats were made diabetic by a single intraperitoneal injection of streptozotocin. Focal ischemia was generated by transient middle cerebral artery occlusion (MCAO). Forty diabetic rats were randomly assigned to four groups ($n=10$): 1) control group: with no other intervention; 2) Sham-operated group: the surgical procedure was identical to other groups, but the MCA was not ligated; 3) I/R group: the brain was undergone ischemia for 90 min followed by reperfusion for 6h; 4) I-Post group: the brain was subjected to middle cerebral artery occlusion for 90 min, then treated for 15 sec, 15 sec, 15 sec by brief reperfusion consecutively, each was separated with occlusion for 15 sec, followed by a persistent reperfusion, which made the total reperfusion time the same as the other three groups. The ultrastructure of mitochondria in cortex was observed by electron microscope 6 h later. The level of malondialdehyde (MDA), Na^+ , K^+ -ATPase, Ca^{2+} -ATPase, superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px) in mitochondria of cortex were measured 6 h later, according to the commercial kit manual. **Results:** Plasma glucose in diabetic rats was routinely 24.6 ± 3.5 mmol/L. The changes ultrastructure of mitochondria in cortex was significantly decreased in I-Post group compared with I-R group. The content of MDA in mitochondria was markedly decreased and the activities of Na^+ , K^+ -ATPase, Ca^{2+} -ATPase, SOD and GSH-Px in mitochondria were increased in I-post group compared with the I-R group ($P < 0.05$ or $P < 0.01$). **Conclusion:** The protective effect of I-Post may be mediated, in part, by inhibiting the production of oxygen free radical, increasing antioxidation, ameliorating energy metabolism, and beneficially improving the integrity of structure and function of mitochondria in brain tissue after reperfusion.

Study on the Artery Morphological Changes and Compensatory Circulation of the Patients with Posterior Circulation Ischemia with DSA

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Objective: To evaluate the abnormal status of cerebral vessel morphology and the types of collateral circulation of the posterior circulation ischemia (PCI) patients on DSA and find out their compensatory significance for better prognosis. **Methods:** Selecting 60 definite PCI treated in neurology department in Lianyungang TCM Hospital from March, 2006 to March, 2008 as experiment group, and 58 healthy controls matched them. We studied on the changes of the cerebral vessels in abnormal status, the presences rate of collateral pathways and the relationship between them by selective cerebral angiography. **Results:** 1. 50(83.3%) patients showed abnormal vascular structures in neck and brain in the PCI group, which included 8 (13.3%) with pure anterior circulation lesion (ACL), 29 (48.3%) with posterior circulation lesion (PCL) and 13 (21.6%) with both. But 10 cases (16.6%)' vessel structures were normal. 2 The distribution of ACL: Total 12 lesions of internal carotid artery (ICA) were found, and 5 cases in ICA and 3 in both ICA and MCA. 3. The distribution of PCL: 4 patients showed stenosis in initiation of subclavian artery (SCA), 14 in left vertebral artery (VA), 13 in right VA, 5 in bilateral VA, only 3 in basal artery (BA) and 3 in posterior cerebral artery (PCA). On the classification of VA abnormality in PCI group, on the left type I, type II and type III were 1, 4 and 9, respectively and on the right type II, type III and type IV were 9, 3 and 1, respectively. 4. The collateral circulation pathways. **Conclusions:** There are different morphological changes of cerebral vessels in most patients with PCI and some of these changes result from ACL. The state of collateral circulation is closely associated with the morphological changes. The main compensations by the patency and thickening of collateral circulation are patency and thickening of thyrocervical trunk and PCOA to the lesion of SCA and the initial segment of VA, PCOA and ACHA to intracalvarium of VA, thyrocervical trunk, PCOA and piamater ramus anastomoticus of ECA to the dysplasia of VA, and PCOA, the muscular branch of arteria cervicalis profunda and PICA to BA.

Study on Predictive Value of Combining Proton Magnetic Resonance Spectroscopy and Diffusion Weighted Imaging in Cerebral Infarct Outcome

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Objective: To study the predictive value of combining proton magnetic resonance spectroscopy (MRS) with diffusion weighted imaging (DWI) in cerebral infarct outcome. **Methods:** 49 patients

with recent cerebral infarction were enrolled into the study, including 15patients superacutely (mean $3.6\pm1.64h$), 18 acutely (mean $33.0\pm22.40h$), 16 subacutely (mean $8.3\pm3.75d$). MRS and DWI were obtained on a GE signa high-speed MR/i 1.5T superconductive MRI system and Probe 2000 multi-voxel software package. The outcomes were measured by ESSS and Barthel Index (BI) three months after infarction. Statistical analysis used linear regression and multiple linear regressions. **Results:** In superacute stage, the content of lactate (Lac) and infarct volume imaged by DWI were significantly correlated to ESSS and BI. The combination of Lac with DWI was better than DWI only, which improved the prediction of all outcome scores. In acute stage, N-acetylaspartate' (NAA'), Lac and the infarct volume were strongly correlated to ESSS and BI. The combination of NAA' with DWI or Lac with DWI significantly improved the prediction of all outcome scores, respectively. In subacute stage, NAA', Lac and infarct volume imaged by DWI were significantly correlated to ESSS and BI. The combination of NAA' with DWI improved the prediction of all outcome scores respectively. **Conclusion:** The combination of MRS with DWI can be used as a important method to predict the clinical outcome in cerebral infarct patients.

Anti-Toll Like Receptor 4 Monoclonal Antibody Attenuates Cerebral Ischemia-Reperfusion Injury

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Background and Objective: We previously reported that the functional mutation of Toll-like receptor 4 (TLR4) in C3H/HeJ mice subjected cerebral ischemia-reperfusion injury resulted in an attenuation of brain infarction size. Meanwhile, we also found that upregulated expression of TLR4 in monocytes correlated with severity of acute cerebral infarction. To define the novel therapeutic target for cerebral infarct, we evaluated the effect of anti-TLR4 monoclonal antibody on cerebral ischemia-reperfusion injury. **Methods:** C57BL/6 mice received neutralizing anti-TLR4 monoclonal antibody (mAb, 100 μ g, twice) intravenously before 30 minutes of middle cerebral artery (MCA) occlusion or 6h after reperfusion. Infarct size was measured using triphenyltetrazoliumchloride staining. Neurological deficits were evaluated by rota-rod test. A c-jun NH₂-terminal kinase (JNK) activation was determined by western blotting, nuclear factor (NF)- κ B activity was detected by gel-shift assay, and cytokine expression such as TNF- α , IL-1, IL-6, MMP-9 were measured by RT-PCR. **Results:** Here we show that treatment with neutralizing anti-TLR4 monoclonal antibody remarkably ameliorated brain infarction induced by 2h occlusion of the MCA in mice, even the mAb was administered 6h after reperfusion. Consistent with the 84.6% reduction in infarct size, the accompanying neurological deficits in locomotor function were significantly improved. mAb treatment resulted in reduction in JNK phosphorylation, less nuclear NF- κ B translocation, and decreased in cytokine expression. However, mAb had little effect on blood flow. **Conclusions:** These results indicate that TLR4 plays a critical role in the development of brain infarction through the amplification of inflammatory injury in the cerebral ischemia region and could be an outstandingly suitable target for the

treatment intravenous injection of neutralizing anti-TLR4 mAb strategy for cerebral infarct.

Pretreatment with the Free Radical Scavenger Edaravone Prevents Cerebral Hyperperfusion after Carotid Stenting

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Objective: To identify and evaluate the effect of a new free radical scavenger Edaravone preventing cerebral hyperperfusion after Carotid Stenting. **Methods:** Forty-one patients with severe carotid artery stenosis (75%) were included into this study consecutively. Twenty patients with severe carotid artery stenosis (75%) were given Edaravone from before carotid stenting three days to after carotid stenting five days. While Twenty-one patients were not given. We checked mean blood flow velocity, peak blood flow velocity and pulsatility index of cerebral middle artery in before carotid stenting, at once after carotid stenting and three days after carotid stenting by transcranial Doppler. **Results:** There were no statistical significances of sex, years, medical history, blood pressure, total cholesterol in two groups at baseline. Hyperperfusion were found only one (5%) in the test group at once after carotid stenting through checking MFV from 65 cm/s before carotid stenting to 150 cm/s (230%) by TCD. Fifty minutes later, this patient feels severe headache, sick and vomiting. And this time, the blood pressure of this patient is normal. The incidence of hyperperfusion was higher remarkably in control group than in test group (15%, $P=0.0300$). **Conclusion:** Edaravone could prevent cerebral hyperperfusion after carotid stenting.

Effects of Recombinant Human Erythropoietin (rhEPO) on JAK2/STAT3 Activity and Endothelial Apoptosis in the Rabbit Basilar Artery after Subarachnoid Hemorrhage

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Background and Purpose: Previous studies have shown that recombinant human erythropoietin (rhEPO) can attenuate the degree of cerebral vasospasm following experimental subarachnoid hemorrhage (SAH). However, the mechanisms for this beneficial effect are still poorly understood. SAH-induced endothelial apoptosis may trigger and aggravate cerebral vasospasm. We, therefore, tried to analyze whether rhEPO administration influenced the endothelial cell apoptosis in the basilar artery after SAH. Another aim of the current study was to investigate the modulation of rhEPO on the activity of Janus kinase 2 (JAK2) and signal transducer and activator of transcription 3 (STAT3), which played an important role in the signaling of apoptosis.

Methods: A total of 48 rabbits were randomly divided into four groups: control group, SAH group, SAH+vehicle group, and SAH+rhEPO group. All SAH animals were subjected to injection of autologous blood into cisterna magna twice on day 0 and day 2. The rhEPO was administered i.p. starting 5 min after the induction of SAH on day 0 and repeated every 8 h for 120 h. The basilar arteries were extracted on day 5 after SAH. The expressions of JAK2, phosphospecific-JAK2, STAT3, and phosphospecific-STAT3 were assessed by Western blot analysis. Cross-sectional area of basilar artery was measured and the endothelial apoptosis was detected by TUNEL method. The mRNA expressions of bcl-2 and bcl-xL were evaluated by quantitative real-time polymerase chain reaction. **Results:** We found that administration of rhEPO could activate JAK2 and STAT3 in the basilar artery and decrease the apoptosis index of endothelial cells following SAH. Moreover, the anti-apoptotic genes such as bcl-2 and bcl-xL were up-regulated after the injections of rhEPO. **Conclusions:** The therapeutic effect of rhEPO on the subsequent vasospasm after SAH may relate to its inhibition on the endothelial apoptosis in the cerebral arteries, which may be mediated in part by JAK2/STAT3 pathway.

The Clinical Value of Quantitative Analysis of Diffusion Tensor Imaging in Acute Ischemic Stroke

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Objective: To investigate the relationship between changes quantitative parameters of diffusion tensor imaging (DTI) and clinical severity or disability, further to assess the clinical value of DTI in acute ischemic stroke with corticospinal tract (CST) impaired. **Methods:** Six patients diagnosed as acute ischemic stroke were evaluated with NIH Stroke Scale (NIHSS), all MRI scanings were examination on a 3.0 T scanner performed within 72 hours after onset. We separately measured fractional anisotropy (FA), averaged diffusivity (D_{av}), primary diffusivity (λ_1) and transverse diffusivity (λ_{23}) of infarcts, and of the distant part in ipsilateral CST to investigate whether the microstructure changes could be detected. Diffusion tensor-based tractography (DTT) demonstrates the appearances of bilateral CST and grades it to detect whether there was a correlation between DTT grades and muscle strength. **Results:** Compared to the contralateral normal parts, all quantitative parameters of white matter in the infarcts decreased. Slight changes of quantitative parameters in ipsilateral CST remote from infarcts were observed. $(I/C)_{FA}$ rate $([I/C] \text{ rate} = [\text{ipsilateral/contralateral}] \text{ rate})$ of white matter in the infarcts decreased with increasing onset time ($r=-0.899$, $P=0.015$). DTT showed that the ipsilateral CSTs were thinner even interrupted than the contralateral ones. DTT grades had a high correlation with muscle strength scores of the lower limbs. **Conclusion:** Decreases of all the four quantitative parameters demonstrate that DTI is sensitive in detecting the white matter ischemia. Some parameter rate may be an indicator of course of stroke. Quantitative DTI and DTT at high field can provide valuable information for early diagnosis in acute ischemic stroke. The observed DTI abnormalities may imply the relationships between white matter ischemia and clinical symptoms.

However, the present study calls for more comprehensive studies with larger sample sizes to validate the clinical value of quantitative DTI in prognosing acute ischemic stroke.

Compensatory Patterns of Collateral Circulation in Ischemic Stroke

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Objective: To study the relationship between compensation of collateral circulation and clinical symptoms, and to find out major compensatory patterns of collateral circulation in ischemic stroke. **Methods:** Fourteen ischemic stroke patients confirmed by Brain CT and DSA were retrospectively analyzed. Nine patients were male and 5 were female, aged 15–75 yrs with a mean of 57.1 yrs. Patients' symptoms for admission included TIAs in 3 cases, persistent hemiparesis in 3 cases, repeated tic in 1 case, ptosis in 1 case, vertigo in 1 case and dizziness in 1 case. 4 cases were asymptomatic. Each patient was found to have at least one cerebral artery occlusion or severe stenosis by DSA. According to the results of DSA and other radiological examinations, the relationship between compensation of collateral circulation and clinical symptoms, and possible compensatory patterns of collateral circulation in ischemic stroke were investigated. **Results:** DSA demonstrated unilateral internal carotid artery occlusion in 7 cases, unilateral middle cerebral artery occlusion in 3 cases, bilateral vertebral artery occlusion in 1 case, unilateral vertebral artery occlusion in 1 case, basilar artery occlusion in 1 case and unilateral subclavian artery occlusion in 1 case. DSA study showed that all these cases had good collateral circulations and thus had temporal or minimal or no clinical symptoms. No venous or arterial fibrinolysis or balloon/stent angioplasty was performed in all these occlusions. After conservative treatment and long time follow-up (1 to 33 months with a mean of 19.2 months), 13 cases had no clinical symptoms and no recurrences. Possible compensatory patterns of collateral circulation in major cerebral artery occlusions were concluded. **Conclusions:** When unilateral cerebral artery occludes, effective collateral circulation can be self-established promptly through multiple ways in order to avoid or minimize neurological deficits.

The Analysis of Cerebrovascular Disease in Cerebral Infarction Patients with Impaired Glucose Tolerance by Transcranial Doppler

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Objective: To investigate cerebrovascular disease in cerebral infarction patients with impaired glucose tolerance (IGT), and to explore the degree of atherosclerosis in IGT. **Methods:** One hun-

dred and forty two patients who had cerebral infarction and had no conclusive medical records of diabetes mellitus (DM) ever before, received 75g oral glucose tolerance test (OGTT). According to the results of OGTT, patients were divided into normal glucose tolerance group (NGT, n=46), IGT group (n=49), newly diagnosed type 2 DM group (n=47). Measurements of cerebral arteries had been measured by transcranial Doppler, and all results were analysis. **Results:** The rate of angiostenosis, arteriosclerosis and bloodstream abnormality in DM group, IGT group and NGT group were 62.8%, 53%, 21.7%; 93.6%, 81.6%, 52.2%; 95.7%, 83.7%, 48.9%. The differences among DM group, IGT group and NGT group had statistic significance ($P<0.05$); but DM group and IGT group had no statistic significance ($P>0.05$). The pulsatility index (PI) of DM group and IGT group had statistic difference with NGT group, while the resistant index (RI) of IGT group and NGT group was different with DM group. All cerebral arteries between injured and uninjured had no statistic differences. **Conclusions:** The rates of angiostenosis, arteriosclerosis and bloodstream abnormality were obviously increased in IGT and DM groups. It is suggested that the atherosclerosis of cerebral arteries could have been developed even in IGT.

Dural Arteriovenous Fistula Incur Olfactory Hallucination

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Objective: We present a rare case of olfactory hallucination caused by dural arteriovenous fistula (DAVF). **Methods:** The patient was a 38 years old man, who had head trauma with normal brain CT 4 years ago. And he had episode of olfactory hallucination before 8 months accompanied dizziness, neurological examination and imageology on brain was performed. **Results:** Digital subtraction angiography (DSA) revealed DAVF in right middle cranial fossa. Episode broke off after interventional therapy. **Conclusions:** DAVF is one of the causes which incur olfactory hallucination. While DAVF is a complicated cerebral vascular disease, we should distinguish olfactory hallucination with the Olfactory Reference Syndrome.

An Analysis of 350 Digital Subtraction Panencephalo-Angiography

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Background: The concern for blood vessels and understanding of blood vessels in order to find more rational and effective therapeutic plan is the key for the management of cerebral vascular disease. Many of traumaless examinations have been developed, but these methods had certain degree of localization, therefore DSA still serves as a gold standard and provided a sound basis for intervention therapy

of various cerebral vascular disease. **Methods:** From April 2005 to April 2008, 350 DSA examinations were performed in our department, and a retrospective analysis of these patients are presented in the following. **Results:** Of the 350 patients, there were 208 males, and 142 females, ranged in age from 26 to 83 years with the average being 63.2 ± 7.1 years. The diagnosis was made in conformity to "Guidance to Chinese Cerebral vascular Disease Prevention and Treatment", 2005 edi, criteria for diagnosis and OCSF classification, and confirmed by cranial CT or MRI, including cerebral infarction 206 patients, (involving partial anterior circulation infarction (n=77), complete anterior circulation infarction (n=5) lacunar cerebral infarction (n=106), posterior circulation infarction (n=48). There were carotid artery TIA 32 patients, vertebralbasilar ischemia 45 patients, syncope 8 patients, headache 5 patients and others 24 patients. **Conclusion:** Adequate puncture site of the femoral artery if too high, may cause retroperitoneal large bleeding, if too low, likely to enter the branches of the femoral artery and was difficulty in hemostasis with compression and likely to form false aneurysm and arteriovenous fistula. Continuous normal saline heparin drip is helpful for the prevention of embolism and thrombosis.

Clinical Features and Topographic Characteristics of Internal Watershed Infarction in Occlusive Diseases of Carotid Artery System

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Background and Purpose: To describe the clinical features and topographic characteristics of internal watershed infarction (IWI) and to analyze the relationship between IWI and occlusive diseases of carotid artery system. **Methods:** We identified IWI patients with diffusion-weighted magnetic resonance imaging by commonly used templates within ten days after the onset of stroke. Patients with potential cardiac sources of embolism were excluded from the study by typical history and related examinations. Occlusive diseases of carotid artery system were assessed by MRA or DSA. Baseline characteristics, clinical course, neuroradiological features, related carotid diseases and prognosis were analyzed. **Results:** Twenty-seven IWI patients with potential cardiac sources of embolism were identified. Two patterns were identified: 14 patients had confluent IWI, all of which were unilateral and six of which was associated with ipsilateral cortical watershed infarction (CWI). 13 patients had partial IWI, 2 bilateral and 11 unilateral, two of which was associated with ipsilateral CWI. 81.5% of the IWI patients had severe stenosis ($>70\%$) or occlusion in either the internal carotid artery (ICA) or middle cerebral artery (MCA). Occlusive diseases of ICA ($p<0.05$) and nonlacunar syndrome ($p=0.057$) were found more frequently in confluent IWI, while occlusive diseases of MCA and lacunar syndrome were found more frequently in partial IWI ($p<0.05$). Clinical deterioration during the first 7 days after admission and poor outcome assessed by the Modified Rankin score 3 months after stroke was more prevalent in confluent IWI than in partial IWI ($p<0.05$). **Conclusions:** IWI has a relatively close relationship with occlusive diseases of carotid artery system. Both hypoperfusion and microembolism are possible

mechanisms. There may be some difference in the role of the two mechanisms in pathogenesis of confluent IWI and partial IWI. It is important to recognize IWI and distinguish IWI from lacunar and other subcortical infarctions in order to select optimal therapeutic strategies according to their pathophysiologies.

Fenestration and Duplicate Origin of the Vertebral Artery in Angiography and its Clinical Significance: Report of Three Cases

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Three cases of anomalous vertebral artery proven by angiography are shown: 2 cases of the extra-cranial vertebral artery fenestration associated with the aneurysm or aberrant origin of the left vertebral artery from the aortic arch and 1 case of duplicate origin with a clot formation in one branch. The embryologic pathogenesis and clinical significance of this kind of variation are also discussed.

Endovascular Embolization and Surgical Excision of Scalp Arteriovenous Fistula

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Objective: We discuss our experience with endovascular embolization and surgical excision of sAVF in six patients. **Methods:** Six patients, two cases treated once by surgical excision or endovascular embolization in other hospitals, included four males and two females with a mean age of 26 years. The diagnosis of sAVF was based on physical examination, image examination (CT or MRI) and confirmed by digital subtraction angiography (DSA) of internal and external carotid. In earlier period, two cases with sAVF combined preoperative endovascular embolization by PVA particle and fragmented gelatin sponge and surgical resection. One case with a small, low-flow sAVF was performed directly surgical excision. In later period, three cases underwent endovascular embolization by injection of Onyx. **Results:** Lesions on two patients in earlier period, whose blood-flow was significantly reduced after preoperative embolization, were subsequently removed without any significant blood loss. One case with total excision showed no recurrence of clinical symptoms and image examination (DSA) with follow-up 18 months, and another with subtotal excision didn't developed clinical symptoms with follow-up 12 months. One lesion was total removed successfully, no recurrence of clinical symptoms with follow-up 10 months. These three lesions were pathologically confirmed as vascular malformations. Three sAVFs, in later period, were completely occluded by Onyx, no recurrence of local signs for recanalization and image examination (DSA in two patients) during an average follow-up period of 8 months. None of all six patients showed any compli-

cations after treatment. **Conclusion:** Angiography is necessary for defining the angioarchitecture of sAVF. As for the treatment of sAVF, we conclude that endovascular embolization is the first choice unless a small, superficial, low-flow sAVF treated by direct surgical operation, and combination of embolization and surgical excision should be considered as an effective treatment for complicate sAVF.

The Primary Research of the Relation between High-Resolution Magnetic Resonance Imaging of Carotid Atherosclerosis Plaque and Acute Ischemic Stroke

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Background: High-resolution magnetic resonance has been gradually used to evaluate carotid atherosclerosis plaque with the merit of noninvasive, safe, good repeatable, good sensitivity and specificity. It can display the size and the internal component of carotid atherosclerosis plaque and reveal the relation between this character of plaque and acute ischemic stroke. **Objective:** To evaluate the size, the internal component and the type of carotid atherosclerosis plaque of the patients which had acute ischemic stroke or asymptomatic. To observe the relation between the character of plaque and the cerebral acute ischemic stroke. **Methods:** Nineteen patients (14 with acute ischemic stroke and 5 asymptomatic patients) from the department of Neurology Huashan Hospital were examined by HMRI to evaluate the size, the internal component and the type of carotid atherosclerosis plaque. And the relation between the character of plaque and the cerebral acute ischemic stroke was observed. **Results:** The cerebral ischemic stroke had a significant association with the type of the plaque ($P=0.012$), presence of a thin or ruptured fibrous cap ($P=0.007$), the ratio of lipid-rich/necrotic core ($P=0.05$), but no relation with plaque size ($P=0.23$), the ratio of plaque size ($P=0.44$), larger maximum wall thickness ($P=0.85$) and the size of lipid-rich/necrotic core ($P=0.15$). **Conclusion:** Carotid atherosclerosis plaque affected cerebral acute ischemic stroke but with its type and internal component but not with its size.

Dynamic Changes in Fibrinogen Levels of Patients with Acute Cerebral Infarction after Taking Defibrase

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Background: At present, as a therapeutic drug mainly for reducing fibrinogen (FIB) levels, the dynamic influence of defibrase on the FIB levels of patients with acute cerebral infarction

has not been clearly ascertained. **Methods:** Patients in the control group were given routine treatment with 30 mL fleabane and 0.75 g cytidine diphosphate added to 500 mL saline solution once a day for 14 consecutive days. Patients in the treatment group were given routine treatment and Haiwang defibrase injection (purchased from Changchu Guoao Bio-Pharmaceutical Co. Ltd., Approval document number H10983237) within 12 hours of infarction. Defibrase doses of 15, 12.5 and 10 U were given over 2 hours according to the patients' pre-treatment plasma FIB levels of ≥ 4.50 g/L, 3.50-4.49 g/L and 1.00-3.49 g/L, respectively. Plasma FIB levels in the treatment group were measured before, and once every six hours for 48 hours after administration of defibrase. **Results:** All 60 patients were included in the final analysis. The treatment group's FIB levels quickly decreased to 0.5-1.3 g/L within 12 h of taking the first dose of defibrase and reached a minimum in 24 h. Later, they began to rise slowly into the therapeutic range (0.5-1.3 g/L) in 48 h. The FIB levels of the treatment group increased slowly to over 1.3 g/L in 60 h after the first dose of defibrase and then quickly decreased to the therapeutic range after the second dose of 5 U defibrase with a minimum level higher than after the first dose, and higher again after the third dose. After treatment, patients' FIB levels could be kept in the therapeutic range for about one week. The FIB levels in patients in the treatment group were significantly lower after taking defibrase for one week in comparison with the levels before treatment ($P < 0.01$). There was no difference in the control group between the levels pre-treatment and one week after treatment ($P > 0.05$). **Conclusions:** FIB levels in patients with acute cerebral infarction quickly decrease after taking the first dose of defibrase and reach a minimum in 24 h. Later, they begin to rise slowly into the therapeutic range (0.5-1.3 g/L) in 48 h. The FIB levels increase slowly to over 1.3 g/L in 60 h. The effect of defibrase is weaker when the same dose of defibrase is used in patients repeatedly.

The Application of CT Angiography in CT-Guided Mini-Traumatic Treatment of Early-Stage Intracerebral Hemorrhage

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Objective: To investigate the value of CTA in CT-guided mini-traumatic treatment of ICH. **Methods:** After 89 patients with ICH were examined by CTA, under the CT guidance direct location in order to avoid the bigger blood vessel, latter good skull drill hole drainage technique and regularly carried on CT to make a follow-up visit the observation. Thirteen cases because discovered seriously moves the vine to be abnormalor the aneurism hemorrhage gived up mini-traumatic treatment, the line hold the skull surgery or the conservative treatment. **Results:** Eight-nine cases (100%) skulls drill hole localization is accurate. Directs the current capacity is 20-90ml, accounts for hemorrhage the quantity 40-70%. Five cases because the drill hole drainage technique hemorrhage expanded but the line hold the skull surgery. After 5 cases is hospitalized the period death; 81 cases latter 3 months the CT reexamination make a follow-up visit, hematoma vanish or majority of vanish, finally leaves behind encephacomalacia. The 6 months follow-up demonstrated an clinical

improvement 71 cases (88.8%). **Conclusion:** CTA is helpful in the choice of mini-traumatic treatment of intracerebral hematoma and the location, it is safe and pragmatic value treatment mean.

Clinical Observation of Xingnaojing Injection on Treating Acute Cerebral Infarction

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Objective: To observe the clinical efficiency and safety of Xingnaojing injection on treating acute cerebral infarction. Additionally to explore the relationship between the clinical efficiency and syndrome type in TCM. **Methods:** 80 cases of acute cerebral infarction patients were randomly divided into two groups including forty patients in treatment group and the other forty patients in control group. Patients in treatment group were treated with Xingnaojing injection and patients in control group were treated with salvia multi-orrhiza injection. Course of treatment in both groups were 20 days. It was designed to observe the changes of stroke scores, clinical symptoms, hemorheology targets, brain CT. Adverse reaction was also observed. **Results:** The total effective rates of treatment group and control group were 90.00% and 82.50% respectively. There was no statistical difference between the two groups ($P>0.05$). However, the significantly effective rates of two groups were 72.50% and 42.50% respectively. There was very significant difference between two groups ($P<0.01$). The significantly effective rate of treatment group surpassed that of control group. The improvement of stroke scores in treatment group, especially of consciousness, language, and comprehensive function, was better than that in control group. The difference between two groups was statistical significance ($P<0.05$ or $P<0.01$). **Conclusion:** Xingnaojing injection can obviously improve blood microcirculation and clinical efficiency in acute cerebral infarction patients.

Clinical Features and Topographic Characteristics of Internal Watershed Infarction in Occlusive Diseases of Carotid Artery System

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Background and Purpose: To describe the clinical features and topographic characteristics of internal watershed infarction (IWI) and to analyze the relationship between IWI and occlusive diseases of carotid artery system. **Methods:** We identified IWI patients with diffusion-weighted magnetic resonance imaging by commonly used templates within ten days after the onset of stroke. Patients with potential cardiac sources of embolism were excluded from the study by typical history and related examinations. Occlusive diseases of carotid artery system were assessed by MRA or DSA. Baseline characteristics, clinical course, neuroradiological features, related carotid diseases and prognosis were analyzed. **Results:** Twenty-seven IWI patients with potential cardiac sources of embolism were identified. Two patterns were identified: 14 patients had confluent IWI, all of which were unilateral and six of which was associated with ipsilateral cortical watershed infarction (CWI). 13 patients had partial IWI, 2 bilateral and 11 unilateral, two of which was associated with ipsilateral CWI. 81.5% of the IWI patients had severe stenosis ($>70\%$) or occlusion in either the internal carotid artery (ICA) or middle cerebral artery (MCA). Occlusive diseases of ICA ($p<0.05$) and nonlacunar syndrome ($p=0.057$) were found more frequently in confluent IWI, while occlusive diseases of MCA and lacunar syndrome were found more frequently in partial IWI ($p<0.05$). Clinical deterioration during the first 7 days after admission and poor outcome assessed by the Modified Rankin score 3 months after stroke was more prevalent in confluent IWI than in partial IWI ($p<0.05$). **Conclusions:** IWI has a relatively close relationship with occlusive diseases of carotid artery system. Both hypoperfusion and microembolism are possible mechanisms. There may be some difference in the role of the two mechanisms in pathogenesis of confluent IWI and partial IWI. It is important to recognize IWI and distinguish IWI from lacunar and other subcortical infarctions in order to select optimal therapeutic strategies according to their pathophysiologies.