Cerebrovascular diseases 1

**EP1114**

**Association of asymptomatic peripheral arterial disease and ischemic stroke in Nigerians**

S.A. Alimi¹, N.H. Alkali², Y.A. Zubair³, S. Oyakhire³, T. Uwaezuoke³, S.A. Bwala³

¹Medicine (Neurology), National Hospital Abuja, Abuja, ²Medicine, ATBU, Bauchi, ³National Hospital Abuja, Abuja, Nigeria

**Introduction:** The burden of stroke is likely to increase substantially over the next few decades in developing countries. The identification of asymptomatic PAD, a condition associated with increased vascular events and mortality in ischemic stroke, will help to reduce the economic and social burden associated with stroke. The primary aim of this study was to determine the association between asymptomatic PAD and ischemic stroke in Nigerians.

**Methods:** An analytical study carried out in the National Hospital, Abuja. One hundred patients (all confirmed by neuroimaging) and 100 controls were consecutively recruited and studied. Ankle-brachial index (ABI) was obtained in all participants using a hand-held 8-MHz continuous-wave Doppler (Huntleigh 500 D) and a mercury sphygmomanometer (Accosson).

**Results:** The mean age of patients was 58.17±12.29 years; while control group was 58.68±10.8 years (p=0.756). Among cases, male to female ratio was 2.2:1. The mean ABI was lower among cases (1.03±0.14 vs. 1.07±0.14, P value =0.043). The frequency of PAD in ischemic stroke patients was 18%. PAD was associated with over 2-fold increased risk of ischemic stroke on univariate analysis, (odds ratio (OR) 2.52, 95% CI 1.042-6.113; p=0.036). Multivariate analysis was however not significant. PAD was associated with older age, diabetes mellitus, previous stroke, left ventricular hypertrophy and hyperlipidemia, after adjustment for potential confounders.

**Conclusions:** This study concludes that asymptomatic PAD increased the risk of ischemic stroke in Nigerians (univariate analysis). However, an independent association was not established. Further studies are needed to make firm conclusions.

**Disclosure:** Nothing to disclose

**EP1115**

**Magnetic resonance imaging patterns associated with cerebral venous thrombosis and cerebral arterial infarctions: a comparison using voxel-based lesion-symptom mapping**

A. Arnoux¹, O. Martinaud², E. Guegan-Massardier², C. Leclercq¹, D. Wallon², D. Andriuta¹, A. Triquenot-Bagan², D. Hannequin², O. Godefroy¹, J.-M. Bugnicourt¹

¹Department of Neurology, Amiens University Hospital, Amiens, ²Department of Neurology, Rouen University Hospital, Rouen, France

**Introduction:** Information available about MRI parenchyma pattern of cerebral venous thrombosis (CVT) is scarce. The study’s primary objective was to establish whether the brain parenchyma lesions observed in CVT and cerebral artery infarction (CAI) can be distinguished by analysis of the corresponding MRI patterns.

**Methods:** We performed an observational, two-centre study of consecutive patients hospitalized for CVT and CAIs. We included 91 patients (CVT with parenchymal lesions: n=44; CAI: n=47, 80% with an anterior cerebral artery infarct) admitted to either of two university hospital stroke units between January 2000 and December 2011. Clinical data were collected prospectively. Brain lesions were imaged using a fast fluid-attenuated inversion recovery imaging sequence. The MRI patterns for CVT and CAIs were then analyzed using two validated methods: region-of-interest analysis and voxel-based lesion symptom mapping (VLSM).

**Results:** The mean ± SD age of the study population was 50.5±17 years. Patients with CAI were less likely than patients with CVT to have lesions located in the posterior cortex (34% vs. 70%; p=0.001) but were more likely to have lesions in deep structures (47% vs. 5%; p<0.001). In a VLSM analysis, the presence of a CAI (relative to CVT) was primarily associated with lesions in two small regions: the putamen (X, Y, Z coordinates: 31, -7, 13; T-score = 2.89) and the centrum ovale (X, Y, Z coordinates: 25, -14, 23; T-score = 2.89).

**Conclusion:** There are substantial differences between CVT and CAI in terms of the location of brain infarcts seen on MRI.

**Disclosure:** Nothing to disclose
EP1116

Migraineurs are more susceptible to infarct growth in acute stroke

E.M. Arsava1,2, J. Mawet1, K. Eikermann-Haerter3, K.Y. Park1, J. Helenius1, L. Pearlman1, A. Ross1, A. Negro1, A. Daneshmand3, H. Ay1,4, C. Ayata3,4
1Radiology, A.A. Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Boston, MA, United States, 2Neurology, Hacettepe University, Faculty of Medicine, Ankara, Turkey, 3Radiology, Neurovascular Research Laboratory, Massachusetts General Hospital, 4Neurology, Stroke Service, Massachusetts General Hospital, Boston, MA, United States

Introduction: Epidemiological data indicate that migraine is an independent stroke risk factor. Recent data suggest that migraine mutations increase brain vulnerability to ischemia via excitatory mechanisms. Migraine mutant mice develop higher number of ischemic depolarizations with accelerated infarct growth during hyperacute stroke leading to worse tissue and neurological outcomes. In this study, we assessed whether a similar untoward effect of migraine was evident on stroke evolution in humans.

Methods: We retrospectively determined lesion volumes on diffusion-weighted imaging (DWI), and mean transit time (MTT) maps on perfusion-weighted imaging (PWI) in consecutive patients with a reliably documented migraine history. DWI-PWI mismatch was calculated on spatially co-registered DWI and MTT maps, as a marker for viable tissue at risk for infarction.

Results: Stroke patients with a history of any migraine or migraine with aura were younger and more often female, compared to patients without migraine. Migraineurs less frequently had coronary artery disease or diabetes. The frequency of posterior circulation lesions was significantly higher in migraineurs. In migraineurs with aura, a larger proportion of the perfusion defect had restricted diffusion, resulting in smaller DWI/PWI mismatches. A significantly larger proportion of migraineurs with aura showed no mismatch (i.e., DWI/PWI>0.9), indicating that the entire perfusion defect was already infarcted.

Conclusions: Our data show that a history of migraine, particularly with aura, is associated with accelerated acute infarct growth, consistent with data obtained in migraine mutant mice.

Disclosure: The study was funded by NIH grants R01NS061505 and R01NS059710.

EP1117

Glyceryl trinitrate for acute stroke: main results from the efficacy of nitric oxide in stroke (ENOS) trial

P.M.W. Bath, L. Woodhouse, S. Utton, N. Sprigg
Stroke Trials Unit, Division of Clinical Neuroscience, University of Nottingham, Nottingham, United Kingdom

Background: High blood pressure (BP) is common during the acute phase of stroke and is associated with a poor outcome. Although small and medium-sized trials have assessed the effect of altering BP on outcome, the management of high BP remains unclear. We tested whether transdermal glyceryl trinitrate (GTN), a nitric oxide that lowers BP, is safe and effective in improving outcome after acute stroke.

Methods: ENOS is an international multicentre prospective randomised single-blind blinded-endpoint trial. Patients with acute ischaemic stroke (IS) or intracerebral haemorrhage (ICH) and systolic BP 140-220 mmHg were randomised to GTN or no GTN (and, where relevant, to continue or stop pre-stroke antihypertensive therapy - results reported separately). The primary outcome is shift in modified Rankin Scale at 3 months. Patients or relatives gave written informed (proxy) consent and all sites had research ethics approval. Analysis is by intention-to-treat.

Results: 4,011 patients were enrolled from 173 sites in 23 countries across 5 continents between July 2001 and October 2013 (with 79% patients recruited from start of 2008).

At baseline: mean age 70 (SD 12); male 57%; recruitment from Asia 14%, Europe 16%, UK 64%; prior hypertension 65%; prior stroke 15%; diabetes 17%; atrial fibrillation 17%; mean BP 167 (19)/90 (13) mmHg; severity (Scandinavian Stroke Scale) 34 (13)/58; total anterior circulation syndrome 30%; IS 81%, ICH 16%; stroke-recruitment time <12 hours 18%.

Summary: The main results will be available for presentation in quarter 2 2014. ENOS is large enough to influence clinical practice.

Disclosure: Nothing to disclose
EP1118
The impact of neurosonology in the emergency department
1st Department of Neurology, Hospitais Universidade de Coimbra, Coimbra, Portugal
Introduction: The neurosonological study is a non-invasive technique, broadly used in assessing the stroke patient. It is useful in detecting cerebrovascular pathology of both extra and intracerebral arteries, as well as hemodynamic changes not detected by other ancillary tests. However, its usefulness in the emergency department (ED) when evaluating a patient with suspected stroke, is not yet documented. The purpose of this work is to determine whether the information provided by the neurosonological study in the ED changes the clinical conduct when facing a patient with suspected acute cerebrovascular disease.
Methods: We made a retrospective analysis of the neurosonological studies performed in the ED in the period between January 2011 and August 2013. The neurosonological study was considered positive if at least one of the following was present: symptomatic extracranial stenosis \( \geq 50\% \); any intracranial stenosis; arterial dissection; cardiac shunt; temporal arteritis. We performed a univariate analysis with Chi-square test, and multivariate analysis with logistic regression. Statistical significance was defined when \( p<0.05 \).
Results: We included 319 patients, 198 males (62\%), aged between 19 and 92 years old (mean 55.5). In 64 patients (20\%) the study was considered positive. We hospitalized 48 patients (75\%) with a positive study, and 83 (32.5\%) without neurosonological changes. With multivariate analysis adjusted to vascular risk factors, the statistically significant association was maintained.
Conclusions: The presence of changes in the neurosonological study led more frequently to hospitalization. These results suggest that neurosonology performed in the ED has impact on decision-making in the stroke patient.
Disclosure: Nothing to disclose

EP1119
Platelet activation and nitric oxide synthesis in patients with leukoaraiosis
C.A.I. Bulboaca¹, A.E.I. Bulboaca¹, I. Opincariu²
¹Neurology, ²Radiology, University of Medicine and Pharmacy ‘Iuliu Hatieganu’, Cluj-Napoca, Romania
Introduction: The importance of endothelial dysfunction in cerebrovascular disease has been established. The endothelial dysfunction is associated high frequency of white matter lesion (hyperintensity lesions in MRI which is the hallmark of leukoaraiosis). The endothelial dysfunction may enhance the platelet activity. While these phenomenons of endothelial dysfunction and platelet activity were studied in stroke patients, there are limited data regarding these pathophysiological mechanisms in leukoaraiosis patients. The objective of this study is to investigate the endothelial dysfunction and platelet activity in patients with leukoaraiosis.
Methods: We compared 50 healthy volunteers with 105 patients with leukoaraiosis. Cerebral infarction was excluded by MRI examination. Staging of leukoaraiosis was made in 4 grades according to lesions severity and their advancement. Haemodynamic assessment was made by carotid Doppler ultrasonography. Endothelial dysfunction was evaluated by plasma determination of NO metabolites (NOx) and platelet activity by platelet aggregation test.
Results: NOx plasma concentration was reduced comparative with healthy subjects. Platelet aggregation was greater in leukoaraiosis patients comparative with healthy subjects. These results were correlated with leukoaraiosis grade.
Conclusions: These results may provide details of leukoaraiosis pathogenesis revealing that the endothelial dysfunction and prothrombotic changes may play an important role. Because leukoaraiosis is an important risk factor for cerebral infarction therapies which may stabilize the endothelial function and antiplatelet therapy may considerable help the prevention of cerebral infarction.
Disclosure: Nothing to disclose
**EP1120**

**Inhibition but not activation of neuronal P2X7 receptors plays roles in brain injury after optic nerve transaction and focal cerebral ischemia**

A.B. Çağlayan¹, M.C. Beker¹, U. Kilic², T. Kelestemur¹, B. Caglayan¹, E. Kilic¹

¹Physiology, Istanbul Medipol University, ²Medical Biology, Bezmi Alem Foundation University, Istanbul, Turkey

**Introduction:** P2X7 receptors (P2X7R) are members of the family of cationic-selective ion channels gated by extracellular ATP. They are involved in the regulation of receptor trafficking, inflammation and ATP-mediated cell death.

**Methods:** Here, we have analyzed cellular expression patterns of P2X7 on neuron, glia and retinal ganglion cells (RGCs) and evaluated roles of P2X7 receptor modulation and activation in the cell survival after optic nerve (ON) transection and focal cerebral ischemia in mice.

**Results:** We observed neuronal but not glial expression of P2X7 receptors in brain and retina. Activation of P2X7 receptor with different concentration of BzATP has no effect on neuronal. However, modulation of P2X7 receptors by Brilliant Blue G (BBG) improved neuronal and RGC survival injury after ON transection and cerebral ischemia. The number of Fluoro-Gold positive RGCs were significantly higher in BBG treated animals. Furthermore, inhibition of P2X7 receptors decreased infarct volume, brain swelling and neurological scores 90 min after cerebral ischemia and 24 hours reperfusion. In addition, inhibition of P2X7 receptors decreased DNA fragmentation and increased neuronal survival after 30 min of cerebral ischemia which was associated with increased phosphorylation of survival kinases AKT and ERK-1/2.

**Conclusions:** Here, we provide evidence that the cellular expression of P2X7 receptors is mainly observed on the neuronal cell and the significance of P2X7 receptor modulation on neuronal cell death. We predict that the clinical implementation of P2X7 receptor antagonists can be beneficial not only in patients with acute ischemic stroke, but also with more delayed degenerative neurological diseases.

**Disclosure:** Nothing to disclose

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**EP1121**

**A prospective study of diagnostic accuracy and outcomes in cerebellar infarction**

Z. Calic, C. Cappelen-Smith, V. Patel, D. Cordato

Department of Neurology and Neurophysiology, Liverpool Hospital, Liverpool, NSW, Australia

**Introduction:** Early and accurate diagnosis of cerebellar infarction (CI) is challenging because of non-specific symptoms and absence of localizing signs. Delayed or misdiagnosis may result in increased morbidity and mortality.

**Methods:** 56 consecutive patients admitted to Liverpool Hospital with CI were prospectively analysed over two years (2012-13) to determine factors associated with delayed diagnosis.

**Results:** Mean age was 61 years, M:F=39:17. Ten patients had prior general practitioner presentations while five had prior Emergency Department (ED) presentations. Twenty-eight (50%) presented within 4.5-hrs, 9 between 4.5-24hrs and 19 (34%) >24hrs after symptom onset. TIA/stroke was not the principal ED diagnosis in 20 (36%). The most common presenting symptoms in patients presenting <4.5hrs were dizziness, gait ataxia and nausea/vomiting compared to dizziness, gait ataxia, and headache in those presenting >24hrs. The most common signs were limb ataxia and nystagmus. ED detection of clinical signs was significantly less than that found by the neurology team. Isolated CI was present in 32 patients (57%), the most frequent site being posterior inferior cerebellar artery (72%). 24 patients had additional territory involvement (posterior circulation 62%; anterior 17%). Complications included brain oedema and recurrent stroke in 11 patients, of whom 8 had multiple territory strokes. Eleven (20%) died within 3-months. Patients with isolated CI had less complications and were more likely to be discharged home (p<0.05).

**Conclusions:** Late presentation in CI and infarction in other vascular territories were common. Although involvement of additional arterial territories did not predict earlier presentation, these patients experienced more complications.

**Disclosure:** Nothing to disclose
**EP1122**

**Clinical results of carotid artery stenting versus carotid endarterectomy; a single center experience**

T. Akıncı¹, E. Derle¹, S. Kibaroglu¹, R. Ocal¹, A. Harman², F. Kural², M. Kılıç³, H.T. Akay³, U. Can¹, U.S. Benli¹

¹Neurology Department, ²Radiology Department, ³Cardiovascular Surgery Department, Baskent University Faculty of Medicine, Teaching and Medical Research Center, Ankara, Turkey

**Introduction:** We aim to review our results of carotid artery stenting (CAS) and carotid endarterectomy (CEA).

**Methods and results:** The records of all our patients who underwent carotid artery revascularization between 2001 and 2013 were evaluated. CAS or CEA procedures were performed in patients with asymptomatic carotid stenosis >70% or symptomatic stenosis >50%. Demographic data, procedural details, and clinical outcomes were also recorded. 194 CEA and 115 CAS procedures were performed for symptomatic and/or asymptomatic carotid artery stenosis. Primary outcome measures were in-30 day stroke/transient ischemic attacks (TIA)/amaurosis fugax or death. Secondary outcome measures were bleeding complications, length of stay in hospital and ICA patency as well as stroke or all-cause death during long-term follow-up. No significant differences were found with respect to 30-day mortality and neurologic morbidity between CAS and CEA procedures (13% and 7.7% respectively). Length of stay in hospital (CAS 4.5±4.4 and CEA 5.9±5.8; p<0.001) were significantly longer in CEA group. In the post-procedural follow-up, only in symptomatic patients, restenosis rate was significantly higher in the CEA group (CEA 16.4% vs CAS 4.4%; p=0.045); the other endpoints did not differ significantly.

**Conclusions:** Endovascular stent treatment of carotid artery atherosclerotic disease is an alternative for vascular surgery, especially for patients that are high risk for standard CEA. The increasing experience, development of cerebral protection systems and new treatment protocols increases CAS feasibility.

**Disclosure:** Nothing to disclose

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**EP1123**

**Antithrombotic treatment and initial stroke severity in patients with acute ischemic stroke and atrial fibrillation: ten years observation of a single academic hospital in Korea**

D.-I. Chang, J.-S. Lee, S.-H. Heo

Neurology, Kyunghee University Korean Medical Center, Seoul, Korea, Republic of

**Introduction:** Clinical practice guideline recommended appropriate use of oral anticoagulants for the patients with AF. However, warfarin has not been widely used in Korea. Here, we elucidated the relationship between international normalized ratio (INR) values on admission and clinical outcomes in patients with acute ischemic stroke and atrial fibrillation.

**Methods:** We identified 5,407 consecutive patients who visited our hospital within 7 days after onset. We adopted INR values extracted in emergency room, and the initial stroke severity and functional outcome were assessed by baseline NIHSS and 3 month mRS.

**Results:** A total of 640 patients had persistent or paroxysmal AF. 277 patients (43%) were aware of their AF before admission. The awareness was not increased over the ten years. Among them, 334 (52.2%) were not on antithrombotic treatment, 208 (32.5%) were receiving antiplatelet treatment, 98 (15.3%) were receiving warfarin. In addition, the patients who were taking warfarin with a therapeutic INR (≥2.0) were only 21 (3.3%). Admission NIHSS score was significantly lower in the group of patients taking warfarin (median 5, interquartile range [3,12]) compared with the groups of no antithrombotic treatment (208 [32.5%] were receiving antiplatelet treatment, 98 [15.3%] were receiving warfarin. In addition, the patients who were taking warfarin with a therapeutic INR (2.0) were only 21 (3.3%). Admission NIHSS score was significantly lower in the group of patients taking warfarin (median 5, interquartile range [3,12]) compared with the groups of no antithrombotic treatment (8[4,16]) and antiplatelet treatment (8[3,15]). Admission NIHSS score had negative linear trend relationship in the patients with higher admission INR. (INR 2.0, 3[1,8], INR=1.5-2.0, 4[2,12], and INR<1.5, 8[3,15], p=0.017)

**Conclusions:** Awareness of AF has been poor in Korean ischemic stroke patients with AF. In addition, underuse and inappropriate use of warfarin was widespread. Therefore, the education about appropriate anticoagulation is needed to general public and health professionals.

**Disclosure:** Nothing to disclose
EP1124
Posterior reversible encephalopathy syndrome (PRES): a series of 22 patients
S. Ciftci¹, A. Guler¹, C. Eraslan², H. Sirin¹, N. Çelebisoy¹, C. Callı²
¹Neurology Department, ²Radiology Department, Ege University Medical School, Izmir, Turkey

Introduction: Posterior reversible encephalopathy syndrome, is a syndrome characterized by headache, lethargy, visual complaints or seizures. On imaging, PRES presents with abnormalities of the white matter and the grey matter, predominantly affecting the posterior regions. The diagnosis currently relies on clinical manifestations and typical neuroimaging findings. In this study, we aimed to discuss causes, clinical aspects, imaging findings and prognosis of PRES.

Methods: The patients who met the diagnosis of PRES were involved in our study. Data of the patients (demographics, presenting symptoms, medical history, risk factors, cranial imaging findings, biochemical markers, treatment, neurologic status after treatment) were collected retrospectively from hospital records.

Results: Total number of patients were 22 (18 female/4 male). The mean age of the patients was 40 (min 19, max 64). Main clinical symptoms were encephalopathy, seizure and visual loss. In our group, hypertension and eclampsia were the major etiologic factors. Relation between etiologic factors, cranial magnetic resonance imaging findings, biochemical markers (serum urea, creatin, LDH levels) and neurologic sequel was evaluated.

Conclusions: PRES is a clinicoradiological entity. Early recognition and resolution of the underlying cause is the keystone of management. So, its different kind of etiologic factors, clinical presentation and radiologic findings should be known.

Disclosure: Nothing to disclose

EP1125
Prospective comparison of continuous cardiac monitoring and Holter on a stroke unit
L. Dobbels, V. Thijs
Neurology, UZ Leuven, Leuven, Belgium

Introduction: Continuous cardiac monitoring (CCM) is commonly used in the stroke unit to detect arrhythmias in stroke patients. Before marketing, cardiac monitoring algorithms are typically validated by comparison with a historic data set, however prospective validation against the gold standard Holter in a real-life setting is not typically performed. The goal was to determine the diagnostic accuracy of continuous cardiac monitoring with an atrial fibrillation (AF) detection algorithm with Holter in a stroke unit.

Methods: We prospectively included patients with a TIA or acute ischemic stroke. During Holter monitoring (HM) (ELA Spiderview, ELA Medical SYNESCOPE MultiChannel-MultiDay Version3.10 SN software), CCM (Philips Intellivue 2 MP30, ST/AR Arrhythmia Algorithm software) was obtained. We included patients with duration of HM >17.5 hours and less than 4 hours absence of overlap of recording times. The rate of bradycardia, tachyarrhythmias (rate >120/min) and AF were compared between CCM and Holter. The Holter events were classified by a cardiologist, the monitor events primarily by a neurologist (seconded by a blinded cardiologist).

Results: We included 95 patients (49% females) with a mean age of 71 years. During the CCM, we detected AF in 4 patients, with 2 additional patients on Holter (sensitivity 67%). On CCM tachy- and bradyarrhythmias were respectively seen in 14 versus 24 patients (sensitivity 58%) and 22 versus 29 (sensitivity 76%) patients on Holter. Specificity of CCM was more than 90% for all arrhythmias.

Conclusions: CCM had lower sensitivities than HM for detection of bradycardia, tachyarrhythmia and AF. Arrhythmia detection algorithms should be validated in real-life circumstances.

Disclosure: Nothing to disclose
EP1126

Treating experimental stroke with adult neural progenitor cells – an analysis of optimal intravenous cell delivery time points and their underlying mechanisms

T.R. Doeppner¹, B. Kaltwasser¹, M.K. Teli², D.M. Hermann¹
¹Neurology, University of Duisburg-Essen, Essen, Germany, ²National Institute of Calicut, Calicut University, Calicut, India

Introduction: Neural progenitor cells (NPCs) induce histological/functional recovery after stroke, albeit grafted cells are not integrated into the residing neural network. Although the most ideal NPC delivery route remains elusive, intravenous cell delivery is not inferior to intracerebral cell transplantation. However, systematic analyses of optimal time points for intravenous NPC delivery and their long-term consequences do not exist.

Methods: Male C57BL6 mice were exposed to cerebral ischemia for 30 min and NPCs were grafted via cannulation of the femoral vein during reperfusion, on day 1 or on day 28 post-stroke. Animals were allowed to survive for up 84 days post-stroke, followed by behavioral tests and immunohistochemical analyses.

Results: Numbers of grafted NPCs within the ischemic hemisphere were increased on days 56 and 84 after transplantation on day 28 post-stroke. Likewise, transplantation on day 28 yielded enhanced neuronal differentiation rates of grafted cells. However, reduced post-ischemic brain injury was only found after acute NPC delivery for as long as 56 days post-stroke. On the contrary, late NPC transplantation on day 28 resulted in reduced functional deficits on day 84, albeit tissue injury was not affected. Reduced brain injury after acute NPC transplantation was associated with enhanced blood-brain-barrier (BBB) stabilization and reduced microglial activation. On the other hand, late NPC transplantation stimulates neural regeneration via enhanced angioneurogenesis within the lesion site.

Conclusions: Acute NPC delivery yields long-term but not stable reduction of brain injury via stabilization of the BBB, whereas late NPC delivery enhances post-ischemic neuroregeneration via mechanisms involving increased angioneurogenesis.

Disclosure: Nothing to disclose

EP1127

Neuroprotective role of statins in the acute phase of ischemic stroke

L. Zhang¹, W. Fan², H. Bao², Q. Lv¹
¹Pharmacy, ²Neurology, Zhongshan Hospital Fudan University, Shanghai, China

Introduction: The pleiotropic effects of statins are receiving increasing attention in stroke patients. We performed a prospective, open-label, observational study to investigate the pleiotropic effects of early statin treatment on stroke-induced changes in the levels of circulating endothelial progenitor cells (EPCs), vascular endothelial growth factor (VEGF) and matrix metalloproteinase (MMP)-9.

Methods: 44 Patients admitted within 48 hours after ischemic stroke onset were enrolled. 22 patients were assigned to receive 20mg atorvastatin and the other were not. Circulating EPCs, VEGF and MMP-9 were determined at 1st day and 7th day for each individual. Stroke severity was assessed by a certified neurologist using National Institute of Health Stroke Scale (NIHSS) at admission and functional outcome was evaluated at the 30th day using modified Rankin Scale at 30th day.

Results: MMP-9 remained in an elevated level within the first 48h after onset, and then distinctly decreased in the acute phase. Moreover, patients received statin-treatment show a significantly larger MMP-9 decrement than those not. On the other hand, statin therapy is associated with an increase in the number of circulating EPCs in patients with ischemic stroke. However, no significant influence of statins use on VEGF was observed.

Conclusions: In summary, treatment with statins initiated in the acute phase of ischemic stroke enhance the post-ischemic vascular repair consequent on augmentation of circulating EPCs as well as attenuate the inflammatory injury on account of decrement of MMP-9 expression.

Disclosure: Nothing to disclose
EP1128

Genetic aspects of inflammatory response mediated by IL-6 following spontaneous intracerebral hemorrhage (SICH): a case control study

M. Florczak-Rzepka¹, C. Grond-Ginsbach², J. Montaner³, A. Rocco⁴, A. Kaminska¹, T. Steiner⁵
¹Department of Neurology, Medical University of Warsaw, Warsaw, Poland, ²Department of Neurology, University of Heidelberg, Heidelberg, Germany, ³Neurovascular Research Laboratory, Institut de Recerca Universitat Autonoma de Barcelona, Barcelona, Spain, ⁴Department of Neurology, Charité Universitätsmedizin Berlin, Berlin, ⁵Departement of Neurology, Klinikum Frankfurt Höchst, Frankfurt am Main, Germany

Introduction: The activity of IL-6, a well-recognized mediator of immunological post-stroke response, is regulated on multiple levels of which IL-6 genetic polymorphism is crucial. The objective of this prospective, clinical, controlled study was to assess the relations between IL-6 genetic variations, extent of inflammatory response and outcome in SICH patients.

Methods: 44 consecutive SICH patients and 36 age and sex matched healthy controls were enrolled. DNA was isolated and a 500bp upstream DNA sequence of the IL-6 gene was sequenced in order to identify 5 common promoter haplotypes (B,C,D,E and F). Serum concentration of IL-1, IL-6, CRP and leukocytes count were analyzed once in the controls and four times (days1,2,3,7) in the SICH patients. Clinical outcome was assessed in SICH patients by means of NIHSS (National Institute Stroke Scale) on admission and mRS (modified Rankin Score) at day 30 and 90 after stroke onset.

Results: IL-6 promoter haplotype F, equally frequent in both cases and controls, was associated with:
1) lower IL-6 levels in patients reaching twofold means difference on day2 (p=0.038, CI:-1,1,51 to -47.38),
2) ten times lower IL-1 concentration on day 7 (p=0.006, CI:-1.53 to-0.29),
3) non-significantly lower leukocytes count and CRP level in patients,
4) no differences were found in the control group.
IL-6 serum level correlated positively with the CRP level and leukocytes count in all measurement time points. Patients with lower IL-6 level had lower NIHSS and mRS on days 1 to7 (p<0.05).

Conclusion: IL-6 promoter haplotype F seems to be associated with lower inflammatory response after SICH, which, in turn, determines better short and long term clinical outcome in SICH patients.

Disclosure: Nothing to disclose